Solicitation 1701-139

Renovations to 355 Texas Avenue Facility in Round Rock, TX

Bid Designation: Public

Williamson County, Texas

Bid 1701-139
Renovations to 355 Texas Avenue Facility in Round Rock, TX

Bid Number	1701-139
Bid Title	Renovations to 355 Texas Avenue Facility in Round Rock, TX
Bid Start Date	In Held
Bid End Date	Mar 29, 2017 10:00:00 AM CDT
Question & Answer End Date	Mar 27, 2017 2:00:00 PM CDT
Bid Contact	Teri Jeffries Senior Purchasing Specialist 512-**943**-1553 Teri.jeffries@wilco.org
Contract Duration	**1 year**
Contract Renewal	Not Applicable
Prices Good for	**180 days**
Pre-Bid Conference	**Mar 16, 2017 11:00:00 AM CDT** **Attendance is mandatory** **Location: The meeting will be held 335 Texas Avenue, Round Rock, Texas.** **This is a MANDATORY meeting. Failure to attend will prohibit your firm from submitting a qualifying proposal. Additionally, it is suggested that due to the electrical concerns and specifications, the Contractor also bring the electrician that will be indicated in its proposal to the meeting.**
Bid Comments	**Williamson County is seeking proposals from qualified contractors to complete the renovations to 355 Texas Avenue, Round Rock, Texas, (sometimes referred to as the Williamson County and Cities Health District). The remodel is to be completed per the specifications provided by Haddon & Cowan Architects, provided with this RFP1701-139, along with directions from the County Project Manager.** **A summary of the scope of work to be completed is as follows, however, this is only a cursory description. Work performance shall be as defined in the specifications and as required by the County personnel.** **SUMMARY OF WORK:** ***Exterior Scope of Work*** **Resurfacing and re-striping of existing asphalt parking lot** **Construction of (2) accessible ramps to the back entrances** **Replacement of existing metal roof fasteners and various flashing connections** **HVAC replacement** **Various exterior finish repairs** **Installation of a back-up generator to serve specific areas of the building** ***Interior Scope of Work*** **Demolition of all floor finishes, ceilings, lighting, HVAC, and select wall, door, electrical, IT/AV and millwork demolition** **Installation of new floor finishes, ceilings, lights, HVAC, new paint and various other new finishes** **Various renovations to existing wall configurations to accommodate new layouts** **Installation of new plumbing lines to accommodate new exam rooms, new toilet room and lab areas** **Modifications to various existing doors, frames and hardware to meet Williamson County standards** **Installation of foam insulation system to the underside of the existing metal roof** **New electrical wiring throughout the building, new receptacles and power in various areas**

MANDATORY Pre-Proposal Meeting : The meeting will be held at 335 Texas Avenue, Round Rock, Texas. Failure to attend will prohibit your firm from submitting a qualifying proposal. Additionally, it is suggested that due to the electrical concerns and specifications, the Contractor also bring the electrician that will be indicated in its proposal to the meeting.

Additional Stipulations:

Please fully review the attached ensuing agreement for all insurance requirements. Insurance certifications will be required within 30 days of the award of the contract. If you can provide those with your proposal that would appreciated, but not necessary.

Please fully review the evaluation criteria, to ensure full compliance. Please fully read the attached ensuing construction contract and required terms and conditions, to ensure you can fully comply with all insurance requirements.

Item Response Form

Item	**1701-139--01-01 -** Add all required documents and proposal to this line item.
Quantity	**1 each**
Unit Price	
Delivery Location	**Williamson County, Texas** Purchasing Department 901 S. Austin Avenue Georgetown TX 78626 **Qty** 1

Description

Please add all documents and proposal to this line item.

PUBLIC ANNOUNCEMENT AND GENERAL INFORMATION

WILLIAMSON COUNTY PURCHASING DEPARTMENT
SOLICIATION 1701-139
Renovations to 355 Texas Avenue Facility in Round Rock, TX

PROPOSALS MUST BE RECEIVED ON OR BEFORE:
Mar 29, 2017 10:00:00 AM CDT

PROPOSAL WILL BE PUBLICLY OPENED:
Mar 29, 2017 10:00:00 AM CDT

Notice is hereby given that sealed Proposals for the above-mentioned goods and/or services will be accepted by the Williamson County Purchasing Department. Williamson County uses BidSync to distribute and receive proposals. Specifications for this RFP may be obtained by registering at www.bidsync.com.

Williamson County prefers and requests electronic submittal of this Proposal.

All electronic proposal must be submitted via: www.bidsync.com

Electronic proposals are requested, however paper proposals will currently still be received, until further notice and may be mailed or delivered to the address listed below.

Respondents are strongly encouraged to carefully read this entire RFP.

All interested Respondents are invited to submit a Proposal in accordance with the Instructions and General Requirements, Proposal Format, Proposal Specifications, and Definitions, Terms and Conditions stated in this RFP.

Please note that a complete package must be submitted choosing one of the above two methods. Split packages submitted will be considered "unresponsive" and will not be accepted or evaluated.

Williamson County will not accept any Proposals received after the submittal deadline, and shall return such Proposals unopened to the Respondent.

General Information:

- If mailed or delivered in person, Proposal and Proposal addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the Public Announcement and General Information listed above for this RFP, to:

  Williamson County Purchasing Department
  Attn: **PROPOSAL NAME AND NUMBER**
  901 South Austin Avenue
  Georgetown, Texas 78626

  - Respondents should list the Proposal Number, Proposal Name, Name and Address of Respondent, and the Date of the Proposal opening on the outside of the box or envelope and note "Sealed Proposal Enclosed."
  - Respondent should submit one (1) original.
  - Williamson County will NOT be responsible for unmarked or improperly marked envelopes.
  - Williamson County will not accept any responsibility for Proposals being delivered by third party carriers.
  - Facsimile transmittals will NOT be accepted.

- Proposals will be opened publicly in a manner; however, to avoid public disclosure of contents, only the names of Respondents and pricing will be read aloud.

- All submitted questions with their answers will be posted and updated on www.bidsync.com.

- It is the Respondent's responsibility to review all documents in BidSync, including any Addenda that may have been added after the document packet was originally released and posted.

  - Any Addenda and/or other information relevant to the RFP will be posted on www.bidsync.com.

  - The Williamson County Purchasing Department takes no responsibility to ensure any interested Respondent has obtained any outstanding addenda or additional information.

Texas Avenue Facility Office Renovations

Located at 355 Texas Avenue, Round Rock, TX

RFP 1701-139

Summary Scope of Work

Below is a general overview/summary of the project. This is in no way intended to be diagnostic. Please ensure you fully read and respond based upon the attached specifications, conditions and requirements.

Exterior Scope of Work

- Resurfacing and re-striping of existing asphalt parking lot
- Construction of (2) accessible ramps to the back entrances
- Replacement of existing metal roof fasteners and various flashing connections
- HVAC replacement
- Various exterior finish repairs
- Installation of a back-up generator to serve specific areas of the building

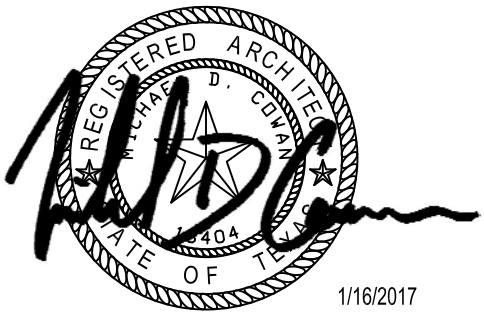
Interior Scope of Work

- Demolition of all floor finishes, ceilings, lighting, HVAC, and select wall, door, electrical, IT/AV and millwork demolition
- Installation of new floor finishes, ceilings, lights, HVAC, new paint and various other new finishes
- Various renovations to existing wall configurations to accommodate new layouts
- Installation of new plumbing lines to accommodate new exam rooms, new toilet room and lab areas
- Modifications to various existing doors, frames and hardware to meet Williamson County standards
- Installation of foam insulation system to the underside of the existing metal roof
- New electrical wiring throughout the building, new receptacles and power in various areas

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas 78664

Project Manual
Issued 1.16.17



1/16/2017

HADDON+COWAN ARCHITECTS
2301 E. Riverside Drive, Bldg A, Suite 80
Austin, TX 78741 | **haddoncowan.com**

DBR ENGINEERING CONSULTANTS
7800 Shoal Creek Blvd | Suite 131S
Austin, Texas 78757
512.637.4393 p 512.637.4396 f
TBPE Firm Registration No. 2234

Edwards + Mulhausen
INTERIOR DESIGN
2301 E. Riverside Drive, Building A, Suite 80
Austin, Texas 78741 Ph. 512.291.6657

SECTION 00 0102
PROJECT INFORMATION

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Project Name: WCCHD Office Renovations, located at 355 Texas Avenue, Round Rock, TX 78664.

B. The Owner, hereinafter referred to as Owner: Williamson County

C. Owner's Project Manager: Bob Lubecker.
   1. Department: Williamson County Facilities.
   2. Address: 3101 SE Inner Loop.
   3. City, State, Zip: Georgetown, TX 78626.
   4. Phone/Fax: 512-943-1625.

1.02 NOTICE TO PROSPECTIVE BIDDERS

A. These documents constitute an Invitation to Bid to General Contractors for the construction of the project described below.

1.03 PROJECT DESCRIPTION

A. Summary Project Description: Renovations to existing 2-story office building. Exterior renovations to include new secondary entry, ADA/TAS compliant ramps, replacement of existing roof attachments and sealing/striping existing parking lot. Interior work is to include new finishes, new hvac, lighting, flooring, data/AV and miscellaneous partition changes.

1.04 PROJECT CONSULTANTS

A. The Architect, hereinafter referred to as Architect: Haddon+Cowan Architects.
   1. Address: 2301 E. Riverside Drive, Bldg A, Suite 80.
   2. City, State, Zip: Austin, TX 78741.
   3. Phone/Fax: 512-374-9120.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 PROJECT

A. Project Name: WCCHD Renovations

B. Owner's Name: Williamson County.

C. Architect's Name: Haddon+Cowan Architects.

1.02 DESCRIPTION OF ALTERATIONS WORK

A. Scope of demolition and removal work is shown on drawings and specified in Section 02 4100.

B. Scope of alterations work is shown on drawings.

1.03 WORK BY OWNER

A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion.

1.04 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.05 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.

B. Provide access to and from site as required by law and by Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permit.

C. Utility Outages and Shutdown:
   1. Prevent accidental disruption of utility services to other facilities.

1.06 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

END OF SECTION

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

1.02 SCHEDULE OF VALUES

A. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.

B. Forms filled out by hand will not be accepted.

C. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

D. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization and bonds and insurance.

E. Revise schedule to list approved Change Orders, with each Application For Payment.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.

C. Forms filled out by hand will not be accepted.

D. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   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.

E. Execute certification by signature of authorized officer.

F. Submit three copies of each Application for Payment.

G. Include the following with the application:
   1. Partial release of liens from major Subcontractors and vendors.
   2. Affidavits attesting to off-site stored products.

H. When Architect requires substantiating information, submit data justifying dollar amounts in question.

1.04 MODIFICATION PROCEDURES

A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.

B. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 5 days.

C. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for

the change, and the effect on the Contract Sum and Contract Time with full documentation . Document any requested substitutions in accordance with Section 01 6000.

D. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.

E. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide the following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Dates and times work was performed, and by whom.
      b. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

H. Promptly enter changes in Project Record Documents.

1.05 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01 7000.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preconstruction meeting.
B. Progress meetings.
C. Construction progress schedule.
D. Coordination drawings.
E. Submittals for review, information, and project closeout.
F. Submittal procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Attendance Required:
   1. Owner.
   2. Architect.
   3. Contractor.
B. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties to Contract, _____ and Architect.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
   7. Scheduling.
C. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
C. Attendance Required:
   1. Contractor.
   2. Owner.
   3. Architect.
   4. Contractor's Superintendent.
   5. Major Subcontractors as required or requested by Architect/Owner.
D. Agenda:
   1. Review minutes of previous meetings.
   2. Review of Work progress.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede, or will impede, planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Maintenance of progress schedule.
   7. Corrective measures to regain projected schedules.

8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.03 CONSTRUCTION PROGRESS SCHEDULE

A. Within 10 days after date of the Agreement, submit preliminary schedule .

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

3.04 COORDINATION DRAWINGS

A. Review drawings prior to submission to Architect. Uncoordinated submittals will be rejected out of hand.

3.05 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below .

3.06 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
1. Design data.
2. Certificates.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout:
1. Project record documents.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.08 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.09 SUBMITTAL PROCEDURES

A. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

B. Transmit each submittal with a copy of approved submittal form.

C. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix.

D. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

E. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

H. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.

I. Provide space for Contractor and Architect review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security requirements.

B. Waste removal facilities and services.

1.02 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.03 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.

1.04 SECURITY - SEE SECTION 01 3553

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

1.05 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site weekly.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Re-use of existing products.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations and procedures.

E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.

1.03 REFERENCE STANDARDS

A. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; 2012.

B. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action; www.greenscreenchemicals.org.

C. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action; www.greenscreenchemicals.org.

D. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures; 2006.

E. ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework; 2006.

F. ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines; 2006.

G. ISO 21930 - Sustainability in building construction -- Environmental declaration of building products; 2007.

1.04 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

1.05 QUALITY ASSURANCE

A. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
   1. Good: Product-specific; compliant with ISO 14044.
   2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.

3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.

B. GreenScreen Chemical Hazard Analysis: All ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
2. Better: GreenScreen Full Assessment.
3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
4. Acceptable Evidence: GreenScreen report.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

B. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is indicated on drawings.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. DO NOT USE products having any of the following characteristics:
1. Made using or containing CFC's or HCFC's.
2. Made of wood from newly cut old growth timber.
3. Containing lead, cadmium, asbestos.

C. Where all other criteria are met, Contractor shall give preference to products that:
1. If used on interior, have lower emissions, as defined in Section 01 6116.
2. If wet-applied, have lower VOC content, as defined in Section 01 6116.
3. Have a published GreenScreen Chemical Hazard Analysis.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

B. A request for substitution constitutes a representation that the submitter:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
2. Agrees to provide the same warranty for the substitution as for the specified product.
3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.

4. Waives claims for additional costs or time extension that may subsequently become apparent.

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

D. Substitution Submittal Procedure (after contract award):
1. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
3. Architect will notify Contractor in writing of decision to accept or reject request.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.02 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings.
   2. Interior adhesives and sealants, including flooring adhesives.
   3. Thermal and acoustical insulation.

B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
   1. Interior paints and coatings.
   2. Interior adhesives and sealants, including flooring adhesives.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
   1. Concrete.
   2. Clay brick.
   3. Metals that are plated, anodized, or powder-coated.
   4. Glass.
   5. Ceramics.
   6. Solid wood flooring that is unfinished and untreated.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; current edition.

B. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings; 2005 (Reapproved 2013).

C. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

D. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition; www.aqmd.gov.

E. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

1.05 QUALITY ASSURANCE

A. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.

1. Evidence of Compliance: Acceptable types of evidence are:
    a. Report of laboratory testing performed in accordance with requirements.
    b. Published product data showing compliance with requirements.
    c. Certification by manufacturer that product complies with requirements.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.

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

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, including selective demolition, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Cutting and patching.

D. Cleaning and protection.

E. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Work of Owner or separate Contractor.

1.03 PROJECT CONDITIONS

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

A. Promptly notify Architect of any discrepancies discovered.

B. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and ramp layouts.
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations.

C. Periodically verify layouts by same means.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
   1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
   2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.
   2. Relocate items indicated on drawings.
   3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
   4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.

2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    b. Provide temporary connections as required to maintain existing systems in service.
4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

E. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

F. Adapt existing work to fit new work: Make as neat and smooth transition as possible.

G. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

H. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

I. Clean existing systems and equipment.

J. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

K. Do not begin new construction in alterations areas before demolition is complete.

L. Comply with all other applicable requirements of this section.

3.06 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-conforming work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.

J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.07 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

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. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.08 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.09 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.10 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.

B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

G. Clean site; sweep paved areas, rake clean landscaped surfaces.

H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.11 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
   1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
   2. Submit Report on a form acceptable to Owner.
   3. Landfill Disposal: Include the following information:
      a. Identification of material.
      b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
      c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
      d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
   4. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

A. See Section 01 3000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

B. See Section 01 5000 for additional requirements related to trash/waste collection and removal facilities and services.

C. See Section 01 6000 for waste prevention requirements related to delivery, storage, and handling.

D. See Section 01 7000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Meetings: Discuss trash/waste management goals and issues at project meetings, particularly at:
   1. Pre-bid meeting.
   2. Pre-construction meeting.
   3. Regular job-site meetings.

E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 3 EXECUTION

2.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Record Drawings : Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

2.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

2.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

2.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

D. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

E. Provide servicing and lubrication schedule, and list of lubricants required.

F. Include manufacturer's printed operation and maintenance instructions.

G. Include sequence of operation by controls manufacturer.

H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

I. Additional Requirements: As specified in individual product specification sections.

2.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

2.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

1.02 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Sequencing and staging requirements.

C. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

D. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

E. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

F. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Areas for temporary construction and field offices.

C. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 3 EXECUTION

2.01 SCOPE

A. Remove portions of existing buildings in the following sequence:
   1. as indicated on demolition drawings. Refer to Architectural, MEP and Technology demolition plans for items to be removed or relocated..

B. Remove other items indicated, for salvage and relocation.

C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
   1. Obtain required permits.
   2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
   3. Provide, erect, and maintain temporary barriers and security devices.
   4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
   5. Do not close or obstruct roadways or sidewalks without permit.
   6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Protect existing structures and other elements that are not to be removed.
   1. Provide bracing and shoring.
   2. Prevent movement or settlement of adjacent structures.
   3. Stop work immediately if adjacent structures appear to be in danger.

E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

2.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.04 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
   1. Verify that construction and utility arrangements are as shown.
   2. Report discrepancies to Architect before disturbing existing installation.
   3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

C. Remove existing work as indicated and as required to accomplish new work.
   1. Remove items indicated on drawings.

D. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
   1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
   2. Verify that abandoned services serve only abandoned facilities before removal.
   3. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

E. Protect existing work to remain.
   1. Prevent movement of structure; provide shoring and bracing if necessary.
   2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
   3. Repair adjacent construction and finishes damaged during removal work.
   4. Patch as specified for patching new work.

2.05 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including equipment pads and concrete ramps and plumbing repair work.

F. Concrete curing.

1.02 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealants: Products and installation for sealants for saw cut joints and isolation joints in slabs.

1.03 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).

C. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).

D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.

E. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).

F. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).

G. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.

H. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.

I. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.

J. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2013.

K. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

L. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

PART 2 PRODUCTS

2.01 FORMWORK

A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire all cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C 33.

C. Water: Clean and not detrimental to concrete.

2.04 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

B. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.

C. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

D. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

E. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with minimum 1 inch diameter holes for conduit or rebars to pass through at 6 inches on center; ribbed steel stakes for setting.

2.05 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Normal Weight Concrete:
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,000 pounds per square inch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
   1. Use latex bonding agent only for non-load-bearing applications.

C. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

D. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

D. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

A. Locate joints as indicated on the drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
   1. Exposed Concrete Floors: 1/8 inch in 10 feet.
   2. Under Seamless Resilient Flooring: 1/8 inch in 10 feet.
   3. Under Carpeting: 1/8 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
   1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:
   1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
   2. Final Curing: Begin after initial curing but before surface is dry.

3.09 DEFECTIVE CONCRETE

3.10 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

1.02 REFERENCE STANDARDS

A. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; Society for Protective Coatings; 1999 (Ed. 2004).

B. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2004).

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.02 FINISHES - STEEL

A. Prime paint steel items.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: Two coats.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION

SECTION 05 5213
PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stair railings and guardrails.

B. Free-standing railings at steps.

1.02 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2013.

C. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.
   1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.
   2. Intermediate Rails: 1-1/2 inches diameter, round.
   3. Posts: 1-1/2 inches diameter, round.

E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.

F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.02 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured.

D. Welded Joints:
   1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
   2. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Install railings in compliance with ADA Standards for accessible design at applicable locations.

D. Anchor railings securely to structure.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concealed wood blocking, nailers, and supports.

B. Miscellaneous wood nailers, furring, and grounds.

1.02 REFERENCE STANDARDS

A. PS 20 - American Softwood Lumber Standard; 2010.

1.03 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
   1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
   2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

3.03 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:
   1. Cabinets and shelf supports.
   2. Wall brackets.
   3. Handrails.
   4. Grab bars.
   5. Towel and bath accessories.
   6. Wall-mounted door stops.
   7. Joints of rigid wall coverings that occur between studs.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Countertops.

C. Cabinet hardware.

1.02 REFERENCE STANDARDS

A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.

B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

1.06 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Single Source Responsibility: Provide and install this work from single fabricator.

2.02 CABINETS

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

B. Plastic Laminate Faced Cabinets: Custom grade.

C. Breakroom Cabinets: Plastic laminate faced, Custom grade.

D. Cabinets at Lobby counters:
   1. Finish - Exposed Exterior Surfaces: Decorative laminate.

2.03 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.04 LAMINATE MATERIALS

A. Manufacturers:
   1. Wilsonart; ____: www.wilsonart.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.05 COUNTERTOPS

A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.

2.06 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

2.07 HARDWARE

A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.

B. Drawer and Door Pulls: "U" shaped wire pull, steel with chrome finish, 4 inch centers.

C. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

D. Drawer Slides:
   1. Type: Extension types as required.
   2. Stops: Integral type.
   3. Features: Provide self closing/stay closed type.

E. Hinges: European style concealed self-closing type, steel with polished finish.

2.08 FABRICATION

A. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
   1. Cap exposed plastic laminate finish edges with material of same finish and pattern.

B. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

C. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

B. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 2119
FOAMED-IN-PLACE INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Foamed-in-place insulation.

B. Protective intumescent coating.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2015.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

C. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

D. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, insulation properties, and preparation requirements.

1.05 QUALITY ASSURANCE

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

1.06 FIELD CONDITIONS

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Foamed-In-Place Insulation:
   1. Johns Manville; JM ocSPF Open Cell Spray Polyurethane Foam: www.jm.com/sle.
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Foamed-In-Place Insulation: Low-density, flexible, open celled, water vapor permeable polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
   1. Aged Thermal Resistance: R-value of 3 (deg F hr sq ft)/Btu, minimum, when tested at 1 inch thickness in accordance with ASTM C518 after aging for 180 days at 41 degrees F.
   2. Air Permeance: 0.004 cfm/sq ft, maximum, when tested at intended thickness in accordance with ASTM E2178 or ASTM E283 at 1.5 psf.
   3. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
   4. Products:
      a. Johns Manville; JM ocSPF Open Cell Spray Polyurethane Foam: www.jm.com/sle.

2.03 ACCESSORIES

A. Primer: As required by insulation manufacturer.

B. Overcoat: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify work within construction spaces or crevices is complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

3.02 PREPARATION

A. Mask and protect adjacent surfaces from over spray or dusting.

B. Apply primer in accordance with manufacturer's instructions.

3.03 APPLICATION

A. Apply insulation in accordance with manufacturer's instructions.

B. Apply insulation by spray method, to a uniform monolithic density without voids.

C. Apply to achieve a thermal resistance R-value of 25.

D. Apply overcoat monolithically, without voids to fully cover foam insulation.

E. Patch damaged areas.

3.04 FIELD QUALITY CONTROL

A. Inspection will include verification of insulation and overcoat thickness and density.

3.05 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C834 - Standard Specification for Latex Sealants; 2010.

B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

D. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition; www.aqmd.gov.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
   1. Adhesives Technology Corporation; _____: www.atcepoxy.com.
   2. BASF Construction Chemicals-Building Systems; _____: www.buildingsystems.basf.com.
   3. Dow Corning Corporation: www.dowcorning.com/construction/sle.
   4. Franklin International, Inc; ____: www.titebond.com.
   5. Hilti, Inc; _____: www.us.hilti.com/#sle.
   6. Tremco Global Sealants; _____: www.tremcosealants.com.
   7. Sherwin-Williams Company; _____: www.sherwin-williams.com.
   8. Substitutions: See Section 01 6000 - Product Requirements.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
   1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Joints between different exposed materials.
      c. Other joints indicated below.
   2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
      a. Joints between door, window, and other frames and adjacent construction.
      b. Other joints indicated below.
   3. Do not seal the following types of joints.
      a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
      b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
      c. Joints where installation of sealant is specified in another section.
      d. Joints between suspended panel ceilings/grid and walls.

B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use non-sag polyurethane sealant, Type ____, unless otherwise indicated.
   1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
   2. Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.

D. Interior Wet Areas: restrooms; fixtures in wet areas include plumbing fixtures and countertops.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.04 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 50 percent, minimum.
   2. Color: Match adjacent finished surfaces.

B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Color: Match adjacent finished surfaces.

C. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface .
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Color: Match adjacent finished surfaces.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
   1. Color: Standard colors matching finished surfaces, Type OP (opaque).

2.05 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Install bond breaker backing tape where backer rod cannot be used.

D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 1217
PRE-FINISHED STEEL DOOR FRAMES

PART 1 - GENERAL

1.01 WORK INCLUDED

The work under this section shall include the furnishing of all items shown on the drawings and as specified, including but not limited to, the following:

1. Knocked down, site assembled pre-finished steel door frames

1.02 RELATED SECTIONS

A. Section 08 71 00 - Hardware

1.03 REFERENCES

A. ASTM A653 - Standard for hot dipped galvanized steel material

B. UBC 7-2-97, UBC 7-4-97 Positive Pressure Fire Test Certification

C. UL 10B Fire test of Door Assemblies and UL10C Standard for Positive Pressure Fire Tests of Door Assemblies

D. NFPA 80 - Fire Doors and Windows (Latest Edition)

E. NFPA-101 - Life Safety Codes (Latest Edition)

F. ASTM D2197 - Standard Test Method for Adhesion of Organic Coatings by Scrape Adhesion.

G. ASTM D2247 - Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.

H. ASTM D2794 - Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).

I. ASTM D3361 - Standard Practice for Unfiltered Open-Flame Carbon-Arc exposures of Paint and Related Coatings.

J. ASTM B117 - Standard test for salt spray testing

1.04 SUBMITTALS

A. Section 01 33 00: Submittal procedures.

B. Product Data: Indicate frame material, gage, configuration and finishes.

C. Shop Drawings: See section 08 06 00. Indicate frame elevations, details of frame anchorage, reinforcements required, rough opening requirements, location of hardware embosses, and finishes. Detail each floor of the building separately.

D. Samples: Submit 1 standard frame samples, illustrating factory finished frame colors.

E. Manufacturer's Installation Instructions: Provide installation instructions for all products under this section.

F. Manufacturer's Certificate of Warranty: Provide manufacturer’s standard warranty certificate stating material is warranted for a period of one year from date of building occupancy

1.05 QUALITY ASSURANCE

Quality Standards

1. Material free from defects in material and according to project specifications for pre-engineered opening systems
2. Proven durability of factory finishes allowing for bending and shaping of material after finish is applied

Fire Rated Frame Construction

1. Conform to ASTM E152, NFPA 252, UL 10B and 10C.

Installed Frame Assembly: Conform to NFPA 80

1. Use only installers familiar with installation of pre-finished opening systems and applied casing frame installation

1.06 DELIVERY, STORAGE AND HANDLING

A. Transport, handle, store, and protect products in a dry area off the ground.

B. Accept frames on site in manufacturer's box packaging with identification labels intact. Inspect for damage.

C. Do not open individual boxes until installation is to begin.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Timely Industries, A Division of SDS Industries, Inc., 10241 Norris Avenue, Pacoima, CA, 91331-2292; Phone toll free: 800-247-6242; Fax: 818-492-3530. Web site: www.timelyframes.com <http://www.timelyframes.com>.

B. Dunbarton Door and Entry Systems <http://www.cmdgroup.com/companies/2923/dunbarton-door-and-entry-systems/>, 1101 Technology Drive, Dothan, AL 36303
Phone: (334) 794-0661 Fax: (334) 793-3462 Website: www.dunbarton.com <http://www.dunbarton.com/> Rediframe

C. Frames: Provide all interior frames for project from same manufacturer. Provide exterior frames as shown on plans

D. Substitutions: Refer to Section 01 60 00

2.02 FRAMES

A. Frame Material: Hot dipped galvanized steel, for interior frames in normal atmospheric exposures.

B. Frame Material: Hot dipped galvanized steel for all frames used in the following locations:

1. Exterior Locations

2. Public and Private Restrooms

3. Coastal locations for both interior and exterior applications exposed to salt air or salt spray within 10 miles of any ocean or salt water lake

C. Frame Throat Opening: As shown on plan details to suit finished wall thickness.

D. Fire rated frames and Office Entry frames to be CK series with kerf formed into frame profile with factory installed, pre-mitered smoke/sound control gasket

E. Frame Profile - Unequal Rabbet profile, standard with manufacturer

F. Casings

1. Provide steel or aluminum casings formed to be applied to heat treated clips on frame face after frame is anchored to wall

2. Standard Steel - TA-8 with 6 mm (1/4 inch) reveal, on steel, stainless steel, and/or brass frames. Fit factory assembled units with MiterGard corner alignment clips.

2.03 FRAME REINFORCEMENT AND ACCESSORIES

A. Provide reinforcements shipped loose to project site for hardware application

1. TA-10 - Regular arm closers, casing mounted coordinators

2. TA-12 - Parallel arm closers, Rim Exit device strikes, other stop mounted surface hardware

3. TA-47 - For CK frame, Parallel arm closers, Rim Exit device strikes, other stop mounted surface hardware

4. TA-25 - Double acting spring hinges, continuous hinges, other surface mounted hardware on door rabbet or cased opening frame

5. Provide hinge reinforcement (TA-11) of 14 gage steel pierced to create depth of thread for hinge screws equal to or exceeding 7 gage steel.

B. Prepare frames for ASA 4-7/8" strikes where required. Provide minimum ¼" depth of threads in factory tapped screw holes

C. Installation fasteners (Provided by others)
   1. Interior Frames: #6 Drywall type length sufficient to penetrate studs or structure at least ½".
   2. Exterior Frames: Drywall type, corrosion resistant coating, same as G.1 above

2.04 FABRICATION

A. Openings for single swing, pair, borrowed light and sidelight frames to be pre- cut, notched and fabricated at the manufacturer's facility.

B. Provide minimum 14 gage hinge reinforcement plate tapped for machine screws supplied with hinges. Hinge plate to be mechanically attached to hinge emboss on frame

C. Casing Clips: Fabricate frames with factory applied, heat treated clips to ensure no deflection in the clip upon application or removal of casing. Attachment clips may not be of same material as frame

D. Provide notches, tabs and/or stops for positive alignment of frame parts at all corners

E. Mullions to be notched as required to provide tight joints

F. Provide manufacturer's standard mullion brackets for positive connection of frame and mullion parts

G. Provide manufacturer's standard steel glass stop pre-cut to exact length. Fire rated glazed openings to have hole for installation screw within 2" of each end of stop piece

H. Provide insert channel full width of borrowed lights installed on finish floor. Provide full width head channel for ceiling height units.

I. Provide adequate structural support (by others) for ceiling insert channel for ceiling height frames

J. Attach approved mylar label to each fire-rated frame indicating fire rating details

K. Factory install TA-46 smoke gasket on all pre-finished, CK series frames. Install with factory mitered corners to ensure adequate seal and pleasing appearance

2.05 FINISHING

A. Frame Units: Pre-finished with factory applied impact resistant, polyurethane baked enamel finish or optional electrostatic applied water based paint system

B. Frames for high humidity areas to be hot dipped galvanized prior to pre-finishing See 2.02.B for specific locations

C. Casing Finishes
   1. Steel: Prefinished with factory applied impact resistant, polyurethane baked enamel finish.
   2. Aluminum: Prefinished with factory applied impact resistant, polyurethane baked enamel finish or Clear anodized for Alumatone (SC108) paint finished frames

D. Colors: Architect to select from Manufacturer's standard color line.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify acceptability of existing conditions before starting work.

B. Verify that opening sizes and wall thicknesses are within specified tolerances. Verify that all finished walls are in plane to ensure proper door alignment.

3.02 INSTALLATION

A. Install frames in accordance with manufacturer's requirements.

B. Anchor frames with screws located at every casing clip or every 11” as shown on manufacturer’s instructions. Field verify quantity and location of fasteners prior to installing casing.

C. Install Pre-finished frames near end of the project after wall painting and wall coverings are applied.

D. Install frames using qualified installers familiar with installation of pre-finished drywall frames.

E. Coordinate installation of glass and glazing in glazed units.

F. Coordinate installation of frames with installation of hardware specified in Section 08 71 00.

G. Touch-up blemishes on finished frames with factory prepared touch up paint.

END OF SECTION

SECTION 08 3313
COILING COUNTER DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated coiling counter doors and operating hardware.

1.02 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's standard literature showing materials and details of construction and finish.

C. Shop Drawings: Indicate rough and actual opening dimensions, anchorage methods, hardware locations, and installation details.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Coiling Counter Doors:
   1. Alpine Overhead Doors, Inc; _____: www.alpinedoors.com.
   2. C.H.I. Overhead Doors; Model 6522 (steel): www.chiohd.com/sle.
   3. Substitutions: See Section 01 6000 - Product Requirements.

2.02 COILING COUNTER DOORS

A. Coiling Counter Doors, Non-Fire-Rated: Aluminum slat curtain.
   1. Mounting: Between jambs, within prepared opening.
   2. Nominal Slat Size: 1-1/4 inches wide.
   3. Slat Profile: Flat, perforated.
   4. Finish: Anodized.
   5. Guides: Formed track; same material and finish unless otherwise indicated.
   6. Hood Enclosure: Manufacturer's standard; primed steel.

2.03 MATERIALS

A. Curtain Construction: Interlocking, single thickness slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; minimum thickness 0.05 inch.

B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
   1. Aluminum Guides: Extruded aluminum channel, with wool pile runners along inside.

C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

D. Lock Hardware:
   1. Latching Mechanism: Inside mounted, adjustable keeper, spring activated latch bar feature to keep in locked or retracted position.
   2. Latch Handle: Manufacturer's standard.

E. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes, tolerances and conditions are acceptable.

3.02 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Install perimeter trim as indicated.

3.03 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation From Plumb: 1/16 inch.

C. Maximum Variation From Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean installed components.

B. Remove labels and visible markings.

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Weatherstripping.

C. Door hardware.

1.02 REFERENCE STANDARDS

A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.

B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

C. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.

D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.06 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

C. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

D. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet: For 1 inch insulating glazing.

2. Glazing Position: Centered (front to back).
3. Finish: Class II natural anodized.
   a. Factory finish all surfaces that will be exposed in completed assemblies.
4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

2.02 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
   1. Glazing Stops: Flush.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Fasteners: Stainless steel.

C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.04 FINISHES

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

2.05 HARDWARE

A. For each door, include weatherstripping, sill sweep strip, and threshold.

B. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.

C. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.

D. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

I. Set thresholds in bed of sealant and secure.

J. Install hardware using templates provided.

K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 1/16 inches per 10 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

3.06 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

SECTION 08 5659
SERVICE AND TELLER WINDOW UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Service window units.

1.02 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2013.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordinate work with adjacent materials specified in other sections and as indicated on drawings and approved shop drawings.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.

B. Store units in area protected from exposure to weather and vandalism.

PART 2 PRODUCTS

2.01 SERVICE AND TELLER WINDOW UNITS

A. Pass-Through Window:
   1. Location: Interior.
   2. Window: Single horizontal sliding.
      a. Operation: Manual, self-closing.
      b. Mounting: Projected from the wall surface.
      c. Size: As indicated on drawings.
      d. Material: Aluminum.
      e. Finish: Natural anodized.
   3. Glazing: Single (monolithic), clear.
      a. Tempered safety glazing.

2.02 MATERIALS

A. Aluminum Extrusions: Minimum 1/8 inch thick frame and sash material complying with ASTM B221 and ASTM B221M.

2.03 FINISHES

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

B. Color: To be selected by Architect from manufacturer's standard range.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that window openings are ready for installation of windows.

B. Notify Architect if conditions are not suitable for installation of units; do not proceed until conditions are satisfactory.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install units in correct orientation (inside/outside or secure/non-secure).

C. Anchor units securely in manner so as to achieve performance specified.

3.03 ADJUSTING

A. Adjust operating components for smooth operation while also maintaining a secure, weather-tight enclosure and a tight fit at the contact points; lubricate operating hardware.

3.04 CLEANING

A. Remove protective material from factory finished surfaces.

B. Clean exposed surfaces promptly after installation without damaging finishes.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 – GENERAL:

1.01 SUMMARY:

A. Section includes the supply and installation of the Finish Hardware.

B. Related Sections
1. Openings – Division 8 / Division 8
2. Electrical – Division 16 / Division 26
3. Security – Division 16 / Division 28

1.02 REFERENCES:

A. Documents and Institutes that shall be used in estimating, detailing and installing the items specified.
1. International Building Code – Current/Adopted Edition
2. ICC/ANSI A117.1 – Accessible and Usable Building and Facilities -
3. Current/Adopted Edition
4. NFPA80 –Standards For Fire Doors and Fire Windows – Current/Adopted Edition
5. NFPA101 – Life Safety Code – Current/Adopted Edition
6. NFPA105 – Installation of Smoke-Control Door Assemblies – Current/Adopted Edition.
7. ANSI - American National Standards Institute
8. BHMA – Builders Hardware Manufacturers Association
9. UL – Underwriters Labratory
10. Texas Accessibility Standards – Current Adopted Edition
11. Local Building Codes

1.03 SUBMITTALS

A. Comply with pertinent provisions of Section 01300.

B. Finish Hardware Schedule to be in vertical format to include:
1. Heading #/Hardware Set
2. Door #, Location, Hand, Degree of Opening, Door Size and Type, Frame Size and Type, Fire Rating
3. Quantity, type, style, function, product, product number, size, fasteners, finish and manufacturer of each hardware item.
4. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
5. Keying schedule
6. Title Sheet, Index, Abbreviations, Manufacturers List, Template List and Templates.
7. Mounting locations for hardware.
8. Explanation of abbreviations, symbols, and codes contained in schedule.

C. Product Data: Provide product data in the form of a binder, manufacturer’s technical product fact sheets for each item of hardware. Include whatever information may be necessary to show compliance with requirements, including instructions for installation and for maintenance of operating parts and finish.

D. Wiring Diagrams: Provide Riser/Elevation and Point to Point Wiring Diagrams for all openings with electrified hardware. Include all information that is necessary for coordination with other trades.

E. Samples: Provide samples as requested by owner or architect with Heading # and Door# marked on boxes. All samples will be returned to the contractor and used on doors for which they were marked.

F. Templates: Provide templates of finish hardware items to each fabricator of doors, frames and other work to be factory or shop prepared for the installation of hardware.

G. Keying Schedule: After meeting with the Owner, a keying schedule shall be submitted using keyset symbols referenced in DHI manual “Keying Systems and Nomenclature." The keying schedule shall be indexed by door number, keyset, hardware heading number, cross keying instructions and special key stamping instructions.

H. Operations and maintenance data: At the completion of the job, provide to the owner two copies of an Owner’s operation and maintenance manual. The manual shall consist of a labeled hardcover three ring binder with the following technical information:
1. Title page containing: Project name, address and phone numbers. Supplier’s name, address and phone numbers.
2. Table of Contents.
3. Copy of final Finish Hardware Schedule and Keying Schedule
4. Maintenance instruction for each item of hardware.
5. Catalog pages for each product.
6. Installation Instructions and Parts List for all Locks, Exit Devices and Door Closers.

1.04 QUALITY ASSURANCES

A. Substitutions: Request for substitutions shall not be accepted within this project. Architect, owner and Hardware Consultant have selected one (1) specified and two (2) equals listed hereinafter in the Hardware Schedule. By this selection process they have established three (3) equal products for competitive pricing, while insuring no unnecessary delays by a substitution process. If any specified product is listed as a “No Substitution” product, this product will be supplied as specified, with no alteration or request of substitution. The reason for this is to comply with the uniformity established at this project. Parts and supplies are inventoried for these particular products for ease and standardization of replacement.

B. Supplier Qualifications: Supplier shall be recognized architectural finish hardware supplier, with warehousing facilities, who have been furnishing hardware in the project vicinity for a period of not less than 2 year and who is or employs a DHI Certified AHC or person with a minimum of 10 years of experience as a hardware supplier. This person shall be available at reasonable times during the course of the work for consultation about products hardware requirements, to the owner, architect and contractor.

C. Installer Qualifications (Mechanical Hardware): All finish hardware shall be installed by the finish hardware installer with a minimum of at least two (2) years documented experience. Installer shall attend a pre-installation meeting between the contractor, finish hardware suppier, hardware manufacturers representative for locks, closers and exit devices, all door / frame suppliers. The finish hardware installer shall be responsible for the proper installation and function of all doors and hardware.

D. Installer Qualifications (Electrified Hardware): All electrified finish hardware (power, load, switch, conductor and monitoring device) shall be installed by a Electronic Access

Control installer licensed by the Texas Department of Public Safety. The electrified finish hardware installer shall have a minimum of at least two (2) years of documented experience. Installer shall attend a pre-installation meeting between the contractor, finish hardware supplier, electrical contractor, fire alarm contractor, security contractor, hardware manufacturers representative for locks, closers and exit devices, all door / frame suppliers. The electrified finish hardware installer shall be responsible for the proper installation and function of all doors and hardware. Installation shall include wiring all electrified products (including the required wire to the power supply and/or junction box).

1.05 DELIVERY, STORAGE AND HANDLING

A. Marking and packaging: Mark each item or package separately, with identification related to hardware set number, door number and keyset symbol.

B. Delivery:
1. Deliver individually packaged and properly marked finish hardware at the proper time and location to avoid any delays in construction or installation.
2. At time of delivery, inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.

C. Storage: Store hardware in enclosed, dry and locked area.

1.06 WARRANTY

A. All finish hardware products shall be covered by a 1 year factory warranty from the date of substantial completion of the project. Exit Devices shall carry a 3-year warranty, Mechanical Door Closers shall carry a 10-year warranty.

B. Supply warranty verification to the owner for all products that provide factory warranty.

1.07 MAINTENANCE:

A. Maintenance Service
1. None

B. Extra Materials:
1. All extra screws, fasteners, and all special installation tools furnished with the hardware shall be turned over to the owner at the completion of the job.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Screws and Fasteners:
1. All closers and exit devices provided for exterior doors, hollow metal doors, and all other required shall be provided with thru-bolts.
2. All finish hardware shall be installed to manufacturer’s recommendations, using screws, attachments and installation tools provided with the hardware. No other screws or attachments are acceptable.
3. All other products to meet door and frame conditions.

B. Hinges:
1. Template: Provide templated units only.
2. Exterior: All exterior hinges shall be stainless steel base and finish.

3. Interior: All interior hinges steel based, satin chrome finish.
4. Iterior corrosive: All interior hinges at corrosive areas shall be stainless steel base and finish.
5. Exit devices: All hinges on doors with exit devices shall be heavy weight.
6. Elecctric Hinge : Provide 8 wire.
7. Provide non-removable pins for outswinging doors that are locked or are lockable.
8. All hinges on doors with door closers shall be ball bearing.
9. All hinges shall be five knuckle.
10. All hinges shall be full mortise.
11. Size: Provide 4 ½ x 4 ½ hinges on doors up to 3'0" in width. Provide 5 x 4 ½ hinges on door from 3'2" to 4'0" in width. Reference manufacturers catalog for all other sizes.
12. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90" or less in height and one additional hinge for each 30" of additional height.
13. The width of hinge shall be sufficient to clear all trim.
14. Supply from the following list of manufacturers:

Ives	IVE	www.ives.ingersollrand.com
Hager	HAG	www.hagerhinge.com
Bommer	BOM	www.bommer.com

C. Cylindrical Locks/Latches
1. Provide cylindrical locksets that comply with ANSI A156.2, Series 4000, Grade 1 and 2. Functions as listed in Hardware Sets.
2. Provide cylindrical locksets that meet ANSI A117.1, Accessibility Code.
3. Provide cylindrical locksets that meet UL A label; to have a minimum listing for single doors 4' x 8'
4. Levers are to be solid. Manufacturers utilizing fillers of any kind are not acceptable.
5. Latchbolt to be steel with minimum ½" throw deadlatch on keyed and exterior functions; ¾" throw anti-friction latchbolt on pairs of doors.
6. Strike to be ANSI curved lip, 1 ¼" x 4 7/8", 16 gauge, with 1" deep box construction.
7. Supply from the following list of manufacturers:

Best	BES	www.bestaccess.com	93K/7KC Series
Falcon	FAL		T/B Series
Sargent	SAR		10/6500 Line

D. Exit Devices
1. All exit device types on this project should be manufactured by the same manufacturer.
2. Exit devices are to be architectural grade touch bar type. Mechanism case to be smooth.
3. Exit devices shall meet ANSI A156.3, 1994, Grade 1. All exit devices are UL listed for Accident Hazard or Fire Exit Hardware.
4. All lever trim to match lock trim in design and finish.
5. Dogging: All non-rated devices are to be provided with dogging. Cylinder dogging as shown in hardware sets.
6. Exit devices are to be supplied and installed with thru-bolts for exterior, hollow metal doors, or as required for application.
7. Provide proper power supply for exit devices as required.
8. Push pads shall be metal, no plastic inserts allowed.
9. Exit devices shall have a flush end cap.
10. Exit devices shall be ordered with the correct strike for application.
11. Exit devices shall be order in the proper length to meet door width.

12. Exit devices shall have deadlatching.
13. Install exit devices with fastners supplied by exit device manufacturer.
14. Provide glass bead kits as required.
15. Provide proper concealed vertical rods for wood or hollow metal doors as required.
16. Supply from the following list of manufacturers:

Von Duprin	VON	www.vonduprin.com	99 Series
Monarch/Falcon	FAL	www.falconlock.com	25 Series
Detex	DET	www.detex.com	Advantex

E. Door Closers
1. All door closers on this project should be manufactured by the same manufacturer.
2. Door closers shall meet the minimum requirements of the 1990 ADA act, in lieu of ANSI Standard A156.4 and ANSI, Grade 1 on interior fire rated openings.
3. Door closers shall be furnished with standard cover. Provide full cover as shown in hardware sets.
4. Size in accordance with the manufacturers recommendations for door size and condition.
5. Door closers shall be furnished with backcheck, delayed action, hold-open and advanced backcheck as listed in the Hardware Sets.
6. Door closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swinging doors.
7. Provide and mount closer top jamb or on brackets and/or drop plates, where special conditions call for it.
8. All closer installation shall include thru bolts on exterior, hollow metal doors or where required for application.
9. Supply from the following list of manufacturers

LCN	LCN	www.lcnclosers.com
Doromatic/Falcon	DOR/FAL	www.falconlock.com
Norton	NOR	www.nortondoorcontrols.com

I. Door Protection Plates
1. Protective plates shall meet ANSI A156.6 requirements for .050 thickness.
2. Protection plates should be fabricated from stainless steel.
3. Kickplates shall be 10” by 2” less than door width on single door and 1” less than door width on pair of doors or as indicated in hardware sets. Beveled 3 edges.
4. Provide kickplate on all wood doors with closers, unless not required for aesthetic reasons.
5. Supply from the following list of manufacturers:

Ives	IVE	www.ives.ingersollrand.com
Rockwood	ROC	www.rockwoodmfg.com
Trimco	TRI	www.trimcobbw.com

I. Door Stops and Holders:
1. Wall and Floor Stops: Supply wall stops where needed to protect doors or door hardware. When wall conditions do not permit use of wall stop provide floor stops with risers as needed to adjust for floor conditions.
2. Overhead Stops: Where wall or floors stops are not applicable provide concealed or surface overhead stops. Provide concealed in public, jury or judges area. Provide surface in all others.
3. Exterior Stops: Provide security floor stop.
4. Supply from the following list of manufacturers:

Ives	IVE	www.ives.ingersollrand.com

Glynn Johnson	GLY	www.glynn-johnson.com
Trimco	TRI	www.trimcobbw.com

J. Silencers
1. Provide silencers on all doors without seal. 3 for single doors and 2 for pairs.
2. Provide silencers as required for frame conditions. SR64 for hollow metal frames. SR65 for wood frames.
3. Supply from the following list of manufacturer's

Ives	IVE	www.ives.ingersollrand.com
Rockwood	ROC	www.rockwoodmfg.com
Trimco	TRI	www.trimcobbw.com

K. Thresholds/Weatherstripping
1. All thresholds shall conform to state and local handicap codes.
2. Smoke seal shall be teardrop design bulb seal.
3. Exterior seal/thresholds shall be silicone or brush as shown in hardware sets.
4. Sound seal shall be neoprene.
5. Drip strips shall protrude 2 ½".
6. Provide door sweeps.
7. Provide UL meeting stile gasketing for fire rated doors.
8. Supply from the following list of manufacturer's

National Guard	NGP	www.ngpinc.com
Hager Hinge Company	HAG	www.hagerhinge.com
Pemko	PEM	www.pemko.com

2.03 KEYING:

A. General: Finish Hardware Supplier shall meet in person with owner to finalize keying requirements and match existing or start a new Best Restricted and Patented Master Key System for the project.

B. Cylinders: All cylinder/cores on this project should be manufactured and providing in the same keyway.

C. Cylinders: Provide the correct and quantity of cylinders for all applications.

D. Keys: Provide nickel silver keys only. Furnish 2 change keys for each lock: 5 control keys: 5 master keys for each master system and 5 grandmaster keys for each grandmaster key system. Deliver all keys to owners' representative.

E. Cores and keys shall be provided with identification stamping.

F. Provide construction keying / construction cores for this project with constructions keys.

PART 3 – EXECUTION:

3.01 EXAMINATION:

A. Examine doors, frames and related items for conditions that would prevent the proper application of any finish hardware items. Do not proceed with installation until all defects are corrected.

3.02 INSTALLATION:

A. Follow Door and Hardware Institute Publication for:
Recommended Location for Architectural Hardware for Standard Steel Doors and Frames
Recommended Location for Builder's Hardware for Custom Steel Doors and Frames

Recommended Locations for Architectural Hardware for Wood Flush Door

B. Follow ANSI A117.1-1998 Accessible and Usable Building and Facilities

C. Review mounting locations with Architect.

D. Pre Installation meeting required with attendees to include Architect, Contractor, Mechanical Hardware and Electrified Hardware Installer, Finish Hardware Supplier and Manufacturer's Representative for Exit Device, Locks and Closers before installation begins.

3.03 FIELD QUALITY CONTROL:

A. After installation has been completed, obtain the services of an Architectural Hardware Consultant to check for proper installation of finish hardware, according to the finish hardware schedule and keying schedule. In addition, check all hardware for adjustments and proper operation.

3.04 ADJUST AND CLEAN:

A. Adjust, clean and inspect all hardware, to ensure proper operation and function of every opening. Replace items, which cannot be adjusted to operate freely and smoothly as intended for the application made.

3.05 PROTECTION:

A. The general contractor shall use all means at his disposal to protect all finish hardware items from abuse, corrosion and other damage until the owner accepts the project as complete.

3.07 TRAINING

A. After installation has been completed, provide training to the Owner on the operation of finish hardware and programming of any access control items.

3.06 HARDWARE SCHEDULE

A. These hardware set shown below are for use as a guideline. Provide hardware as required to meet the requirements of the openings, security, and code requirements.

HW SET: 00.01
DOOR NUMBER:

104	114	114A	115	127	129
130	131	137	137A	155	204
218	220	221	222	223	224
226	226A				

EACH TO HAVE:

1	EA	ENTRANCE LOCK	73KC 7AB 16 D S3	626	BES
1	EA	WALL STOP	W406/407CCV @ 127 137 155	630	IVE
3	EA	SILENCERS	SR64 @ 127 137 155	GRY	IVE

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.02
DOOR NUMBER:

116	121	126	145	149	150
152	153	202	209	236	239

EACH TO HAVE:

1	EA	STOREROOM LOCK	73KC 7D 16 D S3	626	BES
1	EA	WALL STOP	W406/407CCV @ 239	630	IVE
3	EA	SILENCERS	SR64 @ 239	GRY	IVE

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.03
DOOR NUMBER:

135	151

EACH TO HAVE:

2	EA	DUMMY TRIM	73KC 01DT 16 D	626	BES
1	EA	INDICATOR DEADBOLT	D271	626	FAL
1	EA	WALL STOP	W406/407CCV @ 135	630	IVE
3	EA	SILENCERS	SR64 @ 135	GRY	IVE

PROVIDE FASTENERS REQUIRED TO MOUNT DUMMY LEVER BACK TO BACK. VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD

HW SET: 00.04
DOOR NUMBER:

102	110	111	117	118	119
120	122	123	124	125	132
133	134	134A	139	140	141
142	144	159	160	161	162
164	165	166	C103	C104	210
215	216	219	225	227	230
231	232	241			

EACH TO HAVE:

1	EA	PASSAGE SET	73KC 0N 16 D S3	626	BES
1	EA	WALL STOP	W406/407CCV @ 111 142 144 C103 225 227 230 232	630	IVE
3	EA	SILENCERS	SR64 @ 111 142 144 C103 225 227 230 232	GRY	IVE

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE INSTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.05
DOOR NUMBER:

147	147A

EACH TO HAVE:

1	EA	PANIC HARDWARE	99-L-07	628	VON
1	EA	CYLINDER	1E72	626	BES

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. PROVIDE CLOSER IF NOT EXISTING. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.06
DOOR NUMBER:

C202	C203

EACH TO HAVE:

1	EA	ELECTRIC HINGE	5BB1 WEIGHT/SIZE AS REQD TW8	652	IVE
1	EA	EU STOREROOM LOCK	93K 7DEU 16 D S3 RQE	626	BES
1	EA	WALL STOP	W406/407CCV @ 127 137 155	630	IVE
3	EA	SILENCERS	SR64 @ 127 137 155	GRY	IVE

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE

OPERATES PROPERLY. PROVIDE CLOSER IF NOT EXISITNG. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.07
DOOR NUMBER:

103	128	143	157	228	233
234	C201				

EACH TO HAVE:

1	EA	WALL STOP	W406/407CCV	630	IVE
3	EA	SILENCERS	SR64	GRY	IVE

VERIFY IN FIELD PRIOR TO BID DATE THAT NEW HARDWARE SPECIFIED CAN BE INSTALLED ON EXISTING DOOR/FRAME AND THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.08
DOOR NUMBER:

ST1B	ST2C

EACH TO HAVE:

1	EA	PANIC HARDWARE	99-L-BE-F-07	628	VON
1	EA	ELECTROMAGNETIC HOLD OPEN	SEM7800 SERIES	689	LCN
			BALANCE OF HARDWARE EXISTING		

PROVIDE MAGNETIC HOLD OPEN IN DIMENSION REQUIRED. VERIFY IN FIELD PRIOR TO BID DATE THAT THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.09
DOOR NUMBER:
ST2A

EACH TO HAVE:

1	EA	PANIC HARDWARE	99-L-F-07	628	VON
1	EA	CYLINDER	1E72	626	BES
			BALANCE OF HARDWARE EXISTING		

VERIFY IN FIELD PRIOR TO BID DATE THAT THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD.

HW SET: 00.10
DOOR NUMBER:
ST2B E101

EACH TO HAVE:

1	EA	PANIC HARDWARE	99-NL	628	VON
1	EA	CYLINDER	1E72	626	BES
			BALANCE OF HARDWARE EXISTING		

VERIFY IN FIELD PRIOR TO BID DATE THAT THAT BALANCE OF EXISTING HARDWARE OPERATES PROPERLY. NOTIFY A/E IMMEDIATELY IF NEW HARDWARE SPECIFIED CANNOT BE ISNTALLED ON EXISTING DOOR FRAME. PROVIDE COST IN PROPOSAL TO REPLACE ANY EXISTING HARDWARE THAT IS NOT OPERATING PROPERLY. IN SUBMITTAL, PROVIDE NAME/COMPANY/DATE OF VERIFICATION IN FIELD. COVER, FILL, PAINT HOLES THAT REMAIN AFTER EXISTING HARDWARE REMOVED AND NEW HARDWARE ISNTALLED.

HW SET: 03.01
DOOR NUMBER:
163

EACH TO HAVE:

3	EA	HINGE	5PB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	73KC 7AB 16 D S3	626	BES
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCERS	SR64	GRY	IVE

HW SET: 03.02
DOOR NUMBER:
E123

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	ENTRANCE LOCK	93K 7AB 16 D S3	626	BES
1	EA	CLOSER	SC71 SS	689	FAL
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	DOOR SWEEP	200SA	AL	NGP
1	EA	THRESHOLD	425	AL	NGP

PROVIDE MOUNTING ACCESSORIES FOR CLOSER, COORDINATE WITH DOOR/FRAME SUPPLIER. SEAL PROVIDED BY DOOR/FRAME MANUFACTURER.

HW SET: 06.01
DOOR NUMBER:

ST1A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	73KC 0N 16 D S3	626	BES
1	EA	SURFACE CLOSER	SC81 RW/PA	689	FAL
1	EA	ELECTROMAGNETIC HOLD OPEN	SEM7800 SERIES	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
1	SET	SEALS	5050	BWN	NGP

PROVIDE MAGNETIC HOLD OPEN IN DIMENSION REQUIRED.

HW SET: 08.01
DOOR NUMBER:
C101

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT10	626	VON
1	EA	PASSAGE SET WITH RQE	93K 0N 16 D S3 RQE	626	BES
1	EA	DELAYED EGRESS MAGNETIC LOCK	M490DE	AL	SCE
1	EA	SURFACE CLOSER	SC81 RW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCERS	SR64	GRY	IVE

1008.1.9.7 Delayed egress locks. *Approved, listed,* delayed egress locks shall be permitted to be installed on doors serving any occupancy except Group A, E and H occupancies in buildings that are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1. or an approved automatic smoke or heat detection system installed in accordance with Section 907, provide that the doors unlock in accordance with Items 1 through 6 below. A building occupant shall not be required to pass through more than one door equipped with a delayed egress lock before entering an *exit.*

1. The doors unlock upon actuation of the *automatic sprinkler system* or automatic fire detection system.
2. The doors unlock upon loss of power controlling the lock or lock mechanism.
3. The door locks shall have the capability of being unlocked by a signal from the fire command center.
4. The initiation of an irreversible process which will release the latch in not more than 15 seconds when a force of not more than 15 pounds (67 N) is applied for 1 second to the release device. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the door lock has been released by the application of force to the releasing device, relocking shall be by manual means only.
   Exception: Where approved, a delay of not more than 30 seconds is permitted.
5. A sign shall be provided on the door located above and within 12 inches (305 mm) of the release devices reading: PUSH UNTIL ALARM SOUNDS, DOOR CAN BE OPENED IN 15 [30] SECONDS.
6. Emergency lighting shall be provided at the door.

HW SET: 08.02
DOOR NUMBER:
C102

EACH TO HAVE:

2	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	THROUGH WIRE HINGE	5BB1 4.5 X 4.5 TW8	652	IVE
1	EA	FAIL SECURE LOCK WITH RQE	93K 7DEU 16 D S3 RQE	626	BES
1	EA	SURFACE CLOSER	SC81 RW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	WALL STOP	WS407CCV	630	IVE
3	EA	SILENCERS	SR64	GRY	IVE

END OF SECTION

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

1.02 REFERENCE STANDARDS

A. ASTM C1036 - Standard Specification for Flat Glass; 2011.

B. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.

C. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

D. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.

E. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

F. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.

G. GANA (SM) - GANA Sealant Manual; 2008.

H. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.

I. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014.

J. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2014.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.05 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fabricators:
   1. JE Berkowitz, LP; _____: www.jeberkowitz.com.
   2. Trulite Glass & Aluminum Solutions, LLC; _____: www.trulite.com.
   3. Viracon, Inc; _____: www.viracon.com.
   4. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Float Glass Manufacturers:

1. Pilkington North America Inc; _____: www.pilkington.com/na.
2. PPG Industries, Inc; _____: www.ppgideascapes.com.
3. Substitutions: Refer to Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
   2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
   3. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
   1. In conjunction with vapor retarder and joint sealer materials described in other sections.

C. Thermal and Optical Performance: Provide glass products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
   1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
   3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless noted otherwise.
   1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and FT.
   3. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality-Q3, color and performance characteristics as indicated.
   4. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
   1. Pilkington North America Inc; _____: www.pilkington.com/na.
   2. PPG Industries, Inc; _____: www.ppgideascapes.com.
   3. Viracon, Apogee Enterprises, Inc; _____: www.viracon.com.
   4. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
   3. Spacer Color: Black.
   4. Edge Seal:
   5. Color: Black.
   6. Purge interpane space with dry air, hermetically sealed.

2.05 BASIS OF DESIGN - INSULATING GLASS UNITS

A. Basis of Design - Insulating Glass Units: Vision glazing, with Low-E coating.
   1. Applications: Exterior insulating glass glazing unless otherwise indicated.
   2. Space between lites filled with air.
   3. Total Thickness: 1 inch.

2.06 GLAZING UNITS

A. Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Fully tempered float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.05 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic insulation.

B. Gypsum wallboard.

C. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

A. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.

C. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.

D. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014a.

E. GA-216 - Application and Finishing of Gypsum Board; 2013.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

2.02 BOARD MATERIALS

A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Thickness:
      a. Vertical Surfaces: 1/2 inch.

2.03 ACCESSORIES

A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: _____ inch.

B. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

END OF SECTION

SECTION 09 3000
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Ceramic trim.

1.02 REFERENCE STANDARDS

A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.

B. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.

C. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

D. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

E. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999 (Reaffirmed 2010).

F. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2010).

G. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999 (Reaffirmed 2010).

H. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999 (Reaffirmed 2010).

I. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).

J. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 1999 (Reaffirmed 2010).

K. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).

L. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).

M. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).

N. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2013.1.

O. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles; 2014a.

P. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2016.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

1.04 QUALITY ASSURANCE

A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: All products by the same manufacturer.
   1. Dal-Tile Corporation: www.daltile.com.

B. Ceramic Mosaic Tile, Type Keystone Mosaic: ANSI A137.1, standard grade.
   1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
   2. Size: 2 by 2 inch, nominal.
   3. Shape: Square.
   4. Edges: Square.
   5. Surface Finish: Unglazed.
   6. Color(s): As shown on drawings.

C. Glazed Wall Tile, Type Dal-Tile Matte Wall Tile: ANSI A137.1, standard grade.
   1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
   2. Size: 4-1/4 by 4-1/4 inch, nominal.
   3. Edges: Cushioned.
   4. Surface Finish: Matte glaze.
   5. Color(s): As scheduled.

2.02 TRIM AND ACCESSORIES

A. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Manufacturers: Same as for tile.

2.03 SETTING MATERIALS

A. Manufacturers:
   1. Custom Building Products; _____: www.custombuildingproducts.com.

B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Products:
      a. Custom Building Products; EBM-Lite Epoxy Bonding Mortar: www.custombuildingproducts.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GROUTS

A. Manufacturers:
   1. Custom Building Products; _____: www.custombuildingproducts.com.

B. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
   1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
   2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
   3. Color(s): As selected by Architect from manufacturer's full line.
   4. Products:
      a. Custom Building Products; Fusion Pro Single Component Grout: www.custombuildingproducts.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

3.03 INSTALLATION - GENERAL

A. Install tile, thresholds, and stair treads and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Sound tile after setting. Replace hollow sounding units.

G. Keep control and expansion joints free of mortar, grout, and adhesive.

H. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

I. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

J. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - WALL TILE

END OF SECTION

SECTION 09 5100
SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.

B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.

C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.

D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on suspension system components.

C. Samples: Submit two full size samples illustrating material and finish of acoustical units.

D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.06 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Tiles/Panels:
   1. Armstrong World Industries, Inc; as shown on drawings: www.armstrong.com.

B. Suspension Systems:
   1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

B. Acoustical Tile Type Dune 1774: Painted mineral fiber, ASTM E1264 Type III, with the following characteristics:
   1. Size: 24 by 24 inches.
   2. Thickness: 5/8 inches.
   3. Edge: Beveled tegular.
   4. Surface Color: White.

2.03 SUSPENSION SYSTEM(S)

A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

B. Exposed Steel Suspension System Type Prelude XL : Formed steel, commercial quality cold rolled; heavy-duty.
   1. Profile: Tee; 15/16 inch wide face.
   2. Construction: Double web.
   3. Finish: As shown on the drawings.

2.04 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

3.04 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Resilient stair accessories.

D. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 0561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Verification Samples: Submit two samples, 3 by 3 inch in size illustrating color and pattern for each resilient flooring product specified.

D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Materials: Quantity equivalent to 5 percent of each type and color.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

1.05 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.01 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Manufacturers:
      a. Armstrong World Industries, Inc; Standard Excelon: www.armstrong.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   3. Size: 12 by 12 inch.
   4. Thickness: 0.125 inch.
   5. Pattern: Solid color.

B. Rubber Tile: Homogeneous color and pattern throughout thickness.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company; _____: www.johnsonite.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2. Minimum Requirements: Comply with ASTM F1344, of Class corresponding to type specified.
3. Design: as shown on drawings.
4. Size: 24 by 24 inch.
5. Total Thickness: 1/8 inch.
6. Pattern: Solid color.

2.02 STAIR COVERING

A. Stair Treads: Rubber; full width and depth of stair tread in one piece; tapered thickness; nosing not less than 1-5/8 inch deep.
1. Manufacturers:
a. Johnsonite, a Tarkett Company; Visually Impaired Rubber Stair Tread with Integraded Riser: www.johnsonite.com.
2. Style: Contrasting color strips full width.
3. Color: Solid.

2.03 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
1. Manufacturers:
a. Johnsonite, a Tarkett Company; Traditional Wall Base: www.johnsonite.com.
2. Height: 4 inch.
3. Thickness: 0.125 inch thick.
4. Finish: Satin.
5. Length: Roll.
6. Color: as shown on drawings.

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.

3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints and butt seams tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.05 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.06 STAIR COVERINGS

A. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

3.08 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

B. Removal of existing carpet tile.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 7419 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap, removed carpet tile, and _____.

1.03 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016.

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

C. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and _____.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tile Carpeting:
   1. Tandus; ____: www.tandus.com.

2.02 MATERIALS

A. Tile Carpeting, Type as shown on drawings: Tufted, manufactured in one color dye lot.
   1. Product: Overlay Accent II manufactured by Tandus.
   2. Product: [Syllabus] manufactured by [Tandus].

3. Tile Size: 24 by 24 inch, nominal.
4. Thickness:.187 inch.
5. Color: as shown on drawings.
6. Primary Backing Material: non woven synthetic fiber.
7. Secondary Backing Material: ER3 Modular.

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, _____ color.

C. Adhesives:

D. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.

C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
   1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

A. Remove existing carpet tile.

B. Prepare floor substrates for installation of flooring in accordance with Section 09 0561.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 7733
GLASS FIBER REINFORCED PLASTIC PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Glass fiber reinforced plastic panels.

B. Trim.

1.02 REFERENCE STANDARDS

A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Samples: Submit two samples __4__by__4__ inch in size illustrating material and surface design of panels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fiber Reinforced Plastic Panels:
   1. CS Acrovyn Wall Protection
   2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PANEL SYSTEMS

A. Wall Panels:
   1. Panel Size: 4 by 12 feet.
   2. Panel Thickness: 0.10 inch.
   3. Surface Design: Suede.
   4. Color: 262 Driftwood.
   5. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

A. Panels: Glass fiber reinforced plastic (FRP), complying with ASTM D5319.
   1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.

B. Trim: Vinyl; color coordinating with panel.

C. Adhesive: Type recommended by panel manufacturer.

D. Sealant: Type recommended by panel manufacturer; white.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate flatness before starting work.

B. Verify that substrate conditions are ready to receive the work of this section.

3.02 INSTALLATION - WALLS

A. Install panels in accordance with manufacturer's instructions.

B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.

C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.

D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
E. Install panels with manufacturer's recommended gap for panel field and corner joints.
F. Place trim on panel before fastening edges, as required.
G. Fill channels in trim with sealant before attaching to panel.
H. Install trim with adhesive and screws or nails, as required.
I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, and varnishes.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:
   1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
   2. Items indicated to receive other finishes.
   3. Items indicated to remain unfinished.
   4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
   5. Floors, unless specifically indicated.
   6. Glass.
   7. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.

C. SSPC-SP 1 - Solvent Cleaning; 2015.

D. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, submit each color in each sheen available.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets

(MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Sherwin-Williams Company: www.sherwin-williams.com.

C. Transparent Finishes:
   1. Sherwin-Williams Company: www.sherwin-williams.com.

D. Stains:
   1. Sherwin-Williams Company: www.sherwin-williams.com.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Supply each paint material in quantity required to complete entire project's work from a single production run.
   3. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

2.03 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.
   3. Top Coat Sheen:
      a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
      b. Velvet: MPI gloss level 2; use this sheen at all locations.
      c. Eggshell: MPI gloss level 3; use this sheen at all locations.
      d. Satin: MPI gloss level 4; use this sheen for items subject to frequent touching by occupants, including door frames and railings.
      e. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
      f. Gloss: MPI gloss level 6; use this sheen at all locations.
   4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Paint I-OP-MD-DT - Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals and wood:
   1. Two top coats and one coat primer.
   2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.

C. Paint I-OP-MD-WC - Medium Duty Vertical and Overhead: Including gypsum board, plaster, concrete, concrete masonry units, uncoated steel, shop primed steel, galvanized steel, and aluminum.
   1. Two top coats and one coat primer.
   2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143, 144, 145, 146, 147, or 148.

D. Paint I-OP-DF - Dry Fall: Metals; exposed structure and overhead-mounted services in utilitarian spaces, including shop primed steel deck, structural steel, metal fabrications, galvanized ducts, galvanized conduit, galvanized piping, and _____.
   1. Shop primer by others.
   2. One top coat _____.
   3. Top Coat: Latex Dry Fall; MPI #118, 155, or 226.

E. Paint I-TR -W - Transparent Finish on Wood.

2.04 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. Test shop-applied primer for compatibility with subsequent cover materials.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum Wallboard: 12 percent.
2. Plaster and Stucco: 12 percent.
3. Masonry, Concrete, and Concrete Masonry Units : 12 percent.
4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Masonry:

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

H. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

I. Galvanized Surfaces:
   1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.

J. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
   3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

K. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

L. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.05 SCHEDULE - PAINT SYSTEMS

END OF SECTION

SECTION 10 2113.16
PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Plastic laminate toilet compartments.

B. Urinal and Vestibule screens.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Concealed steel support members.

B. Section 05 5000 - Metal Fabrications: Concealed steel support members.

C. Section 06 1000 - Rough Carpentry: Blocking and supports.

1.03 ADMINISTRATIVE REQUIREMENTS

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

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 3 x 3 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Plastic Laminate Toilet Compartments:
   1. Global Steel Products Corp; ____: www.globalpartitions.com.
   2. Substitutions: Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Particleboard for Core: ANSI A208.1; composed of wood chips, sawdust or flakes, made with waterproof resin binder; of grade to suit application; sanded faces.

B. Plastic Laminate: NEMA LD 3, HGS.

2.03 COMPONENTS

A. Toilet Compartments: Plastic laminate finished, floor-mounted unbraced.

B. Doors, Panels, and Pilasters: Plastic laminate adhesive and pressure bonded to faces and edges of particleboard core, with beveled corners and edges; edges of cut-outs sealed.
   1. Plastic Laminate Color: as shown on drawings, textured, low gloss finish.

C. Door and Panel Dimensions:
   1. Thickness: 1 inch.
   2. Door Width: 24 inch.
   3. Door Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 58 inch.
   5. Thickness of Pilasters: 1-1/4 inch.

D. Urinal Screens: Wall mounted with two panel brackets, and floor-to-ceiling vertical upright consisting of pilaster anchored to floor and ceiling.

2.04 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with polished finish, 3 inches high, concealing floor fastenings.

1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
2. Provide ceiling attachment using two adjustable hanging studs, attached to above-ceiling framing.

B. Head Rails: Hollow chrome plated steel tube, 1 x 1-5/8 inch size, with anti-grip strips and cast socket wall brackets.

C. Wall and Pilaster Brackets: Polished stainless steel.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.

E. Hardware: Polished stainless steel:
1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
2. Thumb turn door latch with exterior emergency access feature.
3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
4. Coat hook with rubber bumper; one per compartment, mounted on door.
5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid plastic toilet compartments.

B. Urinal and vestibule screens.

1.02 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel Framing: Concealed steel support members.

B. Section 05 5000 - Metal Fabrications: Concealed steel support members.

C. Section 06 1000 - Rough Carpentry: Blocking and supports.

1.03 REFERENCE STANDARDS

A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

C. Product Data: Provide data on panel construction, hardware, and accessories.

D. Samples: Submit two samples of partition panels, 3 by 3 inch in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Solid Plastic Toilet Compartments:
   1. Scranton Products (Santana/Comtec/Capital); Hiny Hiders: www.scrantonproducts.com.
   2. Substitutions: Section 01 6000 - Product Requirements.

2.02 SOLID PLASTIC TOILET COMPARTMENTS

A. Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286, floor-mounted unbraced.
   1. Color: as shown on drawings.

B. Doors:
   1. Thickness: 1 inch.
   2. Width: 24 inch.
   3. Width for Handicapped Use: 36 inch, out-swinging.
   4. Height: 55 inch.

C. Panels:
   1. Thickness: 1 inch.
   2. Height: 55 inch.

D. Pilasters:
   1. Thickness: 1 inch.
   2. Width: As required to fit space; minimum 3 inch.

E. Screens: Without doors; to match compartments; mounted to wall with two panel brackets.

2.03 ACCESSORIES

A. Pilaster Shoes: Formed chromed steel with polished finish, 3 in high, concealing floor fastenings.

B. Pilaster Brackets: Polished stainless steel.

C. Wall Brackets: Continuous type, polished stainless steel.

D. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.

E. Hardware: Polished stainless steel:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 12 2113
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Horizontal slat louver blinds.

B. Operating hardware.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.03 REFERENCE STANDARDS

A. WCMA A100.1 - Safety of Corded Window Covering Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating physical and dimensional characteristics.

C. Shop Drawings: Indicate opening sizes, tolerances required, method of attachment, clearances, and operation.

D. Samples: Submit two samples, 6 inch long illustrating slat materials and finish, cord type and color.

E. Manufacturer's Installation Instructions: Indicate special procedures.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Blind Assemblies: One of each size.
   3. Extra Slats: 20 of each type and size.

1.05 QUALITY ASSURANCE

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Horizontal Louver Blinds Without Side Guides:
   1. Bali.

2.02 BLINDS WITHOUT SIDE GUIDES

A. Description: Horizontal slat louvers hung from full-width headrail with full-width bottom rail.

B. Manual Operation: Control of raising and lowering by cord with full range locking; blade angle adjustable by control wand.

C. Metal Slats: Spring tempered pre-finished aluminum; square slat corners, with manufacturing burrs removed.
   1. Width: 1/2 inch.
   2. Thickness: 0.008 inch.
   3. Color: As indicated on drawings.

D. Slat Support: Woven polypropylene cord, ladder configuration.

E. Head Rail: Pre-finished, formed aluminum box, with end caps; internally fitted with hardware, pulleys, and bearings for operation; same depth as width of slats.
   1. Color: Same as slats.

F. Bottom Rail: Pre-finished, formed PVC with top side shaped to match slat curvature; with end caps.

1. Color: Same as headrail.

G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
   1. Free end weighted.
   2. Color: As selected by Architect.

H. Control Wand: Extruded hollow plastic; hexagonal shape.
   1. Non-removable type.
   2. Length of window opening height less 3 inch.
   3. Color: Clear.

I. Headrail Attachment: Wall brackets.

J. Accessory Hardware: Type recommended by blind manufacturer.

2.03 FABRICATION

A. Determine sizes by field measurement.

B. Fabricate blinds to cover window frames completely.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that openings are ready to receive the work.

3.02 INSTALLATION

A. Install blinds in accordance with manufacturer's instructions.

B. Secure in place with flush countersunk fasteners.

3.03 TOLERANCES

A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.

B. Maximum Offset From Level: 1/8 inch.

3.04 ADJUSTING

A. Adjust blinds for smooth operation.

3.05 CLEANING

A. Clean blind surfaces just prior to occupancy.

END OF SECTION

SECTION 21 13 13
WET PIPE SPRINKLER SYSTEM

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

C. Refer to Section 21 00 00 for integral requirements.

1.02 SCOPE

A. Scope of the work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. The scope and work shall include the complete flushing of the fire protection piping and providing treatment for MIC (Microbiologically Influenced Corrosion). The initial system fill shall be with treated water, biocides and corrosion inhibitors.

C. The Fire Protection Contractor shall provide the Owner with a periodic plan for the testing of the system’s water.

1.03 REGULATORY CODES

A. Work in accordance with:

1. NFPA.
2. Local municipal codes that have jurisdiction.

B. Products in accordance with:

1. United Laboratories (UL) listed.
2. Factory Mutual (FM) approved.

1.04 CERTIFICATE OF TESTING

A. Furnish Owner with test certificate certifying the system approved by:

1. City Fire Marshall.
2. Insurance Services Officials

PART 2 - PRODUCTS

2.01 FIRE SPRINKLER SYSTEM

A. GENERAL:

1. Work Included:
   a. Design, coordination and installation of inside and outside piping, including sprinkler heads, valves, hangers and supports sleeves.
   b. The sprinkler system is a wet type and is designed to provide coverage

for entire building. The Contract Drawings indicate the extent and general arrangement, and the various occupancy classifications.

c. Sprinkler heads are not shown.

d. The plans provide a preliminary layout with riser assembly location, flow switch locations, valve locations, and fire department Siamese connections. These are a guide for subsequent preparation of the Contractor's detailed working drawings.

e. Interface system with building fire and smoke alarm system.

2. Quality Assurance: Equipment and installation to meet requirements of NFPA Number 13, latest edition and local authority having jurisdiction. All components of the completed system shall be UL listed for the intended service.

2.02 SUBMITTALS:

A. Submit shop drawings in accordance with Section 22 02 00.

B. Submit preliminary layout showing only head locations for review by Architect/Engineer. Furnish additional heads which may be required for coordinated ceiling pattern without added cost, even though number of heads may exceed minimum code requirements.

C. Submit shop drawings of entire sprinkler system including hydraulic calculations to Architect/Engineer.

D. Provide Architect with six complete sets of final approved shop drawings before starting the installation. Include details of the sprinkler system showing sections, light fixtures, air conditioning, ducts, and a plan giving fire department connections, location of all exposed structures within twenty feet of this structure, and other equipment to be used. Drawings shall bear the stamp of review of the local fire insurance rating organization having jurisdiction.

E. Service Utility Diagram: Furnish Architect with an accurately marked print showing location of underground pipes and valves as installed upon completion of underground Work.

F. Provide a printed sheet giving brief instructions relative to all necessary aspects of sprinkler controls and emergency procedures next to sprinkler riser mains. Instruction sheet to be protected by glass or a transparent plastic cover.

G. Materials:

1. Piping:

a. All piping above grade shall be:
- schedule 10 black steel pipe with a rolled groove ends, joined with mechanical coupling and cut groove cast iron fittings for pipe 2-1/2” and greater.
- schedule 40 black steel threaded pipe and fittings for pipe 2” and smaller.

b. Acceptable manufacturer:
- American Tube
- Wheatland Tube
- Gem Sprinkler

c. Acceptable mechanical coupling manufacturer:
- Victaulic
- Grinnell
- Reliable
- Gruvlok

2. Sprinkler Heads:
   a. Suspended Ceiling Type: Standard Concealed pendant type with white cover plate.
   b. Exposed Area Type: Standard upright type with brass finish.
   c. Sidewall Type: Chrome plated finish with matching escutcheon.
   d. Temperature rating on fusible links to suit specific hazard area with minimum margin or safety 50 degrees F.
   e. Sprinkler heads of the “O”-ring seal type are not acceptable.
   f. In natatoriums and pool equipment rooms provide chrome plated or wax coated heads for corrosive environments.
   g. Flexible type sprinkler head connection systems are not acceptable.
   h. Acceptable manufacturer:
      - Reliable
      - Grinnell
      - Viking
3. Sprinkler Alarm Valve:
   a. Provide approved automatic sprinkler valve with one or two pole (as required) flow detectors, pressure switch, [outside water motor gong], [outside electric gongs], and inside electric gong and circuit breaker.
   b. Acceptable manufacturer:
      - Reliable
      - Grinnell
      - Viking
4. Valves:
   a. 2” and smaller: bronze, rising stem, inside screw, solid wedge, U.L. listed valve.
   b. 2-1/2” and larger: iron body, bronze trim, rising stem, OS&Y, solid wedge, U.L. listed valve.
   c. Check valve: cast iron flanged body, bronze fitted, non-slam type.
   d. Install valves with stems upright or horizontal, not inverted.
   e. Acceptable manufacturer:
      - Nibco
      - Grinnell
      - Stockham
      - Victaulic
5. Fire Department Connection: Refer to Section 21 00 00.
6. Insulation:
   a. All piping and valves exposed to the weather or within building and exposed to the weather shall be insulated with Phenolic foam with ASJ and all joints sealed. Insulation density shall not be less than 1.5 pounds per cubic foot, and conductivity (K) not higher than 0.25 and 75°F mean temperature difference, with factory applied all weather vapor barrier jacket.
   b. All insulated pipe and valves subject to damage shall be protected with an aluminum jacket with sealed joints.
   c. Refer to Section 22 07 19 for detailed specification.
7. Products:
   a. All piping, fitting, equipment, sprinkler heads, and valves shall be by a domestic manufacturer.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturer’s recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans

or in the specifications. Provide all items as required by NFPA and installed as per manufacturer's recommendations.

3.03 DESIGN

A. Design spacing of sprinkler heads and selection sizes shall conform to the requirement of NFPA 13 for the indicated occupancy.

B. Uniform discharge density design shall be based on hydraulic calculations utilizing the method outlined in NFPA 13. Density of discharge from sprinkler heads shall conform to NFPA 13.

C. Friction losses in pipe will be based on a value of "C" =120 in the Hazen - Williams formula.

D. Design and install the system so that no part will interfere with doors, windows, heating, plumbing, or electrical equipment. Do not locate sprinkler heads within 6 inches of lighting fixtures, HVAC diffusers and other obstructions. Sprinkler piping cannot penetrate ductwork or lighting fixtures.

E. The Contractor shall conform to the National Fire Protection Association's Fire Code No. 13, latest edition. Special attention shall be given to Article 1-9, working plans. It shall be the Registered Fire Protection Engineer's responsibility to determine if any deficiency or deviations, such as an inadequate water supply, or any other item which would materially affect the acceptability of the system.

3.04 INSTALLATION

A. Install all items in accordance with applicable codes.

B. Install piping so that mains and branches are not located directly underneath HVAC equipment or other items needing access.

C. All sprinkler heads shall be located as near the center of ceiling tiles as is practical (±1/2"). Location shall present a uniform pattern with all heads aligned when completely installed.

D. Run piping concealed above furred ceilings and in joists to minimize obstructions. Expose only heads. Exact routing of piping shall be approved by Architect or relocated as required at no additional cost to Owner.

E. Wire guards on all pendant or upright sprinklers heads in mechanical rooms, gymnasiums, athletic areas, wood and metal shops.

F. Protect sprinkler heads against mechanical injury with standard guards.

G. Locate outside alarms on wall of building adjacent to siamese fire department connection.

H. Provide on wall near sprinkler valve, cabinet containing four extra sprinkler heads of each type and wrench suitable for each head type.

I. Provide 1 inch diameter nipple and 1 inch x 1/2 inch reducing fitting for each upright head.

J. Painting shall be as follows:

1. Exposed sprinkler riser, alarm valve and all related piping shall be painted red.
2. Exposed sprinkler piping in finished areas shall be painted as directed by Architect.

3.05 REPLACEMENT

Upon receipt of written notice of failure of any part of the guaranteed equipment during the guaranteed period, the Contractor will replace the affected part or parts promptly at no additional cost.

3.06 TESTING

A. Prior to testing, the entire sprinkler system shall be thoroughly flushed clean.

B. Upon completion of the installation and flushing, test the system and obtain approval of the local fire insurance rating organization having jurisdiction. Particular attention is called to the requirements of NFPA 13 pamphlet.

3.07 TRAINING

A. Owner's people shall be fully briefed in the normal start-up of the system, operation, normal and emergency shutdown, and maintenance of the system.

B. Routine maintenance, yearly maintenance, winterization, and spring start-up shall be fully discussed and documented.

C. Names of those instructed and dates, as well as a list of information handed over to the owner, shall be included in the final report.

END OF SECTION

SECTION 22 02 00
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect, expressed in writing, is equal to that specified.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Mechanical (HVAC) and Plumbing items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the

discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. The Contractor shall participate in the commissioning process as required. Including, but not limited to meeting attendance, completion of checklists and participation in functional testing.

1.03 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

B. All piping or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for approval.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the contractor at no additional cost to the owner.

D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.04 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.05 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting are included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to Plumbing systems.

C. Furnishing and installing all required Plumbing equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.06 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.07 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division 01 for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or valves properly protected from incidental damage and weather damage.

C. Damaged equipment, valves or pipe shall be promptly removed from the site and new, undamaged equipment, pipe and valves shall be installed in its place promptly with no additional charge to the Owner.

1.09 NOISE AND VIBRATION

A. The pumping systems and the component parts there of, shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the Building structure, piping and other items.

C. Carefully fabricate pipe and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 APPLICABLE CODES

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements of the following nationally accepted codes and standards:

1. American Society of Plumbing Engineers, ASPE.
2. American Standards Association, ASA.
3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
4. American Society of Mechanical Engineers, ASME.
5. American Society of Plumbing Engineers, ASPE.
6. American Society of Testing Materials, ASTM.
7. American Water Works Association, AWWA.
8. National Fire Protection Association, NFPA.
9. Underwriters' Laboratories, Inc., UL.
10. International Energy Conservation Code, IECC.

D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.

E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 01.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity firm engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are

frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 2009 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equal capacity, construction, and performance. However, under no circumstances shall any substitution by made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUAL" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUAL"

product, material or method may be used if it complies with the specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical and Plumbing Design Documents and all other trades, including Division 26.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected subcontractors shall be the responsibility of this bidder and not the owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with above and if accepted, will issue a letter allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades and pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.13 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations

have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.

4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 01 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:

1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.
4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked

revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.

5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not limited to, the following items:

1. Basic Materials.
2. Plumbing Fixture and Valves.
3. Support and Couriers.
4. Floor Drain, Roof Drain and Cleanouts.
5. Interceptors/Traps (All Types).
6. Water Heaters
7. Water Softeners.
8. Water Treatment.
9. Domestic Water Booster Pumps.
10. Fire Pumps and Jockey Pumps.
11. Fire Pump Controllers
12. Backflow Preventers.
13. Plumbing Piping.
14. Expansion Compensation.
15. Variable Frequency Drives.
16. Noise and Vibration Controls.
17. Portable Pipe Hanger and Equipment Supports.
18. Plumbing Specialties.
19. Water Filters.
20. Test, Adjust and Balance Reports.
21. Testing, Adjusting and Balancing Contractor Qualifications.
22. Coordination Drawings.

I. Refer to Division 26 sections for additional shop drawing requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of pipe, equipment, and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances for installing and maintaining insulation.
   c. Locations of light fixtures and sprinkler heads.
   d. Clearances for servicing and maintaining equipment, including tube removal and space for equipment disassembly required for periodic maintenance.
   e. Equipment connections and support details.
   f. Exterior wall and foundation penetrations.
   g. Routing of storm, sanitary sewer piping and plumbing piping.
   h. Fire-rated wall and floor penetrations.
   i. Sizes and location of required concrete pads and bases.
   j. Valve stem movement.
   k. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 23, indicate the following installed conditions:

1. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
3. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
4. Contract Modifications, actual equipment and materials installed.

B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

C. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

D. Refer to Division 01 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

E. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

F. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

G. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY:_____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY:_____
(SIGNATURE)

1.16 OPERATING MANUALS

A. Prepare maintenance manuals in accordance with Division 01 and in addition to the requirements specified in Division 01, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.17 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 22.

1.18 MAINTENANCE MANUALS

A. Coordinate with Division 01 for maintenance manual requirements, unless noted otherwise bind together in “D ring type” binders by National model no. 79-883 or equal, binders shall be large enough to allow ¼” of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Plumbing Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 22 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 22, include the following information for equipment items:

1. Identifying names, name tags designations and locations for all equipment.
2. Valve tag lists with valve number, type, color coding, location and function.
3. Reviewed shop drawing submittals with exceptions noted compliance letter.
4. Fabrication drawings.
5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as

applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.

6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
8. Equipment and motor name plate data.
9. Wiring diagrams.
10. Exploded parts views and parts lists for all equipment and devices.
11. Color coding charts for all painted equipment and conduit.
12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.19 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of on site training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 22 Sections for additional Operator Training requirements.

1.20 FINAL COMPLETION

A. At the completion of the work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 26 for additional requirements.

B. Clean and adjust all valves and operational devices and replace faulty parts immediately prior to final acceptance.

C. Touch up and/or refinish all scratched equipment and devices immediately prior to final acceptance.

1.21 CONTRACTOR'S GUARANTEE

A. Use of the Plumbing systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing and if granted shall not be cause warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after its completion and final acceptance, and shall furnish free of additional cost to the Owner all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of issue of Substantial Completion, Beneficial Occupancy by the Owner or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing equipment except as required by testing, adjusting and balancing.

D. All air compressors shall have parts and labor guarantees for a period of not less than 5 years beyond the date of final acceptance.

E. Refer to Sections in Division 22 for additional guarantee or warranty requirements.

1.22 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.
It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.
If the client, Architect/Owner, or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

F. At the Architect/Owner's request, Engineer will prepare one "CD" of electronic media to assist the contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/Owner for distribution to the contractor. All copies of the "CD" will be reproduced for a cost of reproduction fee of Five Hundred Dollars ($500.00) per "CD".
The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

G. This Five Hundred Dollars ($500.00) per "CD" cost of reproduction will be paid directly from the Contractor to the Engineer. The "CD" will be prepared only after receipt of the Five Hundred Dollars ($500.00). The Five Hundred Dollars ($500.00) per "CD" cost of reproduction is to only recover the cost of the man-hours necessary to reproduce the documents. It is not a contractual agreement between the Contractor and Engineer to provide any engineering services, nor any other service.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer.

B. Access Doors: Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.

C. All access panels located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.

D. Access Doors: shall be as follows:

1. Plastic Surfaces: Milcor Style K.
2. Ceramic Tile Surface: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

PART 3 - EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in Divisions 21 through 22 for additional rough-in requirements.

3.02 PLUMBING INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of plumbing and fire systems, materials, and equipment. Comply with the following requirements:

1. Coordinate plumbing systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for plumbing installations.

4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of plumbing materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of plumbing systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and route proposed solution to the Architect for review.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
11. Install access panel or doors where valves and equipment are concealed behind finished surfaces. Access panels and doors are specified.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curb to match roof slope. Refer to architectural drawings and details.
14. The equipment to be furnished under this Specification shall be essentially the standard product of the manufacturer. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.
15. The architectural and structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Plumbing Equipment:
    a. Plumbing equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Shop drawings shall include dimensions and lettering format for approval. Attachments shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-

built" drawings.

3.03 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of plumbing equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Section "DEFINITIONS" for definition of "Installer."

C. Cut, remove and legally dispose of selected plumbing equipment, components, and materials as indicated, including but not limited to removal of plumbing piping, equipment, plumbing fixtures and trim, and other plumbing items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.04 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:

1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems will have to be maintained in service within the occupied spaces of the existing building.

3.05 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to the existing piping, duct, equipment and other apparatus related to this phase of the work. However, this Contractor shall be

responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by his contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be apart of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During the construction and remodeling, portions of the Project shall remain in service. Construction equipment, material tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility or be so conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition phase of construction may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the working occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the owner's property. Repair, patch or replace as required any damage that might occur as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Corporate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment and plumbing fixtures as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, ventilation and plumbing services for the existing areas with a minimum of interruption.

J. All existing plumbing fixtures, pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical, plumbing and owner's equipment, etc., which is to remain but which is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

M. Refer to Architectural "Demolition and/or Alteration" plans for actual location of walls, ceiling, etc., being removed and/or remodeled.

END OF SECTION

SECTION 22 05 29
HANGERS AND SUPPORT FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Pipe, and equipment hangers, supports, and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.02 RELATED WORK

A. Section 22 05 29 – Hangers and Support for Plumbing Piping and Equipment.

B. Section 22 07 19 – Plumbing Piping Insulation.

C. Section 22 07 16 – Plumbing Equipment Insulation.

D. Section 21 00 00 - Fire Protection and 21 13 13 Wet Pipe Sprinkler System.

E. Section 22 10 00 - Plumbing System.

F. Section 23 21 13 – Above Ground Hydronic Piping.

G. Section 23 23 00 – Refrigerant Piping

1.03 REFERENCES

A. ANSI/ASME B31.1 - Power Piping.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.04 QUALITY ASSURANCE

A. Supports for Sprinkler Piping: In conformance with NFPA 13.

B. Supports for Standpipes: In conformance with NFPA 14.

1.05 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 to 4 Inches Carbon steel, adjustable, clevis.

C. Hangers for Pipe Sizes 6 Inches and Over: Adjustable steel yoke, cast iron roll, double hanger.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for pipe sizes 6 inches and over.

E. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 Inches and Over: adjustable steel yoke and cast iron roll.

G. Vertical Support: Steel riser clamp.

H. Floor Support for Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

I. Floor Support for Pipe Sizes 6 Inches and Over: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

J. Roof Pipe Supports and Hangers: Galvanized Steel Channel System as manufactured by Portable Pipe Hangers, Inc. or approved equal.

For pipes 2-1/2" and smaller – Type PP10 with roller
For pipes 3" through 8" – Type PS
For multiple pipes – Type PSE - Custom

K. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut "Cush-A-Clamp" or equal. Hangers: Plastic coated; Unistrut or equal.

L. For installation of protective shields refer to specification section 22 07 19 -3.03.

M. Shields for Vertical Copper Pipe Risers: Sheet lead.

N. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief "Pipe Titan" hold rite or equal.

2.02 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.03 INSERTS

A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb./sq. ft. sheet lead for waterproofing; 1 lb./sq. ft. sheet lead for soundproofing.

C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/architect for type of flashing on metal roofs.

2.05 EQUIPMENT CURBS

A. Fabricate curbs of hot dipped galvanized steel.

2.06 SLEEVES

A. Sleeves for Pipes Through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, schedule 40.

C. Sleeves for Pipes Through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Form with galvanized steel.

E. Sleeves for Rectangular Ductwork: Form with galvanized steel.

F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.

G. Caulk: Paintable 25-year acrylic sealant.

H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.07 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.08 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with structural engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with structural engineer prior to start of work.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Steel Pipe)		
1/2 to 1-1/4 inch	7’-0”	3/8"
1-1/2 to 3 inch	10'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"
3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"
(Cast Iron)		
2 to 3 inch	5'-0"	3/8"
4 to 6 inch	10'-0"	1/2"
8 to 10 inch	10'-0"	5/8"
12 to 14 inch	10'-0"	3/4"
15 inch and over	10'-0"	7/8"
(PVC Pipe)		
1-1/2 to 4 inch	4'-0"	3/8"
6 to 8 inch	4'-0"	1/2"
10 and over	4'-0"	5/8"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow and at the vertical horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support horizontal cast iron pipe adjacent to each hub, with 5 feet maximum spacing between hangers.

F. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

J. Portable pipe hanger systems shall be installed per manufactures instructions.

3.03 Insulated Piping: Comply with the following installation requirements.

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

D. Piping 2” and larger provide galvanized sheet metal shields with calcium silicate at hangers/supports.

E. Insert material shall be at least as long as the protective shield.

F. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.04 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor shower mop sink and all other drains watertight to adjacent materials.

E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact architect for all flashing details and roof construction. Seal penetrations watertight.

3.06 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION

SECTION 22 05 48
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Vibration and sound control products.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of Contract including General and Supplementary Conditions and Division One specification sections, apply to work of this section

B. This section is Division-22 Basic Materials and Methods section, and is part of each Division-22 section making reference to vibration control products specified herein.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products, of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Vibration and sound control products shall conform to ASHRAE criteria for average noise criteria curves for all equipment at full load conditions.

C. Except as otherwise indicated, sound and vibration control products shall be provided by a single manufacturer.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Amber/Booth Company, Inc.

B. Mason Industries, Inc.

C. Noise Control, Inc.

2.02 GENERAL

A. Provide vibration isolation supports for equipment, piping and ductwork, to prevent transmission of vibration and noise to the building structures that may cause discomfort to the occupants.

B. Model numbers of Amber/Booth products are included for identification. Products of the additional manufacturers will be acceptable provided they comply with all of the requirements of this specification.

2.03 BASE MOUNTED PUMPS

A. Amber/Booth type SP-NR style E flexplate pad isolators consisting of two layers of 3/8'' thick alternate ribbed neoprene pad bonded to a 16 gage galvanized steel separator plate.

B. Pads shall be sized for approximately 40 PSI loading and 1/8'' deflection.

2.04 PIPING

A. Furnish line size flexible connectors at supply and return of pumps, amber/booth style 2800 single sphere EPDM construction, connector shall include 150 lb. cadmium plated carbon steel floating flanges.

2.05 CORROSION PROTECTION

A. All vibration isolators shall be designed and treated for resistance to corrosion.

B. Steel components: PVC coated or phosphated and painted with industrial grade enamel. Nuts, bolts, and washers: zinc-electroplated.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturers recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 The vibration isolation supplier shall certify in writing that he has inspected the installation and that all external isolation materials and devices are installed correctly and functioning properly.

END OF SECTION

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.03 Refer to Architectural Sections for additional requirements.

PART 2 - PRODUCTS

2.01 VALVE AND PIPE IDENTIFICATION

A. Valves:

1. All valves shall be identified with a 1-1/2" diameter brass disc wired onto the handle. The disc shall be stamped with 1/2" high depressed black filled identifying numbers. These numbers shall be numerically sequenced for all valves on the job.
2. The number and description indicating make, size, model number and service of each valve shall be listed in proper operational sequence, properly typewritten. Three copies to be turned over to Owner at completion.
3. Tags shall be fastened with approved meter seal and 4 ply 0.018 smooth copper wire. Tags and fastenings shall be manufactured by the Seton Name Plate Company or approved equal.
4. All valves shall be numbered serially with all valves of any one system and/or trade grouped together.

B. Pipe Marking:

1. All interior visible piping located in accessible spaces such as above accessible ceilings, equipment rooms, attic space, under floor spaces, etc., shall be identified with all temperature pipe markers as manufactured by W.H. Brady Company, 431 West Rock Ave., New Haven, Connecticut, or approved equal.
2. All exterior visible piping shall be identified with UV and acid resistant outdoor grade acrylic plastic markers as manufactured by Set Mark distributed by Seton nameplate company. Factory location 20 Thompson Road, Branford, Connecticut, or approved equal.
3. Generally, markers shall be located on each side of each partition, on each side of each tee, on each side of each valve and/or valve group, on each side of each piece of equipment, and, for straight runs, at equally spaced intervals not to exceed 75 feet. In congested area, marks shall be placed on each pipe at the points where it enters and leaves the area and at the point of connection of each piece of equipment and automatic control valve. All markers shall have directional arrows.

4. Markers shall be installed after final painting of all piping and equipment and in such a manner that they are visible from the normal maintenance position. Manufacturer's installation instructions shall be closely followed.
5. Markers shall be colored as indicated below per ANSI/OSHA Standards:

SYSTEM	COLOR	LEGEND
Sanitary Sewer	Green	Vent Sanitary Sewer
Storm Drain	Green	Storm Drain
Domestic Water	Green	Domestic Water
Domestic Hot Water Supply	Yellow	Domestic Hot Water Supply
Domestic Hot Water Recirculating	Yellow	Domestic Hot Water Return
Fire Protection	Red	Fire Protection
Automatic Sprinkler	Red	Fire Sprinkler
Gas	Yellow	Natural Gas
Compressed Air	Blue	Compressed Air
Oxygen	Yellow	Oxygen
Nitrogen	Green	Nitrogen
Deionized Water	Green	Deionized Water

C. Pipe Painting:

1. All piping exposed to view shall be painted as indicated or as directed by the Architect in the field. Confirm all color selections with Architect prior to installation.
2. The entire fire protection piping system shall be painted red.
3. All piping located in mechanical rooms and exterior piping shall be painted as indicated below:

System	Color
Storm Sewer	White
Sanitary Sewer Waste and Vent	Light Gray
Domestic Cold Water	Dark Blue
Domestic Hot Water Supply and Return	Orange

PART 3 - EXECUTION

3.01 All labeling equipment shall be installed as per manufacturers printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractor’s price shall include all items required as per manufacturers' requirements.

3.03 All piping shall be cleaned of rust, dirt, oil and all other contaminants prior to painting. Install primer and a quality latex paint over all surfaces of pipe.

END OF SECTION

SECTION 22 07 19
PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. Furnish and install piping insulation to:

1. Interior domestic hot and cold water piping.
2. Exterior domestic cold water piping.
3. Drain bodies and horizontal downspouts.
4. Condensate drainage piping.
5. All pipes subject to freezing conditions shall be insulated.

C. Work specified elsewhere.

1. Painting.
2. Pipe hangers and supports.

D. For insulation purpose piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer well, unions, reducing stations, and orifice assemblies.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver undamaged materials in the manufacturer's unopened containers. Containers shall be clearly labeled with the insulation's flame and smoke ratings.

PART 2 - PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved prior to installation.

2.03 A sample quantity of each type of insulation and each type application shall be installed and approval secured prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.05 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.06 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

2.07 APPROVED MANUFACTURERS

A. Calcium silicate materials shall be as manufactured by Johns Manville.

B. Glass fiber materials shall be as manufactured by Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

C. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armstrong, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

D. Armaflex elastomeric cellular thermal insulation by Armstrong.

E. Phenolic foam insulation shall be as manufactured by Kooltherm Insulation (Koolphen).

F. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products.

2.08 MATERIALS

A. INTERIOR DOMESTIC WATER PIPE: provide fiberglass pipe insulation with all service jackets with self sealing lap joint.

B. EXTERIOR DOMESTIC WATER PIPE: Provide elastomeric cellular thermal, or preformed phenolic foam pipe insulation with secured metal jacketing.

C. DRAIN BODIES AND DOWN SPOUTS: Insulate horizontal roof drain down spouts, underside of roof drain bodies, chilled water waste lines from drinking fountain to junction with main waste stacks, and branch lines including traps and exposed underside of floor drains receiving cooling coil condensate, same as water piping where exposed to building occupant view. When concealed, insulation may be same as specified for external duct wrap.

D. CONDENSATE DRAINAGE PIPING: Fire resistant fiberglass insulation; insulation not required when piping is exposed on roof.

E. METAL JACKETING: Utilize Childers “Strap-On” jacketing. Provide preformed fitting covers for all elbows and tees.

PART 3 - EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturers’ recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturers requirements.

3.03 Pipes located outdoors or in tunnels shall be insulated same as concealed piping; and in addition shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

3.04 All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

3.05 WATER PIPE INSULATION INSTALLATION

A. The insulation shall be applied to clean, dry pipes with all joints firmly butted together. Where piping is interrupted by fittings, flanges, valves or hangers and at intervals not to exceed 25 feet on straight runs, an isolating seal shall be formed between the vapor barrier jacket and the bare pipe. The seal shall be by the applications of adhesive to the exposed insulation joint faces, carried continuously down to and along 4 inches of pipe and up to and along 2 inches of jacket.

B. Pipe fittings and valves shall be insulated with pre-molded or shop fabricated glass fiber covers finished with two brush coats of vapor barrier mastic reinforced with glass fabric.

C. All under lap surfaces shall be clean and free of dust, etc. before the SSL is sealed. These laps shall be firmly rubbed to insure a positive seal. A brush coat of vapor retarder shall be applied to all edges of the vapor barrier jacket.

D. At hangers and supports, provide a high density foam insulation insert that extends 2”

beyond the shield on each side and a protective shield/saddle to prevent compression/damage. Secure shield/saddle to insulation using mastic or strapping tape.

3.06 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe.

B. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

PART 4 - SCHEDULES

4.01 LOW TEMPERATURE SURFACES	**MINIMUM INSULATION THICKNESS BASED ON FIBERGLASS**
A. Exposed exterior domestic water pipe:	1½ inch
B. Interior domestic cold water pipe:	1 inch
C. Condensate drain lines:	¾ inch
D. Drains receiving condensate:	1 inch
E. Concealed horizontal leader from roof drain:	1½ inch blanket wrap
Exposed horizontal leader from roof drain:	1 inch thick rigid with all service jackets

4.02 HIGH TEMPERATURE SURFACES	**MINIMUM INSULATION THICKNESS**
A. Hot Water Piping:	
1. Operating temperature 105°F or less:	1 inch
2. Operating temperature higher than 105°F and pipe size 1½ inch or smaller	1 inch
3. Operating temperature higher than 105°F and pipe size more than 1½ inch	2 inch
B. Domestic Hot Water and Hot Water Circulating Piping	1 inch

END OF SECTION

SECTION 22 10 00
PLUMBING PIPING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe and pipe fittings.

B. Valves.

C. Sanitary sewer piping system.

D. Domestic water piping system.

E. Excavation and backfill.

1.02 RELATED SECTIONS

A. Section 22 05 29 – Hangers and Support for Plumbing Piping and Equipment.

B. Section 22 05 48 – Vibration and Seismic Controls for Plumbing Piping.

C. Section 22 05 53 – Identification for Plumbing Piping and Equipment.

D. Section 22 07 19 – Plumbing Piping Insulation.

E. Section 22 11 19 - Plumbing Specialties.

F. Section 22 30 00 - Plumbing Equipment.

G. Section 22 40 00 - Plumbing Fixtures.

1.03 REFERENCES

A. ANSI B31.1 - Power Piping.

B. ANSI B31.9 - Building Service Piping.

C. ASME - Boiler and Pressure Vessel Code.

D. ASME Sec. 9 - Welding and Brazing Qualifications.

E. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.

F. ASME B16.3 - Malleable Iron Threaded Fittings.

G. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250.

H. ASME B16.22 - Wrought Copper and Bronze Solder-Joint Pressure Fittings

I. ASTM A47 - Ferritic Malleable Iron Castings.

J. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

K. ASTM A74 - Cast Iron Soil Pipe and Fittings.

L. ASTM B32 - Solder Metal.

M. ASTM B42 - Seamless Copper Pipe.

N. ASTM B306 - Copper Drainage Tube (DWV).

O. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.

P. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).

Q. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

R. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

S. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

T. ASTM D2846 - Chlorinated Polyvinyl Chloride (CPVC) Pipe, Fittings, Solvent Cements and Adhesives for Potable Hot Water Systems.

U. ASTM F493 - Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

V. AWWA C111- Rubber-Gasket Joints for Ductile Iron and Gray-Iron Pressure Pipe and Fittings.

W. AWWA C651 - Disinfecting Water Mains.

X. CISPI 301 - Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.

Y. CISPI 310 - Joints for Hubless Cast Iron Sanitary Systems.

Z. ASSE 1003 Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems.

1.04 SUBMITTALS

A. Submit under provisions of Division One.

B. Product Data: Provide data on pipe materials, Pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of valves.

1.06 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.07 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating cast or marked on valve body.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with ASME Sec 9.

D. Foreign pipe, fittings or valves are unacceptable. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and shall be listed by NSF International.

E. Piping shall be labeled along entire length indicating size, class, material specification, manufacturers name and country of origin.

1.08 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum 5 years documented experience and must be a domestic manufacturer.

B. Installer: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.09 REGULATORY REQUIREMENTS

A. Perform Work in accordance with plumbing and building codes having jurisdiction.

B. Conform to applicable codes for the provision and installation of all required backflow prevention devices.

C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

D. No PVC pipe or fittings will be allowed for any areas where pipe is to penetrate a fire rated assembly or to be installed in a return air plenum unless the entire length of all such piping is encased within a minimum 2 hour fire rated enclosure.

E. Provide pressure regulating valve, maintaining 50 to 55 psi building service pressure, when supply pressure at building is greater than 70 psi.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division One.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Provide temporary protective coating on cast iron and steel valves.

D. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Tape will not be allowed as an acceptable end cover.

1.11 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two repacking kits for each size valve.

PART 2 - PRODUCTS

2.01 SANITARY SOIL, WASTE AND VENT PIPING, WITHIN BUILDING, ABOVE GRADE

A. Cast Iron Pipe: CISPI 301 or ASTM A 888, hubless, service weight.

1. Fittings: Cast iron, CISPI 301 or ASTM A 888 drainage pattern.
2. Joints: No hub, ASTM C 564 neoprene gaskets with ASTM C1540 wide bodied stainless steel clamp and solid shield assembly constructed of type 300 series stainless steel. Couplings shall have four clamps for pipe sizes up to and including 4” and shall have six clamps for pipe sizes over 4” through 10”. Clamp assemblies shall conform to FM 1680 where required by the administrative authority.

2.02 DOMESTIC WATER PIPING, WITHIN BUILDING, ABOVE GRADE

A. Copper Tubing: ASTM B 88, Type L, hard drawn.

1. Fittings: ASME B 16.18, cast bronze, or ASTM B 16.22 wrought copper alloy.
2. Joints: ASTM B 32, solder.

2.03 FLANGES, UNIONS AND COUPLINGS

A. Pipe size 2 inches and under:

1. Ferrous pipe: ANSI B16.39, 150 psig malleable iron threaded unions.
2. Copper tube and pipe: 150 psig bronze unions with soldered ends.
3. Ferrous pipe: ANSI B16.5, 150 psig forged steel flanges; screwed neck, 1/16" thick preformed neoprene gaskets.

B. Pipe size 2-1/2 inches and larger:

1. Ferrous pipe: 150 psig forged steel slip-on flanges; weld neck, 1/16" thick preformed neoprene gaskets.
2. Copper tube and pipe: 150 psig slip-on bronze flanges; 1/16" thick preformed neoprene gaskets.

C. Dielectric Connections:

1. Pipe size 2 inches and under: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
2. Pipe size 2-1/2 inch and larger: flange, connection as above, with water impervious isolation barrier.
3. Pipe sizes 1 inch to 8 inches: Dielectric waterway grooved, plain end, or thread end. ASTMA-53 carbon steel or ASTMA-536 ductile iron body, zinc electroplated, with LTHS high temperature stabilized polyolefin polymer linear Victulic style 47.

D. Mechanical Couplings:

1. Grooved mechanical pipe couplings, fittings, valves and other grooved components may be used as an option to soldered or braised methods. Fittings

shall be cast of bronze for copper tubing systems. All grooved components shall be of one domestic manufacturer, and conform to local code approval and/or as listed by ANSI-B-31, B-31.3M B-31.9, ASME, UL/ULC, FM, IAPMO OR BOCA. Grooved end manufacturer to be ISO-9001 certified. Grooved couplings shall meet the requirements of ASTM F-1476. Manufacturer shall be Victaulic or approved equal.

2.04 GATE VALVES

A. Manufacturers:

1. Nibco No. T-111 up to 2-1/2"; F-617-O 3" and over.
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 428 up to 2-1/2"; 465-1/2 3" and over.
   b. Stockham No. B-100 up to 2-1/2"; G-623 3" and over.
   c. Milwaukee valve UP148 up to 2", F-2885A 2 ½" and over.
   d. Kitz No. 24 1/2"-3"; No. 72 Flanged 2"-14"

B. Up to and including 2-1/2" Inches: Bronze body – (ASTM B584 C89833), bronze trim – (ASTM B584 C89833), rising stem, handwheel, inside screw, solid wedge threaded ends.

C. Over 3" Inches: Iron body, bronze trim, rising stem, handwheel, OS&Y, solid wedge, flanged ends.

D. Provide bronze tee or cast iron square nut operator for all valves installed below ground.

1. Valves 2-1/2" and smaller shall be equipped with ASTM B62 solid red bronze tee securely affixed to the valve stem.
2. Valves 3" and larger shall be equipped with a standard 2" square combination nut/socket securely affixed to the valve stem.
3. Provide owner with two extended tee handle operating wrenches for each type of valve head installed.

2.05 BALL VALVES

A. Manufacturers:

1. Nibco No. T-685-66-LF
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 9303-B
   b. Stockham Model S-216BR-1R-T
   c. Milwaukee valve UPBA-400S
   d. Kitz No. 68M

B. Up to and including 2 Inches: Bronze – (ASTM B584 C8933), two 600 PSI piece body full port, stainless steel ball and stem, Teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.

C. Ball valves used for balancing shall have memory stops.

2.06 SWING CHECK VALVES

A. Manufacturers:

1. Nibco No. T-413-B up to 2-1/2"; F-918 3" and over.
2. Other acceptable manufacturers offering equivalent products.
   a. Crane No. 37 up to 2-1/2"; 372 3" and over.

b. Stockham No. B-319; up to 2-1/2"; G931 3" and over.
c. Kitz No. 22 up to 3"; No. 78 2"-10".
3. Victualic (for grooved systems only).
4. Milwaukee valve UP509 up to 2", F-2974A 2 ½" and over.

B. Up to and including 2-1/2 Inches: Bronze body ASTM B584 C89833, Bronze swing disc, screwed ends.

C. Over 2-1/2 Inches: Iron body, bronze trim, swing disc, renewable disc and seat, flanged ends. Include outside lever and adjustable weight where required for quiet operation.

2.07 SPRING LOADED (SILENT) CHECK VALVES

A. Manufacturers:

1. Nibco No. W-910

2. Other acceptable manufacturers offering equivalent products.
a. Grinnell No. 402
3. Victualic (for grooved systems only).
4. Milwaukee valve 1400 LF.

B. Iron body, bronze trim, stainless steel spring, renewable composition disc, screwed, wafer, grooved, or flanged ends.

2.08 REGULATING VALVES

A. Manufacturers:

1. Watts No. 223-S up to 2-1/2" size valve.
2. Watts No. F127W for 3" and Watts No. F127W-WR for 4" size valve.
3. Other acceptable manufacturers offering equivalent products.

B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

C. Provide and install pressure regulating valves with inlet strainer and union fittings individually or as integral components of regulator.

D. Install pressure regulating valve within building immediately downstream of building shut-off valve and prior to any building service branch connection. Each building service PRV installation shall include an integral permanent bypass assembly with a normally closed bypass throttling globe or ball valve.

2.09 SOLDER

A. 95.5% tin, 4% copper, 0.5% silver.

B. Lead free, antimony free, zinc-free.

C. Silvabrite 100, by Engelhard Corporation or approved equal.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Coordinate and verify excavations under provisions of Division Two.

B. Verify that all excavations are to the required grade, dry, and not over-excavated.

3.02 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale, oil and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Install, clean bank sand backfill in trench to a minimum of 6 inches below pipe, and to cover all piping a minimum of 12 inches above pipe.

3.03 INSTALLATION

A. Install all materials in accordance with manufacturer's published instructions.

B. All exposed sewer and water pipe in toilet rooms or other finished areas of the building shall be chromium plated.

C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner, parallel and perpendicular to building column grid lines, unless indicated otherwise on drawings, and maintain gradients.

E. Install piping to conserve building space and not conflict with other trades or interfere with intended use of space.

F. Group piping whenever practical at common elevations.

G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

H. Provide clearance for installation of insulation and access to valves and fittings. Valves installed beyond reasonable reach shall be provided with chain operator.

I. Provide access doors where valves and operable fittings are not exposed. Access doors shall be of approved types set in locations pre-approved by submittal to the Architect.

J. Establish elevations of buried piping outside the building to ensure not less than 2 feet of cover, or maximum depth of frost penetration, which ever is the greater.

K. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

L. Provide encasement for and support of utility meters in accordance with requirements of utility companies.

M. Gate valves installed below grade shall be covered with an adjustable cast iron roadway box extended to grade. Cover shall be cast iron with 'water' cast on top and set flush to finished paving or 2" above finished earthen grade. Box shall be supported from undisturbed soil or concrete base and shall not introduce any stress to piping under all traffic conditions.

N. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

O. Excavate in accordance with Division 22.

P. Backfill in accordance with Division 22.

Q. Install bell and spigot pipe with bell end upstream.

R. Maintain uniformity in the installation of piping materials and joining methods. Do not mix materials types.

S. Install valves with stems upright or horizontal, not inverted.

T. Solder joints shall be wiped clean at each joint, remove excess metal while molten and flux residue when cooled.

U. No PVC pipe or fittings will be allowed for any areas where pipe is installed in return air plenum unless the entire length of all such piping is encased within a minimum 2 hour fire rated enclosure.

V. Installations of thermoplastic piping systems shall be in strict conformity to the manufacturers published instructions. Under ground drainage pipe installations shall be in conformity to ASTM D 2321.

W. Installation of solvent cement joints for PVC piping shall be in strict conformity to the requirements outlined in ASTM D 2855.

X. Waste nipple from wall to tapped tee shall be schedule 40 threaded galvanized steel pipe or brass or copper with threaded adapter.

Y. Provide approved PVC slip by cast iron no hub adaptor at each transition from underground PVC piping to above ground cast iron pipe using heavy duty wide bodied no hub couplings as specified elsewhere in this section. Transition shall be made as close as possible to floor for sanitary DWV piping systems and at test tee “minimum 12 in. A.F.F.” for storm drainage piping. Support vertical cast iron pipe from floor anchors using riser clamp and galvanized all thread rod as specified in section 15140.

Z. Provide bracing to prevent axial movement for all storm drainage piping above ground floor. Provide restraints for all drainage piping at al changes in direction and at all diameter changes greater than two pipe sizes. Braces blocks, rodding and other permanent methods as prescribed by cast iron soil pipe institute.

AA. All grooved components (couplings, fittings, valves, gaskets and specialties) shall be of one domestic manufacturer.

BB. Grooved manufacturer shall provide on-site training for contractor’s field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and product installation. Factory trained representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.

3.04 APPLICATION

A. Install union downstream of all valves at equipment or apparatus connections.

B. Install male adapters each side of threaded valves in copper piped system. Sweat solder adapters to tube prior to make-up of threaded connections.

C. Install ball valves for shut-off and to isolate all equipment items, distinct parts of systems, or vertical risers.

D. Each plumbing fixture shall have a shut-off valve on each hot water and cold water supply line.

E. Each plumbing water rough-in stub out shall be fitted with a shut off valve.

F. Install globe, ball or butterfly valves for throttling, bypass, or balancing (manual flow control) services.

G. Ball valves installed in insulated piping shall be fitted with extended lever operators of sufficient length to raise handle above the insulation jacket material. Where valve is used for throttling service valve handle shall be equipped with adjustable memory stop device.

H. Provide spring loaded, non-slam, check valves on discharge of water pumps.

3.05 ERECTION TOLERANCES

A. All drainage lines in the building shall have 1/4 inch to the foot fall where possible and not less than 1/8 inch to the foot fall toward the main sewer. Pipe must be so laid that the slope will be uniform and continuous. Permission shall be secured from the Architect and Engineer before proceeding with any Work where existing conditions prevent the installation at minimum grade specified.

B. Slope all water piping and arrange to drain at low points. Provide loose key operated, polished chrome, sill cock flush to wall where fixture stop will not suffice for this requirement.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, all domestic water systems shall be complete, thoroughly flushed clean and free of all foreign matter or erection residue.

B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. On building side of the main shut off valve, provide a 3/4" connection through which chlorine can be introduced into the water piping

D. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, in sufficient quantity to obtain 50 to 80 mg/L residual free chlorine solution throughout the entire domestic water piping systems.

E. Bleed water from outlets as required to ensure complete distribution and test for disinfectant residual at a minimum 15 percent of total outlets.

F. Maintain disinfectant in system for 24 hours.

G. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

H. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

I. Take samples no sooner than 24 hours after flushing, from 5 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services connecting to existing building services or utility lines as shown on the drawings.

B. Before commencing work, field verify invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover as required.

C. Provide new domestic water service connecting to existing building services or utility lines as shown on plans. Assure connections are in compliance with requirements of the jurisdiction having authority.

D. Extension of services to the building shall be fabricated from the same materials as the utility service lines or those materials specified herein.

E. Should points of connection vary from those indicated on the drawings contractor shall properly allow for this in the actual connections field fabricated.

3.08 RODDING SEWERS

A. All sanitary soil and waste lines, both in the building and out, shall be rodded out after completion of the installation.

B. This Work shall be done, as part of the contract, to make certain that all lines are clear, and any obstruction that may be discovered shall be removed immediately. Rodding shall be accomplished by utilizing a rotary cutter, which shall be full size of pipe being cleaned.

3.09 TESTING OF PLUMBING PIPING SYSTEMS

A. During the progress of the work and upon completion, tests shall be made as specified herein and as required by Authorities Having Jurisdiction, including Inspectors, Owner or Architect. The Architect or duly authorized Construction Inspector shall be notified in writing at least 2 working days prior to each test or other Specification requirement which requires action on the part of the Construction Inspector.

B. Tests shall be conducted as part of this work and shall include all necessary instruments, equipment, apparatus, and service as required to perform the tests with qualified personnel. Submit proposed test procedures, recording forms, and test equipment for approval prior to the execution of testing.

C. Tests shall be performed before piping of various systems have been covered or furred-in. For insulated piping systems testing shall be accomplished prior to the application of insulation.

D. All piping systems shall be tested and proved absolutely tight for a period of not less than 24 hours. Tests shall be witnessed by the Architect or an authorized representative and pronounced satisfactory before pressure is removed or any water drawn off.

E. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to a like new condition. Leaking pipe joints, or defective pipe, shall be removed and replaced with acceptable materials. Test shall be repeated after repairs are completed

and shall continue until such time as the entire test period expires without the discovery of any leaks.

F. Wherever conditions permit, each piping system shall thereafter be subjected to its normal operating pressure and temperature for a period of no less than five 5 days. During that period, it shall be kept under the most careful observation. The piping systems must demonstrate the propriety of their installation by remaining absolutely tight during this period.

G. Domestic Water:

1. Pressure test at one and one half times the normal working pressure or 125 psig, which ever is the greater, for 24 hours.

H. Sanitary Soil, Waste and Vents and Storm Sewer:

1. After the rough-in soil, waste and vent and other parts of the sanitary sewer including branch laterals have been set from the lowest level, at point of connection to existing utility lines, to above the floor line, all outlets shall be temporarily plugged or capped, except as are required for testing as described herein. Ground work shall not permit the backfill of trenches to cover any joints until the completion of testing. Back fill shall be limited to mid sections of full joints of piping only. For pipe in ground the piping shall be readied as described herein and filled with water to a verifiable and visible level to 10' above the lowest portions of the system being tested.
2. On multi-level buildings only one floor level shall be tested at a time. Each floor shall be tested from a level below the structure of the floor, or the outlet of the building in the case of the lowest level, to a level of 12 inches above the floor immediately above the floor being tested, or the top of the highest vent in the case of the highest building level. The pipes for the level being tested shall be filled with water to a verifiable and visible level as described above and be allowed to remain so for 24 hours. If after 24 hours the level of the water has been lowered by leakage, the leaks must be found and stopped, and the water level shall again be raised to the level described, and the test repeated until, after a 24 hour retention period, there shall be no perceptible lowering of the water level in the system being tested.
3. Should the completion of these tests leave any reasonable question or doubt of the integrity of the installation, additional tests including peppermint smoke, or other measures shall be performed to demonstrate the reliability of these systems to the complete satisfaction of the Owner's duly authorized representative. Such tests shall be conducted and completed before any joints in plumbing are concealed or made inaccessible.

3.10 COMPLETE FUNCTIONING OF WORK

A. All work fairly implied as essential to the complete functioning of the systems shown on the Drawings and Specification shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specification to establish the type and function of systems but not to set forth each item essential to the functioning of any system. In case of doubt as to the work intended or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for Supplementary Instructions and Drawings, etc.

END OF SECTION

SECTION 22 11 19
PLUMBING SPECIALTIES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the specialties covered by this Section, with all appurtenances, ready for the Owner's use.

B. Include the following work in addition to items normally part of this Section:

1. Water Hammer Arrestors
2. Strainers and Filters
3. Thermostatic Mixing Valves
4. Floor Drains and Floor Sinks
5. Cleanouts
6. Trap Primers

1.03 RELATED WORK

A. Section 22 05 29 – Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 – Plumbing Piping

C. Section 22 30 00 – Plumbing Equipment

D. Section 22 40 00 – Plumbing Fixtures

1.04 REFERENCES

A. ANSI/ASSE 1011 – Performance Requirements for Hose Connection Vacuum Breakers

B. ANSI/ASSE 1012 – Performance Requirements for Backflow Preventers with an Intermediate Atmospheric Vent

C. ANSI/ASSE 1013 –- Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers

D. ANSI/ASSE 1015 – Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

E. ANSI/ASSE 1019 – Performance Requirements for Wall Hydrants with Backflow Protection and Freeze Resistance

F. ANSI/ASSE 1057 – Performance Requirements for Freeze Resistant Sanitary Yard Hydrants with Backflow Protection

G. ASME A112.6.3 – Floor Drains and Trench Drains

H. ASME A112.6.7 – Sanitary Floor Sinks

I. ASME A112.6.4 – Roof, Deck, and Balcony Drains

J. ASME A112.14.1 – Backwater Valves

K. ASME A112.14.3 – Grease Interceptors

L. ASME/ANSI A112.26.1 – Water Hammer Arresters

M. PDI WH-201 Water Hammer Arresters

N. AWWA C506 – Standard for Backflow Prevention Devices – Reduced Pressure Principle and Double Check Valve Types

O. AWWA C510 – Standard for Double Check Valve Backflow Prevention Assembly

P. ASSE 1069 – Performance Requirements for Automatic Temperature Control Mixing Valves

Q. ASSE 1070 – Performance Requirements for Water Temperature Limiting Devices

R. PDI G-101 – Testing and Rating Procedure for Hydro Mechanical Grease Interceptors

1.05 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

1.06 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit shop drawings and product data under provisions of Division One.

C. Include component sizes, rough-in requirements, service sizes, and finishes.

D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.

1.07 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Division One.

B. Record actual locations of equipment and backflow preventers.

1.08 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Operation Data: Indicate frequency of treatment required for interceptors and separators.

C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

D. Provide backflow prevention assembly test and maintenance report for all devices. A printed and signed form by the licensed tester that performed the work shall be provided both to the Owner and to the Public Water System in accordance with TCEQ (Texas Commission on Environmental Quality) requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled specialties to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept specialties on site in original factory packaging. Inspect for damage. Damaged specialties shall not be acceptable.

D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.

1.10 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two loose keys for hose bibbs and hydrants and spare hose end vacuum breakers.

1.11 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner’s operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:

1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes, and corrections.
6. On site demonstration.

PART 2 - PRODUCTS

2.01 RECESSED VALVE BOX

A. Refrigerator: Pre-formed plastic rough-in box with brass long shank valve with wheel or quarter-turn handle and matching secured faceplate.

B. ACCEPTABLE MANUFACTURERS:

1. Guy Gray
2. Mifab

3. Sioux Chief
4. Oatey

2.02 BACKFLOW PREVENTERS

A. Reduced Pressure Backflow Preventers: ANSI/ASSE 1013; Bronze or FDA approved epoxy coated cast iron body with corrosion resistant internal parts and stainless steel springs; two independently operating, spring loaded check valves; intermediate internal pressure intermediate relief valve with water outlet; test cocks and isolation valves.

B. Double Check Valve Assemblies: ANSI/ASSE 1015; Cast copper alloy or FDA approved epoxy coated cast iron body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves, test cocks and isolation valves.

C. Dual Check Valve with Intermediate Atmospheric Vent: ANSI/ASSE 1012; Brass body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

D. ACCEPTABLE MANUFACTURERS:

1. Watts
2. Wilkins
3. Ames
4. Febco
5. Beeco
6. Conbraco

2.03 WATER HAMMER ARRESTORS

A. ANSI A112.26.1; sized and located in accordance with PDI WH-201, pre-charged suitable for operation in temperature range -100 to 300 degrees F and maximum 250 psig (1700 kPa) working pressure.

B. ACCEPTABLE MANUFACTURERS:

1. J.R. Smith
2. Zurn
3. Mifab
4. Watts
5. Wade
6. Josam
7. P.P.P.
8. Sioux Chief

2.04 THERMOSTATIC MIXING VALVES

A. Provide thermostatic mixing valves in accordance with manufacturer’s recommendations and as indicated and scheduled on Drawings. Unless scheduled otherwise, all units other than under-counter point of use units shall be provided complete in lockable cabinet of 16 gage (1.5 mm) prime coated steel when located in finished areas.

B. ACCEPTABLE MANUFACTURERS:

1. Bradley
2. Powers
3. Symmons

4. Lawler

2.05 FLOOR DRAINS AND FLOOR SINKS

A. Provide floor drains and floor sinks in accordance with manufacturer's recommendations, as appropriate for floor construction, and as indicated and scheduled on Drawings.

B. Provide clamping devices for all drains in membrane floor areas.

C. ACCEPTABLE MANUFACTURERS:

1. J.R. Smith
2. Zurn
3. Mifab
4. Watts
5. Wade
6. Josam

2.06 CLEANOUTS

A. General: Provide cleanouts as indicated and scheduled on Drawings and also as required by the prevailing code, whether shown on the Drawings or not.

B. Construction: All cleanouts shall have tapered bronze plugs.

C. Provide clamping devices for all cleanouts in membrane floor areas.

D. Provide cleanouts of suitable and compatible material for specialized piping systems conveying acid waste.

E. Types:

1. Finished floor cleanouts: Provide cast iron body, with adjustable floor level assembly, and round nickel bronze scoriated top.
2. Resilient or tile finished floor cleanouts: Provide cast iron body, with adjustable floor level assembly, and round nickel-bronze top with gasketed water tight cover and depressed top to receive flooring finish material.
3. Interior finished wall cleanouts: Provide cast iron tee body or cleanout ferrule as required for wall construction and provide counter-sunk bronze plug with stainless steel access cover and securing screw(s).
4. Interior unfinished accessible cleanouts: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

F. ACCEPTABLE MANUFACTURERS:

1. J.R. Smith
2. Zurn
3. Mifab
4. Watts
5. Wade
6. Josam

2.07 TRAP PRIMERS

A. General: Provide trap primers as indicated and scheduled on Drawings and in accordance with manufacturer's recommendations.

B. ACCEPTABLE MANUFACTURERS:

1. J.R. Smith
2. Zurn
3. Mifab
4. Watts
5. Wade
6. Josam
7. P.P.P.
8. Sioux Chief

PART 3 - EXECUTION

3.01 INSTALLATION AND APPLICATION

A. Install specialties in accordance with manufacturer's instructions to provide intended performance.

B. The contractor shall provide water hammer arrestors as shown on Drawings and also in accordance with PDI Standard WH-201, whether shown on Drawings or not. Water hammer arrestors shall be PDI certified and sized and placed as recommended by manufacturer. Provide above ceiling or otherwise accessible location complete with isolation valve to facilitate replacement.

C. Provide strainers at all backflow preventers.

D. Contractor shall certify all newly installed backflow preventers and provide proof of certification to the Owner.

E. Pipe relief line from backflow preventer via manufacturer’s air gap assembly, full size to nearest drain. Such routing shall not pose a trip hazard.

F. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanouts for rodding of drainage system.

G. All cleanouts outside of building on grade shall be set in an 18" x 18" x 4" thick concrete pad, flush with final grade/paving.

H. Coordinate with casework to ensure that all interceptors are readily accessible and removable for servicing and cleaning.

I. Provide approved sampling well downstream of centralized interceptors and separators.

END OF SECTION

SECTION 22 30 00
PLUMBING EQUIPMENT

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Water Heaters.

1.02 RELATED SECTIONS

A. Section 22 05 29 – Hangers and Support for Plumbing Piping and Equipment.

B. Section 22 05 48 – Vibration and Seismic Controls for Plumbing Equipment.

C. Section 22 10 00 - Plumbing Piping.

D. Section 22 11 19 - Plumbing Specialties.

E. Section 26 05 19 - Wire, Cable, and Related Materials.

1.03 REFERENCES

A. ANSI/ASHRAE 90A - Energy Conservation in New Building Design.

B. ASME Section VIIID - Pressure Vessels; Boiler and Pressure Vessel Codes.

C. ANSI/NFPA 54 - National Fuel Gas Code.

D. ANSI/NFPA 70 - National Electrical Code.

E. ANSI/UL 1453 - Electric Booster and Commercial Storage Tank Water Heaters.

1.04 SUBMITTALS

A. Submit under provisions of Division One.

B. Shop Drawings:

1. Include water heater dimensions. size of tappings, and performance data.
2. Include dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

C. Product Data:

1. Include dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements, and affected adjacent construction.
3. Submit certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

D. Manufacturer's Installation Instructions.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 22.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with authorities having jurisdiction.

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Gas Association (AGA).
2. National Sanitation Foundation (NSF).
3. American Society of Mechanical Engineers (ASME).
4. National Board of Boiler and Pressure Vessel Inspectors (NBBPVI).
5. National Electrical Manufacturers' Association (NEMA).
6. Underwriters Laboratories (UL).
7. American Society of Plumbing Engineers (ASPE)

D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.07 REGULATORY REQUIREMENTS

A. Conform to AGA NSF ANSI/NFPA 54 ANSI/NFPA 70 ANSI/UL 1453 requirements for water heaters.

B. Conform to ASME Section VIIID for manufacture of pressure vessels for heat exchangers.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section Division One.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

A. Provide five year warranty under provisions of Division One.

B. Warranty: Include coverage of domestic water heaters, water storage tanks, and packaged water heating systems.

1.10 EXTRA MATERIALS

A. Furnish under provisions of Division One.

B. Provide two sets of electric heater elements.

1.11 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:

1. Purpose of equipment.
2. Principle of how the equipment works
3. Important parts and assemblies
4. How the equipment achieves its purpose and necessary operating conditions
5. Most likely failure modes, causes and corrections
6. On site demonstration

PART 2 - PRODUCTS

2.01 COMMERCIAL ELECTRIC WATER HEATERS

A. Manufacturers:

1. A.O. Smith
2. Other acceptable manufacturers offering equivalent products.
   a. State
   b. Rheem.
   c. Bradford White.
   d. Bock.

B. Type: Factory-assembled and wired, electric, vertical storage.

C. Tank: Glass lined welded steel; 4 inch diameter inspection port (when applicable), thermally insulated with minimum 2 inches glass fiber encased in corrosion-resistant steel jacket; baked-on enamel finish.

D. Controls: Automatic immersion water thermostat; externally adjustable temperature range from 60 to 180 degrees F, flanged or screw-in nichrome elements, high temperature limit thermostat.

E. Accessories: Brass water connections and dip tube, drain valve, high-density magnesium anode, and ASME rated temperature and pressure relief valve.

F. Provide training per 1.11.

PART 3 - EXECUTION

3.01 WATER HEATER INSTALLATION

A. Install water heaters in accordance with manufacturer's instructions and to AGA NSF ANSI/NFPA 54 UL requirements.

B. Coordinate with plumbing piping and related work to achieve operating system.

END OF SECTION

SECTION 22 40 00
PLUMBING FIXTURES

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 22 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. The scope of the work shall include the furnishing and complete installation of the fixtures covered by this Section, with all appurtenances, ready for the Owner's use.

B. Include the following work in addition to items normally part of this Section:

1. Plumbing Fixtures
2. Fixture Carriers
3. Faucets, Supplies, and Trim
4. Flushometers

1.03 RELATED WORK

A. Section 22 05 29 – Hangers and Support for Plumbing Piping and Equipment

B. Section 22 10 00 – Plumbing Piping

C. Section 22 11 19 – Plumbing Specialties

D. Section 22 30 00 – Plumbing Equipment

1.04 REFERENCES

A. ASME A112.4.3 – Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System

B. ASME A112.6.1M – Floor Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use

C. ASME A112.18.1 – Plumbing Supply Fittings

D. ASME A112.18.2 – Plumbing Waste Fittings

E. ASME A112.18.9 – Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures

F. ASME A112.19.1 – Enameled Cast Iron and Enameled Steel Plumbing Fixtures

G. ASME A112.19.2 – Ceramic Plumbing Fixtures

H. ASME A112.19.3 – Stainless Steel Plumbing Fixtures

I. ASME A112.19.7 – Hydromassage Bathtub Systems

J. NSF/ANSI 61 – Drinking Water System Components – Health Effects

K. ANSI Z358.1 – Emergency Eyewash and Shower Equipment

L. ASSE 1016 – Performance Requirements for Individual Thermostatic, Pressure Balancing, and Combination Pressure Balancing and Thermostatic Control Valves for Individual Fixture Fittings.

M. ASSE 1037 – Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures

N. ADA (Americans with Disabilities Act)

O. TAS (Texas Accessibility Standards)

1.05 QUALITY ASSURANCE

A. Manufacturer: For each product specified, provide components by the same manufacturer throughout.

B. Warranty: Warrant the work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or non-conforming materials and workmanship.

C. Defects shall include, but not necessarily be limited to, the following:

1. Noisy operation.
2. Noticeable deterioration of finish.
3. Leakage of water.

1.06 SUBMITTALS

A. Submit under provisions of Division One.

B. Submit product data under provisions of Division One.

C. Include component sizes, rough-in requirements, service sizes, finishes, materials, dimensions, performance information, and accessories.

D. Manufacturer’s Installation Instructions: Indicate assembly and support requirements.

1.07 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division One.

B. Provide pre-printed operating and maintenance instructions for each item specified. Instruct and demonstrate the proper operation and maintenance to the Owner's designated representative.

1.08 DELIVERY, STORAGE, AND HANDLING

A. DELIVERY: Deliver clearly labeled specialties to; and store, protect and handle products on site in accordance with the provisions of Division One.

B. TIMING AND COORDINATION: Arrange for delivery of materials to allow for minimum storage time at the project site. Coordinate with the scheduled time of installation.

C. ACCEPTANCE: Accept specialties on site in original factory packaging. Inspect for damage. Damaged specialties shall not be acceptable.

D. STORAGE: Store materials in a clean, dry location, protected from weather and damage.

1.09 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on the Contract Documents.

B. Confirm and field coordinate that millwork is constructed with adequate provisions for the installation of counter top lavatories and sinks.

PART 2 - PRODUCTS

2.01 PLUMBING FIXTURES

A. GENERAL: Provide plumbing fixtures in accordance with manufacturer's recommendations and as indicated and scheduled on Drawings. Acceptable manufacturers of each fixture type are as indicated below.

1. Provide floor-affixed fixture carriers as appropriate for all wall-hung plumbing fixtures unless specifically noted otherwise.
2. Fixture drilling shall match faucet spread and match any related trim and accessories.

B. SINKS – COUNTER MOUNTED (Stainless Steel)

1. Elkay
2. Just
3. Moen Commercial

C. SHOWER SYSTEMS

1. Acorn
2. Bradley
3. Willoughby Industries
4. Symmons

2.02 FAUCETS, SUPPLIES, AND TRIM

A. GENERAL: Provide faucets, supplies, and trim in accordance with manufacturer's recommendations, as appropriate for fixtures to be served, and as indicated and scheduled on Drawings. Acceptable manufacturers for each type of appurtenance are as indicated below.

1. Strainers shall be heavy cast brass chrome plated with matching grid type strainer, with or without overflow as required, 17 gauge seamless brass tailpiece of length determined by installation requirements. Provide complete with washers and brass locknut.

2. P-traps shall be 17 gauge seamless chrome plated brass, adjustable type. Provide complete with cleanout plug, chrome plated brass slip nuts, wall bend, and wrought brass escutcheon of depth determined by installation requirements.
3. Angle stops shall be lead-free commercial pattern chrome plated brass, quarter turn ball type with loose key handles. Provide complete with chrome plated copper supply risers and wrought brass escutcheon of depth determined by installation requirements.
4. Pipe trim insulation shall be compliant, white molded vinyl, fade/discoloration-resistant, bacteria/fungal-resistant insulation.

B. FAUCETS

1. Chicago
2. T&S Brass
3. Zurn
4. Moen Commercial
5. Delta Commercial
6. Speakman
7. American Standard
8. Kohler
9. Symmons

C. SHOWER VALVES

1. Bradley
2. Symmons Commercial
3. Powers
4. Chicago
5. Speakman

D. SUPPLY STOPS

1. McGuire
2. Zurn
3. Chicago

E. CHROME PLATED TUBULAR BRASS

1. McGuire
2. Zurn
3. Kohler

F. PIPE TRIM INSULATION

1. Truebro
2. McGuire
3. Plumberex

PART 3 - EXECUTION

3.01 PREPARATION

A. EXAMINATION OF CONDITIONS: Examine conditions affecting this work. Report unsatisfactory conditions to the proper authority and do not proceed until those conditions

have been corrected. Commencing work implies acceptance of existing conditions as satisfactory to the outcome of this work.

B. Coordinate forming floor construction to receive drains to required invert elevations.

3.02 INSTALLATION

A. Install fixtures in locations and heights as shown on Drawings and as directed by the Architect.

B. Install materials plumb, level, securely, and in accordance with manufacturer's recommendations.

C. All rough-in pipe openings for final connections with supply, waste, vent, and storm systems shall be closed with caps or plugs during early stages of construction and installation. Tape shall not be considered sufficient protection.

D. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

E. Provide ball valves in piping serving batteries of fixtures. Label stops "Hot" and "Cold." Valves shall be located above accessible ceilings. If ceilings are not accessible, provide access panels of adequate size to ensure valves are fully accessible and can be fully operated.

F. Plumbing fixtures shall be supported by a concealed carrier where required to properly support the fixture specified. All carriers to be securely mounted, bolted and checked prior to concealment.

G. Caulk around fixtures with best grade white silicone caulking. Do not use grout.

H. All handles on supply and drainage fittings or other brass items shall be properly lined up and adjusted. Fittings shall not be left in any haphazard manner.

I. All fixtures shall have individual chrome plated heavy pattern loose key quarter-turn cutoff stops on supply lines, complete with escutcheons. Where same are not specified as a part of the fixture trim, they shall be installed as close to fixtures as possible in the hot and cold water supply.

J. Install each fixture with trap, easily removable for servicing and cleaning.

K. All showers and similar installations shall be installed with type “L” copper pipe between shower valve and shower head rough-in. The termination point shall have a brass drop ear elbow for shower head arm connection. Contractor shall provide proper anchoring support.

3.03 INTERFACE WITH OTHER PRODUCTS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

B. Review architectural drawings. Confirm configuration and orientation of shower controls and trim prior to rough-in and installation.

3.04 ADJUSTING

A. Adjust work under provisions of Division One.

B. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.05 CLEANING

A. Clean work under provisions of Division One.

B. At completion clean plumbing fixtures and appurtenances.

3.06 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division One.

B. Do not permit use of fixtures.

3.07 ADA ACCESSIBLE FIXTURES

A. At all locations required to be accessible, such fixtures, controls, and final installations shall comply with the requirements of ADA and any applicable state accessibility standards. Install fixtures to heights, indicated on architectural drawings.

B. All exposed water supply and drain pipes under accessible lavatories and sinks shall be insulated with securely fastened pipe trim insulation kits of the proper model for the fixtures specified.

C. Wall mounted drinking fountains and coolers which protrude into passages or corridor space, whether single or paired with an adjacent accessible fixture, shall be supplied with a matching skirt or apron to lower the underside clearance of the non-accessible fixture equal to that required for accessible fixture.

END OF SECTION

SECTION 23 02 00
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings is deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect/Engineer for review as soon as practicable. No such departures shall be made without the prior written approval of the Architect/Engineer.

C. Notwithstanding any reference in the Specifications to any article, device, product, material, fixture, form or type of construction by name, make or catalog number, such reference shall not be construed as limiting competition; and the Contractor, in such cases, may at his option use any article, device, product, material, fixture, form or type of construction which in the judgment of the Architect/Engineer, expressed in writing, is the equivalent of that specified.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form complete and functioning systems in all of their various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The Contractor shall review all pertinent drawings, including those of other contracts, prior to commencement of Work.

B. This Division requires the furnishing and installing of all items as specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Mechanical (HVAC) items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to bidding. Where this cannot be done at least 7 working days prior to bid; the greater or more costly of the

discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. The Contractor shall participate in the commissioning process as required; including, but not limited to, meeting attendance, completion of checklists, and participation in functional testing.

1.03 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The Contract Documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the reviewed shop drawings.

B. All duct or pipe or equipment locations as indicated on the documents do not indicate every transition, offset, or exact location. All transitions, offsets, clearances and exact locations shall be established by actual field measurements, coordination with the structural, architectural and reflected ceiling plans, and other trades. Submit shop drawings for review.

C. All transitions, offsets and relocations as required by actual field conditions shall be performed by the Contractor at no additional cost to the Owner.

D. Additional coordination with electrical contractor may be required to allow adequate clearances of electrical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.04 SITE VISIT AND FAMILIARIZATION

A. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

B. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

C. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.05 WORK SPECIFIED IN OTHER SECTIONS

A. Finish painting is specified. Prime and protective painting are included in the work of this Division.

B. Owner and General Contractor furnished equipment shall be properly connected to Mechanical (HVAC) systems.

C. Furnishing and installing all required Mechanical (HVAC) equipment control relays and electrical interlock devices, conduit, wire and J-boxes are included in the Work of this Division.

1.06 PERMITS, TESTS, INSPECTIONS

A. Arrange and pay for all permits, fees, tests, and all inspections as required by governmental authorities.

1.07 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of Owner occupancy, or the date all punch list items have been completed, or the date final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the Architect, Owner and Contractor.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct - properly protected from incidental damage and weather damage.

C. Damaged equipment, duct or pipe shall be promptly removed from the site and new, undamaged equipment, pipe or duct shall be installed in its place promptly with no additional charge to the Owner.

1.09 NOISE AND VIBRATION

A. The heating, ventilating and air conditioning systems, and the component parts thereof, shall be guaranteed to operate without objectionable noise and vibration.

B. Provide foundations, supports and isolators as specified or indicated, properly adjusted to prevent transmission of vibration to the building structure, piping and other items.

C. Carefully fabricate ductwork and fittings with smooth interior finish to prevent turbulence and generation or regeneration of noise.

D. All equipment shall be selected to operate with minimum of noise and vibration. If, in the opinion of the Architect, objectionable noise or vibration is produced or transmitted to or through the building structure by equipment, piping, ducts or other parts of the Work, the Contractor shall rectify such conditions without extra cost to the Owner.

1.10 APPLICABLE CODES

A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.

C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements which includes and is not limited to the following nationally accepted codes and standards:

1. Air Moving & Conditioning Association, AMCA.
2. American Standards Association, ASA.
3. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
4. American Society of Mechanical Engineers, ASME.
5. American Society of Plumbing Engineers, ASPE.
6. American Society of Testing Materials, ASTM.
7. American Water Works Association, AWWA.
8. National Bureau of Standards, NBS.
9. National Fire Protection Association, NFPA.
10. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
11. Underwriters' Laboratories, Inc., UL.
12. International Energy Conservation Code, IECC.
13. International Fire Code.
14. International Gas Code.

D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.

E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.11 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 01.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted",

"Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor, or its Subcontractor or Sub-subcontractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor or, when so noted, by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy

technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by the latest ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.12 DRAWINGS AND SPECIFICATIONS

A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the Work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.

B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.

C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is the equivalent of the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturer’s standard product will meet the requirements of the project design, Drawings, Specifications and space constraints.

D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.

E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equivalent capacity, construction, and performance. However, under no circumstances shall any substitution be made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 days prior to the bid date without fail.

F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.

G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equivalent construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.

H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUIVALENT" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUIVALENT" product, material or method may be used if it complies with the Specifications and is submitted for review to the Engineer as outline herein.

I. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) Design Documents and all other trades, including Division 26.

J. Changes in architectural, structural, electrical, mechanical, and plumbing requirements for the substitution shall be the responsibility of the bidder wishing to make the substitution. This shall include the cost of redesign by the affected designer(s). Any additional cost incurred by affected Subcontractors shall be the responsibility of this bidder and not the Owner.

K. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.

L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with the requirements listed above; and if accepted, will issue a letter allowing the substitutions.

M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades; and to pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.13 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.
2. An index page with a listing of all data included in the Submittal.

3. A list of variations page with a listing of all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "REVISE AND RESUBMIT".

B. Refer to Division 00 and Division 01 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "REVIEWED", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:

1. REVIEWED: Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
2. REVIEWED AS NOTED: Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
3. NOT APPROVED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not

approved. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or Drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.

4. REVISE AND RESUBMIT: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit. The Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
5. CONTRACTOR'S CERTIFICATION REQUIRED: Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating that the submittal meets all conditions of the Contract Documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. MANUFACTURER NOT AS SPECIFIED: Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified. The Contractor will automatically be required to furnish the product, material or method named in the Specifications. Contractor shall not order equipment when submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without submittal review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Submittals are required for, but not limited to, the following items:

1. Pipe Material and Specialties.
2. Pipe Fabrication Drawings.
3. Basic Materials.
4. Variable Air Volume Boxes.
5. Air Handling Units.
6. Cooling Towers.
7. Chillers.
8. Air Cooled Condensing Units.
9. Water Treatment.
10. Expansion Compensation.
11. Variable Frequency Drives.
12. Noise and Vibration Controls.
13. HVAC Pipe and Duct Insulation.
14. Hydronic Valves.
15. Hydronic Piping and Accessories.
16. Hydronic Pumps.
17. Roof-Top A/C Units.
18. Heating Water Boiler.
19. Portable Pipe Hangers and Equipment Supports.

20. Duct Specialties.
21. Duct Fabrication Drawings.
22. Air Distribution Devices.
23. Fan Coil Units.
24. Filters.
25. Fans.
26. Fire Dampers and Fire Smoke Dampers.
27. Temperature Controls and Control Sequences.
28. Test, Adjust and Balance Reports.
29. Testing, Adjusting and Balancing Contractor Qualifications.
30. Coordination Drawings.

I. Refer to other Division 23 sections for additional submittal requirements. Provide samples of actual materials and/or equipment to be used on the Project upon request of the Owner or Engineer.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access, and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances for installing and maintaining insulation.
   c. Locations of light fixtures and sprinkler heads.
   d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   e. Equipment connections and support details.
   f. Exterior wall and foundation penetrations.
   g. Routing of storm and sanitary sewer piping.
   h. Fire-rated wall and floor penetrations.
   i. Sizes and location of required concrete pads and bases.
   j. Valve stem movement.
   k. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting coordination drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and

equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DOCUMENTS

A. Prepare Record Documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 23, indicate the following installed conditions:

1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

B. Engage the services of a Land Surveyor or Professional Engineer registered in the state in which the project is located as specified herein to record the locations and invert elevations of underground installations.

C. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

D. Refer to Division 00 and Division 01 for additional requirements concerning Record Drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of substantial completion.

E. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

F. Submit three prints of the tracings for review. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. "As-Built" drawings shall be furnished in addition to submittals.

G. When the option described in paragraph F above is not exercised, then upon completion of the Work, the Contractor shall transfer all marks from the tracings and submit a set of clear concise reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the Work. The reproducible record "AS-BUILT" drawings shall have the Engineer’s Name and Seal removed or blanked out and shall be clearly marked and

signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY:_____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY:_____
(SIGNATURE)

1.16 OPERATING AND MAINTENANCE MANUALS

A. Prepare operating and maintenance manuals in accordance with Division 00 and Division 01 and, in addition to the requirements specified in those Divisions, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.17 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and scheduled date for each test. This detailed completion and test schedule shall be submitted at least 90 days before the projected substantial completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of substantial completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to, those items outlined in Section 23 02 00.

1.18 OPERATING AND MAINTENANCE MANUALS

A. Coordinate with Division 00 and Division 01 for operating and maintenance manual requirements. Unless noted otherwise, bind together in “D ring type” binders (National

model no. 79-883 or equal). Binders shall be large enough to allow ¼" of spare capacity. Three (3) sets of all reviewed submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under these Specifications. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Mechanical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 23 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions. In addition to the requirements specified in Division 23, include the following information for equipment items:

1. Identifying names, name tag designations and locations for all equipment.
2. Valve tag lists with valve number, type, color coding, location and function.
3. Reviewed submittals with exceptions noted compliance letter.
4. Fabrication drawings.
5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable (i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts).
6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
8. Equipment and motor name plate data.
9. Wiring diagrams.
10. Exploded parts views and parts lists for all equipment and devices.
11. Color coding charts for all painted equipment and piping.
12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 00 and Division 01 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer for review a minimum of 14 working days prior to the beginning of the operator training period.

1.19 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include a minimum of 12 hours of onsite training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline

for review by the Owner. At the conclusion of the instruction period, obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 23 Sections for additional Operator Training requirements.

1.20 FINAL COMPLETION

A. At the completion of the Work, all equipment and systems shall be tested and faulty equipment and material shall be repaired or replaced. Refer to Sections of Division 23 for additional requirements.

B. Clean and adjust all air distribution devices and replace all air filters immediately prior to Substantial Completion.

C. Touch up and/or refinish all scratched equipment and devices immediately prior to Substantial Completion.

1.21 CONTRACTOR'S GUARANTEE

A. Use of the HVAC systems to provide temporary service during construction period will not be allowed without permission from the Owner in writing; and, if granted, shall not cause the warranty period to start, except as defined below.

B. Contractor shall guarantee to keep the entire installation in repair and perfect working order for a period of one year after the date of the Substantial Completion, and shall furnish (free of additional cost to the Owner) all materials and labor necessary to comply with the above guarantee throughout the year beginning from the date of Substantial Completion, Beneficial Occupancy by the Owner, or the Certificate of Final Payment as agreed upon by all parties.

C. This guarantee shall not include cleaning or changing filters except as required by testing, adjusting and balancing.

D. All air conditioning compressors shall have parts and labor guarantees for a period of not less than 5 years beyond the date of Substantial Completion.

E. Refer to Sections in Division 23 for additional guarantee or warranty requirements.

1.22 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner’s risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney’s fees arising out of or resulting thereof.

B. Because data stored in electronic media format can deteriorate or be modified inadvertently, or otherwise, without authorization of the data’s creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be at the Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The Contract Documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.

If the client, Architect/Owner, or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

F. At the Architect/Owner's request, Engineer will prepare one "CD" of electronic media to assist the Contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/Owner for distribution to the Contractor.

The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Provide materials and equipment manufactured by a domestic United States manufacturer and assembled in the United States for all local and Federal Government projects. These materials and equipment shall comply with "Buy American Act."

B. Access Doors: Provide access doors as required for access to equipment, valves, controls, cleanouts and other apparatus where concealed. Access doors shall have concealed hinges and screw driver cam locks.

C. All access doors located in wet areas such as restrooms, locker rooms, shower rooms, kitchen and any other wet areas shall be constructed of stainless steel.

D. Access Doors: shall be as follows:

1. Plastic Surfaces: Milcor Style K.
2. Ceramic Tile Surface: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install doors only in locations approved by the Architect.

2.02 EQUIPMENT PADS (See 2.04 in Section 26 02 00)

PART 3 - EXECUTION

3.01 ROUGH-IN

A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected via reviewed submittals.

B. Refer to equipment specifications in Divisions 2 through 48 for additional rough-in requirements.

3.02 MECHANICAL INSTALLATIONS

A. General: Sequence, coordinate, and integrate the various elements of mechanical systems, materials, and equipment. Comply with the following requirements:

1. Coordinate mechanical systems, equipment, and materials installation with other building components.
2. Verify all dimensions by field measurements.
3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for mechanical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with architectural action markings on submittal, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, resolve conflicts and submit proposed solution to the Architect for review.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install mechanical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as possible, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location and label.
11. Install access doors where units are concealed behind finished surfaces. Refer to paragraph 2.01 in this section and architect for access doors specifications and location.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
13. Provide roof curbs for all roof mounted equipment. Coordinate with roof construction for pitched roof. Provide roof curbs which match the roof slope and provides a level top for equipment installation. Refer to Architectural drawings and details.
14. The equipment to be furnished under these Specifications shall be essentially the standard product of the manufacturer. Where two or more units of the same

class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be the product of the same manufacturer.

15. The Architectural and Structural features of the building and the space limitations shall be considered in selection of all equipment. No equipment shall be furnished which will not suit the arrangement and space limitations indicated.
16. Lubrication: Prior to start-up, check and properly lubricate all bearings as recommended by the manufacturer.
17. Where the word "Concealed" is used in these Specifications in connection with insulating, painting, piping, ducts, etc., it shall be understood to mean hidden from sight as in chases, furred spaces or suspended ceilings. "Exposed" shall be understood to mean the opposite of concealed.
18. Identification of Mechanical Equipment:
    a. Mechanical equipment shall be identified by means of nameplates permanently attached to the equipment. Nameplates shall be engraved laminated plastic or etched metal. Submittals shall include dimensions and lettering format for approval. Attachment shall be with escutcheon pins, self-tapping screws, or machine screws.
    b. Tags shall be attached to all valves, including control valves, with nonferrous chain. Tags shall be brass and at least 1-1/2 inches in diameter. Nameplate and tag symbols shall correspond to the identification symbols on the temperature control submittal and the "as-built" drawings.
19. Provide construction filters for all air handling units, fain coil unit, UAV boxes, and all other air handling equipment during the entire construction period.

3.03 CUTTING AND PATCHING

A. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

B. Perform cutting, fitting, and patching of mechanical equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.
2. Remove and replace defective Work.
3. Remove and replace Work not conforming to requirements of the Contract Documents.
4. Remove samples of installed Work as specified for testing.
5. Install equipment and materials in existing structures.
6. Upon written instructions from the Engineer, uncover and restore Work to provide for Engineer/Owner's observation of concealed Work, without additional cost to the Owner.
7. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers; refer to the materials and methods required for the surface and building components being patched; Refer to Paragraph 1.11 I for definition of "Installer."

C. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical ducts and HVAC units, and other mechanical items made obsolete by the new Work.

D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

3.04 WORK SEQUENCE, TIMING, COORDINATION WITH OWNER, ARCHITECT AND ENGINEER

A. The Owner will cooperate with the Contractor, however, the following provisions must be observed:

1. A meeting will be held at the project site, prior to any construction, between the Owner's Representative, the General Contractor, the Sub-Contractors and the Engineer to discuss Contractor's employee parking space, access, storage of equipment or materials, and use of the Owner's facilities or utilities. The Owner's decisions regarding such matters shall be final.
2. During the construction of this project, normal facility activities will continue in existing buildings until renovated areas are completed. Plumbing, fire protection, lighting, electrical, communications, heating, air conditioning, and ventilation systems shall be maintained in service within the occupied spaces of the existing building.
3. Contractor shall not start-up any of the HVAC equipment unless the Owner, Architect and Engineer are signed off.
4. Start-up for major HVAC equipment such as chillers, cooling towers, variable frequency drives and hot water boilers shall be performed by a factory technician. The start-up shall include a written report signed off by Contractor, Engineer and Owner.

3.05 DEMOLITION AND WORK WITHIN EXISTING BUILDINGS

A. In the preparation of these documents every effort has been made to show the approximate locations of, and connections to, the existing piping, duct, equipment and other apparatus related to this phase of the Work. However, this Contractor shall be responsible for verifying all of the above information. This Contractor shall visit the existing site to inspect the facilities and related areas. This Contractor shall inspect and verify all details and requirements of all the Contract Documents, prior to the submission of a proposal. All discrepancies between the Contract Documents and actual job-site conditions shall be resolved by the contractor, who shall produce drawings that shall be submitted to the Architect/Engineer for review. All labor and materials required to perform the work described shall be a part of this Contract.

B. All equipment and/or systems noted on the Drawings "To Remain" shall be inspected and tested on site to certify its working condition. A written report on the condition of all equipment to remain, including a copy of the test results and recommended remedial actions and costs shall be made by this Contractor to the Architect/Engineer for review.

C. All equipment and/or systems noted on the Drawings "To Be Removed" shall be removed including, associated pipe and duct, pipe and duct hangers and/or line supports. Where duct or pipe is to be capped for future or end of line use, it shall be properly tagged with its function or service appropriately identified. Where existing equipment is to be removed or relocated and has an electric motor or connection, the Electrical Contractor shall disconnect motor or connection, remove wiring to a safe point and this Contractor shall remove or relocate motor or connection along with the equipment.

D. During construction and remodeling, portions of the Project shall remain in service. Construction equipment, material, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building. None of the construction work shall interfere with the proper operation of the existing facility; or be so

conducted as to cause harm or danger to persons on the premises. All fire exits, stairs or corridors required for proper access, circulation or exit shall remain clear of equipment, materials or debris. The General Contractor shall maintain barricades, other separations in corridors and other spaces where work is conducted.

E. Certain work during the demolition and construction phases may require overtime or night time shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner at least seventy-two (72) hours in advance in writing.

F. Any salvageable equipment as determined by the Owner, shall be delivered to the Owner, and placed in storage at the location of his choice. All other debris shall be removed from the site immediately.

G. Equipment, piping or other potential hazards to the occupants of the building shall not be left overnight outside of the designated working or construction area.

H. Make every effort to minimize damage to the existing building and the Owner's property. Repair, patch or replace as required any damage that occurs as a result of work at the site. Care shall be taken to minimize interference with the Owner's activities during construction and to keep construction disrupted areas to a minimum. Coordinate with the Owner and other trades in scheduling and performance of the work.

I. Include in the contract price all rerouting of existing pipe, duct, etc., and the reconnecting of the existing equipment as necessitated by field conditions to allow the installation of the new systems regardless of whether or not such rerouting, reconnecting or relocating is shown on the Drawings. Furnish all temporary pipe, duct, controls, etc., as required to maintain heating, cooling, and ventilation services for the existing areas with a minimum of interruption.

J. All existing pipe, duct, materials, equipment, controls and appurtenances not included in the remodel or alteration areas are to remain in place.

K. Pipe, duct, equipment and controls serving mechanical and other Owner's equipment, etc., which is to remain but is served by pipe, duct, equipment and controls that are disturbed by the remodeling work, shall be reconnected in such a manner as to leave this equipment in proper operating condition.

L. No portion of the **fire protection systems** shall be turned off, modified or changed in any way without the express knowledge and written permission of the Owner’s representative in order to protect systems that shall remain in service.

M. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and operating system in cooperation with other trades with a minimum of disruption or downtime.

N. Refer to Architectural Demolition and/or Alteration plans for actual location of walls, ceilings, etc., being removed and/or remodeled.

END OF SECTION

SECTION 23 05 13
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. The Basic Materials and Methods, Section 23 02 00, are included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

B. WORK SPECIFIED ELSEWHERE:

1. Painting
2. Automatic temperature controls.
3. Power control wiring to motors and equipment.

1.03 WARRANTY

Warrant the Work specified herein for one year and motors for five years beginning on the date of substantial completion against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures variations, and accessories.

C. MOTOR NAMEPLATE INFORMATION: Manufacturer's name, address, utility and operating data.

D. Refer to Division One for additional information.

1.05 DELIVERY AND STORAGE

A. DELIVERY: Deliver clearly labeled, undamaged materials in the manufacturers' unopened containers.

B. TIME AND COORDINATION: Deliver materials to allow for minimum storage time at the project site. Coordinate delivery with the scheduled time of installation.

C. STORAGE: Store materials in a clean, dry location, protected from weather and abuse.

PART 2 - PRODUCTS

2.01 ELECTRIC MOTORS

A. APPROVED MANUFACTURERS: Provide motors by a single manufacturer as much as possible.

1. Baldor
2. Marathon
3. Siemens-Allis
4. General Electric

B. TEMPERATURE RATING: Provide insulation as follows:

1. CLASS B: 40 degrees C maximum.
2. CLASS F:
   a. Between 40 degrees C and 65 degrees C maximum.
   b. Totally enclosed motors.

C. STARTING CAPABILITY: As required for service indicated five starts minimum per hour.

D. PHASES AND CURRENT: Verify electrical service compatibility with motors to be used.

1. UP TO 1/2 HP: Provide permanent split, capacitor-start single phase with inherent overload protection.
2. 3/4 HP AND LARGER: Provide squirrel-cage induction polyphone.
3. Provide two separate windings on 2-speed polyphone motors.
4. Name plate voltage shall be the same as the circuit's normal voltage, serving the motor.

E. SERVICE FACTOR: 1.15 for polyphase; 1.35 for single phase.

F. FRAMES: U-frames 1.5 hp. and larger.

G. BEARINGS: Provide sealed re-greasable ball bearings; with top mounted zerc lubrication fittings and bottom side drains minimum average life 100,000 hours typically, and others as follows:

1. Design for thrust where applicable.
2. PERMANENTLY SEALED: Where not accessible for greasing.
3. SLEEVE-TYPE WITH OIL CUPS: Light duty fractional hp. motors or polyphase requiring minimum noise level.

H. ENCLOSURE TYPE: Provide enclosures as follows:

1. CONCEALED INDOOR: Open drip proof.
2. EXPOSED INDOOR: Guarded.
3. OUTDOOR TYPICAL: Type II. TEC.
4. OUTDOOR WEATHER PROTECTED: Type I. TEA.

I. OVERLOAD PROTECTION: Built-in sensing device for stopping motor in all phase legs and signaling where indicated for fractional horse power motors.

J. NOISE RATING: "Quiet" except where otherwise indicated.

K. EFFICIENCY: Minimum full load efficiency listed in the following table, when tested in accordance with IEEE Test Procedure 112A, Method B, including stray load loss measure.

Motor Horsepower	NEMA Efficiency INDEX Letter	Minimum Efficiency %
	1800 RPM Synchronous Speed	
7.5-10	F	89.5
15-20	E	91.0
25-30	E	92.4
40	D	93.0
50	C	93.0
60	C	93.6
75	C	94.1
100-125	B	94.5
150-200	B	95.0
	1200 RPM Synchronous Speed	
3-5	G	87.5
7.5	G	89.5
10	F	89.5
15	F	90.2
20	E	90.2
25-30	E	91.7
40-50	D	93.0
60	D	93.6
75	C	93.6
100-125	C	94.1
150-200	B	95.0

2.02 MOTOR CONTROLLERS (STARTERS)

A. All motor controllers (for equipment furnished under Division 23) shall be furnished under Division 23 and installed under Division 26 unless otherwise noted on the plans.

1. Starters shall be provided for 3 phase motors 3/4 horsepower and greater.

B. Motor starters shall be furnished as follows.

1. GENERAL: Motor starters shall be Square D Company Class 8536 across-the-line magnetic type, full-voltage, non-reversing (FAVOR) starter. All starters shall be constructed and tested in accordance with the latest NEMA standards, sizes and horsepower. ICE sizes are not acceptable. Starters shall be mounted in a general purpose dead front, painted steel enclosure and surface-mounted. Provide size and number of poles as shown and required by equipment served. Provide two speed, two winding or two speed, single winding motor starter as required for two speed motors.
2. CONTACTS: Magnetic starter contacts shall be double break solid silver alloy. All contacts shall be replaceable without removing power wiring or removing starter from panel. The starter shall have straight-through wiring.
3. OPERATING COILS: Operating coils shall be 120 volts and shall be of molded construction. When the coil fails, the starter shall open and shall not lock in the closed position.
4. OVERLOAD RELAYS: Provide manual reset, trip-free Class 20 overload relays in each phase conductor in of all starters. Overload relays shall be melting alloy

type with visual trip indication. All 3 phase and single phase starters shall have one overload relay in each underground conductor. Relay shall not be field adjustable from manual to automatic reset. Provide 6 overload relays for two speed motor starters.

5. PILOT LIGHTS: Provide a red running pilot light for all motor starters. Pilot lights shall be mounted in the starter enclosure cover. Pilot lights shall be operated from an interlock on the motor starter and shall not be wired across the operating coil.
6. CONTROLS: Provide starters with HAND-OFF-AUTOMATIC switches. Coordinate additional motor starter controls with the requirements of Division 23. Motor starter controls shall be mounted in the starter enclosure cover.
7. CONTROL POWER TRANSFORMER: Provide a single-phase 480 volt control power transformer with each starter for 120 volt control power. Connect the primary side to the line side of the motor starter. The primary side shall be protected by a fuse for each conductor. The secondary side shall have one leg fused and one leg grounded. Arrange transformer terminals so that wiring to terminals will not be located above the transformer.
8. AUXILIARY CONTACTS: Each starter shall have one normally open and one normally closed convertible auxiliary contact in addition to the number of contacts required for the "holding interlock", remote monitoring, and control wiring. In addition, it shall be possible to field-install three more additional auxiliary contacts without removing existing wiring or removing the starter from its enclosure.
9. UNIT WIRING: Unit shall be completely pre-wired to terminals to eliminate any interior field wiring except for line and load power wiring and HVAC control wiring.
10. ENCLOSURES: All motor starter enclosures shall be NEMA 1, general purpose enclosures or NEMA-3R if mounted exposed to high moisture conditions. Provide NEMA 4X when located by cooling towers.
11. POWER MONITOR: Provide a square "D" 8430 MPS phase failure and under-voltage relay, base and wiring required for starters serving all 3 phase motors. Set the under-voltage setting according to minimum voltage required for the motor to operate within its range.

C. APPROVED MANUFACTURERS: Controller numbers are based on first named manufacturer. Provide one of the following manufacturer's.

1. Siemens.
2. Square D.
3. General Electric.
4. Eaton.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturers' recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors' price shall include all items required as per manufacturers' requirements.

3.03 INSTALLATION

A. GENERAL: Install in a professional manner. Any part or parts not meeting this requirement shall be replaced or rebuilt without extra expense to Owner.

B. Install rotating equipment in static and dynamic balance.

C. Provide foundations, supports, and isolators properly adjusted to allow minimum vibration transmission within the building.

D. Correct objectionable noise or vibration transmission in order to operate equipment satisfactorily as determined by the Engineer.

END OF SECTION

SECTION 23 05 29
HANGERS AND SUPPORTS FOR PIPING AND EQUIPMENT - HVAC

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 WORK INCLUDED

A. Pipe, and equipment hangers, supports and associated anchors.

B. Sleeves and seals.

C. Flashing and sealing equipment and pipe stacks.

1.03 RELATED WORK

A. Section 21 00 00 – Fire Suppression.

B. Section 22 10 00 – Plumbing Piping and Pumps.

C. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

D. Section 23 07 16 – HVAC Equipment Insulation.

1.04 REFERENCES

A. ANSI/ASME B31.1 - Power Piping.

B. NFPA 13 - Standard for the Installation of Sprinkler Systems.

C. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems.

1.05 QUALITY ASSURANCE

A. Supports for Sprinkler Piping: In conformance with NFPA 13.

B. Supports for Standpipes: In conformance with NFPA 14.

1.06 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Indicate hanger and support framing and attachment methods.

PART 2 - PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Malleable iron, adjustable swivel, split ring.

B. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roller and stand for pipe sizes 6 inches and over.

C. Vertical Support: Steel riser clamp.

D. Copper Pipe Support and Hangers: Electro-galvanized with thermoplastic elastomer cushions; Unistrut “Cush-A-Clamp” or equal. Hangers: Plastic coated; Unistrut or equal.

E. For installation of protective shields refer to Section 22 05 29.

F. Shields for Vertical Copper Pipe Risers: Sheet lead.

G. Pipe Rough-In Supports in Walls/Chases: Provide preformed plastic pipe supports, Sioux Chief “Pipe Titan” or equal.

2.02 HANGER RODS

A. Galvanized Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

2.03 INSERTS

A. Inserts: Malleable iron case with galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

A. Metal Flashing: 20 gage galvanized steel.

B. Lead Flashing: 4 lb. /sq. ft. sheet lead for waterproofing; 1 lb. /sq. ft. sheet lead for soundproofing.

C. Caps: Steel, 20 gage minimum; 16 gage at fire resistant elements.

D. Coordinate with roofing contractor/Architect for type of flashing on metal roofs.

2.05 EQUIPMENT CURBS

A. Fabricate curbs of hot dipped galvanized steel.

B. For metal roof construction, roof curbs shall be made of aluminum or stainless steel. Coordinate with Architectural Drawings and details.

2.06 SLEEVES

A. Sleeves for Pipes through Non-fire Rated Floors: Form with 18 gage galvanized steel, tack welded to form a uniform sleeve.

B. Sleeves for Pipes through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Form with steel pipe, Schedule 40.

C. Sleeves for Pipes through Fire Rated and Fire Resistive Floors and Walls, and Fireproofing: Prefabricated fire rated steel sleeves including seals, UL listed.

D. Sleeves for Round Ductwork: Form with galvanized steel.

E. Sleeves for Rectangular Ductwork: Form with galvanized steel.

F. Fire Stopping Insulation: Glass fiber type, non-combustible, U.L. listed.

G. Caulk: Paintable 25-year acrylic sealant.

H. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted, two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel.

2.07 FABRICATION

A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

B. Design hangers without disengagement of supported pipe.

C. Design roof supports without roof penetrations, flashing or damage to the roofing material.

2.08 FINISH

A. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

PART 3 - EXECUTION

3.01 INSERTS

A. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Coordinate with Structural Engineer for placement of inserts.

B. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

C. Where concrete slabs form finished ceiling, provide inserts to be flush with slab surface.

D. Where inserts are omitted, drill through concrete slab from below and provide thru-bolt with recessed square steel plate and nut recessed into and grouted flush with slab. Verify with Structural Engineer prior to start of work.

3.02 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE	MAX. HANGER SPACING	HANGER DIAMETER
(Copper Pipe)		
1/2 to 1-1/4 inch	5'-0"	3/8"
1-1/2 to 2-1/2 inch	8'-0"	3/8"

3 to 4 inch	10'-0"	3/8"
6 to 8 inch	10'-0"	1/2"

B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

C. Place a hanger within 12 inches of each horizontal elbow, and at the vertical to horizontal transition.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

F. Install hangers with nut at base and above hanger; tighten upper nut to hanger after final installation adjustments.

G. Portable pipe hanger systems shall be installed per manufacturer's instructions.

H. Distances between supports are maximum distance. Supports shall be provided to carry the pipe/equipment load.

3.03 Insulated Piping: Comply with the following installation requirements.

A. Clamps: Attach galvanized clamps, including spacers (if any), to piping with clamps projecting through insulation; do not exceed pipe stresses allowed by ASME B31.9.

B. Saddles: Install galvanized protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.

C. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

D. Piping 2" and larger: provide galvanized sheet metal shields with calcium silicate insulation at hangers/supports.

E. Insert material shall be at least as long as the protective shield.

F. Thermal Hanger Shields: Install where indicated, with insulation of same thickness as piping.

3.04 EQUIPMENT BASES AND SUPPORTS

A. Provide equipment bases of concrete.

B. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct support of steel members. Brace and fasten with flanges bolted to structure.

D. Provide rigid anchors for pipes after vibration isolation components are installed.

3.05 FLASHING

A. Provide flexible flashing and metal counter flashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

B. Flash vent and soil pipes projecting 8 inches minimum above finished roof surface with lead worked one inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk. Provide metal counter flash and seal.

C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device.

D. Seal floor, shower, mop sink, and all other drains watertight to adjacent materials.

E. Provide curbs for mechanical roof installations 8 inches minimum high above roofing surface. Contact Architect for all flashing details and roof construction. Seal penetrations watertight.

3.06 SLEEVES

A. Set sleeves in position in formwork. Provide reinforcing around sleeves.

B. Extend sleeves through floors minimum one inch above finished floor level. Caulk sleeves full depth with fire rated thermfiber and 3M caulking and provide floor plate.

C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with U.L. listed fire stopping insulation and caulk seal air tight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Fire protection sleeves may be flush with floor of stairways.

END OF SECTION

SECTION 23 05 48
VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. This Section and Section 23 02 00 – Basic Materials and Methods are part of each Division 23 Section which references the vibration control products specified herein.

1.02 WORK INCLUDED

A. Vibration and sound control products.

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of vibration control products of type, size, and capacity required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Vibration and sound control products shall conform to ASHRAE criteria for average noise criteria curves for all equipment at full load conditions.

C. Unless otherwise indicated, sound and vibration control products shall be provided by a single manufacturer.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Amber/Booth Company, Inc.

B. Mason Industries, Inc.

C. Noise Control, Inc.

2.02 GENERAL

A. Provide vibration isolation supports for equipment, piping and ductwork, to prevent transmission of vibration and noise to the building structure that may cause discomfort to the occupants.

B. Model numbers of Amber/Booth products are included for identification. Products of the additional manufacturers will be acceptable provided they comply with all of the requirements of this specification.

2.03 SUSPENDED FANS AND FAN COIL UNITS

A. Provide Amber/Booth type BSS spring hangers sized for 1'' static deflection.

2.09 CORROSION PROTECTION

A. All vibration isolators shall be designed and treated for resistance to corrosion.

B. Steel components: PVC coated or phosphated and painted with industrial grade enamel. Nuts, bolts, and washers: zinc-electroplated.

PART 3 - EXECUTION

3.01 All equipment shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

3.03 If internal isolation option is used on air handling units, the mechanical contractor shall verify proper adjustment and operation of isolators prior to start-up. All shipping brackets and temporary restraint devices shall be removed.

3.04 The vibration isolation supplier shall certify in writing that he has inspected the installation and that all external isolation materials and devices are installed correctly and functioning properly.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 – Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for owner's use.

1.03 Refer to Architectural Sections for additional requirements.

PART 3 - EXECUTION

3.01 All labeling equipment shall be installed as per manufacturer’s printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Contractors price shall include all items required as per manufacturer’s requirements.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 – Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 RELATED DOCUMENTS

Approved submittal date on equipment installed, to accomplish the test procedures, outlined under paragraph 3.01 of this Section, will be provided by the Contractor.

1.03 DESCRIPTION

A. The TAB of the air conditioning systems shall be performed by an impartial technical firm hired by Owner whose operations are limited only to the field of professional TAB. The TAB work will be done under the direct supervision of a qualified engineer employed by the TAB firm.

B. The TAB firm will be responsible for inspecting, adjusting, balancing, and logging the date on the performance of fans, dampers in the duct system, and air distribution devices. The Contractor and the various Subcontractors of the equipment installed shall cooperate with the TAB firm to furnish necessary data on the design and proper applications of the system components and provide labor and material required to eliminate deficiencies or malperformance.

1.04 QUALITY ASSURANCE

A. QUALIFICATIONS OF CONTRACTOR PERSONNEL: Submit evidence to show that the personnel who shall be in charge of correcting deficiencies for balancing the systems are qualified. The Owner and Engineer reserve the right to require that the originally approved personnel be replaced with other qualified personnel if, in the Owner and Engineer's opinion, the original personnel are not qualified to properly place the system in condition for balancing.

B. QUALIFICATIONS OF TAB FIRM PERSONNEL:

1. A minimum of one registered Professional Engineer licensed in the State, is required to be in permanent employment of the firm.
2. Personnel used on the jobsite shall be either Professional Engineers or technicians, who shall have been permanent, full time employees of the firm for a minimum of six months prior to the start of Work for that specified project.
3. Evidence shall be submitted to show that the personnel who actually balance the systems are qualified. Evidence showing that the personnel have passed the tests required by the Associated Air Balance Council (AABC) shall be required.

C. CALIBRATION LIST: Submit to the Engineer for approval, a list of the gauges, thermometers, velometer, and other balancing devices to be used in balancing the system. Submit evidence to show that the balancing devices are properly calibrated

before proceeding with system balancing.

1.05 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner's operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:

1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes and corrections.
6. On site demonstration.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SERVICES OF THE CONTRACTOR

A. The Drawings and Specifications have indicated valves, dampers, and miscellaneous adjustment devices for the purpose of adjustment to obtain optimum operating conditions. Install these devices in a manner that leaves them accessible, and provide access as requested by the TAB firm.

B. Have systems complete and in operational readiness prior to notifying the TAB firm that the project is ready for their services, and certify in writing to the Architect and Owner that such a condition exists.

C. As a part of the Work of this Section, make changes in the sheaves, belts, and dampers or the addition of dampers required for correct balance of the new work as required by the TAB firm, at no additional cost to the Owner.

D. Fully examine the existing system to be balanced, to determine whether or not sufficient volume dampers, balancing valves, thermometers, gauges, pressure and temperature taps, means of reading static pressure and total pressure in duct systems, means of determining water flow, and other means of taking data needed for proper water and air balancing are existing. Submit to the Engineer in writing a listing of omitted items considered necessary to balance existing systems. Submit the list and proposal as a cost add item.

E. Verify that fresh air louvers are free of blockage, coils are clean and fresh air ducts to each air handling unit have individually adjustable volume regulating dampers.

F. Provide, correct, repair, or replace deficient items or conditions found during the testing, adjusting, and balancing period.

G. In order that systems may be properly tested, balanced, and adjusted as specified, operate the systems at no expense to the Owner for the length of time necessary to properly verify their completion and readiness for TAB period.

H. Project construction schedules shall provide time to permit the successful completion of TAB services prior to Substantial Completion. Complete, operational readiness, prior to

commencement of TAB services, shall include the following services of the Contractor:

1. Construction status of building shall permit the closing of doors, windows, ceilings installed and penetrations complete, to obtain project operating conditions.
2. AIR DISTRIBUTION SYSTEMS:
   a. Verify installation for conformity to design. Supply, return, and exhaust ducts terminated and pressure tested for leakage as specified.
   b. Volume and fire dampers properly located and functional. Dampers serving requirements of minimum and maximum outside air, return and relief shall provide tight closure and full opening, smooth and free operation.
   c. Supply, return, exhaust and transfer grilles, registers and diffusers shall be installed.
   d. Air handling systems, units and associated apparatus, such as heating and cooling coils, filter sections, access doors, etc., shall be blanked and sealed to eliminate excessive bypass or leakage of air.
   e. Fans (supply and exhaust) operating and verified for freedom from vibrations, proper fan rotation and belt tension; overload heater elements shall be of proper size and rating; record motor amperage and voltage and verify that these functions do not exceed nameplate ratings.
   f. Furnish or revise fan drives or motors as necessary to attain the specified air volumes.

I. Contractor shall repair any insulation removed from piping system by TAB Contractor during water balancing.

3.02 SERVICES OF THE TAB FIRM

A. The TAB firm will act as liaison between the Owner, Engineer, and the Contractor and inspect the installation of mechanical piping system, sheet metal work, temperature controls and other component parts of the heating, air conditioning and ventilating systems being retrofitted, repaired, or added under this Contract. The reinspection of the Work will cover that part related to proper arrangement and adequate provision for the testing and balancing and will be done when the Work is 80 percent complete.

B. Upon completion of the installation and start-up of the mechanical equipment, to check, adjust, and balance system components to obtain optimum conditions in each conditioned space in the building. Prepare and submit to the Engineer complete reports on the balance and operations of the systems.

C. Measurements and recorded readings of air, water, and electricity that appear in the reports will be done by the permanently employed technicians or engineers of the TAB firm.

D. Make an inspection in the building during the opposite season from that in which the initial adjustments were made. At the time, make necessary modifications to the initial adjustments required to produce optimum operation of system components to affect the proper conditions as indicated on the Drawings. At time of opposite season check-out, the Owner's representative will be notified before readings or adjustments are made.

E. In fan systems, the air quantities indicated on the Drawings may be varied as required to secure a maximum temperature variation of two degrees within each separately controlled space, but the total air quantity indicated for each zone must be obtained. It shall be the obligation of the Contractor to furnish or revise fan drive and motors if necessary, without cost to the Owner, to attain the specified air volumes.

3.03 PROFESSIONAL REPORT

A. Before the final acceptance of the report is made, the TAB firm will furnish the Engineer the following data to be approved by the Owner and Engineer:

1. Summary of main supply, return and exhaust duct pitot tube traverses and fan settings indicating minimum value required to achieve specified air volumes.
2. A listing of the measured air quantities at each outlet corresponding to the temperature tabulation as developed by the Engineer and TAB firm.
3. Air quantities at each return and exhaust air handling device.
4. Static pressure readings entering and leaving each supply fan, exhaust fan, filter, coil, balancing dampers and other components of the systems. Including the retrofit Work. These readings will be related to performance curves in terms of the CFM handled if available.
5. Motor current readings at each equipment motor on load side of capacitors. The voltages at the time of the reading shall be listed.
6. The final report shall certify test methods and instrumentation used, final velocity reading obtained, temperatures, pressure drops, RPM of equipment, amperage of motors, air balancing problems encountered, recommendations and uncompleted punch list items. The test results will be recorded on standard forms.
7. A summary of actual operating conditions shall be included with each system outlining normal and ventilation cycles of operation. the final report will act as a reference of actual operating conditions for the Owner's operating personnel.

3.04 BALANCING AIR CONDITIONING SYSTEM

A. GENERAL:

1. Place all equipment into full operation, and continue operating during each working day of balancing and testing. If the air conditioning system is balanced during Off-Peak cooling season Contractor shall return to rebalance air side system as required to put system in proper balance at that season.
2. The Contractor shall submit detailed balancing and recording forms for approval. After approval by the Engineer, prepare complete set of forms for recording test data on each system. All Work shall be done under the supervision of a Registered Professional Engineer. All instruments used shall be accurately calibrated to within 1% of scale and maintained in good working order.
3. Upon completion of the balancing and testing, the TAB Contractor shall compile the test data in report forms, and forward five copies to the Engineer for evaluation.
4. The final report shall contain logged results of all tests, including such data as:
    a. Tabulation of air volume at each outlet.
    b. Outside dry bulb and wet bulb temperature.
    c. Inside dry bulb and wet bulb temperatures in each conditioned space room or area.
    d. Actual fan capacities and static pressures. Motor current and voltage readings at each fan.

B. AIR SYSTEMS: Perform the following operations as applicable to balance and test systems:

1. Check fan rotation.
2. Check filters (balancing shall be done with clean filters).
3. Test and adjust blower rpm to design requirements.

4. Test and record motor full load amperes.
5. Test and record system static pressures, suction and discharge.
6. Test and adjust system for design cfm, return air and outside air (±2%). Change-out fan sheaves as required to balance system.
7. Test and record entering air temperatures, db and wb.
8. Test and record leaving air temperatures, db and wb.
9. Adjust all zones to design cfm (±2%).
10. Test and adjust each diffuser, grille, and register to within 5% of design.

C. AIR DUCT LEAKAGE: (From SMACNA Duct Standards latest edition) Test all ductwork (designed to handle over 1000 CFM) as follows:

1. Test apparatus
   The test apparatus shall consist of:
   a. A source of high pressure air--a portable rotary blower or a tank type vacuum cleaner.
   b. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.
2. Test Procedures
   a. Test for audible leaks as follows:
      1) Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
      2) Start the blower with its control damper closed.
      3) Gradually open the inlet damper until the duct pressure reaches 1.2 times the standard designed duct operating pressure.
      4) Survey all joints for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
   b. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
      1) Start blower and open damper until pressure in duct reaches 25% in excess of designed duct operating pressure.
      2) Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.
      3) Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
      4) Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which must be corrected.

D. DX SYSTEMS:

1. Test and record suction and discharge pressures at each compressor and record ambient air temperature entering the condensing coils.
2. Test and record unit full load amps and voltage.
3. Test and record staging and unloading of unit required by sequence of operation or drawing schedule.

E. Automatic temperature controls shall be calibrated; and all thermostats and dampers

adjusted so that the control system is in proper operating condition, subject to the approval of the Engineer/Owner.

F. The TAB Contractor shall report to Engineer all air distribution devices or other equipment that operate noisily so that corrective measures may be implemented by the Contractor at no additional cost to the Owner or Architect/Engineer.

END OF SECTION

SECTION 23 07 13
DUCT INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 WORK INCLUDED

A. Ductwork system insulation.

1.03 RELATED SECTIONS

A. Section 23 05 13 – Common Motor Requirements for HVAC Equipment

B. Section 23 05 53 – Identification for HVAC Equipment

1.04 QUALITY ASSURANCE

A. Installer's Qualifications: Firm with at least 5 years successful installation experience on projects with mechanical insulations similar to that required for this project.

B. Flame/Smoke Ratings: Provide composite mechanical insulation (insulation, jackets, coverings, sealers, mastics and adhesives) with flame-spread index of 25 or less, and smoke-developed index of 50 or less, as tested by ASTM E 84 (NFPA 255) method.

1. Exception: Outdoor mechanical insulation may have flame spread index of 75 and smoke developed index of 150.

C. Duct and plenum insulation shall comply with minimum R-value requirements of 2009 International Energy Conservation Code.

D. Adhesive and other material shall comply with NFPA and NBFU Standards No. 90A and 90B.

1.05 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective, or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.06 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation

procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened containers with manufacturer’s stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 - PRODUCTS

2.01 GENERAL DESCRIPTION

A. The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and approved before any insulation is installed.

B. A sample quantity of each type of insulation and each type of application shall be installed and approval secured prior to proceeding with the main body of the Work.

2.02 ACCEPTABLE MANUFACTURERS

A. Glass fiber materials shall be as manufactured by Knauf, Certain-Teed, Johns-Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

B. Adhesives shall be as manufactured by Minnesota Mining, Arabol, Benjamin-Foster, Armstrong or Insulmastic, Inc., and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

C. Ceramic fiber materials shall be as manufactured by Primer Refractories, A.P. Green Refractories or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. All insulation shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

B. All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

3.02 EXTERNAL DUCT INSULATION

A. Fasten all longitudinal and circumferential laps with outward clinching staples 3" on center. On rectangular ducts over 24" wide apply as above and hold insulation in place on bottom side with mechanical pins and clips on 12" centers.

B. Seal all joints, fastener penetrations and other breaks in vapor barrier with 3 inch wide

strips of white glass fabric embedded between two coats of vapor barrier mastic, Childers CP-30 or approved equal.

C. All external duct insulation shall be Johns Manville Microlite EQ or Microlite XG fiberglass duct wrap insulation with reinforced aluminum facing or approved equal.

D. External duct wrap is required on all outside air ducts, supply and return air ducts that are not internally insulated. Duct wrap shall be provided as follows:

1. 1½" thick, 1.0 PCF density minimum when ducts are located in conditioned spaces.
2. 2" thick with a minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.

3.03 DUCT LINER

A. Duct liner shall be kept clean and dry during transportation, storage, installation, and throughout the construction process care should be taken to protect the liner from exposure to the elements or damage from mechanical abuse.

B. All portions of duct designed to receive duct liner shall be completely covered with liner as specified. The smooth, black, acrylic-coated surfaces with flexible glass cloth reinforcement shall face the airstream. All duct liner shall be cut to assure tight, overlapped corner joints. The top pieces shall be supported by the sidepieces. Duct liner shall be installed following the guidelines in the NAIMA "Duct Liner Installation Standard".

C. The duct liner shall be tested according to erosion test method in UL 181 and shall be guaranteed to withstand velocities in the duct system up to 5000 fpm without surface erosion.

D. Duct liner shall be adhered to the sheet metal with full coverage of an approved adhesive that conforms to ASTM C 916, and all exposed leading edges and transverse joints shall be coated with Permacote factory-applied or field-applied edge coating and shall be neatly butted without gaps. Shop or field cuts shall be liberally coated with Johns Manville SuperSeal® duct butter and Edge Treatment or approved adhesive.

E. Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at forward discharge and at any point where lined duct is preceded by unlined duct.

F. When velocity exceeds 4000 fpm (20.3 m/sec), use metal nosing on every leading edge. Nosing may be formed on duct or be channel or zee attached by screws, rivets or welds.

G. The liner shall further be secured with Graham welding pins and washers on not more than 18 inch centers both vertical and horizontal surfaces, and the pins and washers shall be pointed up with adhesive.

H. Duct liner shall be Johns Manville Linacoustic RC fiberglass duct liner with factory-applied edge coating and acrylic coating on the mat surface of airstream side or approved equal. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B, FHC 25/50 and Limited Combustibility and the air stream surface coating should contain an immobilized, EPA-registered, anti-microbial agent so it will not support microbial growth as tested in accordance with ASTM G21 and G22. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than .70 as tested per ASTM C 423 using a Type "A" mounting, and a thermal conductivity no higher than .25 BTU•in/(hr•ft^2•°F) at 75°F mean temperature.

I. Line supply and return ductwork at connection of HVAC unit to a point of 15 feet upstream and downstream of the equipment and in return air boots. Attach with full cover coat of cement, duct dimensions up to 16 inches; provide stick clips or screws and cap for dimensions over 16 inches, spaced 16 inches o.c. maximum. Provide sheet metal liner cap over all leading edges of internal insulation exposed to air stream.

J. Duct liner shall be provided as follows:

1. 1” Thick, 1.5 PCF density minimum when ducts are located in conditioned spaces.
2. 1 ½” Thick with a minimum installed R-value of 6 when ducts are located in unconditioned spaces, such as ceiling plenum space.
3. 2” Thick with a minimum installed R-value of 8 when ducts are located outdoors.

3.04 AIR DEVICE AND MISCELLANEOUS DUCT INSULATION

A. The backside of all supply air devices shall be insulated with taped and sealed 1½ inch thick external duct wrap.

B. The contractor shall install an additional layer of 1½ inch thick external fiberglass duct wrap on any portion of the supply air, return air, outside air, or exhaust air system that has condensation forming during any period of operation. The insulation shall be taped and sealed and located until all evidence of the condensation has been eliminated, at no additional cost to the Owner.

END OF SECTION

SECTION 23 07 16
HVAC EQUIPMENT INSULATION

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 – Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

B. Work specified elsewhere.

1. Basic materials and methods.
2. Piping systems.
3. Air distribution equipment.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.

1.05 DELIVERY AND STORAGE

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened containers with manufacturer’s stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 – PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an

absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and reviewed before any insulation is installed.

2.03 A sample quantity of each type of insulation and each type application shall be installed and reviewed prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 Glass fiber materials as manufactured by Owens/Corning, PPG, CSG, or Johns Manville will be acceptable, if they comply with the specifications.

2.05 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.06 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.07 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

PART 3 – EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 – Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 SCOPE

A. Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

B. Furnish and install piping insulation to:

1. Condensate drain piping.
2. Refrigerant piping.
3. All pipes subject to freezing conditions shall be insulated.

C. Work specified elsewhere.

1. Painting.
2. Pipe hangers and supports.

D. For insulation purpose piping is defined as the complete piping system including supplies and returns, pipes, valves, automatic control valve bodies, fittings, flanges, strainers, thermometer well, unions, reducing stations, and orifice assemblies.

1.03 WARRANTY

A. Warrant the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.

B. Defects shall include, but not be limited to, the following:

1. Mildewing.
2. Peeling, cracking, and blistering.
3. Condensation on exterior surfaces.

1.04 SUBMITTALS

A. SHOP DRAWINGS: Indicate size, material, and finish. Show locations and installation procedures. Include details of joints, attachments, and clearances.

B. PRODUCT DATA: Submit schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, project variations, and accessories.

1.05 DELIVERY AND STORAGE

A. Deliver insulation, coverings, cements, adhesives, and coatings to site in unopened

containers with manufacturer's stamp, clearly labeled with flame and smoke rating, affixed showing fire hazard indexes of products.

B. Protect insulation against dirt, water and chemical and mechanical damage. Do not install damaged or wet insulation; remove such from project site.

PART 2 - PRODUCTS

2.01 It is the intent of these specifications to secure superior quality workmanship resulting in an absolutely satisfactory installation of insulation from the standpoint of both function and appearance. Particular attention shall be given to valves, fittings, pumps, etc., requiring low temperature insulation to insure full thickness of insulation and proper application of the vapor seal. All flaps of vapor barrier jackets and/or canvas covering must be neatly and securely smoothed and sealed down.

2.02 The type of insulation and its installation shall be in strict accordance with these specifications for each service, and the application technique shall be as recommended by the manufacturer. All insulation types, together with adhesives and finishes shall be submitted and reviewed prior to installation.

2.03 A sample quantity of each type of insulation and each type application shall be installed and accepted prior to proceeding with the main body of the work. Condensation caused by improper installation of insulation shall be corrected by Installing Contractor. Any damage caused by condensation shall be made good at no cost to the Owner or Architect/Engineer.

2.04 All insulation shall have composite (insulation, jacket or facing, and adhesive used to adhere the facing or jacket to insulation) fire and smoke hazard as tested by Procedure ASTM E084, NFPA 255 and UL 723 not exceeding:

Flame Spread 25
Smoke Developed 50

2.05 Accessories, such as adhesives, mastics and cements shall have the same component ratings as listed above.

2.06 All products or their shipping cartons shall have a label affixed, indicating flame and smoke ratings do not exceed the above requirements.

2.07 APPROVED MANUFACTURERS

A. Calcium silicate materials shall be as manufactured by Johns Manville.

B. Glass fiber materials shall be as manufactured by Johns Manville or Owens-Corning and shall have the same thermal properties, density, fire rating, vapor barrier, etc., as the types specified herein, subject to review by the Engineer.

C. Adhesives shall be as manufactured by Childers, Foster, HB Fuller or Armstrong, and shall have the same adhesive properties, fire rating, vapor seal, etc., as the types specified herein, subject to review by the Engineer.

D. Armaflex elastomeric cellular thermal insulation by Armstrong.

E. Phenolic foam insulation shall be as manufactured by Kooltherm Insulation (Koolphen).

F. Metal jacketing and fitting covers shall be as manufactured by Childers or RPR Products.

2.08 MATERIALS

A. CONDENSATE DRAINAGE PIPING: Fire resistant fiberglass insulation; insulation not required when piping is exposed on roof.

B. REFRIGERANT PIPING: Refrigerant pipe insulation shall be model "AP-2000", fire rated for use in environmental air plenums. Apply manufacturers recommended finish and sealant for exterior applications.

C. METAL JACKETING: Utilize Childers “Strap-On” jacketing. Provide preformed fitting covers for all elbows and tees.

PART 3 - EXECUTION

3.01 All insulation shall be installed in accordance with the manufacturer’s recommendations and printed installation instructions, including high density inserts at all hangers and pipe supports to prevent compression of insulation.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer’s requirements.

3.03 Pipes located outdoors or in tunnels shall be insulated same as concealed piping; and in addition shall have a jacket of 0.016 inch thick, smooth aluminum with longitudinal modified Pittsburg Z-Lock seam and 2 inch overlap. Jacketing shall be easily removed and replaced without damage. All insulation butt joints shall be sealed with gray silicone. Galvanized banding is not acceptable.

3.04 All insulated piping located over driveways shall have an aluminum shield permanently banded over insulation to protect it from damage from car antennas.

3.05 FIRE RATED INSULATION

A. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe.

B. The penetration shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty.

C. All fire rating material shall be insulated in accordance with manufacturer's printed instructions.

PART 4 - SCHEDULES

4.01 LOW TEMPERATURE SURFACES	**MINIMUM INSULATION THICKNESS**
A. Condensate drain lines:	¾ inch
B. Refrigerant Piping	
1. 1½“ and smaller	1 inch
2. Larger than 1½ inch	1½ inch

END OF SECTION

SECTION 23 09 23
INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.01 Products Not Furnished or Installed under but Integrated with the Work of This Section

A. Section - General

1. Coordination Meeting: The Installer furnishing the DDC network shall meet with the Installer(s) furnishing each of the following products to coordinate details of the interface between these products and the DDC network. The Owner or his designated representative shall be present at this meeting. Each Installer shall provide the Owner and all other Installers with details of the proposed interface including PICS for BACnet equipment, hardware and software identifiers for the interface points, network identifiers, wiring requirements, communication speeds, and required network accessories. The purpose of this meeting shall be to insure there are no unresolved issues regarding the integration of these products into the DDC network. Submittals for these products shall not be approved prior to the completion of this meeting.

1.02 Related Sections

A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.

B. The following sections constitute related work:

1.03 Description

A. General: The control system shall consist of a high-speed, peer-to-peer network of DDC controllers, a control system server, and a web-based operator interface.

B. System software shall be based on a server/thin client architecture, designed around the open standards of web technology. The control system server shall be accessed using a Web browser over the control system network, the owner's local area network, and (at the owner's discretion) over the Internet.
The intent of the thin-client architecture is to provide operators complete access to the control system via a Web browser. No special software other than a web browser shall be required to access graphics, point displays, and trends, configure trends, configure points and controllers, or to download programming into the controllers.

C. System shall use the BACnet protocol for communication to the operator workstation or web server and for communication between control modules. I/O points, schedules, setpoints, trends and alarms specified in 23 09 93 – “Sequence of Operations for HVAC Controls” shall be BACnet objects.

1.04 Approved Control system Manufacturers

A. The following are approved control system manufacturers:

1. Automated Logic Corporation
2. Trane
3. Johnson Control

1.05 Quality Assurance

A. Installer and Manufacturer Qualifications

1. Installer shall have an established working relationship with Control System Manufacturer.

2. Installer shall have successfully completed Control System Manufacturer’s control system training. Upon request, Installer shall present record of completed training including course outlines.

1.06 Codes and Standards

A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with the current editions in effect 30 days prior to the receipt of bids of the following codes:

1. National Electric Code (NEC)
2. International Building Code (IBC)
    a. Section 719 Ducts and Air Transfer Openings
    b. Section 907 Fire Alarm and Detection Systems
    c. Section 909 Smoke Control Systems
    d. Chapter 28 Mechanical
3. International Mechanical Code (IMC)
4. ANSI/ASHRAE Standard 135, BACnet - A Data Communication Protocol for Building Automation and Control Systems

1.07 System Performance

A. Performance Standards. System shall conform to the following minimum standards over network connections. Systems shall be tested using manufacturer’s recommended hardware and software for operator workstation (server and browser for web-based systems).

1. Graphic Display.A graphic with 20 dynamic points shall display with current data within 10 sec.
2. Graphic Refresh.A graphic with 20 dynamic points shall update with current data within 8 sec. and shall automatically refresh every 15 sec.
3. Configuration and Tuning Screens. Screens used for configuring, calibrating, or tuning points, PID loops, and similar control logic shall automatically refresh within 6 sec.
4. Object Command. Devices shall react to command of a binary object within 2 sec. Devices shall begin reacting to command of an analog object within 2 sec.
5. Alarm Response Time. An object that goes into alarm shall be annunciated at the workstation within 45 sec.
6. Program Execution Frequency. Custom and standard applications shall be capable of running as often as once every 5 sec. Select execution times consistent with the mechanical process under control.
7. Performance. Programmable controllers shall be able to completely execute DDC PID control loops at a frequency adjustable down to once per sec. Select execution times consistent with the mechanical process under control.
8. Multiple Alarm Annunciation. Each workstation on the network shall receive alarms within 5 sec of other workstations.
9. Reporting Accuracy. System shall report values with minimum end-to-end accuracy listed in Table 1.
10. Control Stability and Accuracy. Control loops shall maintain measured variable at setpoint within tolerances listed in Table

Table-1
Reporting Accuracy

Measured Variable	Reported Accuracy
Space Temperature	±0.5ºC (±1ºF)
Ducted Air	±0.5ºC (±1ºF)
Outside Air	±1.0ºC (±2ºF)
Dew Point	±1.5ºC (±3ºF)
Water Temperature	±0.5ºC (±1ºF)
Delta-T	±0.15º (±0.25ºF)
Relative Humidity	±5% RH
Water Flow	±2% of full scale
Airflow (terminal)	±10% of full scale (see Note 1)
Airflow (measuring stations)	±5% of full scale
Airflow (pressurized spaces)	±3% of full scale
Air Pressure (ducts)	±25 Pa (±0.1 in. w.g.)
Air Pressure (space)	±3 Pa (±0.01 in. w.g.)
Water Pressure	±2% of full scale (see Note 2)
Electrical	±1% of reading (see Note 3)
Carbon Monoxide (CO)	±5% of reading
Carbon Dioxide (CO2)	±50 ppm

Note 1: Accuracy applies to 10%–100% of scale

Note 2: For both absolute and differential pressure

Note 3: Not including utility-supplied meters

Table 2
Control Stability and Accuracy

Controlled Variable	Control Accuracy	Range of Medium
Air Pressure	±50 Pa (±0.2 in. w.g.) ±3 Pa (±0.01 in. w.g.)	0–1.5 kPa (0–6 in. w.g.) -25 to 25 Pa (-0.1 to 0.1 in. w.g.)
Airflow	±10% of full scale	
Space Temperature	±1.0ºC (±2.0ºF)	
Duct Temperature	±1.5ºC (±3ºF)	
Humidity	±5% RH	
Fluid Pressure	±10 kPa (±1.5 psi) ±250 Pa (±1.0 in. w.g.)	MPa (1–150 psi) 0–12.5 kPa (0–50 in. w.g.) differential

1.08 Submittals

A. Product Data and Shop Drawings: Meet requirements of Section 01 30 00 on Shop Drawings, Product Data, and Samples. In addition, the contractor shall provide shop drawings or other submittals on hardware, software, and equipment to be installed or provided. No work may begin on any segment of this project until submittals have been approved for conformity with design intent. Provide drawings as AutoCAD compatible files on magnetic or optical disk (file format: .DWG, .DXF, .VSD, or comparable) and three 11" x 17" prints of each drawing. When manufacturer's cutsheets apply to a product series rather than a specific product, the data specifically applicable to the project shall be highlighted or clearly indicated by other means. Each submitted piece of literature and drawing shall clearly reference the specification and/or drawing that the submittal is to cover. General catalogs shall not be accepted as cutsheets to fulfill submittal requirements. Select and show submittal quantities appropriate to scope of work. Submittal approval does not relieve Contractor of responsibility to supply sufficient quantities to complete work. Submittals shall be provided within 12 weeks of contract award. Submittals shall include:

1. DDC System Hardware
    a. A complete bill of materials to be used indicating quantity, manufacturer, model number, and relevant technical data of equipment to be used.
    b. Manufacturer's description and technical data such as performance curves, product specifications, and installation and maintenance instructions for items listed below and for relevant items not listed below:
        i. Direct digital controllers (controller panels)
        ii. Transducers and transmitters
        iii. Sensors (including accuracy data)
        iv. Actuators
        v. Valves
        vi. Relays and switches
        vii. Control panels
        viii. Power supplies
        ix. Batteries
        x. Operator interface equipment
        xi. Wiring
    c. Wiring diagrams and layouts for each control panel. Show termination numbers.
    d. Schematic diagrams for all field sensors and controllers. Provide floor plans of all sensor locations and control hardware. Riser diagrams showing control network layout, communication protocol, and wire types.
2. Central System Hardware and Software
    a. A complete bill of material of equipment used indicating quantity, manufacturer, model number, and relevant technical.
    b. Manufacturer's description and technical data such as product specifications and installation and maintenance instructions for items listed below and for relevant items furnished under this contract not listed below:
        i. Central Processing Unit (CPU) or web server
        ii. Monitors
        iii. Keyboards
        iv. Power supplies
        v. Battery backups
        vi. Interface equipment between CPU or server and control panels

vii. Operating System software
viii. Operator interface software
ix. Color graphic software
x. Third-party software

c. Schematic diagrams for all control, communication, and power wiring. Provide a schematic drawing of the central system installation. Label all cables and ports with computer manufacturers' model numbers and functions. Show interface wiring to control system.

d. Network riser diagrams of wiring between central control unit and control panels.

3. Controlled Systems

a. Riser diagrams showing control network layout, communication protocol, and wire types.

b. A schematic diagram of each controlled system. The schematics shall have all control points labeled with point names shown or listed. The schematics shall graphically show the location of all control elements in the system.

c. A schematic wiring diagram of each controlled system. Label control elements and terminals. Where a control element is also shown on control system schematic, use the same name.

d. An instrumentation list (Bill of Materials) for each controlled system. List each control system element in a table. Show element name, type of device, manufacturer, model number, and product data sheet number.

e. A mounting, wiring, and routing plan-view drawing. The design shall take into account HVAC, electrical, and other systems' design and elevation requirements. The drawing shall show the specific location of all concrete pads and bases and any special wall bracing for panels to accommodate this work.

f. A complete description of the operation of the control system, including sequences of operation. The description shall include and reference a schematic diagram of the controlled system.

g. A point list for each control system. List I/O points and software points specified in Section 23 09 93. Indicate alarmed and trended points.

4. Quantities of items submitted shall be reviewed but are the responsibility of the Contractor.

5. A description of the proposed process along with all report formats and checklists to be used in Section 23 09 23 Article3.16(Control System Demonstration and Acceptance).

6. BACnet Protocol Implementation Conformance Statement (PICS) for each submitted type of controller and operator interface.

B. Schedules

1. Within one month of contract award, provide a schedule of the work indicating the following:

a. Intended sequence of work items

b. Start date of each work item

c. Duration of each work item

d. Planned delivery dates for ordered material and equipment and expected lead times

e. Milestones indicating possible restraints on work by other trades or situations

2. Monthly written status reports indicating work completed and revisions to expected delivery dates. Include updated schedule of work.

C. Project Record Documents. Upon completion of installation, submit three copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:

1. Project Record Drawings. As-built versions of submittal shop drawings provided as AutoCAD compatible files on magnetic or optical media (file format: .DWG, .DXF, .VSD, or comparable) and as 11" x 17" prints.
2. Testing and Commissioning Reports and Checklists. Completed versions of reports, checklists, and trend logs used to meet requirements of Section 23 09 23 Article3.16(Control System Demonstration and Acceptance).
3. Operation and Maintenance (O&M) Manual.
4. As-built versions of submittal product data.
5. Names, addresses, and telephone numbers of installing contractors and service representatives for equipment and control systems.
6. Operator's manual with procedures for operating control systems: logging on and off, handling alarms, producing point reports, trending data, overriding computer control, and changing setpoints and variables.
7. Programming manual or set of manuals with description of programming language and syntax, of statements for algorithms and calculations used, of point database creation and modification, of program creation and modification, and of editor use.
8. Engineering, installation, and maintenance manual or set of manuals that explains how to design and install new points, panels, and other hardware; how to perform preventive maintenance and calibration; how to debug hardware problems; and how to repair or replace hardware.
9. Documentation of programs created using custom programming language including setpoints, tuning parameters, and object database. Electronic copies of programs shall meet this requirement if control logic, setpoints, tuning parameters, and objects can be viewed using furnished programming tools.
10. Graphic files, programs, and database on magnetic or optical media.
11. List of recommended spare parts with part numbers and suppliers.
12. Complete original-issue documentation, installation, and maintenance information for furnished third-party hardware including computer equipment and sensors.
13. Complete original-issue copies of furnished software, including operating systems, custom programming language, operator workstation or web server software, and graphics software.
14. Licenses, guarantees, and warranty documents for equipment and systems.
15. Recommended preventive maintenance procedures for system components, including schedule of tasks such as inspection, cleaning, and calibration; time between tasks; and task descriptions.

D. Training Materials: Provide course outline and materials for each class at least six weeks before first class. Training shall be furnished via instructor-led sessions, computer-based training, or web-based training. Engineer will modify course outlines and materials if necessary to meet Owner's needs. Engineer will review and approve course outlines and materials at least three weeks before first class.

1.09 Warranty

A. Warrant work as follows:

1. Warrant labor and materials for specified control system free from defects for a period of 12 months after final acceptance. Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request.
2. Work shall have a single warranty date, even if Owner receives beneficial use due to early system start-up. If specified work is split into multiple contracts or a multi-phase contract, each contract or phase shall have a separate warranty start date and period.
3. If the engineer determines that equipment and systems operate satisfactorily at the end of final start-up, testing, and commissioning phase, the engineer will certify in writing that control

system operation has been tested and accepted in accordance with the terms of this specification. Date of acceptance shall begin warranty period.

4. Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve the contractor-identified software deficiencies at no charge during warranty period. If available, Owner can purchase in-warranty service agreement to receive upgrades for functional enhancements associated with above-mentioned items. Do not install updates or upgrades without Owner's written authorization.
5. Exception: Contractor shall not be required to warrant reused devices except those that have been rebuilt or repaired. Installation labor and materials shall be warranted. Demonstrate operable condition of reused devices at time of Engineer's acceptance.

1.10 Ownership of Proprietary Material

A. Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
   1. Graphics
   2. Record drawings
   3. Database
   4. Application programming code
   5. Documentation

1.11 Definitions

Term	Definition
BACnet Interoperability Building Blocks (BIBB)	A BIBB defines a small portion of BACnet functionality that is needed to perform a particular task. BIBBS are combined to build the BACnet functional requirements for a device in a specification.
BACnet/BACnet Standard	BACnet communication requirements as defined by the latest version of ASHRAE/ANSI 135 and approved addenda.
Control Systems Server	A computer(s) that maintain(s) the systems configuration and programming database.
Controller	Intelligent stand-alone control device. Controller is a generic reference to building controllers, custom application controllers, and application specific controllers.
Direct Digital Control	Microprocessor-based control including Analog/Digital conversion and program logic.
Gateway	Bi-directional protocol translator connecting control systems that use different communication protocols.
Local Area Network	Computer or control system communications network limited to local building or campus.
Master-Slave/Token Passing	Data link protocol as defined by the BACnet standard.
Point-to-Point	Serial communication as defined in the BACnet standard.
Primary Controlling LAN	High speed, peer-to-peer controller LAN connecting BCs and optionally AACs and ASCs. Refer to System Architecture below.
Protocol Implementation Conformance Statement	A written document that identifies the particular options specified by BACnet that are implemented in a device.
Router	A device that connects two or more networks at the network layer.
Wiring	Raceway, fittings, wire, boxes and related items.

2.01 Materials

A. Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least five years after completion of this contract.

2.02 Communication

A. Control products, communication media, connectors, repeaters, hubs, and routers shall comprise a BACnet internetwork. Controller and operator interface communication shall conform to ANSI/ASHRAE Standard 135, BACnet.

B. Install new wiring and network devices as required to provide a complete and workable control network.

C. Each controller shall have a communication port for temporary connection to a laptop computer or other operator interface. Connection shall support memory downloads and other commissioning and troubleshooting operations.

D. Internetwork operator interface and value passing shall be transparent to internetwork architecture.

1. An operator interface connected to a controller shall allow the operator to interface with each internetwork controller as if directly connected. Controller information such as data, status, and control algorithms shall be viewable and editable from each internetwork controller.
2. Inputs, outputs, and control variables used to integrate control strategies across multiple controllers shall be readable by each controller on the internetwork. Program and test all cross-controller links required to execute control strategies specified in Section 23 09 93. An authorized operator shall be able to edit cross-controller links by typing a standard object address or by using a point-and-click interface.

E. Workstations, Building Control Panels, and Controllers with real-time clocks shall use the BACnet Time Synchronization service. System shall automatically synchronize system clocks daily from an operator-designated device via the internetwork. The system shall automatically adjust for daylight saving and standard time as applicable.

F. System shall be expandable to at least twice the required input and output objects with additional controllers, associated devices, and wiring.

2.03 Operator Interface

A. Operator Interface. Web server shall reside on high-speed network with building controllers. Each standard browser connected to server shall be able to access all system information. The Operator Workstation or server shall conform to the BACnet Operator Workstation (B-OWS) or BACnet Advanced Workstation (B-AWS) device profile as specified in ASHRAE/ANSI 135 BACnet Annex L.

B. Communication. Web server or workstation and controllers shall communicate using BACnet protocol. Web server or workstation and control network backbone shall communicate using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing as specified in ANSI/ASHRAE 135, BACnet Annex J.

C. Hardware.

1. Workstation or web server. Industry-standard hardware shall meet or exceed DDC system manufacturer’s recommended specifications and shall meet response times specified elsewhere in this document. The following hardware requirements also apply:
    a. The hard disk shall have sufficient memory to store:
        i. All required operator workstation software.
        ii. A DDC database at least twice the size of the delivered system database.
        iii. One year of trend data based on the points specified to be trended at their specified trend intervals.
    b. Provide additional hardware (communication ports, video drivers, network interface cards, cabling, etc.) to facilitate all control functions and software requirements specified for the DDC system.

c. Minimum hardware configuration shall include the following:
    i. Quad Core Processor
    ii. 8 GB RAM
    iii. 1 TB hard disk providing data at 3.0 Gb/sec
    iv. 16x DVD+/-RW drive
    v. Serial, parallel, and network communication ports and cables as required for proper DDC system operation

D. System Software.
1. Operating System. Web server or workstation shall have an industry-standard professional-grade operating system. Operating system shall meet or exceed the DDC System manufacturers minimum requirements for their software. Acceptable systems include Microsoft Windows 7 or 8, Microsoft Vista, Windows Server 2008 or 2012, Red Hat Enterprise Linux, or Ubuntu Desktop 12.04.
2. System Graphics. The operator interface software shall be graphically based and shall include at least one graphic per piece of equipment or occupied zone, graphics for each chilled water and hot water system, and graphics that summarize conditions on each floor of each building included in this contract.
    a. Functionality. Graphics shall allow operator to monitor system status, to view a summary of the most important data for each controlled zone or piece of equipment, to use point-and-click navigation between zones or equipment, and to edit setpoints and other specified parameters.
    b. Animation. Graphics shall be able to animate by displaying different image files for changed object status.
    c. Alarm Indication. Indicate areas or equipment in an alarm condition using color or other visual indicator.
    d. Format. Graphics shall be saved in an industry-standard format such as BMP, JPEG, PNG, or GIF. Web-based system graphics shall be viewable on browsers compatible with World Wide Web Consortium browser standards. Web graphic format shall require no plug-in or shall only require widely available no-cost plug-ins (such as Adobe Flash).
3. Custom Graphics. Custom graphic files shall be created with the use of a graphics generation package furnished with the system. The graphics generation package shall be a graphically based system that uses the mouse to create and modify graphics that are saved in the same formats as are used for system graphics.
4. Graphics Library. Furnish a complete library of standard HVAC equipment graphics such as chillers, boilers, air handlers, terminals, fan coils, and unit ventilators. This library also shall include standard symbols for other equipment including fans, pumps, coils, valves, piping, dampers, and ductwork. The library shall be furnished in a file format compatible with the graphics generation package program.

E. System Applications. System shall provide the following functionality to authorized operators as an integral part of the operator interface or as stand-alone software programs. If furnished as part of the interface, the tool shall be available from each workstation or web browser interface. If furnished as a stand-alone program, software shall be installable on standard IBM-compatible PCs with no limit on the number of copies that can be installed under the system license.
1. Automatic System Database Configuration. Each workstation or web server shall store on its hard disk a copy of the current system database, including controller firmware and software. Stored database shall be automatically updated with each system configuration or controller firmware or software change.
2. Manual Controller Memory Download. Operators shall be able to download memory from the system database to each controller.

3. System Configuration. The workstation software shall provide a method of configuring the system. This shall allow for future system changes or additions by users under proper password protection. Operators shall be able to configure the system.
4. On-Line Help. Provide a context-sensitive, on-line help system to assist the operator in operating and editing the system. On-line help shall be available for all applications and shall provide the relevant data for that particular screen. Additional help information shall be available through the use of hypertext.
5. Security. Each operator shall be required to log on to the system with user name and password in order to view, edit, add, or delete data.
    a. Operator Access. The user name and password combination shall define accessible viewing, editing, adding, and deleting privileges for that operator. Users with system administrator rights shall be able to create new users and edit the privileges of all existing users.
    b. Automatic Log Out. Automatically log out each operator if no keyboard or mouse activity is detected. This auto logoff time shall be user adjustable.
    c. Encrypted Security Data. Store system security data including operator passwords in an encrypted format. System shall not display operator passwords.
6. System Diagnostics. The system shall automatically monitor the operation of all building management panels and controllers. The failure of any device shall be annunciated to the operator.
7. Alarm Processing. System input and status objects shall be configurable to alarm on departing from and on returning to normal state. Operator shall be able to enable or disable each alarm and to configure alarm limits, alarm limit differentials, alarm states, and alarm reactions for each system object. Configure and enable alarm points as specified in Section 23 09 93 (Sequences of Operation). Alarms shall be BACnet alarm objects and shall use BACnet alarm services.
8. Alarm Messages. Alarm messages shall use the English language descriptor for the object in alarm in such a way that the operator will be able to recognize the source, location, and nature of the alarm without relying on acronyms or mnemonics.
9. Alarm Reactions. Operator shall be able to configure (by object) what, if any actions are to be taken during an alarm. As a minimum, the workstation or web server shall be able to log, print, start programs, display messages, send e-mail, send page, and audibly annunciate.
10. Alarm and Event log. Operators shall be able to view all system alarms and changes of state from any location in the system. Events shall be listed chronologically. An operator with the proper security level may acknowledge and delete alarms, and archive closed alarms to the workstation or web server hard disk.
11. Trend Logs. The operator shall be able to configure trend sample or change of value (COV) interval, start time, and stop time for each system data object and shall be able to retrieve data for use in spreadsheets and standard database programs. Controller shall sample and store trend data and shall be able to archive data to the hard disk. Configure trends as specified in Section 23 09 93 (Sequences of Operation). Trends shall be BACnet trend objects.
12. Object and Property Status and Control. Provide a method for the operator to view, and edit if applicable, the status of any object or property in the system. The status shall be available by menu, on graphics, or through custom programs.
13. Reports and Logs. Operator shall be able to select, to modify, to create, and to print reports and logs. Operator shall be able to store report data in a format accessible by standard spreadsheet and word processing programs.
14. Standard Reports. Furnish the following standard system reports:

a. Objects. System objects and current values filtered by object type, by status (in alarm, locked, normal), by equipment, by geographic location, or by combination of filter criteria.

b. Alarm Summary. Current alarms and closed alarms. System shall retain closed alarms for an adjustable period.

c. Logs. System shall log the following to a database or text file and shall retain data for an adjustable period:

i. Alarm History.

ii. Trend Data. Operator shall be able to select trends to be logged.

iii. Operator Activity. At a minimum, system shall log operator log in and log out, control parameter changes, schedule changes, and alarm acknowledgment and deletion. System shall date and time stamp logged activity.

F. Workstation Application Editors. Each PC or browser workstation shall support editing of all system applications. The applications shall be downloaded and executed at one or more of the controller panels.

1. Controller. Provide a full-screen editor for each type of application that shall allow the operator to view and change the configuration, name, control parameters, and set points for all controllers.

2. Scheduling. An editor for the scheduling application shall be provided at each workstation. Provide a method of selecting the desired schedule and schedule type. Exception schedules and holidays shall be shown clearly on the calendar. The start and stop times for each object shall be adjustable from this interface.

3. Custom Application Programming. Provide the tools to create, edit, debug, and download custom programs. System shall be fully operable while custom programs are edited, compiled, and downloaded. Programming language shall have the following features:

a. Language. Language shall be graphically based or English language oriented. If graphically based, language shall use function blocks arranged in a logic diagram that clearly shows control logic flow. Function blocks shall directly provide functions listed below, and operators shall be able to create custom or compound function blocks. If English language oriented, language shall be based on thesyntax of BASIC, FORTRAN, C, or PASCAL, and shall allow for free-form programming that is not column-oriented or "fill-in-the-blanks."

b. A full-screen character editor programming environment shall be provided. The editor shall be cursor/mouse-driven and allow the user to insert, add, modify, and delete custom programming code. It also shall incorporate features such as cut/ paste and find.

c. The programming language shall allow independently executing program modules to be developed. Each module shall be able to independently enable and disable other modules.

d. The editor/programming environment shall have a debugging/simulation capability that allows the user to step through the program and observe any intermediate values and/or results.

e. The programming language shall support conditional statements (IF/THEN/ELSE/ ELSE-IF) using compound Boolean (AND, OR, and NOT) and/or relations (EQUAL, LESS THAN, GREATER THAN, NOT EQUAL) comparisons.

f. The programming language shall support floating-point arithmetic using the following operators: +, , ÷, ×, and square root. The following mathematical functions also shall be provided: absolute value and minimum/maximum value.

g. The programming language shall have predefined variables that represent time of day, day of the week, month of the year, and the date. Other predefined variables

shall provide elapsed time in seconds, minutes, hours, and days. These elapsed time variables shall be able to be reset by the language so that interval-timing functions can be stopped and started within a program. Values from all of the above variables shall be readable by the language so that they can be used in a program for such purposes as IF/ THEN comparisons, calculations, etc.

h. The language shall be able to read the values of the variables and use them in programming statement logic, comparisons, and calculations.

i. The programming language shall have predefined variables representing the status and results of the system software and shall be able to enable, disable, and change the setpoints of the system software described below.

G. Portable Operator's Terminal. Provide all necessary software to configure an IBM-compatible laptop computer for use as a Portable Operator's Terminal. Operator shall be able to connect configured Terminal to the system network or directly to each controller for programming, setting up, and troubleshooting.

2.04 Controller Software

A. Furnish the following applications for building and energy management. All software application shall reside and operate in the system controllers. Applications shall be editable through operator workstation, web browser interface, or engineering workstation.

B. System Security. See Paragraph 2.3.E.5 (Security) and Paragraph 2.3.E.14.c.iii (Operator Activity).

C. Scheduling. Provide the capability to execute control functions according to a user created or edited schedule. Each schedule shall provide the following schedule options as a minimum:

1. Weekly Schedule. Provide separate schedules for each day of the week. Each schedule shall be able to include up to 5 occupied periods (5 start-stop pairs or 10 events).

2. Exception Schedules. Provide the ability for the operator to designate any day of the year as an exception schedule. Exception schedules may be defined up to a year in advance. Once an exception schedule has executed, the system shall discard and replace the exception schedule with the standard schedule for that day of the week.

3. Holiday Schedules. Provide the capability for the operator to define up to 24 special or holiday schedules. These schedules will be repeated each year. The operator shall be able to define the length of each holiday period.

D. System Coordination. Operator shall be able to group related equipment based on function and location and to use these groups for scheduling and other applications.

E. Binary Alarms. Each binary object shall have the capability to be configured to alarm based on the operator-specified state. Provide the capability to automatically and manually disable alarming.

F. Analog Alarms. Each analog object shall have both high and low alarm limits. The operator shall be able to enable or disable these alarms.

G. Alarm Reporting. The operator shall be able to determine the action to be taken in the event of an alarm. An alarm shall be able to start programs, print, be logged in the event log, generate custom messages, and display on graphics.

H. Remote Communication. System shall automatically contact operator workstation or server on receipt of critical alarms. If no network connection is available, system shall use a modem connection.

I. Demand Limiting.

1. The demand-limiting program shall monitor building power consumption from a building power meter (provided by others) which generates pulse signals or a BACnet communications interface. An acceptable alternative is for the system to monitor a watt transducer or current transformer attached to the building feeder lines.

2. When power consumption exceeds adjustable levels, system shall automatically adjust setpoints, de-energize low-priority equipment, and take other programmatic actions to

reduce demand as specified in Section 23 09 93 (Sequences of Operation). When demand drops below adjustable levels, system shall restore loads as specified.

J. Maintenance Management. The system shall be capable of generating maintenance alarms when equipment exceeds adjustable runtime, equipment starts, or performance limits. Configure and enable maintenance alarms as specified in 23 09 93 (Sequences of Operation).

K. Sequencing. Application software shall sequence chillers, boilers, and pumps as specified in Section 23 09 93 (Sequences of Operation).

L. PID Control. System shall provide direct- and reverse-acting PID (proportional-integral-derivative) algorithms. Each algorithm shall have anti-windup and selectable controlled variable, setpoint, and PID gains. Each algorithm shall calculate a time-varying analog value that can be used to position an output or tostage a series of outputs. The calculation interval, PID gains, and other tuning parameters shall be adjustable by a user with the correct security level.

M. Staggered Start. System shall stagger controlled equipment restart after power outage. Operator shall be able to adjust equipment restart order and time delay between equipment restarts.

N. Energy Calculations.

1. The system shall accumulate and convert instantaneous power (kW) or flow rates (L/s [gpm]) to energy usage data.
2. The system shall calculate a sliding-window average (rolling average). Operator shall be able to adjust window interval to 15 minutes, 30 minutes, or 60 minutes.

O. Anti-Short Cycling. All binary output objects shall be protected from short cycling by means of adjustable minimum on-time and off-time settings.

P. On and Off Control with Differential. Provide an algorithm that allows a binary output to be cycled based on a controlled variable and a setpoint. The algorithm shall be direct-acting or reverse-acting.

Q. Runtime Totalization. Provide software to totalize runtime for each binary input and output. Operator shall be able to enable runtime alarm based on exceeded adjustable runtime limit. Configure and enable runtime totalization and alarms as specified in Section 23 09 93 (Sequence of Operations).

2.05 Controllers

A. General. Provide an adequate number of Building Controllers (BC), Advanced Application Controllers (AAC), Application Specific Controllers (ASC), Smart Actuators (SA), and Smart Sensors (SS) as required to achieve performance specified in Section 23 09 23 Article 1.9 (System Performance). Every device in the system which executes control logic and directly controls HVAC equipment must conform to a standard BACnet Device profile as specified in ANSI/ASHRAE 135, BACnet Annex L. Unless otherwise specified, hardwired actuators and sensors may be used in lieu of BACnet Smart Actuators and Smart Sensors.

B. BACnet.

1. Building Controllers (BCs). Each BC shall conform to BACnet Building Controller (B-BC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L, and shall be listed as a certified B-BC in the BACnet Testing Laboratories (BTL) Product Listing.
2. Advanced Application Controllers (AACs). Each AAC shall conform to BACnet Advanced Application Controller (B-AAC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-AAC in the BACnet Testing Laboratories (BTL) Product Listing.
3. Application Specific Controllers (ASCs). Each ASC shall conform to BACnet Application Specific Controller (B-ASC) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-ASC in the BACnet Testing Laboratories (BTL) Product Listing.
4. Smart Sensors (SSs). Each SS shall conform to BACnet Smart Sensor (B-SS) device profile as specified in ANSI/ASHRAE 135, BACnet Annex L and shall be listed as a certified B-SS in the BACnet Testing Laboratories (BTL) Product Listing.
5. BACnet Communication.

a. Each BC shall reside on or be connected to a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol and BACnet/IP addressing.

b. BACnet routing shall be performed by BCs or other BACnet device routers as necessary to connect BCs to networks of AACs and ASCs.

c. Each AAC shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

d. Each ASC shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

e. Each SA shall reside on a BACnet network using the ARCNET or MS/TP Data Link/Physical layer protocol.

f. Each SS shall reside on a BACnet network using ISO 8802-3 (Ethernet) Data Link/Physical layer protocol with BACnet/IP addressing, or it shall reside on a BACnet network using ARCNET or MS/TP Data Link/Physical layer protocol.

C. Communication

1. Service Port. Each controller shall provide a service communication port for connection to a Portable Operator's Terminal. Connection shall be extended to space temperature sensor ports where shown on drawings.

2. Signal Management. BC and ASC operating systems shall manage input and output communication signals to allow distributed controllers to share real and virtual object information and to allow for central monitoring and alarms.

3. Data Sharing. Each BC and AAC shall share data as required with each networked BC and AAC.

4. Stand-Alone Operation. Each piece of equipment specified in Section 23 09 93 shall be controlled by a single controller to provide stand-alone control in the event of communication failure. All I/O points specified for a piece of equipment shall be integral to its controller. Provide stable and reliable stand-alone control using default values or other method for values normally read over the network such as outdoor air conditions, supply air or water temperature coming from source equipment, etc.

D. Environment. Controller hardware shall be suitable for anticipated ambient conditions.

1. Controllers used outdoors or in wet ambient conditions shall be mounted in waterproof enclosures and shall be rated for operation at -29°C to 60°C (-20°F to 140°F).

2. Controllers used in conditioned space shall be mounted in dust-protective enclosures and shall be rated for operation at 0°C to 50°C (32°F to 120°F).

E. Keypad. Provide a local keypad and display for each BC and AAC. Operator shall be able to use keypad to view and edit data. Keypad and display shall require password to prevent unauthorized use. If the manufacturer does not normally provide a keypad and display for each BC and AAC, provide the software and any interface cabling needed to use a laptop computer as a Portable Operator's Terminal for the system.

F. Real-Time Clock. Controllers that perform scheduling shall have a real-time clock.

G. Serviceability. Provide diagnostic LEDs for power, communication, and processor. All wiring connections shall be made to a field-removable modular terminal strip or to a termination card connected by a ribbon cable. Each BC and AAC shall continually check its processor and memory circuit status and shall generate an alarm on abnormal operation. System shall continuously check controller network and generate alarm for each controller that fails to respond.

H. Memory.

1. Controller memory shall support operating system, database, and programming requirements.

2. Each BC and AAC shall retain BIOS and application programming for at least 72 hours in the event of power loss.

3. Each ASC and SA shall use nonvolatile memory and shall retain BIOS and application programming in the event of power loss. System shall automatically download dynamic control parameters following power loss.

I. Immunity to Power and Noise. Controllers shall be able to operate at 90% to 110% of nominal voltage rating and shall perform an orderly shutdown below 80% nominal voltage. Operation shall be protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 1 m (3 ft).

J. Transformer. ASC power supply shall be fused or current limiting and shall be rated at a minimum of 125% of ASC power consumption.

2.06 Input and Output Interface

A. General. Hard-wire input and output points to BCs, AACs, ASCs, or SAs.

B. Protection. All input points and output points shall be protected such that shorting of the point to itself, to another point, or to ground shall cause no damage to the controller. All input and output points shall be protected from voltage up to 24 V of any duration, such that contact with this voltage will cause no controller damage.

C. Binary Inputs. Binary inputs shall allow the monitoring of ON/OFF signals from remote devices. The binary inputs shall provide a wetting current of at least 12 mA to be compatible with commonly available control devices and shall be protected against contact bounce and noise. Binary inputs shall sense dry contact closure without application of power external to the controller.

D. Pulse Accumulation Inputs. Pulse accumulation inputs shall conform to binary input requirements and shall also accumulate up to 10 pulses per second.

E. Analog Inputs. Analog inputs shall allow the monitoring of low-voltage (0–10 Vdc), current (4–20 mA), or resistance (thermistor or RTD) signals. Analog inputs shall be compatible with and field configurable to commonly available sensing devices.

F. Binary Outputs. Binary outputs shall provide for ON/OFF operation or a pulsed low-voltage signal for pulse width modulation control. Binary outputs on Building Controllers shall have three-position (on-off-auto) override switches and status lights. Outputs shall be selectable for normally open or normally closed operation.

G. Analog Outputs. Analog outputs shall provide a modulating signal for the control of end devices. Outputs shall provide either a 0–10 Vdc or a 4–20 mA signal as required to properly control output devices. Each Building Controller analog output shall have a two-position (auto-manual) switch, a manually adjustable potentiometer, and status lights. Analog outputs shall not drift more than 0.4% of range annually.

H. Tri-State Outputs. Control three-point floating electronic actuators without feedback with tri-state outputs (two coordinated binary outputs). Tri-State outputs may be used to provide analog output control in zone control and terminal unit control applications such as VAV terminal units, duct-mounted heating coils, and zone dampers.

I. Universal Inputs and Outputs. Inputs and outputs that can be designated as either binary or analog in software shall conform to the provisions of this section that are appropriate for their designated use.

J. System Object Capacity. The system size shall be expandable to at least twice the number of input/output objects required for this project. Additional controllers (along with associated devices and wiring) shall be all that is necessary to achieve this capacity requirement. The operator interfaces installed for this project shall not require any hardware additions or software revisions in order to expand the system

2.07 Power Supplies and Line Filtering

A. Power Supplies. Control transformers shall be UL listed. Furnish Class 2 current-limiting type or furnish over-current protection in primary and secondary circuits for Class 2 service in accordance with NEC requirements. Limit connected loads to 80% of rated capacity.

1. DC power supply output shall match output current and voltage requirements. Unit shall be full-wave rectifier type with output ripple of 5.0 mV maximum peak-to-peak. Regulation shall be 1.0% line and load combined, with 100-microsecond response time for 50% load

changes. Unit shall have built-in over-voltage and over-current protection and shall be able to withstand 150% current overload for at least three seconds without trip-out or failure.

a. Unit shall operate between 0°C and 50°C (32°F and 120°F). EM/RF shall meet FCC Class B and VDE 0871 for Class B and MILSTD 810C for shock and vibration.

b. Line voltage units shall be UL recognized and CSA listed.

B. Power Line Filtering.

1. Provide internal or external transient voltage and surge suppression for workstations and controllers. Surge protection shall have:

a. Dielectric strength of 1000 V minimum

b. Response time of 10 nanoseconds or less

c. Transverse mode noise attenuation of 65 dB or greater

d. Common mode noise attenuation of 150 dB or greater at 40–100 Hz

2.08 Auxiliary Control Devices

A. Motorized Control Dampers, unless otherwise specified elsewhere, shall be as follow.

1. Type. Control dampers shall be the parallel or opposed-blade type as specified below or as scheduled on drawings.

a. Outdoor and return air mixing dampers and face-and-bypass dampers shall be parallel-blade and shall direct airstreams toward each other.

b. Other modulating dampers shall be opposed-blade.

c. Two-position shutoff dampers shall be parallel- or opposed-blade with blade and side seals.

2. Frame. Damper frames shall be 2.38 mm (13 gauge) galvanized steel channel or 3.175 mm (⅛ in.) extruded aluminum with reinforced corner bracing.

3. Blades. Damper blades shall not exceed 20 cm (8 in.) in width or 125 cm (48 in.) in length. Blades shall be suitable for medium velocity (10 m/s [2000 fpm]) performance. Blades shall be not less than 1.5875 mm (16 gauge).

4. Shaft Bearings. Damper shaft bearings shall be as recommended by manufacturer for application, oil impregnated sintered bronze, or better.

5. Seals. Blade edges and frame top and bottom shall have replaceable seals of butyl rubber or neoprene. Side seals shall be spring-loaded stainless steel. Blade seals shall leak no more than 50 L/s·m^2 (10 cfm per ft^2) at 1000 Pa (4 in. w.g.) differential pressure. Blades shall be airfoil type suitable for wide-open face velocity of 7.5 m/s (1500 fpm).

6. Sections. Individual damper sections shall not exceed 125 cm × 150 cm (48 in. × 60 in.). Each section shall have at least one damper actuator.

7. Modulating dampers shall provide a linear flow characteristic where possible.

8. Linkages. Dampers shall have exposed linkages.

B. Electric Damper and Valve Actuators.

1. Stall Protection. Mechanical or electronic stall protection shall prevent actuator damage throughout the actuator’s rotation.

2. Spring-return Mechanism. Actuators used for power-failure and safety applications shall have an internal mechanical spring-return mechanism or an uninterruptible power supply (UPS).

3. Signal and Range. Proportional actuators shall accept a 0–10 Vdc or a 0–20 mA control signal and shall have a 2–10 Vdc or 4–20 mA operating range. (Floating motor actuators may be substituted for proportional actuators in terminal unit applications as described in paragraph 2.6H.)

4. Wiring. 24 Vac and 24 Vdc actuators shall operate on Class 2 wiring.

5. Manual Positioning. Operators shall be able to manually position each actuator when the actuator is not powered. Non-spring-return actuators shall have an external manual gear release. Spring-return actuators with more than 7 N·m (60 in.-lb) torque capacity shall have a manual crank.

C. Binary Temperature Devices.

1. Low-Voltage Space Thermostats. Low-voltage space thermostats shall be 24 V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
2. Line-Voltage Space Thermostats. Line-voltage space thermostats shall be bimetal-actuated, open-contact type or bellows-actuated, enclosed, snap-switch type or equivalent solid-state type, with heat anticipator, UL listing for electrical rating, concealed setpoint adjustment, 13°C–30°C (55°F–85°F) setpoint range, 1°C (2°F) maximum differential, and vented ABS plastic cover.
3. Low-Limit Thermostats. Low-limit airstream thermostats shall be UL listed, vapor pressure type. Element shall be at least 6 m (20 ft) long. Element shall sense temperature in each 30 cm (1 ft) section and shall respond to lowest sensed temperature. Low-limit thermostat shall be manual reset only.

D. Temperature Sensors.

1. Type. Temperature sensors shall be Resistance Temperature Device (RTD) or thermistor.
2. Duct Sensors. Duct sensors shall be single point or averaging as shown. Averaging sensors shall be a minimum of 1.5 m (5 ft) in length per 1 m^2(10 ft^2) of duct cross-section.
3. Space Sensors. Space sensors shall have setpoint adjustment, override switch, display, and communication port as shown.
4. Differential Sensors. Provide matched sensors for differential temperature measurement.

E. Relays.

1. Control Relays. Control relays shall be plug-in type, UL listed, and shall have dust cover and LED “energized” indicator. Contact rating, configuration, and coil voltage shall be suitable for application.
2. Time Delay Relays. Time delay relays shall be solid-state plug-in type, UL listed, and shall have adjustable time delay. Delay shall be adjustable ±100% from setpoint shown. Contact rating, configuration, and coil voltage shall be suitable for application. Provide NEMA 1 enclosure for relays not installed in local control panel.

F. Override Timers.

1. Unless implemented in control software, override timers shall be spring-wound line voltage, UL Listed, with contact rating and configuration required by application. Provide 0–6 hour calibrated dial unless otherwise specified. Flush mount timer on local control panel face or where shown.

G. Current Transmitters.

1. AC current transmitters shall be self-powered, combination split-core current transformer type with built-in rectifier and high-gain servo amplifier with 4–20 mA two-wire output. Full-scale unit ranges shall be 10 A, 20 A, 50 A, 100 A, 150 A, and 200 A, with internal zero and span adjustment. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
2. Transmitter shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized.
3. Unit shall be split-core type for clamp-on installation on existing wiring.

H. Current Transformers.

1. AC current transformers shall be UL/CSA recognized and shall be completely encased (except for terminals) in approved plastic material.

2. Transformers shall be available in various current ratios and shall be selected for ±1% accuracy at 5 A full-scale output.
3. Use fixed-core transformers for new wiring installation and split-core transformers for existing wiring installation.

I. Voltage Transmitters.
1. AC voltage transmitters shall be self-powered single-loop (two-wire) type, 4–20 mA output with zero and span adjustment.
2. Adjustable full-scale unit ranges shall be 100–130 Vac, 200–250 Vac, 250–330 Vac, and 400–600 Vac. Unit accuracy shall be ±1% full-scale at 500 ohm maximum burden.
3. Transmitters shall meet or exceed ANSI/ISA S50.1 requirements and shall be UL/CSA recognized at 600 Vac rating.

J. Voltage Transformers.
1. AC voltage transformers shall be UL/CSA recognized, 600 Vac rated, and shall have built-in fuse protection.
2. Transformers shall be suitable for ambient temperatures of 4°C–55°C (40°F–130°F) and shall provide ±0.5% accuracy at 24 Vac and 5 VA load.
3. Windings (except for terminals) shall be completely enclosed with metal or plastic.

K. Current Switches.
1. Current-operated switches shall be self-powered, solid-state with adjustable trip current. Select switches to match application current and DDC system output requirements.

L. Differential Pressure Switches. Differential pressure switches (air or water service) shall be UL listed, SPDT snap-acting, pilot duty rated (125 VA minimum) and shall have scale range and differential suitable for intended application and NEMA 1 enclosure unless otherwise specified.

M. Pressure-Electric (PE) Switches.
1. Shall be metal or neoprene diaphragm actuated, operating pressure rated for 0–175 kPa (0–25 psig), with calibrated scale minimum setpoint range of 14–125 kPa (2–18 psig) minimum, UL listed.
2. Provide one- or two-stage switch action (SPDT, DPST, or DPDT) as required by application. Electrically rated for pilot duty service (125 VA minimum) and/or for motor control.
3. Switches shall be open type (panel-mounted) or enclosed type for remote installation. Enclosed type shall be NEMA 1 unless otherwise specified.
4. Each pneumatic signal line to PE switches shall have permanent indicating gauge.

N. Occupancy Sensors. Occupancy sensors shall utilize Passive Infrared (PIR) and/or Microphonic Passive technology to detect the presence of people within a room. Sensors shall be mounted as indicated on the approved drawings. The sensor output shall be accessible by any lighting and/or HVAC controller in the system. Occupancy sensors shall be capable of being powered from the lighting or HVAC control panel, as shown on the drawings. Occupancy sensor delay shall be software adjustable through the user interface and shall not require manual adjustment at the sensor.

O. Local Control Panels.
1. All indoor control cabinets shall be fully enclosed NEMA 1 construction with (hinged door) key-lock latch and removable subpanels. A single key shall be common to all field panels and subpanels.
2. Interconnections between internal and face-mounted devices shall be prewired with color-coded stranded conductors neatly installed in plastic troughs and/or tie-wrapped. Terminals for field connections shall be UL listed for 600 volt service, individually identified per control/interlock drawings, with adequate clearance for field wiring. Control terminations for field connection shall be individually identified per control drawings.

3. Provide ON/OFF power switch with overcurrent protection for control power sources to each local panel.
4.

2.09 Wiring and Raceways

A. General. Provide copper wiring, plenum cable, and raceways as specified in applicable sections of Division 26.

B. Insulated wire shall use copper conductors and shall be UL listed for 90°C (200°F) minimum service.

2.10 Fiber Optic Cable System

A. Optical Cable. Optical cables shall be duplex 900 mm tight-buffer construction designed for intra-building environments. Sheath shall be UL listed OFNP in accordance with NEC Article 770. Optical fiber shall meet the requirements of FDDI, ANSI X3T9.5 PMD for 62.5/125mm.

B. Connectors. Field terminate optical fibers with ST type connectors. Connectors shall have ceramic ferrules and metal bayonet latching bodies.

PART 3 - EXECUTION

3.01 Examination

A. The contractor shall inspect the site to verify that equipment may be installed as shown. Any discrepancies, conflicts, or omissions shall be reported to the engineer for resolution before rough-in work is started.

B. The contractor shall examine the drawings and specifications for other parts of the work. If head room or space conditions appear inadequate—or if any discrepancies occur between the plans and the contractor's work and the plans and the work of others—the contractor shall report these discrepancies to the engineer and shall obtain written instructions for any changes necessary to accommodate the contractor's work with the work of others. Any changes in the work covered by this specification made necessary by the failure or neglect of the contractor to report such discrepancies shall be made by—and at the expense of—this contractor.

3.02 Protection

A. The contractor shall protect all work and material from damage by his/her work or employees and shall be liable for all damage thus caused.

B. The contractor shall be responsible for his/her work and equipment until finally inspected, tested, and accepted. The contractor shall protect any material that is not immediately installed. The contractor shall close all open ends of work with temporary covers or plugs during storage and construction to prevent entry of foreign objects.

3.03 Coordination

A. Site

1. Where the mechanical work will be installed in close proximity to, or will interfere with, work of other trades, the contractor shall assist in working out space conditions to make a satisfactory adjustment. If the contractor installs his/her work before coordinating with other trades, so as to cause any interference with work of other trades, the contractor shall make the necessary changes in his/her work to correct the condition without extra charge.
2. Coordinate and schedule work with other work in the same area and with work dependent upon other work to facilitate mutual progress.

B. Submittals. See Section 23 09 23 Article 1.10 (Submittals).

C. Test and Balance.

1. The contractor shall furnish a single set of all tools necessary to interface to the control system for test and balance purposes.
2. The contractor shall provide training in the use of these tools. This training will be planned for a minimum of 4 hours.
3. In addition, the contractor shall provide a qualified technician to assist in the test and balance process, until the first 20 terminal units are balanced.
4. The tools used during the test and balance process will be returned at the completion of the testing and balancing.

D. Life Safety.

1. Duct smoke detectors required for air handler shutdown are provided under Division 28. Interlock smoke detectors to air handlers for shutdown as specified in Section 23 09 93 (Sequences of Operation).
2. Smoke dampers and actuators required for duct smoke isolation are provided under Division 23. Interlock smoke dampers to air handlers as specified in Section 23 09 93 (Sequences of Operation).
3. Fire and smoke dampers and actuators required for fire-rated walls are provided under Division 23. Fire and smoke damper control is provided under Division 28.

E. Coordination with controls specified in other sections or divisions. Other sections and/or divisions of this specification include controls and control devices that are to be part of or interfaced to the control

system specified in this section. These controls shall be integrated into the system and coordinated by the contractor as follows:

1. All communication media and equipment shall be provided as specified in Section 23 09 23 Article 2.2 (Communication).
2. Each supplier of a controls product is responsible for the configuration, programming, start up, and testing of that product to meet the sequences of operation described in Section 23 09 93.
3. The contractor shall coordinate and resolve any incompatibility issues that arise between control products provided under this section and those provided under other sections or divisions of this specification.
4. The contractor is responsible for providing all controls described in the contract documents regardless of where within the contract documents these controls are described.
5. The contractor is responsible for the interface of control products provided by multiple suppliers regardless of where this interface is described within the contract documents.

3.04 General Workmanship

A. Install equipment, piping, and wiring/raceway parallel to building lines (i.e. horizontal, vertical, and parallel to walls) wherever possible.

B. Provide sufficient slack and flexible connections to allow for vibration of piping and equipment.

C. Install equipment in readily accessible locations as defined by Chapter 1 Article 100 Part A of the National Electrical Code (NEC).

D. Verify integrity of all wiring to ensure continuity and freedom from shorts and grounds.

E. All equipment, installation, and wiring shall comply with industry specifications and standards for performance, reliability, and compatibility and be executed in strict adherence to local codes and standard practices.

3.05 Field Quality Control

A. All work, materials, and equipment shall comply with rules and regulations of applicable local, state, and federal codes and ordinances as identified in Section 23 09 23 Article 1.8 (Codes and Standards).

B. Contractor shall continually monitor the field installation for code compliance and quality of workmanship.

C. Contractor shall have work inspection by local and/or state authorities having jurisdiction over the work.

3.06 Wiring

A. All control and interlock wiring shall comply with national and local electrical codes, and Division 26 of this specification, Where the requirements of this section differ from Division 26, the requirements of this section shall take precedence.

B. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to NEC and Division 26 requirements.

C. All low-voltage wiring shall meet NEC Class 2 requirements. Low-voltage power circuits shall be subfused when required to meet Class 2 current limit.

D. Where NEC Class 2 (current-limited) wires are in concealed and accessible locations, including ceiling return air plenums, approved cables not in raceway may be used provided that cables are UL listed for the intended application.

E. All wiring in mechanical, electrical, or service rooms – or where subject to mechanical damage – shall be installed in raceway at levels below 3 m (10ft).

F. Do not install Class 2 wiring in raceways containing Class 1 wiring. Boxes and panels containing high-voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two (e.g. relays and transformers).

G. Do not install wiring in raceway containing tubing.

H. Where Class 2 wiring is run exposed, wiring is to be run parallel along a surface or perpendicular to it and neatly tied at 3 m (10 ft) intervals.

I. Where plenum cables are used without raceway, they shall be supported from or anchored to structural members. Cables shall not be supported by or anchored to ductwork, electrical raceways, piping, or ceiling suspension systems.

J. All wire-to-device connections shall be made at a terminal block or terminal strip. All wire-to-wire connections shall be at a terminal block.

K. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

L. Maximum allowable voltage for control wiring shall be 120 V. If only higher voltages are available, the contractor shall provide step-down transformers.

M. All wiring shall be installed as continuous lengths, with no splices permitted between termination points.

N. Install plenum wiring in sleeves where it passes through walls and floors. Maintain fire rating at all penetrations.

O. Size of raceway and size and type of wire type shall be the responsibility of the contractor in keeping with the manufacturer’s recommendations and NEC requirements, except as noted elsewhere.

P. Include one pull string in each raceway 2.5 cm (1 in.) or larger.

Q. Use color-coded conductors throughout with conductors of different colors.

R. Control and status relays are to be located in designated enclosures only. These enclosures include packaged equipment control panel enclosures unless they also contain Class 1 starters.

S. Conceal all raceways except within mechanical, electrical, or service rooms. Install raceway to maintain a minimum clearance of 15 cm (6 in.) from high-temperature equipment (e.g. steam pipes or flues).

T. Secure raceways with raceway clamps fastened to the structure and spaced according to code requirements. Raceways and pull boxes may not be hung on flexible duct strap or tie rods. Raceways may not be run on or attached to ductwork.

U. Adhere to this specification's Division 26 requirements where raceway crosses building expansion joints.

V. Install insulated bushings on all raceway ends and openings to enclosures. Seal top end of vertical raceways.

W. The contractor shall terminate all control and/or interlock wiring and shall maintain updated (as-built) wiring diagrams with terminations identified at the job site.

X. Flexible metal raceways and liquid-tight flexible metal raceways shall not exceed 1 m (3 ft) in length and shall be supported at each end. Flexible metal raceway less than ½ in. electrical trade size shall not be used. In areas exposed to moisture, including chiller and boiler rooms, liquid-tight, flexible metal raceways shall be used.

Y. Raceway must be rigidly installed, adequately supported, properly reamed at both ends, and left clean and free of obstructions. Raceway sections shall be joined with couplings (according to code). Terminations must be made with fittings at boxes, and ends not terminating in boxes shall have bushings installed.

3.07 Communication Wiring

A. The contractor shall adhere to the items listed in the "Wiring" article in Part 3 of the specification.

B. All cabling shall be installed in a neat and workmanlike manner. Follow manufacturer's installation recommendations for all communication cabling

C. Do not install communication wiring in raceways and enclosures containing Class 1 or other Class 2 wiring.

D. Maximum pulling, tension, and bend radius for the cable installation, as specified by the cable manufacturer, shall not be exceeded during installation.

E. Contractor shall verify the integrity of the entire network following cable installation. Use appropriate test measures for each particular cable.

F. When a cable enters or exits a building, a lightning arrestor must be installed between the lines and ground. The lighting arrestor shall be installed according to manufacturer’s instructions.

G. All runs of communication wiring shall be unspliced length when that length is commercially available.

H. All communication wiring shall be labeled to indicate origination and destination data.

I. Grounding of coaxial cable shall be in accordance with NEC regulations article on "Communications Circuits, Cable, and Protector Grounding."

J. BACnet MS/TP communications wiring shall be installed in accordance with ASHRAE/ANSI Standard 135. This includes but is not limited to:

1. The network shall use shielded, twisted-pair cable with characteristic impedance between 100 and 120 ohms. Distributed capacitance between conductors shall be less than 100 pF per meter (30 pF per foot.)
2. The maximum length of an MS/TP segment is 1200 meters (4000 ft) with AWG 18 cable. The use of greater distances and/or different wire gauges shall comply with the electrical specifications of EIA-485.
3. The maximum number of nodes per segment shall be 32, as specified in the EIA 485 standard. Additional nodes may be accommodated by the use of repeaters.
4. An MS/TP EIA-485 network shall have no T connections.

3.08 Fiber Optic Cable

A. Maximum pulling tensions as specified by the cable manufacturer shall not be exceeded during installation. Post-installation residual cable tension shall be within cable manufacturer's specifications.

B. All cabling and associated components shall be installed in accordance with manufacturers' instructions. Minimum cable and unjacketed fiber bend radii, as specified by cable manufacturer, shall be maintained.

3.09 Installation of Sensors

A. Install sensors in accordance with the manufacturer's recommendations.

B. Mount sensors rigidly and adequately for environment within which the sensor operates.

C. Room temperature sensors shall be installed on concealed junction boxes properly supported by wall framing.

D. All wires attached to sensors shall be sealed in their raceways or in the wall to stop air transmitted from other areas from affecting sensor readings.

E. Sensors used in mixing plenums and hot and cold decks shall be of the averaging type. Averaging sensors shall be installed in a serpentine manner vertically across the duct. Each bend shall be supported with a capillary clip.

F. Low-limit sensors used in mixing plenums shall be installed in a serpentine manner horizontally across duct. Each bend shall be supported with a capillary clip. Provide 3 m (1 ft) of sensing element for each 1 m^2(1 ft^2) of coil area.

G. Install outdoor air temperature sensors on north wall, complete with sun shield at designated location.

H. Differential Air Static Pressure.

1. Supply Duct Static Pressure. Pipe the high-pressure tap to the duct using a pitot tube. Pipe the low-pressure port to a tee in the high-pressure tap tubing of the corresponding building

static pressure sensor (if applicable) or to the location of the duct high-pressure tap and leave open to the plenum.

2. Return Duct Static Pressure. Pipe high-pressure tap to duct using a pitot tube. Pipe the low-pressure port to a tee in the low-pressure tap tubing of the corresponding building static pressure sensor.
3. Building Static Pressure. Pipe the low-pressure port of the pressure sensor to the static pressure port located on the outside of the building through a high-volume accumulator. Pipe the high-pressure port to a location behind a thermostat cover.
4. All air and water differential pressure sensors shall have gauge tees mounted adjacent to the taps.

I. Smoke detectors, freezestats, high-pressure cut-offs, and other safety switches shall be hard-wired to de-energize equipment as described in the sequence of operation. Switches shall require manual reset. Provide contacts that allow DDC software to monitor safety switch status.

3.10 Actuators

A. General. Mount and link control damper actuators according to manufacturer's instructions.

1. To compress seals when spring-return actuators are used on normally closed dampers, power actuator to approximately 5° open position, manually close the damper, and then tighten the linkage.
2. Check operation of damper/actuator combination to confirm that actuator modulates damper smoothly throughout stroke to both open and closed positions.
3. Provide all mounting hardware and linkages for actuator installation.

B. Electric/Electronic

1. Dampers: Actuators shall be direct mounted on damper shaft or jackshaft unless shown as a linkage installation. For low-leakage dampers with seals, the actuator shall be mounted with a minimum 5° travel available for tightening the damper seal. Actuators shall be mounted following manufacturer’s recommendations.
2. Valves: Actuators shall be connected to valves with adapters approved by the actuator manufacturer. Actuators and adapters shall be mounted following the actuator manufacturer's recommendations.

3.11 Warning Labels

A. Permanent warning labels shall be affixed to all equipment that can be automatically started by the control system.

1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

C A U T I O N
This equipment is operating under automatic control and may start or stop at any time without warning. Switch disconnect to"Off"position before servicing.

B. Permanent warning labels shall be affixed to all motor starters and control panels that are connected to multiple power sources utilizing separate disconnects.

1. Labels shall use white lettering (12-point type or larger) on a red background.
2. Warning labels shall read as follows.

C A U T I O N
This equipment is fed from more than one power source with separate disconnects. Disconnect all power sources before servicing.

3.12 Identification of Hardware and Wiring

A. All wiring and cabling, including that within factory-fabricated panels shall be labeled at each end within 5 cm (2 in.) of termination with control system address or termination number.

B. All pneumatic tubing shall be labeled at each end within 5 cm (2 in.) of termination with a descriptive identifier.

C. Permanently label or code each point of field terminal strips to show the instrument or item served.

D. Identify control panels with minimum 1 cm (½ in.) letters on laminated plastic nameplates.

E. Identify all other control components with permanent labels. All plug-in components shall be labeled such that label removal of the component does not remove the label.

F. Identify room sensors related to terminal boxes or valves with nameplates.

G. Manufacturers' nameplates and UL or CSA labels shall be visible and legible after equipment is installed.

H. Identifiers shall match record documents.

3.13 Controllers

A. Provide a separate controller for each AHU or other HVAC system. A DDC controller may control more than one system provided that all points associated with the system are assigned to the same DDC controller. Points used for control loop reset, such as outside air or space temperature, are exempt from this requirement.

B. Building Controllers and Custom Application Controllers shall be selected to provide the required I/O point capacity required to monitor all of the hardware points listed in Section 23 09 93 (Sequences of Operation).

3.14 Programming

A. Provide sufficient internal memory for the specified sequences of operation and trend logging.

B. Point Naming. Name points as shown on the equipment points list provided with each sequence of operation. See Section 23 09 93 (Sequences of Operation). If character limitations or space restrictions make it advisable to shorten the name, the abbreviations given in Appendix B to Section 23 09 93 may be used. Where multiple points with the same name reside in the same controller, each point name may be customized with its associated Program Object number. For example, "Zone Temp 1" for Zone 1, "Zone Temp 2" for Zone 2.

C. Software Programming.

1. Provide programming for the system and adhere to the sequences of operation provided. All other system programming necessary for the operation of the system, but not specified in this document, also shall be provided by the contractor. Embed into the control program sufficient comment statements to clearly describe each section of the program. The comment statements shall reflect the language used in the sequences of operation. Use the appropriate technique based on the following programming types:
    a. Text-based:
        i. Must provide actions for all possible situations
        ii. Must be modular and structured
        iii. Must be commented
    b. Graphic-based:
        i. Must provide actions for all possible situations
        ii. Must be documented
    c. Parameter-based:
        i. Must provide actions for all possible situations
        ii. Must be documented.

D. Operator Interface.

1. Standard Graphics. Provide graphics for all mechanical systems and floor plans of the building. This includes each chilled water system, hot water system, chiller, boiler, air handler, and all terminal equipment. Point information on the graphic displays shall dynamically update. Show on each graphic all relevant input and output points for that equipment. Also show relevant calculated points such as setpoints. As a minimum, show on each equipment graphic the input and output points and relevant calculated points as indicated on the applicable Points List in Section 23 09 93.
2. The contractor shall provide all the labor necessary to install, initialize, start up, and troubleshoot all operator interface software and its functions as described in this section. This includes any operating system software, the operator interface database, and any third-party software installation and integration required for successful operation of the operator interface.

3.15 Control System Checkout and Testing

A. Startup Testing. All testing listed in this article shall be performed by the contractor and shall make up part of the necessary verification of an operating control system. This testing shall be completed before the owner's representative is notified of the system demonstration.

1. The contractor shall furnish all labor and test apparatus required to calibrate and prepare for service of all instruments, controls, and accessory equipment furnished under this specification.
2. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
3. Enable the control systems and verify calibration of all input devices individually. Perform calibration procedures according to manufacturers' recommendations.
4. Verify that all binary output devices (relays, solenoid valves, two-position actuators and control valves, magnetic starters, etc.) operate properly and that the normal positions are correct.
5. Verify that all analog output devices (I/Ps, actuators, etc.) are functional, that start and span are correct, and that direction and normal positions are correct. The contractor shall check all control valves and automatic dampers to ensure proper action and closure. The contractor shall make any necessary adjustments to valve stem and damper blade travel.
6. Verify that the system operation adheres to the sequences of operation. Simulate and observe all modes of operation by overriding and varying inputs and schedules. Tune all DDC loops.
7. Alarms and Interlocks:
    a. Check each alarm separately by including an appropriate signal at a value that will trip the alarm.
    b. Interlocks shall be tripped using field contacts to check the logic, as well as to ensure that the fail-safe condition for all actuators is in the proper direction.
    c. Interlock actions shall be tested by simulating alarm conditions to check the initiating value of the variable and interlock action

3.16 Control System Demonstration and Acceptance

A. Demonstration.

1. Prior to acceptance, the control system shall undergo a series of performance tests to verify operation and compliance with this specification. These tests shall occur after the Contractor has completed the installation, started up the system, and performed his/her own tests.
2. The tests described in this section are to be performed in addition to the tests that the contractor performs as a necessary part of the installation, start-up, and debugging process and as specified in the "Control System Checkout and Testing" article in Part 3 of this specification. The engineer will be present to observe and review these tests. The engineer shall be notified at least 10 days in advance of the start of the testing procedures.

3. The demonstration process shall follow that approved in Part 1, "Submittals." The approved checklists and forms shall be completed for all systems as part of the demonstration.
4. The contractor shall provide at least two persons equipped with two-way communication and shall demonstrate actual field operation of each control and sensing point for all modes of operation including day, night, occupied, unoccupied, fire/smoke alarm, seasonal changeover, and power failure modes. The purpose is to demonstrate the calibration, response, and action of every point and system. Any test equipment required to prove the proper operation shall be provided by and operated by the contractor.
5. As each control input and output is checked, a log shall be completed showing the date, technician's initials, and any corrective action taken or needed.
6. Demonstrate compliance with Part 1, "System Performance."
7. Demonstrate compliance with sequences of operation through all modes of operation.
8. Demonstrate complete operation of operator interface.
9. Additionally, the following items shall be demonstrated:
    a. DDC loop response. The contractor shall supply trend data output in a graphical form showing the step response of each DDC loop. The test shall show the loop's response to a change in set point, which represents a change of actuator position of at least 25% of its full range. The sampling rate of the trend shall be from 10 seconds to 3 minutes, depending on the speed of the loop. The trend data shall show for each sample the set point, actuator position, and controlled variable values. Any loop that yields unreasonably under-damped or over-damped control shall require further tuning by the Contractor.
    b. Demand limiting. The contractor shall supply a trend data output showing the action of the demand limiting algorithm. The data shall document the action on a minute-by-minute basis over at least a 30-minute period. Included in the trend shall be building kW, demand limiting set point, and the status of sheddable equipment outputs.
    c. Optimum start/stop. The contractor shall supply a trend data output showing the capability of the algorithm. The change-of-value or change-of-state trends shall include the output status of all optimally started and stopped equipment, as well as temperature sensor inputs of affected areas.
    d. Interface to the building fire alarm system.
    e. Operational logs for each system that indicate all set points, operating points, valve positions, mode, and equipment status shall be submitted to the architect/engineer. These logs shall cover three 48-hour periods and have a sample frequency of not more than 10 minutes. The logs shall be provided in both printed and disk formats.
10. Any tests that fail to demonstrate the operation of the system shall be repeated at a later date. The contractor shall be responsible for any necessary repairs or revisions to the hardware or software to successfully complete all tests.

B. Acceptance.

1. All tests described in this specification shall have been performed to the satisfaction of both the engineer and owner prior to the acceptance of the control system as meeting the requirements of completion. Any tests that cannot be performed due to circumstances beyond the control of the contractor may be exempt from the completion requirements if stated as such in writing by the engineer. Such tests shall then be performed as part of the warranty.
2. The system shall not be accepted until all forms and checklists completed as part of the demonstration are submitted and approved as required in Part 1, "Submittals."

3.17 Cleaning

A. The contractor shall clean up all debris resulting from his/her activities daily. The contractor shall remove all cartons, containers, crates, etc., under his/her control as soon as their contents have been removed. Waste shall be collected and placed in a designated location.

B. At the completion of work in any area, the contractor shall clean all work, equipment, etc., keeping it free from dust, dirt, and debris, etc.

C. At the completion of work, all equipment furnished under this section shall be checked for paint damage, and any factory-finished paint that has been damaged shall be repaired to match the adjacent areas. Any cabinet or enclosure that has been deformed shall be replaced with new material and repainted to match the adjacent areas.

3.18 Training

A. Provide training for a designated staff of Owner's representatives. Training shall be provided via self-paced training, web-based or computer-based training, classroom training, or a combination of training methods.

B. Training shall enable students to accomplish the following objectives.

1. Day-to-day Operators:
    a. Proficiently operate the system
    b. Understand control system architecture and configuration
    c. Understand DDC system components
    d. Understand system operation, including DDC system control and optimizing routines (algorithms)
    e. Operate the workstation and peripherals
    f. Log on and off the system
    g. Access graphics, point reports, and logs
    h. Adjust and change system set points, time schedules, and holiday schedules
    i. Recognize malfunctions of the system by observation of the printed copy and graphical visual signals
    j. Understand system drawings and Operation and Maintenance manual
    k. Understand the job layout and location of control components
    l. Access data from DDC controllers and ASCs
    m. Operate portable operator's terminals
2. Advanced Operators:
    a. Make and change graphics on the workstation
    b. Create, delete, and modify alarms, including annunciation and routing of these
    c. Create, delete, and modify point trend logs and graph or print these both on an ad-hoc basis and at user-definable time intervals
    d. Create, delete, and modify reports
    e. Add, remove, and modify system's physical points
    f. Create, modify, and delete programming
    g. Add panels when required
    h. Add operator interface stations
    i. Create, delete, and modify system displays, both graphical and others
    j. Perform DDC system field checkout procedures
    k. Perform DDC controller unit operation and maintenance procedures
    l. Perform workstation and peripheral operation and maintenance procedures
    m. Perform DDC system diagnostic procedures

n. Configure hardware including PC boards, switches, communication, and I/O points
o. Maintain, calibrate, troubleshoot, diagnose, and repair hardware
p. Adjust, calibrate, and replace system components

3. System Managers/Administrators:
a. Maintain software and prepare backups
b. Interface with job-specific, third-party operator software
c. Add new users and understand password security procedures

C. Organize the training into sessions or modules for the three levels of operators listed above. (Day-to-Day Operators, Advanced Operators, System Managers and Administrators). Students will receive one or more of the training packages, depending on knowledge level required.

D. Provide course outline and materials according to the "Submittals" article in Part 1 of this specification. Provide one copy of training material per student.

E. The instructor(s) shall be factory-trained and experienced in presenting this material.

F. Classroom training shall be done using a network of working controllers representative of installed hardware.

3.19 Sequences of Operation

See Section 23, Appendix A (Sequences of Operation, With Points Lists).

3.20 Control Damper Installation

A. Damper submittals shall be coordinated for type, quantity, and size to ensure compatibility with sheet metal design.

B. Duct openings shall be free of any obstruction or irregularities that might interfere with blade or linkage rotation or actuator mounting. Duct openings shall measure ¼ in. larger than damper dimensions and shall be square, straight, and level.

C. Individual damper sections, as well as entire multiple section assemblies, must be completely square and free from racking, twisting, or bending. Measure diagonally from upper corners to opposite lower corners of each damper section. Both dimensions must be within 0.3 cm (1/8 in.) of each other.

D. Follow the manufacturer's instructions for field installation of control dampers. Unless specifically designed for vertical blade application, dampers must be mounted with blade axis horizontal.

E. Install extended shaft or jackshaft according to manufacturer’s instructions. (Typically, a sticker on the damper face shows recommended extended shaft location. Attach shaft on labeled side of damper to that blade.)

F. Damper blades, axles, and linkage must operate without binding. Before system operation, cycle damper after installation to ensure proper operation. On multiple section assemblies, all sections must open and close simultaneously.

G. Provide a visible and accessible indication of damper position on the drive shaft end.

H. Support ductwork in area of damper when required to prevent sagging due to damper weight.

I. After installation of low-leakage dampers with seals, caulk between frame and duct or opening to prevent leakage around perimeter of damper.

3.21 Duct Smoke Detection

A. Submit data for coordination of duct smoke detector interface to HVAC systems as required in Part 1, "Submittals."

B. This Contractor shall provide a dry-contact alarm output in the same room as the HVAC equipment to be controlled.

3.22 Start-Up and Checkout Procedures

A. Start up, check out, and test all hardware and software and verify communication between all components.

1. Verify that all control wiring is properly connected and free of all shorts and ground faults. Verify that terminations are tight.
2. Verify that all analog and binary input/output points read properly.
3. Verify alarms and interlocks.
4. Verify operation of the integrated system.

Section 23 09 93

Sequence of Operations for HVAC Controls

PART 1: GENERAL

1.01 Exhaust Fan - On/Off (Restroom Fans)

Run Conditions - Scheduled:
The fan shall run according to a user definable schedule.

Fan:
The fan shall have a user definable (adj.) minimum runtime.

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.
- Fan Runtime Exceeded: Fan status runtime exceeds a user definable limit (adj.).

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Schedule								x			
Fan Failure										x	
Fan in Hand										x	
Fan Runtime Exceeded										x	

1.02 Exhaust Fan - On/Off

Run Conditions -
The fan(s) EF-1 shall be run by on/off switch.

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Fan Failure										x	
Fan in Hand										x	

1.03 DX SPLIT SYSTEM (TWO STAGES COOLING/HEATING)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 75°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Emergency Shutdown:
The unit shall shut down and generate an alarm upon receiving an emergency shutdown signal.

Supply Air Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.

Supply Fan:
The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.

Alarms shall be provided as follows:

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan in Hand: Commanded off, but the status is on.

Cooling Stages:
The controller shall measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the zone temperature is above cooling setpoint.
- AND the supply fan status is on.
- AND the heating is not active.

Electric Heating Stages:
The controller shall measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the supply fan status is on.
- AND the cooling is not active.

Minimum Outside Air Ventilation - Fixed Percentage:
Interlock motorized damper with associated air handling unit. Damper shall be in closed position when unit is deactivate.

Filter Differential Pressure Monitor:
The controller shall monitor the differential pressure across the prefilter.

Alarms shall be provided as follows:

- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Filter Differential Pressure	x								x		
Supply Air Temp	x								x		x
Zone Setpoint Adjust	x										x
Zone Temp	x								x		x
Supply Air Smoke Detector			x						x	x	x
Supply Fan Status			x						x		x
Zone Override			x						x		x

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Cooling Stage 1				x					x		x
Cooling Stage 2				x					x		x
Heating Stage 1				x					x		x
Heating Stage 2				x					x		x
Outside Air Damper				x							x
Supply Fan Start/Stop				x					x		x
Cooling Setpoint					x				x		x
Heating Setpoint					x				x		x
Emergency Shutdown						x				x	x
Schedule								x			
filter Change Required										x	x
Supply Fan Failure										x	
Supply Fan in Hand										x	

1.04 DX SPLIT SYSTEM (SINGLE STAGE COOLING/HEATING)

Run Conditions - Scheduled:
The unit shall run according to a user definable time schedule in the following modes:

- Occupied Mode: The unit shall maintain
  - A 75°F (adj.) cooling setpoint
  - A 70°F (adj.) heating setpoint.

- Unoccupied Mode (night setback): The unit shall maintain
  - A 85°F (adj.) cooling setpoint.
  - A 55°F (adj.) heating setpoint.

Zone Setpoint Adjust:
The occupant shall be able to adjust the zone temperature heating and cooling setpoints at the zone sensor.

Zone Optimal Start:
The unit shall use an optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period.

Zone Unoccupied Override:
A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule.

Emergency Shutdown:
The unit shall shut down and generate an alarm upon receiving an emergency shutdown signal.

Supply Air Smoke Detection:
The unit shall shut down and generate an alarm upon receiving a supply air smoke detector status.

Supply Fan:
The supply fan shall run anytime the unit is commanded to run, unless shutdown on safeties. To prevent short cycling, the supply fan shall have a user definable (adj.) minimum runtime.

Alarms shall be provided as follows:

- Supply Fan Failure: Commanded on, but the status is off.
- Supply Fan in Hand: Commanded off, but the status is on.
- Supply Fan Runtime Exceeded: Status runtime exceeds a user definable limit (adj.).

Cooling Stages:
The controller shall measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The cooling shall be enabled whenever:

- Outside air temperature is greater than 60°F (adj.).
- AND the zone temperature is above cooling setpoint.
- AND the supply fan status is on.
- AND the heating is not active.

Electric Heating Stages:
The controller shall measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, there shall be a user definable (adj.) delay between stages, and each stage shall have a user definable (adj.) minimum runtime.

The heating shall be enabled whenever:

- Outside air temperature is less than 65°F (adj.).
- AND the zone temperature is below heating setpoint.
- AND the supply fan status is on.
- AND the cooling is not active.

Minimum Outside Air Ventilation - Fixed Percentage:
Interlock motorized damper with associated air handling unit. Damper shall be in closed position when unit is deactivate.

Filter Differential Pressure Monitor:
The controller shall monitor the differential pressure across the filter.

Alarms shall be provided as follows:

- Filter Change Required: Filter differential pressure exceeds a user definable limit (adj.).

Supply Air Temperature:
The controller shall monitor the supply air temperature.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Filter Differential Pressure	x								x		
Supply Air Temp	x								x		x
Zone Setpoint Adjust	x										x
Zone Temp	x								x		x
Supply Air Smoke Detector			x						x	x	x
Supply Fan Status			x						x		x

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Zone Override			x						x		x
Cooling Stage 1				x					x		x
Heating Stage 1				x					x		x
Outside Air Damper				x							x
Supply Fan Start/Stop				x					x		x
Cooling Setpoint					x				x		x
Heating Setpoint					x				x		x
Emergency Shutdown						x				x	x
Schedule								x			
Filter Change Required										x	x
Supply Fan Failure										x	
Supply Fan in Hand										x	

1.05 Unit Heater

Run Conditions - Continuous:
The unit shall run continuously and shall maintain a heating setpoint of 70°F (adj.).

Alarms shall be provided as follows:

- Low Zone Temp: If the zone temperature is less than the heating setpoint by a user definable amount (adj.).

Fan:
The fan shall run anytime the zone temperature drops below heating setpoint, unless shutdown on safeties.

Electric Heating Stage:
The controller shall measure the zone temperature and stage the heating to maintain its heating setpoint. To prevent short cycling, the stage shall have a user definable (adj.) minimum runtime.

The heating shall be enabled whenever:

- AND the zone temperature is below heating setpoint.
- AND the fan is on.

Discharge Air Temperature:
The controller shall monitor the discharge air temperature.

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Discharge Air Temp	x								x		x
Zone Temp	x								x		x
Fan Status			x						x		x
Fan Start/Stop				x					x		x
Heating Stage 1				x					x		x

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Heating Setpoint					x				x		x
Fan Failure										x	
Fan in Hand										x	

1.06 Ductless Split System (Cooling Only) (typical of 1)

Run Conditions - Continuous:
The unit shall run continuously and shall maintain:

- A 75°F (adj.) cooling setpoint.
- A 70°F (adj.) heating setpoint.

Alarms shall be provided as follows:

- High Zone Temp: If the zone temperature is greater than the cooling setpoint by a user definable amount (adj.).

Emergency Shutdown:
The unit shall shut down and generate an alarm upon receiving an emergency shutdown signal.

Fan:
The fan shall run anytime the unit is commanded to run, unless shutdown on safeties.

Cooling Stage:
The controller shall measure the zone temperature and stage the cooling to maintain its cooling setpoint. To prevent short cycling, the stage shall have a user definable (adj.) minimum runtime.

The cooling shall be enabled whenever:

- AND the zone temperature is above cooling setpoint.
- AND the fan is on.

Fan Status:
The controller shall monitor the fan status.

Alarms shall be provided as follows:

- Fan Failure: Commanded on, but the status is off.
- Fan in Hand: Commanded off, but the status is on.

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Discharge Air Temp	x								x		x
Zone Temp	x								x		x
Fan Status			x								x
Cooling Stage 1				x					x		x

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Fan Start/Stop				x					x		x
Cooling Setpoint					x				x		x
Heating Setpoint					x				x		x
Emergency Shutdown						x			x	x	x
Fan Failure										x	
Fan in Hand										x	
High Zone Temp										x	

APPENDIX A: Glossary of Terms

Terms used within the Specification Text:

- **Advanced Application Controller (AAC):**

A fully programmable control module. This control module may be capable of some of the advanced features found in Building Controllers (storing trends, initiating read and write requests, etc.) but it does not serve as a master controller. Advanced Application Controllers may reside on either the Ethernet/IP backbone or on a subnet.

- **Application Specific Controller (ASC):**

A pre-programmed control module which is intended for use in a specific application. ASCs may be configurable, in that the user can choose between various pre-programmed options, but it does not support full custom programming. ASCs are often used on terminal equipment such as VAV boxes or fan coil units. In many vendors' architectures ASCs do not store trends or schedules but instead rely upon a Building Controller to provide those functions.

- **BACnet/IP:**

An approved BACnet network type which uses an Ethernet carrier and IP addressing.

- **BACnet MS/TP:**

  An approved BACnet network type which uses a Master-Slave Token Passing configuration. MS/TP networks are unique to BACnet and utilize EIA485 twisted pair topology running at 9600 to 76,800 bps.

- **BACnet over ARCNET:**

  An approved BACnet network type which uses an ARCNET (attached resource computer network) carrier. ARCNET is an industry standard that can utilize several speeds and wiring standards. The most common configuration used by BACnet controllers is an EIA485 twisted pair topology running at 156,000 bps.

- **Building Controller (BC):**

  A fully programmable control module which is capable of storing trends and schedules, serving as a router to devices on a subnet, and initiating read and write requests to other controllers. Typically this controller is located on the Ethernet/IP backbone of the BAS. In many vendors' architectures a Building Controller will serve as a master controller, storing schedules and trends for controllers on a subnet underneath the Building Controller.

- **Direct Digital Control (DDC):**

  A control system in which a digital computer or microprocessor is directly connected to the valves, dampers, and other actuators which control the system, as opposed to indirectly controlling a system by resetting setpoints on an analog pneumatic or electronic controller.

- **PICS - Protocol Implementation Conformance Statement:**

  A written document, created by the manufacturer of a device, which identifies the particular options specified by BACnet that are implemented in the device.

- **Smart Actuator (SA):**

  An actuator which is controlled by a network connection rather than a binary or analog signal. (0-10v, 4-20mA, relay, etc.)

- **Smart Sensor (SS):**

  A sensor which provides information to the BAS via network connection rather than a binary or analog signal. (0-10000 ohm, 4-20mA, dry contact, etc.)

- **Web services:**

  Web services are a standard method of exchanging data between computer systems using the XML (extensible markup language) and SOAP (simple object access protocol) standards. Web services can be used at any level within a Building Automation System (BAS), but most commonly they are used to transfer data between BAS using different protocols or between a BAS and a non-BAS system such as a tenant billing system or a utility management system.

Terms used within the Sequences of Operation:

- **adj.**
  Adjustable by the end user, through the supplied user interface.
- **AI, AO, etc. (Column Headings on Points List)**

  AI = Analog Input. A physical input to the control module.
  AO = Analog Output. A physical output from the control module.
  AV = Analog Value. An intermediate (software) point that may be editable or read-only. Editable AVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only AVs are typically used to display the status of a control operation.
  BI = Binary Input. A physical input to the control module.
  BO = Binary Output. A physical output from the control module.
  BV = Binary Value. An intermediate (software) point that may be editable or read-only. Editable BVs are typically used to allow the user to set a fixed control parameter, such as a setpoint. Read Only BVs are typically used to display the status of a control operation.
  Loop = A control loop. Most commonly a PID control loop. Typically a control loop will include a setpoint, an input which is compared to the setpoint, and an output which controls some action based upon the difference between the input and the setpoint. A PID control loop will also include gains for the proportional, integral, and derivative response as well as an interval which controls how frequently the control loop updates its output. These gains may be adjustable by the end user for control loop "tuning," but in self-tuning control loops or loops which have been optimized for a specific application the gains may not be adjustable.
  Sched = Schedule. The control algorithm for this equipment shall include a user editable schedule.
  Trend. The control system shall be configured to collect and display a trend log of this object. The trending interval shall be no less than one sample every 5 minutes. (Change of Value trending, where a sample is taken every time the value changes by more than a user-defined minimum, is an acceptable alternative.)
  Alarm. The control system shall be configured to generate an alarm when this object exceeds user definable limits, as described in the Sequence of Controls.

Note: If the specifications require use of the BACnet protocol, all of the above shall be provided as BACnet objects.

- **KW Demand Limiting: ***

  An energy management strategy that reduces energy consumption when a system's electric power meter exceeds an operator-defined threshold.

  When power consumption exceeds defined levels, the system automatically adjust setpoints, de-energizes low priority equipment, and takes other pre-programmed actions to avoid peak demand charges. As the demand drops, the system restores loads in a predetermined manner.

- **Occupant Override Switch, or Timed Local Override:**

  A control option that allows building occupants to override the programmed HVAC schedule for a limited period of time.

  When the override time expires, the zone returns to its unoccupied state.

- **Occupant Setpoint Adjustment:**

  A control option that allows building occupants to adjust - within limits set by the HVAC control system - the heating and cooling setpoints of selected zones. Typically the user interface for this function is built into the zone sensor.

- **Optimal Start-Up: ***

  A control strategy that automatically starts an HVAC system at the latest possible time yet ensures comfort conditions by the time the building becomes occupied.

  In a typical implementation, a controller measures the temperature of the zone and the outside air. Then, using design heating or cooling capacity at the design outside air temperature, the system computes how long a unit must run at maximum capacity to bring the zone temperature to its occupied setpoint.

  The optimal start algorithm often includes a self-learning feature to adjust for variations from design capacity.

  A distributed system must use Run on Request with Optimal Start. (See below.)

- **Requested, or Run on Request: ***

  A control strategy that optimizes the runtime of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service. Source equipment runs only when needed, not on a fixed schedule.

  The source equipment runs when one or more receiving units request its services. An operator determines how many requests are required to start the source equipment.

  For example, if all the zones in a building are unoccupied and the zone terminal units do not need heating or cooling, the AHU will shut down. However, if a zone becomes occupied or needs cooling, the terminal unit will send a run request to the AHU to initiate the start-up sequence. If this AHU depends on a central chiller, it can send a run request to the chiller.

  The run on request algorithm also allows an operator to schedule occupancy for individual zones based on the needs of the occupants without having to adjust the schedules of related AHUs and chillers.

- **Trim and Respond, or Setpoint Optimization: ***

A control strategy that optimizes the setpoint of a source piece of equipment that supplies one or more receiving units - such as an air handler unit supplying zone terminal units with heating, cooling, ventilation, or similar service.

The source unit communicates with receiving units to determine heating, cooling, and other requirements, and then adjusts its setpoint.

For example, if all zones are comfortable and do not request cooling, the AHU will gradually increase (trim) its supply air setpoint. When a zone requests cooling, the AHU responds by dropping its setpoint. The more zones that request cooling, the more it drops the setpoint. The AHU repeats this process throughout the day to keep zones cool, but with a supply air setpoint that is no cooler than necessary.

Contracting Terms:

- **Furnished or Provided:**

  The act of supplying a device or piece of equipment as required meeting the scope of work specified and making that device or equipment operational. All costs required to furnish the specified device or equipment and make it operational are borne by the division specified to be responsible for providing the device or equipment.

- **Install or Installed:**

  The physical act of mounting, piping or wiring a device or piece of equipment in accordance with the manufacturer's instructions and the scope of work as specified. All costs required to complete the installation are borne by the division specified to include labor and any ancillary materials.

- **Interface:**

  The physical device required to provide integration capabilities from an equipment vendor's product to the control system. The equipment vendor most normally furnishes the interface device. An example of an interface is the chilled water temperature reset interface card provided by the chiller manufacturer in order to allow the control system to integrate the chilled water temperature reset function into the control system.

- **Integrate:**

  The physical connections from a control system to all specified equipment through an interface as required to allow the specified control and monitoring functions of the equipment to be performed via the control system.

APPENDIX B: Abbreviations

The following abbreviations may be used in graphics, schematics, point names, and other UI applications where space is at a premium.

AC - Air Conditioning
ACU - Air Conditioning Unit
AHU - Air Handling Unit
AI - Analog Input
AO - Analog Output
AUTO - Automatic
AUX - Auxiliary
BI - Binary Input
BO - Binary Output
C - Common
CHW - Chilled Water
CHWP - Chilled Water Pump
CHWR - Chilled Water Return
CHWS - Chilled Water Supply
COND - Condenser
CW - Condenser Water
CWP - Condenser Water Pump
CWR - Condenser Water Return
CWS - Condenser Water Supply
DA - Discharge Air
EA - Exhaust Air
EF - Exhaust Fan
EVAP - Evaporators
FCU - Fan Coil Unit
HOA - Hand / Off / Auto
HP - Heat Pump
HRU - Heat Recovery Unit
HTEX - Heat Exchanger
HW - Hot Water
HWP - Hot Water Pump
HWR - Hot Water Return
HWS - Hot Water Supply
MAX - Maximum
MIN - Minimum
MISC - Miscellaneous
NC - Normally Closed
NO - Normally Open
OA - Outdoor Air
PIU - Powered Induction Unit
RA - Return Air
RF - Return Fan
RH - Relative Humidity
RTU - Roof-top Unit
SA - Supply Air
SF - Supply Fan
SP - Static Pressure
TEMP - Temperature
UH - Unit Heater
UV - Unit Ventilator
VAV - Variable Air Volume
VVTU - Variable Volume Terminal Unit
W/ - with

W/O - without
WSHP - Water Source Heat Pump

SECTION 23 21 13
ABOVE GROUND HYDRONIC PIPING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 WORK INCLUDED

A. Pipe and pipe fittings.

B. Valves.

C. Condensate drain piping.

1.03 RELATED WORK

A. Section 23 05 29 – Hangers and Supports for Piping and Equipment HVAC.

B. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment.

C. Section 23 05 53 – Identification for HVAC Piping and Equipment.

D. Section 23 07 19 – HVAC Piping Insulation.

E. Section 23 21 19 – Hydronic Specialties.

1.04 REFERENCES

A. ANSI/ASME Sec 9 - Welding and Brazing Qualifications.

B. ANSI/ASME B16.3 - Malleable Iron Threaded Fittings Class 150 and 300.

C. ANSI/ASME B31.9 - Building Services Piping.

D. ANSI/AWS A5.8 - Brazing Filler Metal.

E. ANSI/AWWA C110 - Ductile-Iron and Gray-Iron Fittings 3 in. through 48 in., for Water and Other Liquids.

F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.

G. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.

H. ASTM B32 - Solder Metal.

I. ASTM B88 - Seamless Copper Water Tube.

1.05 REGULATORY REQUIREMENTS

A. Conform to ANSI/ASME B31.9.

1.06 QUALITY ASSURANCE

A. **Foreign made pipes, valves and fittings will not be acceptable.**

B. Valves: Manufacturer's name and pressure rating marked on valve body.

C. Welding Materials and Procedures: Conform to ANSI/ASME SEC 9. and applicable state labor regulations.

D. Welder’s Certification: In accordance with ANSI/ASME SEC 9.

1.07 SUBMITTALS

A. Submit product data under provisions of Division One.

B. Include data on pipe materials, pipe fittings, valves, and accessories.

C. Include welder’s certification of compliance with ANSI/ASME SEC 9.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site under provisions of Division One.

B. Store and protect products under provisions of Division One.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 EQUIPMENT DRAINS AND OVERFLOWS

A. Steel Pipe: ASTM A53 or A120, Schedule 40 galvanized.

1. Fittings: Galvanized cast iron, or ANSI/ASTM B16.3 malleable iron.
2. Joints: Screwed, or grooved mechanical couplings.

2.02 FLANGES, UNIONS, AND COUPLINGS

A. Pipe Size 2 Inches and Under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.

B. Pipe Size Over 2 Inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping; 1/16 inch thick preformed neoprene bonded gasket.

C. Grooved mechanical pipe couplings, fittings, valves and other grooved components may be used as an option to welding, threading or flanged methods. All grooved components shall be of one manufacturer, and conform to local code approval and/or is listed by ANSI-B-31.1, B-31.3, B-31.9, ASME, UL/ULC. FM, IAPMO or BOCA. Grooved end manufacturer to be ISO-9001 certified. Grooved couplings shall meet the requirements of ASTM F-1476. Manufacturer shall be Victaulic or approved equal. Can be utilized only in mechanical rooms or cooling tower areas.

PART 3 - EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. After completion, fill, clean, and treat systems.

E. Provide extended necks for all vents, thermometer wells, pressure gauge wells, pet cocks and pete's plugs.

3.02 INSTALLATION

A. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient.

B. Install piping to conserve building space, and not interfere with use of space and other work.

C. Group piping whenever practical at common elevations.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 23 05 16.

E. Provide clearance for installation of insulation, and access to valves and fittings.

F. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Division 8.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

I. Prepare pipe, fittings, supports, and accessories for finish painting. Refer to Division 9.

J. Install valves with stems upright or horizontal, not inverted.

K. All grooved components (couplings, fittings, valves, gaskets, and specialties) shall be of one manufacturer.

L. Grooved manufacturer shall provide on-site training for contractor's field personnel by a factory trained representative in the proper use of grooving tools, application of groove, and the product installation. Factory trained representative shall periodically visit the job site and inspect installation. Contractor shall remove and replace any improperly installed products.

3.03 APPLICATION

A. Use grooved mechanical couplings and fasteners only in accessible locations.

B. Install unions downstream of valves, and at equipment or apparatus connections.

C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.

D. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

E. Install plug valves for throttling, bypass, or manual flow control services.

F. Provide spring loaded check valves on discharge of condenser and chilled water pumps.

G. Use plug cocks for throttling service. Use non-lubricated plug cocks only when shut-off or isolating valves are also provided.

H. Use only butterfly valves in condenser water systems for throttling and isolation service.

I. Use lug end butterfly valves to isolate equipment.

J. Provide chain operated butterfly valve for installations at 12 feet or higher.

K. Provide 3/4 inch ball (drain) valves equal to Nibco T-585-70-HC at main shut-off valves, low points of piping, bases of vertical risers, and at equipment and pipe to nearest drain.

L. Provide automatic air vents at all high points and air pockets in the system.

3.04 CONDENSATE DRAIN PIPING

A. Drain piping from each unit shall be extended to the nearest floor drain or condensate drainage system. Drains shall be of the size indicated but not less than the full size of the drain pan connections.

B. Use plugged tees in lieu of elbows.

C. Pipe shall be Schedule 40 galvanized with malleable iron screwed or type "L" copper fittings.

D. Slope all drain lines 1/8" per foot, minimum.

E. Provide auxiliary drain pan on all AHU's above ceiling with auxiliary drain line routed to discharge in visually prominent area. Discharge location shall be coordinated with Architect.

3.05 PIPE FABRICATION AND INSTALLATION

A. All pipes shall be cut accurately to measurements established at the site and shall be worked into place without springing or forcing.

B. Piping layout and installation shall be made in the most advantageous manner possible with respect to headroom, valve access, opening and equipment clearance, and clearance from other work. Particular attention shall be given to piping in the vicinity of equipment; layout shall be made in such manner as to preserve maximum access to the various equipment parts for maintenance.

C. All changes in directions shall be made with fittings; field bending and mitering of pipe is prohibited.

D. Air vents and air chambers shall be installed as hereinafter specified.

3.06 OFFSETS AND FITTINGS

A. Due to the small scale of the Drawings, it is not possible to indicate all offsets, fittings, etc. which may be required. The Contractor shall carefully investigate structural and finish conditions affecting the Work, and shall take such steps as may be required to meet such conditions at no additional cost to the Owner.

B. All piping shall be installed close to walls, ceilings and columns, (consistent with the proper space for covering, removal of pipe and special clearances), so as to occupy the minimum of space, and all offsets, fittings, etc., required shall be provided at no additional cost to the Owner.

3.07 SECURING AND SUPPORTING

A. All piping shall be adequately supported to line and grade, with due provisions for expansion and contraction.

B. Piping shall be supported on approved clevis type, split ring, or trapeze type hangers properly connected to the structural members of the building.

C. All insulated piping shall be fitted with suitable steel protection saddles.

D. Perforated bar hangers, straps, wire or chains will not be permitted.

3.08 ISOLATION VALVES

A. All piping systems shall be provided with line size shut-off valves located at risers, at branch connections to mains, and at other locations as indicated and required.

3.09 TESTING OF PIPING SYSTEMS

A. During the progress of the Work and upon completion, tests shall be made as specified herein and as required by Authorities Having Jurisdiction, including Inspectors, Owner or Engineer. The Engineer or duly authorized Construction Inspector shall be notified in writing at least 2 working days prior to each test or other Specification requirement which requires action on the part of the Construction Inspector.

B. Tests shall be conducted as part of this Work and shall include all necessary instruments, equipment, apparatus, and service as required to perform the tests with qualified personnel. Submit proposed test procedures, recording forms, and test equipment for approval prior to the execution of testing.

C. Tests shall be performed before piping of various systems have been covered or furred-in. For insulated piping systems, testing shall be accomplished prior to the application of any insulation.

D. All piping systems shall be tested and proved absolutely tight for a period of not less than 2 hours at a pressure of 150 psi(g) or 150% of design pressure, whichever is greater. Tests shall be witnessed by the Engineer or an authorized representative and pronounced satisfactory before pressure is removed or any water drawn off.

E. Leaks, damage or defects discovered or resulting from test shall be repaired or replaced to a like new condition. Leaking pipe joints, or defective pipe, shall be removed and

replaced with acceptable materials. Test shall be repeated after repairs are completed and shall continue until such time as the entire test period expires without the discovery of any leaks, damage, or defects.

F. Wherever conditions permit, each piping system shall thereafter be subjected to its normal operating pressure and temperature for a period of no less than five 5 days. During that period, it shall be kept under the most careful observation. The piping systems must demonstrate the propriety of their installation by remaining absolutely tight during this period.

3.10 PIPE CLEANING, FLUSHING AND PURGING REQUIREMENTS AND PROCEDURES

The hydronic system shall be flushed and purged by contractor:
a. All mains, branches and zones shall be cleaned and treated per steps indicated below.
b. Owner/Engineer shall be given 72 hour notice prior to each step being performed.

A. Pre-flush requirements: Purpose is to get system ready for flushing and purging:

a. Piping must pass all required pressure testing and visual inspection for leaks.
b. All pumps shall be tested for rotation and properly aligned and lubricated.
c. Chemicals planning on being used must have certificate of assurance and product cut sheets presented to the owner/engineer prior to being used. All chemicals must: be approved by the state prior to being added to the system, FDA approved and meet ASTM-1384. Automotive grade chemicals are not allowed.
d. Bypass all terminal units and coils by connecting the supply and return piping together.
e. Fill entire system with clean fresh potable water.

B. The flush requirements: Purpose is to completely remove all debris, dirt and air from hydronic system.

a. Add system cleaner that contains detergent and emulsifying agents to properly remove grease, grime and other debris for steel pipe. Volume of cleaner used shall be about 10% of total volume.
b. System shall be circulated for a minimum of 48 hours with water velocities of a minimum of 5 ft/sec or greater. After completed all strainers shall be removed and cleaned thoroughly. House pumps are acceptable to circulate water.
c. The system shall be entirely drained and flushed out to remove all of the cleaner from the system as quickly as possible after cleaning to prevent debris from settling. All strainers shall be removed and thoroughly cleaned after no more dirt and cleaner is visible in the flushing water as it leaves the system.

C. Final fill:

a. All air vents shall be opened to allow air to escape during filling.
b. Reconnect all flex connections to equipment.
c. System shall be drained and filled with a local domestic/softened water mixture as required by chemical treatment supplier. System shall be filled with pressure reducing valve at the specified fill pressure.

D. Purging: Purpose is to remove all air from the system:

a. System shall be circulated for a minimum of one hour with water velocities of a minimum of 5 ft/sec or greater until all visible air is removed.

E. Final chemical addition: Purpose is to install chemicals during inhibitor as required:

a. After the above final fill and purging has been completed and accepted by the engineer/owner the final chemical addition can be done.
b. Chemical treatment shall be added to the system after thoroughly mixing water according to the manufacturer recommendations. Chemical treatment shall include inhibitors. Quantities and concentrations of inhibitor/chemicals should be applied according to manufacturer specifications and approval submittals.
c. System water shall be tested for chemical inhibitor concentrations, reserve alkalinity and PH. Reports shall be submitted to engineer/owner.
d. All records and documentation shall be kept and given to the owner upon completion.

END OF SECTION

SECTION 23 23 00
REFRIGERANT PIPING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 – Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 SCOPE

Scope of the Work shall include the furnishing and complete installation of the equipment covered by this Section, with all auxiliaries, ready for Owner's use.

PART 2 - PRODUCTS

2.01 GENERAL

Provide for the systems as shown. Submit shop drawings of piping systems showing all traps, pipe sizes, and accessories; drawing to be marked "Approved", and signed by a representative of the Application Engineering Department of the condensing unit manufacturer. Pipe sizes shall be as recommended by unit manufacturer. Refer to piping schematic on Drawings.

2.02 MATERIAL

A. PIPE: Copper ACR hard-drawn tubing.

B. FITTINGS: Wrought copper streamlined sweat fitting.

C. SOLDER: Sil-Fos; except on valves use solder recommended by valve manufacturer.

2.03 ACCESSORIES

All accessories shall be UL listed and rated in accordance with ARI Standard 710.

A. On systems 7-1/2 tons and larger, each separate refrigerant circuit shall have a separate filter dryer. Each filter dryer shall have a replaceable core and a three valve bypass. The filter drier shall be full line size and installed in the refrigerant liquid line. The filter shall have a minimum 4-3/4 inches diameter shell with removable flange and gasket. Flange shall be tapped for 1/4 inch FPT access valve. Size filter-drier for maximum 2.0 psi pressure drop at evaporator operating temperature. Similar to Mueller Brass Company model Drymaster micro-guard refillable filter series SD-485 through SD19217 or Sporlan catch-all.

B. On systems less than 7-1/2 tons, the filter dryer shall be the sealed type; sizes as above. One drier per refrigerant circuit.

C. Liquid-Moisture Indicator shall be installed in liquid refrigerant line; full line size similar to Mueller Brass Company model "Vuemaster" with soldered ends.

D. Thermostatic expansion valve shall have adjustable super heat and be as manufactured by Sporlan.

2.04 EVACUATION

Evacuate moisture completely by applying a commercial vacuum pump for a minimum of 24 hours. Moisture indicator shall indicate a completely moisture-free condition at time of final inspection. The vacuum pump shall run until the system indicates a maximum of 35 degrees FDB. The system shall be flushed with the operating refrigerant and the vacuum pump connected and rerun to repeat the evacuation. Evaluation shall be performed under supervision of the Engineer.

2.05 REFRIGERANT AND OIL

A. Contractor shall leave the refrigeration system with a full charge of refrigerant and oil and shall be responsible for the maintenance of a full charge of refrigerant and oil in the systems for a period of one year from date of Substantial Completion.

B. Should any leaks in the refrigeration system occur during the guarantee period, the Contractor shall eliminate such leaks and recharge system to a full charge of refrigerant and oil at no cost to the Owner.

PART 3 - EXECUTION

3.01 All equipment and piping shall be installed in accordance with the manufacturer's recommendations and printed installation instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the Drawings or in the Specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 23 31 13
METAL DUCTWORK

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Low pressure ductwork.

B. Medium and high pressure ductwork.

C. Casings.

D. Duct cleaning.

1.02 RELATED SECTIONS

Division 9 - Finishes: Weld priming, weather resistant, paint or coating.

A. Section 23 02 00 - Basic Material and Methods.

B. Section 23 05 29 – Hangers and Support for Piping and Equipment HVAC.

C. Section 23 05 93 - Testing, Adjusting and Balancing.

D. Section 23 07 13 - Duct Insulation.

E. Section 23 33 00 - Ductwork Accessories.

F. Section 23 37 13 - Air Distribution Devices.

1.03 QUALITY ASSURANCE

A. Manufacturer’s Qualifications: Firms regularly engaged in manufacture of metal ductwork products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer’s Qualifications: Firms with least 3 years of successful installation experience on projects with metal ductwork systems similar to that required for project.

C. Codes and Standards:

1. SMACNA Standards: Comply with latest SMACNA’s “HVAC Duct Construction Standards, Metal and Flexible” for fabrication and installation of metal ductwork.
2. ASHRAE Standards: Comply with ASHRAE Handbook, Equipment Volume, Chapter 1 “Duct Construction”, for fabrication and installation of metal ductwork.
3. NFPA Compliance: Comply with NFPA 90A “Standard for the Installation of Air Conditioning and Ventilating Systems”, NFPA 90B “Standard for the Installation of Warm Air Heating and Air Conditioning Systems”, and NFPA 96 Standard.
4. IECC 2000: Comply with 2000 International Energy Conservation Code.

1.04 GENERAL DESCRIPTION

A. Extent of metal ductwork is indicated on drawings and in schedules, and by requirements of this section.

1.05 SUBMITTALS

A. Submit shop drawings, duct fabrication standards and product data under provisions of Division One.

B. Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work.

C. The contract documents are schematic in nature and are to be used only for design intent. The contractor shall prepare sheet metal shop drawings, fully detailed and drawn to scale, indicating all structural conditions, all plumbing pipe and light fixture coordination, and all offsets and transitions as required to permit the duct to fit in the space allocated and built. All duct revisions required as a result of the contractor not preparing fully detailed shop drawings will be performed at no additional cost.

1.06 DEFINITIONS

A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain indicated clear size inside lining. Where offsets or transitions are required, the duct shall be the equivalent size based on constant friction rate.

B. Low Pressure: Low pressure ductwork shall be rated for an operating pressure of 2”. Low pressure ductwork shall be defined as all return, exhaust, and outside air ducts, all supply ductwork associated with constant volume air handling units with a scheduled external static pressure of less than 2”, and all supply ductwork downstream of terminal units in variable volume systems.

C. Medium Pressure: Medium pressure ductwork shall be rated for an operating pressure of 4”. Medium pressure ductwork shall be defined as all supply ductwork extending from variable volume air handling units to terminal units in variable volume systems with air handling units having a scheduled external static pressure of less than 4”. The supply ductwork of constant volume air handling units having a scheduled external static pressure greater than 2” and less than 4” shall be rated for medium pressure.

D. High Pressure: High pressure ductwork shall be rated for an operating pressure of 6”, or the scheduled external pressure of the equipment it is connected to, whichever is greater. The supply ductwork of air handling units having a scheduled external static pressure greater than 4” shall be high pressure.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protection: Protect shop-fabricated and factory-fabricated ductwork, accessories and purchased products from damage during shipping, storage and handling. Prevent end damage and prevent dirt and moisture from entering ducts and fittings, use sheet metal end caps on any lined duct exposed to the weather.

B. Storage: Where possible, store ductwork inside and protect from weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.

PART 2 - PRODUCTS

2.01 DUCTWORK MATERIALS

A. Exposed Ductwork Materials: Where ductwork is indicated to be exposed to view in occupied spaces, provide materials which are free from visual imperfections including

pitting, seam marks, roller marks, stains and discolorations, and other imperfections, including those which would impair painting.

B. Sheet Metal.: Except as otherwise indicated, fabricate ductwork from galvanized sheet steel complying with ASTM A 527, lockforming quality, with G 90 zinc coating in accordance with ASTM A 525; and mill phosphatized for exposed locations.

2.02 MISCELLANEOUS DUCTWORK MATERIALS

A. General: Non combustible and conforming to UL 181, Class 1 air duct materials.

B. Flexible Ducts: Flexmaster U.S.A., Inc. Type 3M or approved equal, corrosive resistant galvanized steel formed and mechanically locked to inner fabric with 1" thick insulation when flexible ducts are located in conditioned spaces and with R-5 insulation when located in unconditioned spaces. Flexible duct shall have reinforced metalized outer jacket comply with UL 181, Class 1 air duct.

C. Sealants: Hard-Cast "iron grip" or approved equal, non-hardening, water resistant, fire resistive and shall not be a solvent curing product. Sealants shall be compatible with mating materials, liquid used alone or with tape or heavy mastic.

D. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim and angles for support of ductwork.

1. For exposed stainless steel ductwork, provide matching stainless steel support materials.
2. For aluminum ductwork, provide aluminum support materials.

2.03 LOW PRESSURE DUCTWORK

A. Fabricate and support in accordance with latest SMACNA Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by approved shop drawings. Obtain engineer's approval prior to using round duct in lieu of rectangular duct.

C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.

D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

E. Use crimp joints with bead for joining round duct sizes 6 inch smaller with crimp in direction of airflow.

F. Use double nuts and lock washers on threaded rod supports.

2.04 MEDIUM AND HIGH PRESSURE DUCTS

A. Fabricate and support in accordance with SMACNA Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.

B. Construct T's, bends, and elbows with radius of not less than 1½ times width of duct on centerline. Where not possible and where rectangular elbows are used, provide airfoil-turning vanes. Where acoustical lining is required, provide turning vanes of perforated metal with glass fiber insulation. Weld in place.

C. Transform duct sizes gradually, not exceeding 15 degrees divergence and 30 degrees convergence.

D. Fabricate continuously welded medium and high pressure round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA Standard. Joints shall be minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.

E. Provide standard 45 degree lateral wye takeoffs unless otherwise indicated where 90 degree conical tee connections may be used.

2.05 CASINGS

A. Fabricate casings in accordance with SMACNA Duct Construction Standards and SMACNA High Pressure Duct Construction Standards and construct for operating pressures indicated.

B. Mount floor mounted casings on 4 inch high concrete curbs. At floor, rivet panels on 8 inch centers to angles. Where floors are acoustically insulated, provide liner of 18 gauge galvanized expanded metal mesh supported at 12 inch centers, turned up 12 inches at sides with sheet metal shields.

C. Reinforce doorframes with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection. Provide clear wire glass observation ports, minimum 6 X 6 inch size.

D. Fabricate acoustic casings with reinforcing turned inward. Provide 16 gauge back facing and 22 gauge perforated front facing with 3/32 inch diameter holes on 5/32 inch centers. Construct panels 3 inches thick packed with 4.5 lb./cubic foot minimum glass fiber media, on inverted channels of 16 gauge.

PART 3 - EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

A. Obtain manufacturer's inspection and acceptance of fabrication and installation of ductwork at beginning of installation.

B. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pitot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. Connect diffusers or troffer boots to low pressure ducts with 6 feet maximum, 4 feet minimum, length of flexible duct. Hold in place with strap or clamp.

E. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

F. The interior surface of all ductwork shall be smooth. No sheet metal parts, tabs, angles, or anything else may project into the ducts for any reason, except as specified to be so. All seams and joints shall be external.

G. All ductwork located exposed on roof shall be "crowned" to prevent water from ponding. Ref: Insulation for additional requirements.

H. Where ducts pass through floors, provide structural angles for duct support. Where ducts pass through walls in exposed areas, install suitable sheet metal escutcheons as closers.

I. All angles shall be carried around all four sides of the duct or group of ducts. Angles shall overlap corners and be welded or riveted.

J. All ductwork shall be fabricated in a manner to prevent the seams or joints being cut for the installation of grilles, registers, or ceiling outlets.

K. All duct hangers shall be attached to building structure. Cutting slots in roof or floor decking for hanger straps to be cast in concrete is not acceptable.

3.02 INSTALLATION OF FLEXIBLE DUCTS

A. Maximum Length: For any duct run using flexible ductwork, do not exceed 6'-0" extended length.

B. Installation: Install in accordance with Section III of SMACNA’s, “HVAC Duct Construction Standards, Metal and Flexible”.

3.03 REQUIREMENTS FOR UNIT CASINGS

A. Set plenum doors 6 to 12 inches above floor. Arrange door swings so that fan static pressure holds door in closed position.

3.04 DUCTWORK APPLICATION SCHEDULE

AIR SYSTEM	MATERIAL
Low Pressure Supply	Galvanized Steel
Medium and High Pressure Supply	Galvanized Steel
Return and Relief	Galvanized Steel
General Exhaust	Galvanized Steel
Outside Air Intake	Steel

3.05 DUCTWORK HANGERS AND SUPPORTS

A. All ductwork shall be properly suspended or supported from the building structure. Hangers shall be galvanized steel straps or hot-dipped galvanized rod with threads pointed after installation. Strap hanger shall be attached to the bottom of the ductwork, provide a minimum of two screws one at the bottom and one in the side of each strap on metal ductwork. The spacing, size and installation of hangers shall be in accordance with the recommendations of the latest SMACNA edition.

B. All duct risers shall be supported by angles or channels secured to the sides of the ducts at each floor with sheet metal screws or rivets. The floor supports may also be secured to ducts by rods, angles or flat bar to the duct joint or reinforcing. Structural steel supports for duct risers shall be provided under this Division.

3.06 AIR DUCT LEAKAGE: (From SMACNA Duct Standards Latest Edition) Test all ductwork (designed to handle over 1000 CFM) as follows:

A. Test apparatus

The test apparatus shall consist of:

1. A source of high pressure air--a portable rotary blower or a tank type vacuum cleaner.
2. A flow measuring device consisting of straightening vanes and an orifice plate mounted in a straight tube with properly located pressure taps. Each orifice assembly shall be accurately calibrated with its own calibration curve. Pressure and flow readings shall be taken with U-tube manometers.

B. Test Procedures

1. Test for audible leaks as follows:
2. Close off and seal all openings in the duct section to be tested. Connect the test apparatus to the duct by means of a section of flexible duct.
   a. Start the blower with its control damper closed.
   b. Gradually open the inlet damper until the duct pressure reaches 1.5 times the standard designed duct operating pressure.
   c. Survey all joint for audible leaks. Mark each leak and repair after shutting down blower. Do not apply a retest until sealants have set.
3. After all audible leaks have been sealed, the remaining leakage should be measured with the orifice section of the test apparatus as follows:
   a. Start blower and open damper until pressure in duct reaches 50% in excess of designed duct operating pressure.
   b. Read the pressure differential across the orifice on manometer No. 2. If there is no leakage, the pressure differential will be zero.
   c. Total allowable leakage shall not exceed one (1) percent of the total system design air flow rate. When partial sections of the duct system are tested, the summation of the leakage for all sections shall not exceed the total allowable leakage.
   d. Even though a system may pass the measured leakage test, a concentration of leakage at one point may result in a noisy leak which, must be corrected.
4. Test Witness
   a. Air duct leakage test shall be witnessed by Owner/Engineer.
   b. The Architect or duly authorized construction inspector shall be notified in writing at least 2 working days prior to each test.

3.07 DUCT SYSTEM CLEANING

A. Duct system cleaning shall be performed in accordance with the current published standards of ASHRAE and NADCA.

B. Duct system cleaning method used shall incorporate the use of vacuum collection devices that are operated continuously during cleaning. A vacuum device shall be connected to the downstream end of the section being cleaned through a predetermined opening. The vacuum collection device must be of sufficient power to render all areas being cleaned under negative pressure, such that containment of debris and the protection of the indoor environment is assured.

C. All vacuum devices exhausting air inside the building shall be equipped with HEPA filters (minimum efficiency), including hand-held vacuums and wet-vacuums.

D. All vacuum devices exhausting air outside the facility shall be equipped with Particulate Collection including adequate filtration to contain debris removed from the HVAC system. Such devices shall exhaust in a manner that will not allow contaminants to re-enter the facility. Release of debris outdoors must not violate any outdoor environmental standards, codes or regulations.

E. Fibrous glass thermal or acoustical insulation elements present in any equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment, while the HVAC system is under constant negative pressure, and not permitted to get wet in accordance with applicable NADCA and NAIMA standards and recommendations.

F. Duct cleaning method used shall not damage the integrity of the ductwork, nor damage porous surface materials such as liners inside the ductwork or system components.

G. Replace the fiberglass material if there is any evidence of damage, deterioration, delamination, friable material, mold or fungus growth, or moisture such that fibrous glass materials cannot be restored by cleaning or resurfacing with an acceptable insulation repair coating.

H. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or, where ductwork is to be painted, might interfere with painting or cause paint deterioration.

I. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.

J. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

K. Cleaning Report: Contractor shall provide a report to the Owner indicating the completion of duct cleaning per specification and areas of the duct system found to be damaged and/or in need of repair.

3.08 DUCT JOINTS AND SEAMS

A. Seal all non-welded duct joints with duct sealant as indicated.

END OF SECTION

SECTION 23 33 00
DUCTWORK ACCESSORIES

PART 1 – GENERAL

1.01 WORK INCLUDED

A. Volume control dampers.

B. Round Duct Taps.

C. Fire dampers.

D. Combination fire and smoke dampers.

E. Back draft dampers.

F. Air turning devices.

G. Flexible duct connections.

H. Duct access doors.

I. Duct test holes.

1.02 RELATED WORK

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

B. Section 23 31 13 - Metal Ductwork.

1.03 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilating Systems.

B. SMACNA - Low Pressure Duct Construction Standards.

C. UL 33 - Heat Responsive Links for Fire-Protection Service.

D. UL 555 - Fire Dampers and Ceiling Dampers.

1.04 SUBMITTALS

A. Submit shop drawings and product data under provisions of Division One.

B. Provide shop drawings for shop fabricated assemblies indicated, including volume control dampers duct access doors duct test holes. Provide product data for hardware used.

C. Submit manufacturer's installation instructions under provisions of Division 1, for fire dampers and combination fire and smoke dampers.

PART 2 - PRODUCTS

2.01 VOLUME CONTROL DAMPERS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and

as indicated.

B. Fabricate splitter dampers of material same gauge as duct to 24 inches size in either direction, and two gauges heavier for sizes over 24 inches.

C. Fabricate splitter dampers of double thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/2 inch diameter rod in self aligning, universal joint, action flanged bushing, with set screw.

D. Fabricate single blade dampers for duct sizes to 9-1/2 x 24 inch.

E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch.

1. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
2. On outside air, return air, and all other dampers required to be low leakage type, provide galvanized blades and frames, seven inches wide maximum, with replaceable vinyl, EPDM, silicone rubber seals on blade edges and stainless steel side seals. Provide blades in a double sheet corrugated type construction for extra strength. Provide hat channel shape frames for strength and blade linkage enclosure to keep linkage out of the air stream. Construction leakage not to exceed 1/2%, based on 2,000 fpm and 4 inch static pressure.

F. Except in round ductwork 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearings.

G. Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths exceed 30 inches provide regulator at both ends.

H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.

2.02 ROUND DUCT TAPS

A. Taps to trunk duct for round flexible duct shall be spin-in fitting with locking quadrant butterfly damper, model no. FLD-B03 by Flexmaster or approved equal.

2.03 ACCEPTABLE MANUFACTURERS - [FIRE DAMPERS] [AND] [COMBINATION FIRE AND SMOKE DAMPERS]

A. Greenheck.

B. Ruskin.

C. Nailor Industries.

D. Pottorff

2.04 FIRE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Provide curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream.

C. Fabricate multiple blade fire dampers per U.L. with 16 gauge minimum galvanized steel

frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.

D. Fusible links, UL 33, shall separate at 160 degrees F. Provide adjustable link straps for combination fire/balancing dampers.

2.05 COMBINATION FIRE AND SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Provide factory sleeve for each damper. Install damper operator on exterior of sleeve and link to damper operating shaft.

C. Fabricate with multiple blades with 16 gauge galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, stainless steel jamb seals, 1/8 x 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock, and 1/2 inch actuator shaft.

1. Operators shall be spring return electric type suitable to operate on 120 V AC, 60 cycle.
2. Operators shall be UL listed and labeled.

2.06 SMOKE DAMPERS

A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.

B. Motorized Smoke Dampers: multi-blade type, normally open with power on, close automatically when power is interrupted, UL-listed and labeled damper and damper operator.

2.07 ACCEPTABLE MANUFACTURERS – BACKDRAFT DAMPERS

A. Greenheck

B. Ruskin.

C. Pottorff

D. Substitutions: Under provisions of Division One.

2.08 BACKDRAFT DAMPERS

A. Gravity back draft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.

B. Fabricate multi-blade, parallel action gravity balanced back draft dampers of 16 gauge galvanized steel, or extruded aluminum, with blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

2.09 ACCEPTABLE MANUFACTURERS – AIR TURNING DEVICES

A. Young Regulator.
B. Titus.

C. Tuttle and Bailey.
D. Substitutions: Under provisions of Division One.

2.10 AIR TURNING DEVICES

A. On duct sizes less than 12 x 12, multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

B. Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum construction, with worm drive mechanism with 18 inch long removable key operator.

2.11 ACCEPTABLE MANUFACTURERS – FLEXIBLE DUCT CONNECTIONS

A. Metaledge.

B. Ventglass.

C. Substitutions: Under provisions of Division One.

2.12 FLEXIBLE DUCT CONNECTIONS TO AIR MOVING EQUIPMENT

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.

B. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 20 oz per sq yd, approximately 6 inches wide, crimped into metal edging strip.

2.13 ACCEPTABLE MANUFACTURERS – DUCT ACCESS DOORS

A. Greenheck.

B. Ruskin.

C. Titus.

D. Substitutions: Under provisions of Division One.

2.14 DUCT ACCESS DOORS

A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.

B. Review locations prior to fabrication.

C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum one inch thick insulation with sheet metal cover. Insulation shall be replaceable without field cutting or patching.

D. Access doors smaller than 12 inches square may be secured with sash locks.

E. Provide two hinges and two sash locks for sizes up to 18 inches square, three hinges and two compression latches with outside and inside handles for sizes up to 24 x 48 inches.

Provide an additional hinge for larger sizes.

F. Access doors with sheet metal screw fasteners are not acceptable.

2.15 DUCT TEST HOLES

A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions.

B. Balancing Dampers

1. Provide at points on low pressure supply, return, and exhaust systems where branches are taken from larger ducts and as required for air balancing. Use splitter dampers only where indicated.
2. All regulators mounted on externally insulated ductwork shall have 16 gauge elevated platforms at least 1/8 inch higher than the thickness of the insulation. Damper shaft shall have Ventlock No. 607 bearing mounted on ductwork within elevated platform. If duct is inaccessible the operating handle shall be extended and the regulator installed on the face of the wall or ceiling. Where regulators are exposed in finished parts of the building, they shall be flush type, Ventlock No. 666. All regulators shall be manufactured by Ventlock, or approved equal.
3. All dampers in lined ductwork shall have bushing to prevent damper damage to liner.

C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by authorities having jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.

D. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.

E. Provide back draft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.

F. Provide flexible duct connections immediately adjacent to equipment in ducts associated with fans and motorized equipment. Provide at least one inch slack at all flexible duct connections.

G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, and as indicated.

H. Provide duct test holes where indicated and required for testing and balancing purposes.

END OF SECTION

SECTION 23 34 00
HVAC FANS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. Section 23 02 00 - Basic Materials and Methods is included as a part of this Section as though written in full in this document.

1.02 WORK INCLUDED

A. Ceiling and inline ventilators.

1.03 RELATED SECTIONS

A. Section 23 05 13 – Common Motor Requirements for HVAC Equipment

B. Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment

C. Section 23 05 93 – Testing, Adjusting and Balancing

1.04 QUALITY ASSURANCE

A. UL Compliance: Fans shall be designed, manufactured, and tested in accordance with UL 705 "Power Ventilators."

B. UL Compliance: Fans and components shall be UL listed and labeled.

C. Nationally Recognized Testing Laboratory Compliance (NRTL): Fans and components shall be NRTL listed and labeled. The term "NRTL" shall be as defined in OSHA Regulation 1910.7.

D. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

E. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

F. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data." Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating." Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.

G. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

1.05 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections:

B. Product data for selected models, including specialties, accessories, and the following:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound power ratings.
3. Motor ratings and electrical characteristics plus motor and fan accessories.
4. Materials, gages and finishes, include color charts.
5. Dampers, including housings, linkages, and operators.
6. Full color paint samples.

C. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.

D. Coordination drawings, in accordance with Division 23, Section "Basic Materials and Methods", for roof penetration requirements and for reflected ceiling plans drawn accurately to scale and coordinating penetrations and units mounted above ceiling. Show the following:

1. Roof framing and support members relative to duct penetrations.
2. Ceiling suspension members.
3. Method of attaching hangers to building structure.
4. Size and location of initial access modules for acoustical tile.
5. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinkler heads, access panels, and special moldings.

F. Wiring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer installed wiring and field installed wiring.

G. Product certificates, signed by manufacturer, certifying that their products comply with specified requirements.

H. Maintenance data for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 23, Section "Basic Materials and Methods".

1.06 DELIVERY, STORAGE, AND HANDLING

A. Fans shall be stored and handled in accordance with the unit manufacturer’s instructions.

B. Lift and support units with the manufacturer's designated lifting or supporting points.

C. Disassemble and reassemble units as required for movement into the final location following manufacturer's written instructions.

D. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, and fan has been test run under observation.

1.08 OPERATIONS PERSONNEL TRAINING

A. Provide a training session for the owner’s operations personnel. Training session shall be performed by a qualified person who is knowledgeable in the subject system/equipment. Submit a training agenda two (2) weeks prior to the proposed training session for review and approval. Training session shall include at the minimum:

1. Purpose of equipment.
2. Principle of how the equipment works.
3. Important parts and assemblies.
4. How the equipment achieves its purpose and necessary operating conditions.
5. Most likely failure modes, causes and corrections.
6. On site demonstration.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. PennBarry

B. Loren Cook Company

C. Greenheck Fan Corporation

D. ACME

2.02 GENERAL DESCRIPTION

A. Provide fans that are factory fabricated and assembled, factory tested, and factory finished with indicated capacities and characteristics.

B. Fans and Shafts shall be statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

C. Provide factory baked-enamel finish coat after assembly. Color for roof mounted fans shall be chosen by Architect during the submittal process.

2.03 CEILING AND INLINE VENTILATORS

A. Ceiling and inline ventilators shall be direct drive or belt drive as indicated, centrifugal blower type. Fan wheel shall be constructed of galvanized steel and shall be dynamically balanced. The housing shall be constructed of minimum 20 gauge corrosion resistant galvanized steel and acoustically insulated for quiet operation. Blower and motor assembly shall be easily removable from the housing without disturbing the ductwork. The motor shall be permanently lubricated with built-in thermal overload protection and shall be factory tested prior to shipment. The ceiling ventilators shall be furnished standard with a powder-painted white steel grille.

B. Ventilators shall be certified and licensed to bear the AMCA Seal for Air and Sound Performance. Ventilator performance shall be based on tests and procedures performed in accordance with AMCA publication 211 and comply with the requirements of the AMCA Certified Ratings Program. Fan sound power level ratings shall be based on tests and procedures performed in accordance with AMCA publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Ventilators shall be UL listed and CSA certified.

C. Accessories: The following accessories are required.

1. Dampers:
   a. Aluminum backdraft damper.

b. Motor-operated volume control damper.
c. U.L. listed ceiling radiation damper for ceiling fans comply with NFPA Standard 90A rated for 3 hours.

2. Disconnect Switch: Nonfusible type with thermal overload protection.
3. Speed Controls: Fan mounted, solid state speed controller.

PART 3 – EXECUTION

3.01 Install in accordance with manufacturer's instructions.

3.02 All items required for a complete and proper installation are not necessarily indicated on the plans or in the specifications. Provide all items required as per manufacturer's requirements.

END OF SECTION

SECTION 23 37 13
AIR DISTRIBUTION DEVICES

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Ceiling air diffusers.

B. Wall registers and grilles.

C. Other air devices indicated on drawings and schedules.

1.02 RELATED SECTIONS

A. Section 23 02 00 – Basic Materials and Methods

B. Section 23 05 93 – Testing, Adjusting and Balancing

C. Section 23 31 13 – Metal Ductwork

D. Section 23 31 19 – Ductwork Accessories

1.03 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of air distribution devices of types and capacities required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. ARI Compliance: Test and rate air distribution devices in accordance with ARI 650 "Standard for Air Outlets and Inlets".
2. ASHRAE Compliance: Test and rate air distribution devices in accordance with ASHRAE 70 "Method of Testing for Rating the Air Flow Performance of Outlets and Inlets".
3. AMCA Compliance: Test and rate louvers in accordance with AMCA 500 "Test Method for Louvers, Dampers and Shutters".
4. AMCA Seal: Provide louvers bearing AMCA Certified Rating Seal.
5. NFPA Compliance: Install air distribution devices in accordance with NFPA 90A "Standard for the Installation of Air Conditioning and Ventilating Systems".

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for air distribution devices including the following:

1. Schedule of air distribution devices indicating drawing designation, room location, number furnished, model number, size, and accessories furnished.
2. Data sheet for each type of air distribution devices, and accessory furnished; indicating construction, finish, and mounting details.
3. Performance data for each type of air distribution devices furnished, including aspiration ability, temperature and velocity traverses; throw and drop; and noise criteria ratings. Indicate selections on data.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawing for each type of air distribution devices, indicating materials and methods of assembly of components.

C. Maintenance Data: Submit maintenance data, including cleaning instructions for finishes, and spare parts lists. Include this data, product data, and shop drawings in maintenance manuals; in accordance with requirements of Division 1.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver air distribution devices wrapped in factory-fabricated fiber-board type containers. Identify on outside of container type of outlet or inlet and location to be installed. Avoid crushing or bending and prevent dirt and debris from entering and settling in devices.

B. Store air distribution devices in original cartons and protect from weather and construction work traffic. Where possible, store indoors; when necessary to store outdoors, store above grade and enclose with waterproof wrapping.

1.06 WARRANTY

A. Warrant the installation of the Work specified herein for one year against becoming unserviceable or causing an objectionable appearance resulting from defective or nonconforming workmanship.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Titus Company

B. Nailor Industries

C. Price

D. Substitutions under provisions of Division One.

2.02 GENERAL DESCRIPTION

A. Unless otherwise indicated, provide manufacturer’s standard air devices when shown of size, shape, capacity, type and accessories indicated on drawings and schedules, constructed of materials and components as indicated and as required for complete installation and proper air distribution.

B. Provide air devices that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device and listed in manufacturer’s current data.

C. Unless noted otherwise on drawings, the finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100 hour ASTM D117 Corrosive Environments Salt Spray Test without creepage, blistering, or deterioration of film. The paint must pass a 250 hour ASTM-870 Water Immersion Test. The paint must also pass the ASTM D-2794 Reverse Impact Cracking Test with a 50 inch pound force applied.

D. Provide air device with border styles that are compatible with adjacent ceiling or wall system, and that are specially manufactured to fit into the wall construction or ceiling

module with accurate fit and adequate support. Refer to architectural construction drawings and specifications for types of wall construction and ceiling systems.

E. Provide integral volume damper with roll formed steel blades where indicated on drawings or schedules. Dampers shall be opposed blade design with a screw driver slot or a concealed lever operator for adjustment through the face of the air device.

F. Air devices designated for fire rated systems shall be pre-assembled with UL classified radiation damper and thermal blanket. Fire rated air devices shall be shipped completely assembled; one assembly per carton, Each assembly shall be enclosed in plastic shrink wrap with installation instructions.

PART 3 – EXECUTION

3.01 All interior surfaces of all air devices shall be painted flat black.

3.02 See floor plans for type, neck size and CFM of air for all air distribution devices.

3.03 Install all air distribution devices as detailed on plans and in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 23 72 14
UVC/HEPA AIR FILTRATION UNIT, FAN POWERED

PART 1 - GENERAL

1.01 SCOPE

Provide and install self-contained, above-the-ceiling fan powered UVC-HEPA air filtration unit – ISO-UVC/HEPA horizontal series or approved equal unit.

A. ACCEPTABLE MANUFACTURERS:

1. ISOLATE, CORP
   P.O. Box 40794
   Houston, TX 77240

2. Or other approved manufacturer.

B. DESIGN AND PERFORMANCE CRITERIA:

1. Air purification's systems, as scheduled, shall be capable of effectively removing particulate contaminants from outside or recirculated air. The operation of the air purification system shall include a combination 99.97% efficient high efficiency HEPA air filter (to 0.3 micron particle size) for particulate capture and a high intensity ultraviolet (UVC) fixture for disinfection of microbiological airborne contaminants.

2. The unit manufacturer shall be able to submit a genuine third-party performance test by an independent and nationally recognized biological or health center laboratory normally engaged in biological testing. Destruction and removal of bacillus spores from circulated air must be demonstrated for both wet and dry spores. Test bacterium shall include bacillus megaterium, bacillus cereus, bacillus atrophaeus, bacillus thuringiensis and bacillus stearothermophilus.

   Testing must demonstrate that with a six log challenge, at least a five-log reduction in microorganisms, i.e., kill by the UVC fixture, is possible at the unit inlet side of the HEPA filter for any of the challenge bacillus. Cultures must be made by swabbing the inlet of the filter. In all cases, a "no-growth" plate down stream of the HEPA filter must in fact demonstrate "no microorganism growth."

3. The air velocity through the filtration unit shall not exceed 500 fpm.

4. The particulate phase shall consist of a single stage UL Class 2, 99.97% efficient at 0.3 microns HEPA element, meeting ASHRAE Test Standard 52-76.

5. HEPA disinfection shall be provided by a UVC fixture and shall be a high intensity, single ended type, suitable for installation in a cold or moving air stream.

6. The UVC fixture shall be installed in the unit, immediately upstream of the HEPA element, in order to provide maximum opportunity to irradiate any organisms or particulate that is captured by the HEPA element. The UVC/HEPA element must be changed by the buyer's maintenance department after 9,000 hours of continuous operation, i.e., typically at least one (1) time per year, in order to maintain maximum disinfection capacity.

C. GENERAL:

1. The air filtration unit shall be a factory fabricated, single-piece unit, with integral housing structure. The unit shall be designed for horizontal air flow (above the ceiling design) for building recirculation air filtration or with direct connection to a standard roof or duct mounted exhaust fan for exhaust duty. The air filter unit shall include an all aluminum structural framework and integral housing structure with all aluminum housing panels to minimize weight.

2. The unit air intake shall be at one end.

3. Next, the UVC fixture shall be installed, immediately upstream of the HEPA filter. The UVC fixture shall include a separate power "on-off" switch.

4. Following the UVC fixture, a 99.97% efficient HEPA element, UL Class 2, meeting ASHRAE Test Standard 52-76 shall be installed. This HEPA element provides the high efficiency air filtration barrier and permits the UVC element to irradiate and destroy captured bio organisms.

5. A 120/1/60 backwardly inclined plenum type centrifugal fan shall follow the filter elements.

6. The structural aluminum extrusion framing system shall be as provided by Modular Framing Systems, Inc. The framing system assembly shall be accomplished using structural members and mechanical fasteners. (Welding is not necessary and not recommended). Precision die cast aluminum corners (three-way) joining elements shall be used to connect the perimeter enclosure framing (profile) members. Vertical and horizontal wall, roof, and floor supports, or "omega" extrusions, shall be incorporated and spaced to enable the finished enclosure to withstand the system design static pressures as listed on the equipment schedule.
Structural framing profiles and omega supports shall be extruded from 6063 alloy T5 temper aluminum as a minimum.

7. The unit manufacturer shall provide a single wall panel casing system.

8. Mechanical fasteners such as self tapping steel screws or rivets shall also be employed to secure the housing sheeting to the structural aluminum members.

9. Housing panels shall be a nominal .063" thick painted aluminum, formed to provide an air tight gasketed fit.

10. Panels shall be joined together with a neat and clean appearance. Any safing, internal partitions, or other tie-ins to the casing shall be made using internal support angle extrusions or panels that are a part of the casing. Such members may be bolted, screwed, or riveted to or through the support structure.

11. The unit shall include one (1) 12" diameter suction inlet for above the ceiling use.

12. One (1) 12" diameter supply outlet is recommended for the customer supplied flexible duct connection to recirculation ductwork or exhaust system ductwork, whichever the case.

13. Suction inlet connections shall be on one end of the unit with the supply outlet located on the other end for straight through airflow.

14. Air filters and unit internal components shall be suitable for side or bottom access for horizontal (above the ceiling installation) and front and side access for vertical (portable unit) installation.

15. The unit shall be capable of including a "self-hanging" feature, that allows for the drilling of 3/8" diameter holes in the unit frame corners, thus allowing he installing contractor to use 5/16" threaded rods to simply hang the unit from building superstructure ceiling joists.

D. UNIT CONSTRUCTION:

1. Housing construction

a) The unit housing shall be single wall construction of all aluminum structure and panels, as described above.

b) HEPA filter elements and UVC fixtures shall be side servicing via access panels provided with door latches for easy entrance.

c) Wall panels shall be sealed against leakage up to a 3" w.g. Silicone sealant, gaskets, or other appropriate pressure sealing means are acceptable for housing sealing use.

d) Panels that are not normally removed for maintenance may be fastened using either corrosion resistant or stainless steel sheet metal screws and/or high performance double-backed tape.

2. Filtration Requirements

a) Cylindrical elements as described above shall be used.

b) Filter elements shall be factory installed in the unit prior to shipment.

3. Electrical Requirements

a) The unit shall be factory wired with on-off switch to an internal unit junction box or power cord with plug, for ease of contractor connection in the field.

b) The unit shall operate on 120/1/60, with a 250 watt fan motor. An adjustable speed control shall be furnished for unit volume control.

c) Each unit shall be fully factory tested prior to shipment.

d) An aluminum nametag shall be provided with unit model number, serial number, operating amps and electrical input requirements.

e) A unit electrical wiring diagram shall be provided with each unit.

f) All wiring shall be in accordance with the latest version of the National Electric Code.

g) The unit shall be ETL listed.

E. DIMENSIONAL REQUIREMENTS:

1. Due to building and air handling unit dimensional constraints, the air filtration unit housing shall not exceed the dimensions as shown on the unit drawing.

2. Filtration units shall be suitable for mounting above the drop ceiling and installed via 5/16" diameter hanger rods with nylon lock-nut fasteners that use the unit vertical profiles as support members. Hanger rods are by installing contractor.

3. Access to the unit internal filters and components shall be achieved via the access panels provided and shown on the unit drawings.

F. OPTIONAL FEATURES:

1. Supply a Model H800 current switch for use in remote indication.

2. Supply a Series 20000 AC Hour Meter, 10,000 hour indication.

3. Supply one spare UVC/HEPA element, Model UVC/HEPA-12R.

G. WARRANTY

1. Isolate units are warranted against defects in material and workmanship for a period of twelve (12) months from date of commissioning or fifteen (15) months from date of shipment, whichever occurs first.

SECTION 23 81 26
SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

2. Wiring Diagrams: For power, signal, and control wiring.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set for each air-handling unit.

2. Gaskets: One set for each access door.

3. Fan Belts: One set for each air-handling unit fan.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - " Procedures," and Section 7 - "Construction and System Start-up."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. For Compressor: Five years from date of Substantial Completion.
2. For Parts: One years from date of Substantial Completion.
3. For Labor: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following**:**

1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. Lennox International Inc.
3. Trane; a business of American Standard companies.
4. YORK; a Johnson Controls company.

2.2 INDOOR UNITS (5 TONS OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
6. Fan Motors:
   a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
   b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
   c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
7. Filters: Permanent, cleanable.
8. Condensate Drain Pans:
   a. Fabricated with one percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and to direct water toward drain connection.

      Depth: A minimum of 2 inches deep.
   b. Single-wall, stainless-steel sheet.

c. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

d. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

2.3 OUTDOOR UNITS (5 TONS OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

a. Compressor Type: Scroll.

b. Refrigerant Charge: R-410A.

c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.

4. Fan: Aluminum-propeller type, directly connected to motor.

5. Motor: Permanently lubricated, with integral thermal-overload protection.

6. Low Ambient Kit: Permits operation down to 45 deg F.

7. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

D. Drain Hose: For condensate.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Install roof-mounted, compressor-condenser components on equipment supports specified in Section 077200 "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.

D. Equipment Mounting:

Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment."

E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Duct Connections: Duct installation requirements are specified in Section 233113 "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-

system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Section 23 33 00 "Ductwork Accessories."

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.4 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION

SECTION 26 02 00
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all Work herein.

B. The Contract Drawings indicate the extent and general arrangement of the systems. If any departure from the Contract Drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore, shall be submitted to the Architect for approval as soon as practicable. No such departures shall be made without the prior written approval of the Architect.

1.02 SCOPE OF WORK

A. The Work included under this Contract consists of the furnishing and installation of all equipment and material necessary and required to form the complete and functioning systems in all of its various phases, all as shown on the accompanying Drawings and/or described in these Specifications. The contractor shall review all pertinent drawings, including those of other contracts prior to commencement of Work.

B. This Division requires the furnishing and installing of all items Specified herein, indicated on the Drawings or reasonably inferred as necessary for safe and proper operation; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include, but are not limited to, materials, labor, supervision, transportation, storage, equipment, utilities, all required permits, licenses and inspections. All work performed under this Section shall be in accordance with the Project Manual, Drawings and Specifications and is subject to the terms and conditions of the Contract.

C. The approximate locations of Electrical items are indicated on the Drawings. These Drawings are not intended to give complete and accurate details in regard to location of outlets, apparatus, etc. Exact locations are to be determined by actual measurements at the building, and will in all cases be subject to the Review of the Owner or Engineer, who reserves the right to make any reasonable changes in the locations indicated without additional cost to the Owner.

D. Items specifically mentioned in the Specifications but not shown on the Drawings and/or items shown on Drawings but not specifically mentioned in the Specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

E. All discrepancies within the Contract Documents discrepancies between the Contract Documents and actual job-site conditions shall be reported to the Owner or Engineer so that they will be resolved prior to the bidding, where this cannot be done at least 7 working days prior to bid; the greater or more costly of the discrepancy shall be bid. All labor and materials required to perform the work described shall be included as part of this Contract.

F. It is the intention of this Section of the Specifications to outline minimum requirements to furnish the Owner with a turn-key and fully operating system in cooperation with other trades.

G. It is the intent of the above "Scope" to give the Contractor a general outline of the extent of the Work involved; however, it is not intended to include each and every item required for the Work. Anything omitted from the "Scope" but shown on the Drawings, or specified later, or necessary for a complete and functioning heating, ventilating and air conditioning system shall be considered a part of the overall "Scope".

H. The Contractor shall rough-in fixtures and equipment furnished by others from rough-in and placement drawings furnished by others. The Contractor shall make final connection to fixtures and equipment furnished by others.

I. Contractor shall participate in the commissioning process; including but not limited to meeting attendance, completion of checklists and participation in functional testing.

1.03 RELATED SECTIONS

A. General Conditions

B. Supplementary Conditions

C. Division One

1.04 COOPERATION WITH TRADES:

A. Cooperation with trades of adjacent, related, or affected materials or operations shall be considered a part of this work in order to affect timely and accurate placing of work and bring together in proper and correct sequence, the work of such trades.

1.05 REFERENCES

A. National Electrical Code (NEC)

B. American Society for Testing and Materials (ASTM)

C. Underwriter's Laboratories, Inc. (UL)

D. Insulated Cable Engineer's Association (ICEA).

E. National Electrical Manufacturer's Association (NEMA).

F. Institute of Electrical and Electronic's Engineers (IEEE).

G. American National Standards Institute (ANSI).

H. National Fire Protection Association (NFPA).

I. International Energy Conservation Code (IECC).

1.06 COMPLETE FUNCTIONING OF WORK:

A. All work fairly implied as essential to the complete functioning of the electrical systems shown on the Drawings and Specifications shall be completed as part of the work of this Division unless specifically stated otherwise. It is the intention of the Drawings and Specifications to establish the types of the systems, but not set forth each item essential to the functioning of the system. In case of doubt as to the work intended, or in the event of amplification or clarification thereof, the Contractor shall call upon the Architect for

supplementary instructions, Drawings, etc.

B. Contractor shall review all pertinent Drawings and adjust his work to all conditions shown there on. Discrepancies between Plans, Specifications, and actual field conditions shall be brought to the prompt attention of the Architect.

1. Approximate location of feeders, branch circuits, outlets, lighting and power panels, etc., are indicated on the Drawings. However, the Drawings, do not give complete and accurate detailed locations of such outlets, conduit runs, etc., and exact locations must be determined by actual field measurement. Such locations will, at all times, be subject to the approval of the Architect.
2. Communicate with the Architect and secure his approval of any outlet (light fixture, receptacle, switch, etc.) location about which there may be the least question. Outlets obviously placed in a location not suitable to the finished room or without specific approval, shall be removed and relocated when so directed by the Architect. Location of light fixtures shall be coordinated with reflected ceiling plans.

C. Additional coordination with mechanical contractor may be required to allow adequate clearances of mechanical equipment, fixtures and associated appurtenances. Contractor to notify Architect and Engineer of unresolved clearances, conflicts or equipment locations.

1.07 SCHEMATIC NATURE OF CONTRACT DOCUMENTS

A. The contract documents are schematic in nature in that they are only to establish scope and a minimum level of quality. They are not to be used as actual working construction drawings. The actual working construction drawings shall be the approved shop drawings.

1.08 CONTRACTOR'S QUALIFICATIONS

A. An approved contractor for the work under this division shall be:

1. A specialist in this field and have the personnel, experience, training, and skill, and the organization to provide a practical working system.
2. Able to furnish evidence of having contracted for and installed not less than 3 systems of comparable size and type that have served their Owners satisfactorily for not less than 3 years.
3. Perform work by persons qualified to produce workmanship of specified quality. Persons performing electrical work shall be required to be licensed. Onsite supervision, journeyman shall have minimum of journeyman license. Helpers, apprentices shall have minimum of apprentice license.

1.09 DATE OF FINAL ACCEPTANCE

A. The date of final acceptance shall be the date of owner occupancy, or the date all punch list items have been completed or final payment has been received. Refer to Division One for additional requirements.

B. The date of final acceptance shall be documented in writing and signed by the architect, owner and contractor.

1.10 DEFINITIONS AND SYMBOLS

A. General Explanation: A substantial amount of construction and Specification language constitutes definitions for terms found in other Contract Documents, including Drawings which must be recognized as diagrammatic and schematic in nature and not completely descriptive of requirements indicated thereon. Certain terms used in Contract Documents are defined generally in this article, unless defined otherwise in Division 1.

B. Definitions and explanations of this Section are not necessarily either complete or exclusive, but are general for work to the extent not stated more explicitly in another provision of the Contract Documents.

C. Indicated: The term "Indicated" is a cross-reference to details, notes or schedules on the Drawings, to other paragraphs or schedules in the Specifications and to similar means of recording requirements in Contract Documents. Where such terms as "Shown", "Noted", "Scheduled", "Specified" and "Detailed" are used in lieu of "Indicated", it is for the purpose of helping the reader locate cross-reference material, and no limitation of location is intended except as specifically shown.

D. Directed: Where not otherwise explained, terms such as "Directed", "Requested", "Accepted", and "Permitted" mean by the Architect or Engineer. However, no such implied meaning will be interpreted to extend the Architect's or Engineer's responsibility into the Contractor's area of construction supervision.

E. Reviewed: Where used in conjunction with the Engineer's response to submittals, requests for information, applications, inquiries, reports and claims by the Contractor the meaning of the term "Reviewed" will be held to limitations of Architect's and Engineer's responsibilities and duties as specified in the General and Supplemental Conditions. In no case will "Reviewed" by Engineer be interpreted as a release of the Contractor from responsibility to fulfill the terms and requirements of the Contract Documents.

F. Furnish: Except as otherwise defined in greater detail, the term "Furnish" is used to mean supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

G. Install: Except as otherwise defined in greater detail, the term "Install" is used to describe operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance.

H. Provide: Except as otherwise defined in greater detail, the term "Provide" is used to mean "Furnish and Install", complete and ready for intended use, as applicable in each instance.

I. Installer: Entity (person or firm) engaged by the Contractor or its subcontractor or Sub-contractor for performance of a particular unit of work at the project site, including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning and similar operations, as applicable in each instance. It is a general requirement that such entities (Installers) be expert in the operations they are engaged to perform.

J. Imperative Language: Used generally in Specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or when so noted by other identified installers or entities.

K. Minimum Quality/Quantity: In every instance, the quality level or quantity shown or specified is intended as minimum quality level or quantity of work to be performed or provided. Except as otherwise specifically indicated, the actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable tolerance limits. In complying with requirements, indicated or scheduled numeric values are either minimums or maximums as noted or as appropriate for the context of the requirements. Refer instances of uncertainty to Owner or Engineer via a request for information (RFI) for decision before proceeding.

L. Abbreviations and Symbols: The language of Specifications and other Contract Documents including Drawings is of an abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual word abbreviations of a self explanatory nature have been included in text of Specifications and Drawings. Specific abbreviations and symbols have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of Specification requirements with notations on Drawings and in Schedules. These are frequently defined in Section at first instance of use or on a Legend and Symbol Drawing. Trade and industry association names and titles of generally recognized industry standards are frequently abbreviated. Singular words will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of Contract Documents so indicate. Except as otherwise indicated, graphic symbols and abbreviations used on Drawings and in Specifications are those recognized in construction industry for indicated purposes. Where not otherwise noted symbols and abbreviations are defined by 1993 ASHRAE Fundamentals Handbook, chapter 34 "Abbreviations and Symbols", ASME and ASPE published standards.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

B. Deliver products to the project at such time as the project is ready to receive the equipment, pipe or duct properly protected from incidental damage and weather damage.

C. Damaged equipment shall be promptly removed from the site and new, undamaged equipment shall be installed in its place promptly with no additional charge to the Owner.

1.12 SUBMITTALS

A. Coordinate with Division 01 for submittal timetable requirements, unless noted otherwise within thirty (30) days after the Contract is awarded. The Contractor shall submit an electronic copy of a complete set of shop drawings and complete data covering each item of equipment or material. The submittal of each item requiring a submittal must be received by the Architect or Engineer within the above thirty day period. The Architect or Engineer shall not be responsible for any delays or costs incurred due to excessive shop drawing review time for submittals received after the thirty (30) day time limit. The Architect and Engineer will retain a copy of all shop drawings for their files. All literature pertaining to items subject to Shop Drawing submittal shall be submitted at one time. Submittals shall be placed in one electronic file in PDF 8.0 format and bookmarked for individual specification sections. Individual electronic files of submittals for individual specifications shall not be permitted. Each submittal shall include the following items:

1. A cover sheet with the names and addresses of the Project, Architect, MEP Engineer, General Contractor and the Subcontractor making the submittal. The cover sheet shall also contain the section number covering the item or items submitted and the item nomenclature or description.

2. An index page with a listing of all data included in the Submittal.
3. A list of variations page with a listing all variations, including unfurnished or additional required accessories, items or other features, between the submitted equipment and the specified equipment. If there are no variations, then this page shall state "NO VARIATIONS". Where variations affect the work of other Contractors, then the Contractor shall certify on this page that these variations have been fully coordinated with the affected Contractors and that all expenses associated with the variations will be paid by the submitting Contractor. This page will be signed by the submitting Contractor.
4. Equipment information including manufacturer's name and designation, size, performance and capacity data as applicable. All applicable Listings, Labels, Approvals and Standards shall be clearly indicated.
5. Dimensional data and scaled drawings as applicable to show that the submitted equipment will fit the space available with all required Code and maintenance clearances clearly indicated and labeled at a minimum scale of 1/4" = 1'-0", as required to demonstrate that the alternate or substituted product will fit in the space available.
6. Identification of each item of material or equipment matching that indicated on the Drawings.
7. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements or accessories shall be so indicated. All applicable information shall be clearly indicated with arrows or another approved method.
8. Additional information as required in other Sections of this Division.
9. Certification by the General Contractor and Subcontractor that the material submitted is in accordance with the Drawings and Specifications, signed and dated in long hand. Submittals that do not comply with the above requirements shall be returned to the Contractor and shall be marked "**REVISE AND RESUBMIT**".

B. Refer to Division 1 for additional information on shop drawings and submittals.

C. Equipment and materials submittals and shop drawings will be reviewed for compliance with design concept only. It will be assumed that the submitting Contractor has verified that all items submitted can be installed in the space allotted. Review of shop drawings and submittals shall not be considered as a verification or guarantee of measurements or building conditions.

D. Where shop drawings and submittals are marked "**REVIEWED**", the review of the submittal does not indicate that submittals have been checked in detail nor does it in any way relieve the Contractor from his responsibility to furnish material and perform work as required by the Contract Documents.

E. Shop drawings shall be reviewed and returned to the Contractor with one of the following categories indicated:

1. **REVIEWED:** Contractor need take no further submittal action, shall include this submittal in the O&M manual and may order the equipment submitted on.
2. **REVIEWED AS NOTED:** Contractor shall submit a letter verifying that required exceptions to the submittal have been received and complied with including additional accessories or coordination action as noted, and shall include this submittal and compliance letter in the O&M manual. The contractor may order the equipment submitted on at the time of the returned submittal providing the Contractor complies with the exceptions noted.
3. **NOT APPROVED:** Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is not

approved, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or drawings. Contractor shall not order equipment that is not approved. Repetitive requests for substitutions will not be considered.

4. **REVISE AND RESUBMIT:** Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked revise and resubmit, the Contractor will automatically be required to furnish the product, material or method named in the Specifications and/or provide as noted on previous shop drawings. Contractor shall not order equipment marked revise and resubmit. Repetitive requests for substitutions will not be considered.
5. **CONTRACTOR'S CERTIFICATION REQUIRED:** Contractor shall resubmit submittal on material, equipment or method of installation. The Contractor's stamp is required stating the submittal meets all conditions of the contract documents. The stamp shall be signed by the General Contractor. The submittal will not be reviewed if the stamp is not placed and signed on all shop drawings.
6. **MANUFACTURER NOT AS SPECIFIED:** Contractor shall resubmit new submittal on material, equipment or method of installation when the alternate or substitute is marked manufacturer not as specified, the Contractor will automatically be required to furnish the product, material or method named in the specifications. Contractor shall not order equipment where submittal is marked manufacturer not as specified. Repetitive requests for substitutions will not be considered.

F. Materials and equipment which are purchased or installed without shop drawing review shall be at the risk of the Contractor and the cost for removal and replacement of such materials and equipment and related work which is judged unsatisfactory by the Owner or Engineer for any reason shall be at the expense of the Contractor. The responsible Contractor shall remove the material and equipment noted above and replace with specified equipment or material at his own expense when directed in writing by the Architect or Engineer.

G. Shop Drawing Submittals shall be complete and checked prior to submission to the Engineer for review.

H. Furnish detailed shop drawings, descriptive literature, physical data and a specification critique for each section indicating "compliance" and/or "variations" for the following items:

Heavy Duty Disconnect Switches
Lighting Fixtures
Wiring Devices and Plates
Conduit and Fittings
Wire
Emergency Generator
Automatic Transfer Switches
Fire Alarm System

I. Refer to each specification section for additional requirements.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Prepare maintenance manuals in accordance with Division 1 and in addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.14 COORDINATION DRAWINGS

A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of pipe, duct, equipment, and other materials. Include the following:
   a. Wall and type locations.
   b. Clearances for installing and maintaining insulation.
   c. Locations of light fixtures and sprinkler heads.
   d. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
   e. Equipment connections and support details.
   f. Exterior wall and foundation penetrations.
   g. Routing of storm and sanitary sewer piping.
   h. Fire-rated wall and floor penetrations.
   i. Sizes and location of required concrete pads and bases.
   j. Valve stem movement.
   k. Structural floor, wall and roof opening sizes and details.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare reflected ceiling plans to coordinate and integrate installations, air distribution devices, light fixtures, communication systems components, and other ceiling-mounted items.

B. This Contractor shall be responsible for coordination of all items that will affect the installation of the work of this Division. This coordination shall include, but not be limited to: voltage, ampacity, capacity, electrical and piping connections, space requirements, sequence of construction, building requirements and special conditions.

C. By submitting shop drawings on the project, this Contractor is indicating that all necessary coordination has been completed and that the systems, products and equipment submitted can be installed in the building and will operate as specified and intended, in full coordination with all other Contractors and Subcontractors.

1.15 RECORD DRAWINGS

A. Maintain a continuous record during the course of construction of all changes and deviations in the work from the contract drawings. Upon completion of the work, purchase a set of "Auto Positive Tracings" on vellum and make corrections as required to reflect the electrical systems as installed. Location and size of all conduit shall be accurately shown to dimension. Submit three prints of the tracings for approval. Make corrections to tracings as directed and deliver "Auto Positive Tracings" to the Architect. Record drawings shall be furnished in addition to shop drawings. Symbols on the Record drawings shall correspond to the identification symbols on the contract drawings and equipment identification plates and tags.

B. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

C. Refer to Division 1 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as-built prints and reproducibles is a condition of final acceptance.

D. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.

E. Submit three prints of the tracings for approval. Make corrections to tracings as directed and delivered "Auto Positive Tracings" to the architect. "As-Built" drawings shall be furnished in addition to shop drawings.

F. When the option described in paragraph F., above is not exercised then upon completion of the work, the Contractor shall transfer all marks from the submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as follows:

CERTIFIED RECORD DRAWINGS

DATE:

(NAME OF GENERAL CONTRACTOR)

BY:_____
(SIGNATURE)

(NAME OF SUBCONTRACTOR)

BY:_____
(SIGNATURE)

1.16 CERTIFICATIONS AND TEST REPORTS

A. Submit a detailed schedule for completion and testing of each system indicating scheduled dates for completion of system installation and outlining tests to be performed and schedule date for each test. This detailed completion and test schedule shall be submittal at least 90 days before the projected Project completion date.

B. Test result reporting forms shall be submitted for review no later than the date of the detailed schedule submitted.

C. Submit 4 copies of all certifications and test reports to the Architect or Engineer for review adequately in advance of completion of the Work to allow for remedial action as required to correct deficiencies discovered in equipment and systems.

D. Certifications and test reports to be submitted shall include, but not be limited to those items outlined in Section of Division 26.

1.17 MAINTENANCE MANUALS

A. Coordinate with Division 1 for maintenance manual requirements, unless noted otherwise bind together in “D ring type” binders by National model no. 79-883 or equal, binders shall be large enough to allow ¼” of spare capacity. Three (3) sets of all approved shop drawing submittals, fabrication drawings, bulletins, maintenance instructions, operating instructions and parts exploded views and lists for each and every piece of equipment furnished under this Specification. All sections shall be typed and indexed into sections and labeled for easy reference and shall utilize the individual specification section numbers shown in the Electrical Specifications as an organization guideline. Bulletins containing information about equipment that is not installed on the project shall be properly marked up or stripped and reassembled. All pertinent information required by the Owner for proper operation and maintenance of equipment supplied by Division 26 shall be clearly and legibly set forth in memoranda that shall, likewise, be bound with bulletins.

B. Prepare maintenance manuals in accordance with Special Project Conditions, in addition to the requirements specified in Division 26, include the following information for equipment items:

1. Identifying names, name tags designations and locations for all equipment.
2. Fault Current calculations and Coordination Study.
3. Reviewed shop drawing submittals with exceptions noted compliance letter.
4. Fabrication drawings.
5. Equipment and device bulletins and data sheets clearly highlighted to show equipment installed on the project and including performance curves and data as applicable, i.e., description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and model numbers of replacement parts.
6. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
7. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, servicing instructions and lubrication charts and schedules.
8. Equipment name plate data.
9. Wiring diagrams.
10. Exploded parts views and parts lists for all equipment and devices.
11. Color coding charts for all painted equipment and conduit.

12. Location and listing of all spare parts and special keys and tools furnished to the Owner.
13. Furnish recommended lubrication schedule for all required lubrication points with listing of type and approximate amount of lubricant required.

C. Refer to Division 1 for additional information on Operating and Maintenance Manuals.

D. Operating and Maintenance Manuals shall be turned over to the Owner or Engineer a minimum of 14 working days prior to the beginning of the operator training period.

1.18 OPERATOR TRAINING

A. The Contractor shall furnish the services of factory trained specialists to instruct the Owner's operating personnel. The Owner's operator training shall include 12 hours of onsite training in three 4 hour shifts.

B. Before proceeding with the instruction of Owner Personnel, prepare a typed outline in triplicate, listing the subjects that will be covered in this instruction, and submit the outline for review by the Owner. At the conclusion of the instruction period obtain the signature of each person being instructed on each copy of the reviewed outline to signify that he has a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

C. Refer to other Division 26 Sections for additional Operator Training requirements.

1.19 SITE VISITATION

A. Visit the site of the proposed construction in order to fully understand the facilities, difficulties and restriction attending the execution of the work.

B. Before submitting a bid, it will be necessary for each Contractor whose work is involved to visit the site and ascertain for himself the conditions to be met therein in installing his work and make due provision for same in his bid. It will be assumed that this Contractor in submitting his bid has visited the premises and that his bid covers all work necessary to properly install the equipment shown. Failure on the part of the Contractor to comply with this requirement shall not be considered justification for the omission or faulty installation of any work covered by these Specifications and Drawings.

C. Understand the existing utilities from which services will be supplied; verify locations of utility services, and determine requirements for connections.

D. Determine in advance that equipment and materials proposed for installation fit into the confines indicated.

1.20 WARRANTY

A. The undertaking of the work described in this Division shall be considered equivalent to the issuance, as part of this work, of a specific guarantee extending one year beyond the date of completion of work and acceptance by Owner, against defects in materials and workmanship. Materials, appliances and labor necessary to effect repairs and replacement so as to maintain said work in good functioning order shall be provided as required. Replacements necessitated by normal wear in use or by Owner's abuse are not included under this guarantee.

B. All normal and extended warranties shall include parts, labor, miscellaneous materials, travel time, incidental expenses, freight/shipping, refrigerant, oils, lubricants, belts, filters

and any expenses related to service call required to diagnose warranty problems.

1.21 TRANSFER OF ELECTRONIC FILES

A. Project documents are not intended or represented to be suitable for reuse by Architect/Owner or others on extensions of this project or on any other project. Any such reuse or modification without written verification or adaptation by Engineer, as appropriate for the specific purpose intended, will be at Architect/Owner's risk and without liability or legal exposure to Engineer or its consultants from all claims, damages, losses and expense, including attorney's fees arising out of or resulting thereof.

B. Because data stored in electric media format can deteriorate or be modified inadvertently, or otherwise without authorization of the data's creator, the party receiving the electronic files agrees that it will perform acceptance tests or procedures within sixty (60) days of receipt, after which time the receiving party shall be deemed to have accepted the data thus transferred to be acceptable. Any errors detected within the sixty (60) day acceptance period will be corrected by the party delivering the electronic files. Engineer is not responsible for maintaining documents stored in electronic media format after acceptance by the Architect/Owner.

C. When transferring documents in electronic media format, Engineer makes no representations as to the long term compatibility, usability or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by Engineer at the beginning of the Project.

D. Any reuse or modifications will be Contractor's sole risk and without liability or legal exposure to Architect, Engineer or any consultant.

E. The Texas Board of Architectural Examiners (TBAE) has stated that it is in violation of Texas law for persons other than the Architect of record to revise the Architectural drawings without the Architect's written consent.

It is agreed that "MEP" hard copy or computer-generated documents will not be issued to any other party except directly to the Architect/Owner. The contract documents are contractually copyrighted and cannot be used for any other project or purpose except as specifically indicated in AIA B-141 Standard Form of Agreement Between Architect and Owner.

If the client, Architect/Owner, or developer of the project requires electronic media for "record purposes", then an AutoCAD based compact disc ("CD") will be prepared. The "CD" will be submitted with all title block references intact and will be formatted in a "plot" format to permit the end user to only view and plot the drawings. Revisions will not be permitted in this configuration.

F. At the Architect/Owner's request, Engineer will prepare one "CD" of electronic media to assist the contractor in the preparation of submittals. The Engineer will prepare and submit the "CD" to the Architect/Owner for distribution to the contractor. All copies of the "CD" will be reproduced for a cost of reproduction fee of Five Hundred Dollars ($500.00) per "CD".

The "CD" will be prepared and all title blocks, names and dates will be removed. The "CD" will be prepared in a ".dwg" format to permit the end user to revise the drawings.

G. This Five Hundred Dollars ($500.00) per "CD" cost of reproduction will be paid directly from the Contractor to the Engineer. The "CD" will be prepared only after receipt of the Five Hundred Dollars ($500.00). The Five Hundred Dollars ($500.00) per "CD" cost of

reproduction is to only recover the cost of the manhours necessary to reproduce the documents. It is not a contractual agreement between the Contractor and Engineer to provide any engineering services, nor any other service.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. The names and manufacturers and model numbers have been used in the Contract documents to establish types of equipment and standards of quality. Where more than one manufacturer is named for a specific item of equipment, only one of the specified manufacturers will be considered for approval. Where only one manufacturer is mentioned with the phrase "or approved equal", Contractor may submit an alternate manufacturer for consideration, provided the following conditions are met:

1. Submit alternate equipment with complete descriptive data in shop drawing form. Provide sample of equipment upon request for review by Architect. Samples will be returned if requested in writing.
2. Alternate equipment must be equal from the standpoint of materials, construction and performance.
3. Alternate submittal must be presented to the Engineer/Architect ten (10) days prior to bid date for approval.

B. The Architect and Engineer shall be the sole judge of quality and equivalence of equipment, materials and methods.

2.02 All materials and products used on this project shall be listed by Underwriters' Laboratories.

2.03 ACCESS DOORS

A. Wherever access is required in walls or ceilings to concealed junction boxes, pull boxes, equipment, etc., installed under this Division, furnish a hinged access door and frame with flush latch handle to another Division for installation. Doors shall be as follows:

1. Plaster Surfaces: Milcor Style K.
2. Ceramic Tile Surfaces: Milcor Style M.
3. Drywall Surfaces: Milcor Style DW.
4. Install panels only in locations approved by the Architect.

2.04 EQUIPMENT PADS

A. Unless noted otherwise 4" high concrete pads for floor mounted equipment shall be installed under Division 3. Pads shall conform to the shape of the equipment with a minimum of 3" margin at equipment supports. Top and sides of pads shall be troweled to a smooth finish, equal to floor. External corners shall be bullnosed to a 3/4" radius, unless shown otherwise.

2.05 ESCUTCHEONS

A. Provide heavy chrome or nickel plated plates, of approved pattern, on conduit passing through walls, floors and ceilings in finished areas. Where conduit passes through a sleeve, no point of the conduit shall touch the building construction. Caulk around such conduit with sufficient layers of two hour rated firesafing by Thermafiber 4.0 P.C.F. density, U.S.G. fire test 4/11/78 and seal off openings between conduit and sleeves with non-hardening mastic prior to application of escutcheon plate. Escutcheons shall be Gravler Sure-Lock, or approved equal.

2.06 SPACE LIMITATIONS

A. Equipment shall be chosen which shall properly fit into the physical space provided and shown on the drawings, allowing ample room for access, servicing, removal and replacement of parts, etc. Adequate space shall be allowed for clearances in accordance with Code requirements. Physical dimensions and arrangement of equipment shall be subject to the approval of the Architect.

2.07 PAINTING

A. All factory assembled equipment for electrical work, except light fixtures, that normally is delivered with a factory applied finish shall be delivered with a hard surface factory applied finish such as baked-on machinery enamel which will not require additional field painting. The finish shall consist of not less than 2 coats of medium gray color paint USA No. 61 Munsell Notation 8-3G, 6. 10/0.54 enamel. This Contractor shall protect this finish from damage due to construction operations until acceptance of the building. He shall be responsible for satisfactorily restoring any such finishes or replacing equipment that becomes stained or damaged.

2.08 ELECTRICAL SYSTEM IDENTIFICATION

A. Conduit Systems: Provide adequate marking of major conduit which is exposed or concealed in accessible spaces to distinguish each run as either a power or signal/communication conduit. Except as otherwise indicated, use orange banding with black lettering. Provide self-adhesive or snap-on type plastic markers. Indicate voltage for that raceway. Locate markers at ends of conduit runs, on pull boxes, on junction boxes, near switches and other control devices, near items of equipment served by the conductors, at points where conduit passes through walls or floors, or enters non-accessible construction and at spacings of not more than 50 feet along each run of conduit. Switch-leg conduit and short branches for power connections do not have to be marked, except where conduit is larger than ¾ inch. Branch circuit conduits, junction boxes and pull boxes shall be marked with a permanent marker indicating panel name and branch circuit numbers.

B. Underground Cable Identification: Bury a continuous, preprinted, bright colored plastic ribbon cable marker with each underground cable (or group of cables), regardless of whether conductors are in conduit, duct bank, or direct buried. Locate each directly over cables, 6 to 8 inches below finished grade.

C. Identification of Equipment:

1. All major equipment shall have a manufacturer's label identifying the manufacturer's address, equipment model and serial numbers, equipment size, and other pertinent data. Care shall be taken not to obliterate this nameplate in any way.
2. A black-white-black laminated plastic engraved identifying nameplate shall be secured by stainless steel screws to each automatic transfer switch, switchboard, distribution panel, motor control center, motor starter panels and panelboards.
    a. Identifying nameplates shall have ¼ inch high engraved letters and shall contain the following information:
        1) Name
        2) Voltage
        3) Phase
        4) "3" or "4" wire, and
        5) Where it is fed from.

b. An example of a panelboard nameplate is:
Center Panel – 1HB
480/277 volt, 3 phase, 4 wire
Center Fed from DP2

c. An example of an automatic transfer switch nameplate is:
Center ATS #2
480/277 volt, 3 phase, 4 wire, 4 pole
Center Fed from MSB and DPE

3. Each feeder device in a switchboard, distribution panel, and motor control center device shall have a nameplate showing the load served in ½ inch high engraved letters.
4. A black-white-black laminated plastic engraved identifying nameplate shall be secured by screws to each safety switch, disconnect switch, individual motor starter, enclosed circuit breaker, wireway, and terminal cabinet.
   a. Identifying nameplates shall have ¼ inch high engraved letters and shall indicate the equipment served.
   b. An example if a disconnect switch is: AHU-1.
5. Cardholders and directory cards shall be furnished for circuit identification in panelboards. Cardholder shall be located on inside of panel door and shall be in a metal frame with clear plastic front. Circuit lists shall be typewritten. Circuit descriptions shall include location and name of each item of equipment served. Spares and spaces shall be written in erasable pencil for future use. Circuit directory shall show the room served by each circuit. The final graphs/signage room numbers shall be used. Do not use Architectural numbering on plans.
6. Prohibited Markings: Markings which are intended to identify the manufacturer, vendor, or other source from which the material has been obtained are prohibited for installation within public, tenant, or common areas within the project. Also, prohibited are materials or devices which bear evidence that markings or insignias have been removed. Certification, testing (example, Underwriters' Laboratories, Inc.), and approval labels are exceptions to this requirement.
7. Warning Signs: Provide warning signs where there is hazardous exposure associated with access to or operation of electrical facilities. Provide text of sufficient clarity and lettering of sufficient size to convey adequate information at each location; mount permanently in an appropriate and effective location. Comply with recognized industry standards for color and design.
8. Operational Tags: Where needed for proper and adequate information on operation and maintenance of electrical system, provide tags of plasticized card stock, either preprinted or hand printed. Tags shall convey the message, example: "DO NOT OPEN THIS SWITCH WHEN BURNER IS OPERATING."

PART 3 - EXECUTION

3.01 EXCAVATING AND BACKFILLING

A. Trenching and backfilling and other earthwork operations required to install the facilities specified herein shall conform to the applicable requirements of Division 2 (95% of maximum standard density). Where trenching or excavation is required in improved areas, the backfill shall be compacted to a condition equal to that of adjacent undisturbed earth and the surface of the area restored to the condition existing prior to trenching or excavating operations. Provide a minimum of 3" of sand underneath all conduits. The plans indicate information pertaining to surface and sub-surface obstructions; however, this information is not guaranteed. Should obstructions be encountered whether or not shown, the Contractor shall alter routing of new work, reroute existing lines, remove obstructions where permitted, or otherwise perform whatever work is necessary to satisfy the purpose of new work and leave existing surfaces and structures in a satisfactory and serviceable condition. **All work shall comply with OSHA Standards.**

3.02 WORKMANSHIP AND CONCEALMENT

A. The work of this Section shall be performed by workman skilled in their trade. Installation shall be consistent in completeness whether concealed or exposed. Each item of electrical work shall be concealed in walls, chases, under floors and above ceilings except:

1. Where shown to be exposed.
2. Where exposure is necessary to the proper function.

3.03 SLEEVES, CUTTING AND PATCHING

A. This section shall be responsible for placing sleeves for all conduit passing through walls, partitions, sound walls, beams, floors, roof, etc. Sleeves through below-grade walls shall use water-tight fitting manufactured by O-Z/Gedney.

B. All cutting and patching will be done under another Division, but this Section will be responsible for timely performance of this work and layout of holes and setting sleeves.

C. All un-used sleeves shall be sealed with 2 hour UL approved fire sealant manufactured by “3M” or approved equal.

D. Refer to 26 05 33 for additional requirements.

3.04 ELECTRICAL GEAR

A. Install all electrical equipment in accordance with the National Electrical Code and as shown on the drawings.

B. Disconnect switches, etc. mounted in mechanical/electrical rooms shall be mounted at a working height not requiring a ladder, when wall space is available. Installation of these devices at greater elevations shall be approved by the Engineer. Contractor shall provide a coordination sketch of each mechanical/electrical room noting locations and mounting heights of all electrical devices(note bottom and top elevations) shown to be installed. Sketches shall be provided to the Engineer for review and the general contractor for coordination with other trades working in these rooms.

3.05 CLEANING

A. Clean lighting fixtures and equipment.

B. Touch-up and refinish scratches and marred surfaces on panels, switches, starters, and transformers.

3.06 TESTS AND INSPECTIONS

A. Tests and inspection requirements shall be coordinated with Division I.

B. Date for final acceptance test shall be sufficiently in advance of completion date of contract to permit alterations or adjustments necessary to achieve proper functioning of equipment prior to contract completion date.

C. Conduct re-tests as directed by Architect on portions of work or equipment altered or adjusted as determined to be necessary by final acceptance test. No resultant delay or

consumption of time as a result of such necessary re-test beyond contract completion date shall relieve Contractor of his responsibility under contract.

D. Put circuits and equipment into service under normal conditions, collectively and separately, as may be required to determine satisfactory operation. Demonstrate equipment to operate in accordance with requirements of these specifications. Perform tests in the presence of Architect. Furnish instruments and personnel required for tests.

E. Final Inspection:

1. At the time designated by the Architect, the entire system shall be inspected by the Architect and Engineer. The contractor or his representative shall be present at this inspection.
2. Panelboards, switches, fixtures, etc., shall be cleaned and in operating condition.
3. Certificates and documents required hereinbefore shall be in order and presented to the Architect prior to inspection.
4. Panel covers, junction box covers, etc., shall be removed for visual inspection of the wire, bus bars, etc.

5. After the inspection, any items which are noted as needing to be changed or corrected in order to comply with these specifications and the drawings shall be accomplished without delay.

F. The contractor shall provide a thermographic test using an independent testing laboratory using an infrared scanning device. This test shall include but not limited to all switchboards, distribution panelboards, panelboards, automatic transfer switches and other electrical distribution devices. This test shall be conducted to locate high temperature levels. This test shall be conducted between 3 to 8 months after occupancy, but not beyond the one year warranty period. Submit test to the architect and engineer using test reporting forms. All unacceptable conditions shall be corrected prior to the end of the warranty period.

END OF SECTION

SECTION 26 03 13
ELECTRICAL DEMOLITION FOR REMODELING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Electrical demolition.

B. The contractor shall be responsible for loss or damage to the existing facilities caused by him and his workmen, and shall be responsible for repairing such loss or damage. The contractor shall send proper notices, make necessary arrangements, and perform other services required for the care, protection and in-service maintenance of all electrical services for the new and existing facilities. The contractor shall erect temporary barricades, with necessary safety devices, as required to protect personnel from injury, removing all such temporary protection upon completion of the work.

C. Outages of services as required by the new installation will be permitted but only at a time approved by the Owner. The contractor shall allow the Owner 2 weeks in order to schedule required outages. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the contract amount.

D. The contractor shall provide temporary or new services to all existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.

1.02 RELATED SECTIONS

A. Section 01120 – Alteration Project Procedures.

B. Section 02072 – Minor Demolition for Remodeling.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. Materials and equipment for patching and extending work: As specified in individual Sections.

B. Include in the contract price all rerouting of existing conduits, wiring, outlet boxes, fixtures, etc., and the reconnecting of existing fixtures as necessitated by field conditions to allow the installation of the new systems. Furnish all temporary conduit, wiring, boxes, etc., as required to maintain lighting and power service for the existing areas with a minimum of interruption. Remove wire and conduit back to nearest accessible active junction box and extend to existing homeruns as required.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify field measurements and circuiting arrangements are as shown on Drawings.

B. Verify that abandoned wiring and equipment serve only abandoned facilities.

C. Demolition Drawings are based on casual field observation and existing record

documents. Report discrepancies to Owner before disturbing existing installation.

D. Beginning of demolition means installer accepts existing conditions.

3.02 PREPARATION

A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

B. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits use personnel experienced in such operations.

3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

A. Demolish and extend existing electrical work under provisions of Section 01120, Section 02072, and this Section.

B. Remove, relocate, and extend existing installations to accommodate new construction.

C. Remove abandoned wiring to source of supply.

D. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets, which are not removed.

F. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

G. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

H. Repair adjacent construction and finishes damaged during demolition and extension work.

I. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

J. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.

K. Where existing construction is removed to provide working and extension access to existing utilities, contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air conditioning ductwork and equipment, etc., to provide this access and shall reinstall same upon completion of work in the areas affected.

L. Where partitions, walls, floors, or ceilings of existing construction are being removed, all contractors shall remove and reinstall in locations approved by the Architect all devices required for the operation of the various systems installed in the existing construction.

M. During the construction and remodeling, portions of the project shall remain in service. Construction equipment, materials, tools, extension cords, etc., shall be arranged so as to present minimum hazard or interruption to the occupants of the building.

N. Certain work during the demolition phase of construction may require overtime or

nighttime shifts or temporary evacuation of the occupants. Coordinate and schedule all proposed down time with the Owner's Representative at least 72 hours in advance.

O. All existing lighting fixtures, switches, outlets, speakers, materials, equipment and appurtenances not included in the remodel or alteration areas are to remain in place and shall remain in service.

P. Electrical equipment, outlets, speakers, circuits to mechanical and building systems equipment, etc., which are to remain but which are served by conduit and/or circuiting that is disturbed by the remodeling work, shall be reconnected in such as manner as to leave it in proper operating condition.

Q. Existing branch circuit wiring which is to be removed, shall be pulled from the raceways and the empty conduit shall be removed to a point of permanent concealment.

R. Within the remodeled or alteration areas where existing walls are being removed, all existing lighting fixtures, switches, receptacles, other materials and equipment and their appurtenances shall be removed, where required by the remodel work either shown or specified.

S. New circuiting indicated to be connected to existing panels shall be connected to "spares" and/or "released" breakers as applicable, or new breakers provided where space is available. Contractor shall verify the existing panel load and feeder capacity prior to adding any additional loads.

T. In all the remodeled areas where existing ceilings are being removed and reinstalled, all ceiling mounted devices (i.e. smoked detectors, speakers, etc.) and their appurtenances shall be removed and reinstalled, unless otherwise shown or specified. This also applies to new ceiling installations.

3.04 CLEANING AND REPAIR

A. Clean and repair existing materials and equipment which remain or are to be reused.

B. Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

3.05 INSTALLATION

A. Install relocated materials and equipment under the provisions of Section 01120.

3.06 REMOVAL OF MATERIALS

A. The contractor shall modify, remove, and/or relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain the property of the Owner, and shall be delivered to such destination as directed by the Owner. Materials and/or items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to good operative condition. The contractor may, at his discretion and upon the approval of the Owner, substitute new materials and/or items of like design and quality in lieu of materials and/or items to be relocated.

B. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The contractor shall clean, repair,

and provide all new materials, fittings, and appurtenances required to complete the relocations and to restore to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.

C. When items scheduled for relocation are found to be in damaged condition before work has been started on dismantling, the contractor shall call the attention of the Owner to such items and receive further instructions before removal. Items damaged in repositioning operations are the contractor's responsibility and shall be repaired or replaced by the contractor as approved by the Owner, at no additional cost to the Owner.

D. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied-off or disconnected in a safe manner acceptable to the Owner. All disconnections or connections into the existing facilities shall be done in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted without prior specific approval of the Owner as hereinbefore specified.

END OF SECTION

SECTION 26 05 19
WIRE, CABLE AND RELATED MATERIALS

PART 1 - GENERAL

1.01 SCOPE

A. Provide 600 volt building wire, cable and connectors and 300 volt wire, cable and connectors.

B. WORK INCLUDED: Include the following Work in addition to items normally part of this Section.

1. Wiring for lighting and power.
2. Automatic Control Wiring.
3. Connection of equipment shown.
4. Fire Alarm System.

C. WORK SPECIFIED ELSEWHERE:

1. Heating, ventilating, and air conditioning equipment.
2. Structured cabling system.
3. Coaxial cables

1.02 STANDARDS

A. UL83

B. ASTM B-3

C. All wire cable and connectors shall be UL approved.

1.03 ACCEPTABLE MANUFACTURERS

A. 300 VOLT WIRE AND CABLE

1. Westpenn
2. Beldon
3. Alpha
4. Tappan - Southwire

B. FLEXIBLE CABLE SYSTEMS

1. AFC Modular Cable Systems

C. CONNECTORS

1. Ilsco
2. Cooper
3. AMP - TYCO
4. Burndy
5. Ideal
6. 3M
7. O.Z. Gedney
8. Thomas & Betts
9. Buchanan

1.04 SUBMITTALS

A. Shop drawings shall include, but not limited to:

1. Cutsheets of wire, cable and connectors to indicate the performance, fabrication procedures, product variations, and accessories.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electrical Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 WIRING

A. All wire shall be new and continuous without weld, splice, or joints throughout its length. It must be uniform in cross-section, free from flaws, scales and other imperfections.

B. WIRE MATERIAL: Conductors shall be soft drawn, annealed copper. Aluminum wiring is not acceptable unless otherwise noted on drawings.

C. TYPES:

1. Provide type “THHN/THWN-2” insulation for all buried feeders and service entrance conductors.
2. Provide type “THHN/THWN-2” insulation for all branch circuits and above grade feeders.
3. All wire No. 8 and larger shall be stranded. All wire No. 10 and smaller shall be stranded or solid.
4. Provide type "XHHW" or other 90 degrees insulation wiring for branch circuit wiring installed through continuous rows of fluorescent fixture bodies.
5. All 300-volt cable including but not limited to telephone, fire alarm, data, CATV and security shall be UL listed for use in return air plenums.

D. CONDUCTOR SIZES

1. Feeder conductors shall be sized for a maximum of 2% drop in rated voltage at scheduled load.
2. Branch circuit conductors shall be sized for a maximum 3% drop in the rated voltage to the longest outlet on the circuit.
3. Minimum wire shall be No. 12, unless otherwise shown on Drawings or required by Code.

E. COLOR CODING: No. 6 or larger shall use tape for color coding. No. 8 and smaller wire shall be color coded in accordance with the governing authority requirements or as follows:

120/208 VOLT	277/480 VOLT	120/240 VOLT
NEUTRAL: White	Neutral: Gray	Neutral: White
PHASE A: Black	Phase A: Brown	Phase A: Black
PHASE B: Red	Phase B: Purple	Phase B: Orange
PHASE C: Blue	Phase C: Yellow	Phase C: Blue
GROUND: Green	Ground: Green	Ground: Green

2.02 GROUNDING

Permanently connect all conduit work, motors, starters, and other electrical equipment to grounding system in accordance with the National Electrical Code.

PART 3 - EXECUTION

3.01 WIRE

A. Do not pull wire into conduit until Work of an injurious nature is completed. Where two or more circuits run to a single outlet box, each circuit shall be properly tagged. Wyreze or approved equal may be used as a lubricant where necessary.

B. Splices shall be fully made up in outlet boxes with compression crimp-on type splice connectors.

C. Joints and splices will not be permitted in service entrance or in feeders. Joints in branch circuits will be permitted where branch circuits divide, and then shall consist of one through-circuit to which the branch shall be spliced. Joints shall not be left for the fixture hanger to make. Connect joints and splices with Buchanan Series "2000" solderless connectors complete with insulating caps or properly sized twist on wire nuts. **“Wago” push-in connectors are not acceptable.**

D. All stranded conductors shall be furnished with lugs or connectors.

E. Connectors furnished with circuit breakers or switches shall be suitable for copper wire termination.

F. “Sta-Cons” shall be used to terminate stranded conductors on all switches and receptacles.

G. All stranded #10 and small conductors shall be terminated with an approved solderless terminal if the device or light fixture does not have provisions for clamp type securing of the conductor.

H. The jacket for all travelers used on 3-way and 4-way switches shall be pink.

3.02 BALANCING SYSTEM

The load on each distribution and lighting panel shall be balanced to within 10% by proper arrangement of branch circuits on the different phase legs. Provide written documentation showing results. Submit with O & M manuals.

3.03 LOW VOLTAGE WIRING

A. Low voltage wiring shall be plenum rated. All wiring in mechanical rooms, electrical rooms, drywall ceiling, inaccessible areas, underground, plaster ceiling, inside concealed walls areas exposed to occupant view, and other areas subject to physical damage shall be run in conduit.

B. Low voltage wiring shall be routed in separate raceways from power wiring systems.

C. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of wiring. Sleeves should be set in place a sufficient time

ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel.

3.04 CABLE SUPPORTS

A. Provide cable supports in all vertical raceways in accordance with Article 300-19 of the NEC.

3.05 DEFECTS

A. Defects shall include, but are not to limited to, the following:

1. Tripping circuit breakers under normal operation.
2. Improperly connected equipment.
3. Damaged, torn, or skinned insulation.

END OF SECTION

SECTION 26 05 26
GROUNDING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.02 SCOPE

A. WORK COMBINED WITH OTHER SECTIONS: Combine the work specified herein with the following Sections to form a single responsibility for the Work:

1. Electrical.
2. Basic materials and methods.

B. Provide electrical service, equipment and wiring device grounding as shown, scheduled and as specified.

C. The types of grounding include, but not limited to, the grounding bonding of all equipment devices, building steel piping, and as required by the National Electrical Code, Local Inspection Department and Power Company.

1.03 STANDARDS

A. NATIONAL ELECTRICAL CODE (NFPA-70)

B. Local municipal and State codes that have jurisdiction.

C. NECA

1.04 ACCEPTABLE MANUFACTURES

A. Provide grounding products manufactured by Copperweld and Cadweld.

1.05 SUBMITTALS

A. Shop drawings shall include, but not limited to the following:

1. Cut sheets of ground rods, clamps and connectors.
2. Grounding system diagram.

PART 2 - PRODUCTS

A. GENERAL: Provide all materials required to construct a complete grounded electrical system.

B. GROUND RODS: Ground rods shall be 3/4" inch diameter by 10 feet long construction with copper jacket and a steel core.

C. CLAMPS: Ground clamps shall be copper except for steel or iron pipes in which the clamps shall be galvanized iron.

D. CONDUCTORS: Conductors shall be connected by means of an approved pressure

connector or clamp.

PART 3 - EXECUTION

3.01 INSTALLATION

A. GENERAL: Install grounding system as shown and specified to ensure a properly grounded system.

B. GROUNDING SEPARATELY DERIVED ALTERNATING CURRENT SYSTEM

1. STANDBY EMERGENCY GENERATOR: The generator neutral shall be bonded to the generator when a 4 pole switched neutral automatic transfer switch is specified.

C. GROUNDING CONDUCTOR: A grounding conductor and metallic conduit system shall bond all equipment served by the electrical system. Provide a flexible bonding jumper for isolated metallic piping and ductwork and around expansion fittings and joints.

D. CONDUIT GROUNDING BUSHING:

Conduit terminating in equipment that has a ground bus such as panelboards, etc., shall have grounding bushings installed. Ground each conduit by means of a grounding bushing and to the ground bus in the equipment.

E. MOTORS: The frame of all motors shall be grounded.

F. SPECIAL GROUNDING: Provide a #6 AWG copper grounding conductor for each telephone board, television system, etc. Terminate the grounding conductor on ground bus and to the building electrical grounding system. Refer to 800-40(d) and 820-40(d) of the NEC.

G. LIGHTING FIXTURES: Flexible fixture whips containing a green grounding conductor shall be used to connect light fixtures. Flexible fixture whips shall not exceed ten feet.

H. RECEPTACLES: All receptacles shall be grounded using the branch circuit grounding conductor. Receptacles shall use an approved grounding yoke.

END OF SECTION

SECTION 26 05 33
RACEWAYS

PART 1 - GENERAL

1.01 SCOPE

A. Provide electrical raceways and fittings as shown, scheduled and specified.

B. The types of raceways and fittings required are as follows:

1. Rigid hot-dipped galvanized steel conduit (RGS)
2. Intermediate hot-dipped galvanized steel conduit (IMC)
3. Electrical metallic tubing (EMT)
4. PVC
5. Flexible metal conduit
6. Liquid-tight flexible metal conduit (non-metallic is not acceptable)
7. PVC coated rigid galvanized steel conduit
8. Aluminum Rigid Conduit (ARC)

1.02 STANDARDS

A. ANSI, C80.1 & C80.3

B. NEMA FB-1

C. NEMA TC3

D. UL, 6, 797 & 1242

1.03 ACCEPTABLE MANUFACTURERS

A. Raceways

1. Allied
2. Triangle
3. Republic
3. Carlon
4. Wheatland Tube
5. Cantex
6. Western Tube
7. Robroy Industries

B. Fittings

1. Appleton
2. Crouse Hinds
3. Steel City
4. O.Z. Gedney
5. Carlon
6. Raco, Inc.

1.04 SUBMITTALS

A. Shop drawing shall include but not be limited to:

1. Cutsheets for raceways and fitting.

1.05 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electrical Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 PROVIDE CONDUIT AS FOLLOWS:

A. Except as noted or otherwise specified, all wiring shall be installed in galvanized rigid steel, rigid aluminum conduit or electrical steel tube (EMT) of the proper size to contain the number of conductors required in accordance with the latest edition of the N.E.C. Where conduit sizes are shown on the drawings, these shall take preference. Contractor shall epoxy coat galvanized rigid steel conduit for use in natatoriums.

B. EMT in sizes up to 4 inches when concealed or not exposed to damage and located indoors only.

C. PVC coated rigid galvanized steel shall be used for all penetrations of slab on grade.

D. Rigid galvanized steel where embedded in concrete or masonry construction, mechanical yard or in exterior/interior applications where subject to damage.

E. Rigid aluminum shall be used in exterior applications. (i.e. roof, top of canopies)

F. Carlon Schedule 40 PVC may be utilized underground, in or below slab where shown on the construction documents.

G. MINIMUM SIZE: 3/4 inch. All homeruns shall be 3/4" minimum.

H. PVC coated rigid galvanized steel conduit shall be coated inside and outside.

I. PVC coated rigid galvanized steel conduit shall be used at cooling towers, corrosive areas and pool pump rooms.

J. Fixture whips: Refer to 26 51 00 for additional information.

K. Flexible metal shall be used for connecting rotating equipment installed in conditioned spaces.

L. Liquidtight Flexible Metal Conduit (Sealtite) shall be used for connecting rotating equipment installed in non-conditioned spaces and outside.

M. Bear the stamped approval of the UL and be approved by the Architect and Engineer.

2.02 Branch circuits run underground shall be run in Carlon Schedule 40 PVC conduit. Install ground wire in accordance with NEC table 250-122.

2.03 FITTINGS

A. Couplings for rigid steel or intermediate conduit shall be hot dipped galvanized steel. Set screw type is not acceptable.

B. Steel or malleable iron fittings shall be used on all other raceway types except for PVC.

C. Couplings for aluminum raceways shall be threaded aluminum.

D. EMT systems shall utilize steel insulated throat, threadless, water tight compression type connectors and threadless steel water tight compression type couplings.

E. Coupling and connectors accessories and fittings for PVC coated rigid galvanized steel shall be PVC coated.

F. Metal Sealtite fittings shall be steel. Plastic is not acceptable.

G. Provide nylon bushing on end of all low voltage cabling system conduits (sleeves, rough-ins, etc.).

PART 3 - EXECUTION

3.01 CONDUIT

A. GENERAL

The Drawings are diagrammatic, and are intended to show the general location of outlets, devices, fixtures, and arrangement and control of circuits. The Contractor shall determine exact locations by actual measurement of the building or by reference to the Architectural Drawings.

B. Of such size, and so installed that conductors may be drawn in without injury or excessive strain.

C. Where entering panels, pull boxes, junction boxes, or outlet boxes, shall be secured in place with lock nuts inside and outside, and insulated bushings inside.

D. Have Red seal type VCC or approved equal cable supports in risers, as required by N.E.C.

E. Have ends reamed after cutting and application of die.

F. Keep conduit corked and dry during construction, and swab out before conductors are pulled.

G. Have bends and offsets made with approved tools. Bends or offsets in which the pipe is crushed or deformed shall not be installed.

H. Where not embedded in concrete or masonry, be firmly secured by approved clamps, half-straps or hangers.

I. Have O.Z. Gedney or approved equal expansion fittings where crossing building expansion joints.

J. EXPANSION JOINTS: Make provision for expansion and shifting of metal or PVC conduits where risers occur from underground.

K. Except in the mechanical equipment rooms, run conduit concealed, and by the shortest practicable route between outlets. Install risers, drops, and offsets necessary to avoid conflict with ductwork, piping, structural members, and similar items.

L. Install exposed conduit in mechanical rooms, and elsewhere as indicated, parallel to horizontal and vertical lines of walls, ceilings, and floors.

M. In general, light fixtures in finished areas having suspended acoustical ceilings shall be connected to outlet boxes of lighting grid by flexible metal conduit; length not to exceed ten feet.

N. Outlet boxes in partitions shall never be set back to back. They shall be offset to prevent undue noise transmission from room to room.

O. Concealed conduit shall run in as direct manner as possible using long bends. Exposed conduit shall be run parallel with or at right angles to the lines of the building; and all bends shall be made with standard conduit elbows or conduit benders. Not more than equivalent of four quarter bends shall be used in any run between terminals and cabinet, of between outlet or junction boxes. Approved condulets shall be used in lieu of conduit elbows where ease of installation and appearance warrants their use and approved by the engineer. Conduit joints shall be made with approved couplings and unions.

P. Conduits shall be continuous from outlet to outlet and from outlets to cabinets, junction or pull boxes and shall be electrically continuous throughout. Terminals of all conduits shall be provided with double lock nuts and bushing or terminated on conduit hubs. Use of running threads is prohibited.

Q. Each entire conduit system shall be installed complete before any conductors are drawn in. Every run of conduit shall be finished before covering up to guard against obstructions and omissions.

R. Sleeves shall be placed in the forms of concrete, masonry and fire rated walls, floor slabs and beams, for the passage of conduits. Sleeves should be set in place a sufficient time ahead of the concrete work so as not to delay the work. Sleeves shall be rigid galvanized steel and set to extend 4” above slab.

S. All pipe penetrations through walls and concrete floors shall be fire rated by applying USG Thermafiber in the space between the concrete and the pipe. The fire rating shall be additionally sealed by using 3M brand model CP 25 or 303 fire barrier caulk and putty. All fire rating material shall be installed in accordance with manufacturer's printed instructions.

T. All conduit shall be cleaned and swabbed to remove all foreign matter and moisture prior to pulling wire and cable. All boxes in which conduits terminate shall be cleaned of all concrete mortar and other foreign matter.

U. Provide #30 nylon pulling line in all conduits in which permanent wiring is not installed.

V. All conduit shall be securely fastened and supported using hot galvanized malleable iron one-hole pipe straps, clamps, hanger or other means approved by the engineer. Supports shall be as required by NEC Table 344-3 (B)(2). Tie wire shall not be used as support or securing means. Support conduit independently of ceiling hanger wire. Use all thread rods to support outlet boxes, junction boxes and conduit.

W. When PVC conduit is routed underground, all stub-up's and 90° elbows shall be PVC coated rigid galvanized steel. Use PVC coated rigid galvanized steel when penetrating concrete on grade.

X. Route all conduit above grade unless otherwise noted on the construction documents.

Y. Contact the Architect and Engineer for an installation review before covering any below grade or above grade conduit.

Z. All new outlets shall be flush mounted. In remodeled areas where wall construction prohibits flush mounting, provide wiremold 2400 series. Verify exact location and routing with architect before installation.

AA. Contractor shall not penetrate water proof barriers without using proper fitting to maintain barriers. This shall include exterior walls and slabs. Coordinate with Architect for proper methods.

3.02 FITTINGS

A. Install approved expansion fitting in all conduit runs in excess of 150 feet or when crossing building expansion joints.

3.03 CONDUIT CORROSION PROTECTION

A. Branch circuit conduits installed in concrete slabs on fill or grade shall be positioned in a manner to ensure complete concrete cover. In no case shall such conduits be exposed below or above the slab surfaces, or penetrate the waterproof membrane.

B. At locations where metallic conduits pass through slabs on grade or transitions below grade, PVC coated rigid galvanized conduit shall be used.

3.04 OUTLET AND JUNCTION BOXES

A. Provide an approved galvanized outlet box with adequate volume for number of conductors installed.

B. Provide standard galvanized switch boxes of the required number of gangs. Switch boxes where conduit is exposed shall be handy boxes or approved equal.

C. Outlet boxes for receptacles shall be similar to Universal 52151 with suitable raised cover. Receptacle boxes where conduit is exposed shall be handy boxes or approved equal.

D. Weatherproof boxes shall be FS or FD. Provide these boxes in all non-conditioned areas, exterior areas and natatoriums.

E. Outdoor boxes shall be NEMA 3R, with conduit connections made by Myers Hubs.

F. See notes and details on Drawings for special box requirements.

G. Provide junction boxes required to facilitate installation of the various conduit systems. Provide support boxes required for risers, each complete with approved cable supports as described elsewhere in this Division.

H. Outlet boxes for drywall shall be standard galvanized 4" square boxes with the appropriate device cover.

I. Provide floor outlet fittings for telephone to match fittings for duplex floor receptacles.

J. Provide 3-1/2” deep gangable masonry boxes in all masonry wall (CMU). Steel City GW-135-G or approved equal.

K. Provide shallow 4”x4” boxes in all demountable partitions.

L. Metallic boxes located in fire rated walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between metallic boxes may be reduced when “ Wall Opening Protective Materials” (CLIV) are installed according to the requirements of their Classification. Metallic boxes shall not be installed on opposite side of walls or partitions of staggered stud construction unless “Wall Opening Protective Materials” are installed with the metallic boxes in accordance with Classification requirements for the protective materials.

M. Junction, pull boxes, condulets, gutters, disconnects, contactors, etc., above 2-foot x 2-foot grid ceilings shall be mounted within 18-inches of ceiling grid. Above 2-foot x 4 – foot grid ceiling they shall be mounted within 30-inches of ceiling grid. All junction box, pull box, gutter openings shall be side or bottom accessible.

3.05 THRU-WALL SEALS

A. Provide O.Z. Gedney “Thru-wall” seals for all conduits passing through concrete structure below grade, above grade, and floor penetrations below grade. These prevent moisture from entering the building.

B. Straight sleeves are not acceptable.

3.06 PULL BOXES

A. Pull boxes shall be provided for conduit systems as required and shall be constructed of galvanized steel of not less than gauge and size specified by National Electrical Code.

B. Where two or more feeders pass through a common pull box, they shall be tagged to indicate clearly their electrical characteristics, circuit number, and panel designation.

3.07 WIREWAYS

A. Wireways shall be installed as indicated or required and locations shall be coordinated with architect.

B. Wireways shall be made of not less than 16-gauge sheet steel for 4 inch and 6 inch square sizes and 14 gauge steel for 8 inch and 12 inch square sizes. Couplings end plates, and knockouts shall be furnished as required. Each section of wireways shall be rigidly supported.

C. Wiring in wireways shall be neatly bundled, tied and suitably tagged.

D. The finish shall be ANSI-49 gray epoxy paint applied by a cathodic electrode position paint process over a corrosion resistant phosphate preparation for NEMA 1 wireways. Provide galvanized steel for NEMA 3R wireways. NEMA 3R wireways and auxiliary gutters are for horizontal mounting only.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 – GENERAL

1.1 SCOPE

A. Provide wiring devices as shown; scheduled, required and as specified.

B. The types of wiring devices required include:

1. Receptacles
2. Switches
3. Coverplates

1.2 STANDARDS

A. NEMAWD-1

B. NEMA WD-5

C. UL

D. Federal Spec WC-596-F and WS-896

1.3 ACCEPTABLE MANUFACTURERS

A. Hubbell

B. Leviton

C. Pass & Seymour

1.4 SUBMITTALS

A. Shop drawings shall include but not be limited to:

1. Cut sheets of all devices indicating NEMA configuration, rating, materials, color, and all accessories.
2. Cut sheets of all coverplates indicating materials, color and any engraving specified on drawing or in the specifications.

1.5 REQUIREMENTS OF REGULATORY AGENCIES WORK IN ACCORDANCE WITH:

A. National Electric Code.

B. Local, municipal, or state codes that have jurisdiction.

PART 2 – PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. GENERAL
1. Provide factory assemble wiring devices with the rating type and color as required and specified for the service indicated.
2. Provide matching one-piece multiple gang plates where switches are ganged.

3. Provide wall plates for each receptacle furnished.
4. Architect reserves the right to select wiring device styles and colors to match wall finish.
5. Wall plates shall be of same manufacturer as devices.

2.2 SWITCHES

A. Provide specification grade toggle switches where indicated on the Drawings. Coordinate exact locations and finish with architect.

B. Wall switches shall be 20 amp, 120-277 volt and shall be Hubbell, Leviton or P&S as follows:
1. SINGLE POLE SWITCHES: Leviton 1221-2, Hubbell 1221, P&S PS20AC1
2. DOUBLE POLE SWITCHES: Leviton 1222-2, Hubbell Hubbell 1222, P&S PS20AC2
3. THREE WAY SWITCHES: Leviton 1223-2, Hubbell Hubbell 1223, P&S PS20AC3
4. FOUR WAY SWITCHES: Leviton 1224-2, Hubbell Hubbell 1224, P&S PS20AC4

C. Dimmers: Provide Lutron Nova "T" series or Leviton or as shown on drawings. Wall box dimmers shall be sized to handle the load. Where fluorescent dimming ballasts are to be used, coordinate wall box dimmer with ballast manufacturer.

2.3 RECEPTACLES

A. Provide specification grade receptacles where indicated on the drawings. Provide “Red” receptacles for receptacles on emergency power. Coordinate exact location and finish with architect.

B. Receptacles shall be Hubbell, Leviton or Pass & Seymour as follows:

1. Duplex 20A-125V-self grounding:with Brass mounting yoke (NEMA configuration 5-20R): Hubbell HBL5352, Leviton 5362, P&S 5362A
5. Ground fault circuit interrupter (GFCI) receptacle 20A-125V; (NEMA Configuration 5-20R, shall incorporate features which will lock-out or render the device incapable of being reset if ground fault protection is compromised, with "Feed through" connectors capable of protecting connected downstream receptacles on a single circuit, and of being installed in a 2-3/4" deep outlet box without adapter, Hubbell GF20L, Leviton N7899 or P & S 2095.
Install Hubbell GFTR20, Leviton X7899 or P&S 2095TR Tamper Resistant type for locations requiring Tamper Resistant installations.
Install Hubbell GFTR20, Leviton X7899 or P&S 2095TRWR Weather Resistant type for installations in damp or wet locations.

2.4 PLATES

A. Furnish and install plates on all outlet boxes. Oversize (Jumbo) plates are not acceptable.

B. Plates shall be smooth nylon.
Plates shall be 302/304 smooth stainless steel in kitchen and coffee bar areas.

C. Provide Hubbell WP Series, Bell, Carlon or Leviton NEMA 3R weatherproof coverplates on all exterior wiring devices. Enclosure shall be suitable for wet locations when in use.

D. Plates shall be Hubbell SS Series, Leviton, Pass & Seymour 302/304 smooth stainless steel on all receptacles 30 amps and larger.

E. Stainless steel device plates shall be provided at locations with tile or stone walls.

PART 3 – EXECUTION

3.1 WIRING DEVICE MOUNTING HEIGHTS

A. Unless noted to the contrary on plans, or directed otherwise during the progress of the Work, wiring devices shall be set as follows:

1. Switches 42" above finished floor.
2. Wall mounted receptacles shall be installed vertically at 15 inches to the bottom outlet above finished floor unless otherwise noted or as required by local codes.
3. Wall telephone outlets shall be mounted 15 inches to the bottom above finished floor unless otherwise noted. Mount even with wall mounted receptacles.
4. At locations above counters, set devices at 6 inches above to the centerline counter tops, verify exact mounting height with the architect.

3.2 INSTALLATION (Refer to 26 05 33 for outlet box specifications).

A. Wall switches shall be set in a suitable steel box and shall be installed on the strike side of the door as finally hung, whether so indicated on the Drawings or not.

B. Receptacles shall be installed in a suitable steel box.

C. The Architect reserves the right to relocate wiring device up to a distance of 5 feet from the location shown, before rough-in, without additional cost.

D. Provide multi-gang device covers at locations where devices gang together.

E. Device locations are indicated schematically on the drawings along with the type and mounting height. Final locations and mounting heights shall be coordinated with the Architect on the jobsite, and with shop drawings of equipment; including equipment to be furnished and installed by the Owner. Devices installed in walls covered with vinyl, fabric wallpaper or other special finishes shall be coordinated and verified with the Architect on the job-site.

F. Stranded wire termination to switches, receptacles, devices and miscellaneous control devices shall be with an approved solderless terminal if clamp type securing is not possible (i.e. Sta-Con crimp on fork tongue connectors; Burndy Type TP-F).

END OF SECTION

SECTION 26 28 16
SAFETY AND DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 SCOPE

A. Provide safety and disconnect switches as shown, scheduled and as specified herein.

1.02 STANDARDS

A. Products shall be designed, manufactured, tested and installed in compliance with applicable standards.

1. NEMA KS1 - Enclosed switches
2. Federal specification W-S-865C-Heavy duty switches

B. Products shall conform all applicable UL standards, including UL98 (standard for safety, enclosed and dead front switches) and shall be UL-labeled.

1.03 ACCEPTABLE MANUFACTURERS

A. Provide one of the following manufacturers:

1. General Electric Company
2. Square D Company
3. Siemens
4. Eaton

1.04 SUBMITTALS

A. Shop drawings shall include, but not be limited to:

1. Cutsheets of switches with ratings, physical dimensions and all accessories clearly labeled.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:

1. National Electrical Code.
2. Local, municipal, or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 GENERAL

A. Furnish and install heavy duty type safety switches with the number of switched poles as indicated on the plans and specifications. All safety switches shall be NEMA Heavy Duty Type HD, and Underwriters Laboratories listed.

2.02 MATERIALS AND COMPONENTS

A. Switch Interior

All switches shall have switch blades that are fully visible in the "OFF" position when the

door is open. Switches shall have removable arc suppressor where necessary, to permit easy access to line side lugs. Lugs shall be front removable and UL listed for 60ºC and 75ºC copper or aluminum cables. All switches blades and contacts shall be plated copper. Adjust fuse block to accept Class J fuses.

B. Switch Mechanism

Switches shall have a quick-make and quick-break operating handle and mechanism, which shall be an integral part of the box, not the cover. Padlocking provisions shall be provided for locking in the "OFF" position with at least three padlocks. Switches shall have a dual cover interlock to prevent unauthorized opening of the switch door when the handle is in the "ON" position, and to prevent closing of the switch mechanism with the door open. A means shall be provided to permit authorized personnel to release the interlock for inspection purposes. Handle position shall indicate if switch is "ON" or "OFF".

C. Neutral

Provide a solid neutral with the safety switch where a neutral is present in the circuit.

D. Ratings

Switches shall be horsepower rated for ac and/or dc as indicated by the plans. The fused switches shall have Class R rejection fuse clips or adjusted for Class J fuses. UL listed short circuit ratings of the switches, when equipped with Class R fuses, shall be 200,000 symmetrical amperes.

E. Enclosures

1. Indoor switches shall be furnished in NEMA 1 enclosures.
2. Outdoor switches, switches located in wet areas or sprinkled areas shall be furnished in NEMA 3R enclosures.
3. Switches installed in kitchens shall be stainless steel.

PART 3 - EXECUTION

3.01 GENERAL

A. Install safety and disconnect switches, including electrical connections, and fuses in accordance with manufacturer’s written instructions, NEC and recognized industry practices.

B. Location: Install switches within sight of controllers.

C. Hubs: Provide bolt-on hubs for rainproof or wet area applications.

3.02 IDENTIFICATION

A. Nameplate: Each disconnect switch shall have an engraved bakelite nameplate. Nameplates shall be white with black letters and show equipment served. Nameplates shall be attached with stainless steel screws.

END OF SECTION

SECTION 26 29 26
MISCELLANEOUS ELECTRICAL CONTROLS AND WIRING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

1.02 SCOPE

A. Provide the various miscellaneous control devices, wiring and additional branch circuits as required, shown and specified.

B. The types of miscellaneous control devices and wiring include but not limited to the following.

1. Additional control wiring and safety devices as shown and specified.
2. Connect power from fire alarm relays to starters to shut down air handling units.

C. WORK SPECIFIED ELSEWHERE:

1. Various control devices, of an electrical nature, for the safe operation and temperature control of the heating, ventilating, air conditioning and plumbing systems provided under Division 23.
2. All control wiring and conduit shall be furnished under Division 23. All power wiring 120 volt or larger shall be provided by Division 26.
3. Refer to building controls specification, Division 23 for scope of work required to be performed by Division 26 (electrical contractor).

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:

1. National Electrical Code.
2. Local municipal or state codes that have jurisdiction.

PART 2 - PRODUCTS

2.01 MATERIAL

A. GENERAL: This Section shall outline the basic installation of electric devices, conduit, boxes, fittings, and wiring required for complete interconnection of several systems, this may not reflect every required appurtenance. It does not cover integral parts of mechanical equipment.

B. Control wiring shall be not less than #14 AWG type TW, and shall be color coded and labeled with Brady markers throughout. Bundle multiple conductors with Ty-Raps.

PART 3 - EXECUTION

3.01 Install miscellaneous electrical controls and wiring to provide a functioning system.

3.02 DIVISION 22, 23, 27 AND 28 MISCELLANEOUS POWER AND CONTROLS

A. Install electrical devices not an integral part of system equipment providing conduit, boxes, fittings, wiring, circuit breakers, disconnecting means and other devices.

B. Contractor is responsible for providing all line voltage power to devices that require electrical power to operate. Contractor shall terminate line voltage power to termination points. Contractor shall coordinate between all trades to determine sizing and quantities of line voltage circuits to adequately power and control devices. Provide circuits from nearest low voltage panel using spare circuits provided, if device requires power not already available or indicated.

C. Provide GFCI receptacle with weather proof cover within 25 feet of all heating, air conditioning and refrigeration equipment.

3.03 Install contactor and relays in electrical/mechanical rooms unless otherwise noted.

3.04 Install photocells on the roof unless otherwise directed by the architect. Coordinate any roof penetrations with all other trades and shield from other light sources.

3.05 Provide miscellaneous connections for signs and other furnished equipment as shown on the Drawings.

END OF SECTION

SECTION 26 32 13 16
DIESEL ENGINE DRIVEN STANDBY GENERATOR

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The requirements of the General Conditions and Supplementary Conditions apply to all work herein.

B. SCOPE

1. Provide a standby electric generating system manufactured by Onan DQFAA series electric set rated for continuous standby service at 35 kW, 44 kVA at 0.8 power factor, 3-phase, 120/208 VAC, 60 cycle. The system shall be a package of new and current equipment consisting of:
   a. A diesel engine driven electric set installed indoors to provide emergency electric power.
   b. Automatic transfer switch(es) to provide automatic starting and stopping of the plant and switching of the load for separate transfer switch section.
   c. Mounted accessories as specified.
   d. Control wiring.
   e. Alternator oversized as shown.

1.02 PERMITS, TEST INSPECTIONS

A. This system shall be completely built, tested and shipped by a manufacturer who has been regularly engaged in the production of such equipment for the past ten years and who has parts and service facilities locally available so there is one source of supply and responsibility. The performance of the electric plant shall be certified by an independent testing laboratory as to the plant's full power rating and voltage and frequency regulation. The complete system shall bear a seal showing that it is prototype test supported.

1.03 REQUIREMENTS

A. Level 1 applications are legally-required emergency systems.

B. The electric generating system must meet all requirements of NFPA 110 (latest edition) including design specification, prototype tests, one-step full-load pickup, and installation acceptance. Engine-generator system to provide source of power for Level 1.

1.04 STANDARDS

A. Equipment shall meet the latest versions of the following codes:

1. N.E.C.
2. NFPA 101, 110, 37, 99, 30
3. IEEE - 446, 587
4. NEMA - MG1, ICS
5. ANSI
6. UL – 1008
7. MIL-STD 461 C – Part 9, IEC 801.2, IEC 801.3, IEC 801.5, IEC 1000-4-2,3,6 – RFI and EMI Performance.
8. UL 2200

1.05 SUBMITTALS

A. Shop drawings shall include but not be limited to:

1. Catalog cut sheets with all equipment, fuel tank, accessories and devices including all ratings.
2. Interconnection wiring diagrams.
3. Complete bill of materials.
4. Certified performance tests.

B. Operation and Maintenance Data

1. Submit under provisions of Division One.
2. Furnish three copies of the manuals and books listed below in substantial three-ring binders for each unit:
   a. Operating Instructions: Describe and illustrate all switchgear controls and indicators and engine and general controls. Include instructions for operating transfer switch equipment under normal and emergency conditions when engine generator is running.
   b. Parts Books: Illustrate and list all assemblies, subassemblies and components, except standard fastening hardware (nuts, bolts, washers, etc.).
   c. Preventative Maintenance Instructions: Describe the daily, weekly, monthly biannual and annual maintenance requirements and include a complete lubrication chart.
   d. Routine Test Procedures: Describe procedure for engine, radiator, all electronic and electrical circuits, and the generator.
   e. Troubleshooting Chart: Describe and list all troubles, probable causes, and suggested remedies.
   f. Recommended Spare Parts List: List all consumables anticipated to be required during routing maintenance and testing. List special tools, maintenance materials and replacement parts.
   g. Wiring Diagrams and Schematics: Show function of all electrical components.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division One.

B. Accept unit(s) on site on skids. Inspect for damage.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic.

1.07 ACCEPTABLE MANUFACTURERS

A. Provide products complying with these specifications and produced by one of the following:

1. Engine sets
   a. Caterpillar
   b. Cummins
   c. Detroit Diesel Allison
2. Generators
   a. IEC – Baylor
   b. Kato
   c. Marathon
   d. Cummins Power Generation/Onan

3. Automatic Transfer Switches
   a. ASCO
   b. Kohler
   c. Cummins Power Generation/Onan
   d. GE/Zenith

1.08 ACCEPTABLE SUPPLIERS

A. All equipment provided shall be supplied by an authorized distributor of the manufacturer who has been continuously engaged in the distribution of industrial grade Power System products for a minimum of 15 years. The supplier shall provide initial start-up services, conduct field acceptance testing, and warranty service. The supplier be authorized to perform warranty service on all products provided.

B. Within 50 mile of the job site, the supplier shall maintain; a minimum of 6 factory trained and qualified field technicians; a proper supply of spare parts for the supplied equipment; a shop with overhaul capabilities; and be able to provide 24 hour, 7 day per week, 365 day per year field service capability.

PART 2 - PRODUCTS

2.01 ENGINE

A. The engine shall be radiator cooled, diesel fueled, 4 cycle, 12 cylinder. It shall have a total piston displacement of not less than 1860 cubic inches and develop not less than 1490 brake horsepower at its operating speed. A radiator air discharge duct flange shall be provided for a connecting duct to allow all heated air and gases to be discharged out of the building or enclosure through one opening. The radiator cooling system shall be rated at 40 degrees C. ambient against an external restriction of 0.5 inch water column. Engine cooling air requirements shall not exceed 34,000 CFM.

B. The engine shall be of 1-piece cast alloy iron construction with cast alloy iron heads. Valves shall be overhead and free to rotate. Valves shall be hard chrome-cobalt alloy faced with replaceable valve seat inserts of solid chrome-cobalt alloy. The crankshaft shall be forged steel. main bearings between all cylinders. The connecting rods shall be forged steel with connecting rod bearings. Fuel injection system with automatic fuel shut-off, automatic positive head maintained on injectors, and a reusable air element air cleaner; mechanical fuel transfer pump with filters. Provide full-flow, replaceable, oil filter with bypass; oil pressure gauge shall be included.

C. Provide a 5000 watt, 208 VAC thermostatically controlled water jacket heater system. Contractor shall install normal power to the heater.

D. Provide the following safety shutdown fault devices:

1. Low oil pressure
2. Over-speed
3. Over-crank
4. High temperature (with low water level)

E. Provide the following alarms:

1. Low engine temperature (indicating jacket heater malfunction)
2. Marginally high engine temperature
3. Marginally low oil pressure
4. Low fuel

5. Flashing for control switch in "Stop" position.

F. The engine shall be equipped with adjustable electronic governor isochronous (speed regulation 0.25 percent, no load to full load) with controls.

G. Generator main circuit breaker: set-mounted and wired, UL listed, molded case type with electronic trip unit, rated at 100 amps frame with 100 amp trip, 3 pole, 240volts. Submittals shall demonstrate that the circuit breaker provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator overcurrent protection. (Lugs on breaker shall match “ATS” lugs.)

H. Provide 24 volt electrical system and starting shall be a 24 volt electric starter.

2.02 ALTERNATOR

A. Rating 35 kW, 43 kVA, at 0.8 power factor, 208Y/120, 60 Hz at 1800 rpm and 125 degree C Temperature Rise above 40 degree C Ambient.

B. The alternator shall be a single bearing revolving field type, 2/3 pitch, 4-pole and shall be completely brush less. No commutator or commutator brushes shall be allowed. The main alternator and exciter shall be vacuum impregnated. The alternator shall be directly connected to the engine through a rigid coupling to insure permanent alignment. Voltage regulation shall be within plus or minus 1% of rated voltage, from no load to full load. Voltage recovery to rated voltage after acceptance of 100% of rated load in one step shall occur within 10 seconds. Provide a permanent magnet generator (PMG) excitation system. Motor starting capability shall be a minimum of 45 kVA. The generator set shall be capable of sustaining a minimum of 90% of rated no load voltage with the specified kVA load at near zero power factor applied to the generator set. The instantaneous voltage dip shall be less than 10% of rated voltage when full load and rated power factor is applied to the alternator. Stable or study-state operation is defined as operation with terminal voltage remaining constant within plus or minus 1% of rated voltage. Temperature rise shall be within rating as defined by NEMA MG1-22.40. Radio interference reduction shall exceed requirements for general civilian or commercial applications with TIF less than 50 and waveform deviation less than 0.06 line to line.

C. Provide a 120 volt anti-condensation heater minimum (100 watts) to prevent condensation during non-operating periods. Heater shall be thermostatically controlled, or rated for continuous use for the frame. Provide normal power to the heater.

D. Overload Rating: Capable of withstanding a three phase load of 300% rated current for 10 seconds, 150% of rated current for 2 minutes and 110% rated current for 60 minutes with field set for normal rated load excitation, and capable of withstanding an overspeed of 125%.

E. Performance Criteria:

1. Waveform Deviation: Less than 5%.
2. Crest Factor: 1.41 +/- 0.07.
3. Form Factor: 1.11 +/-0.05.
4. Total Harmonic Distortion: 5%.
5. Single Harmonic Distortion: 3%.
6. Telephone Interference Factor: 50% maximum.
7. Dynamic Balance: Less than 1 mil displacement peak to peak.

F. Enclosure: NEMA MG1, open drip proof.

G. Neutral Ground: As shown on drawings.

2.03 CONTROLS AND INSTRUMENTS

A. Provide comprehensive monitoring and control system integral to the Generator Set control to guard the electrical integrity of the alternator and power system. Provide single and 3-phase fault current regulation, so that downstream protective devices have the maximum current available to quickly clear fault conditions, without subjecting the alternator to potentially catastrophic failure conditions. Include provisions to either prevent over voltage due to single phase faults, or to shut down the generator set if line to neutral voltage on any phase exceeds 115% for more than 0.5 seconds. Acceptable methods are a fully rated (100%) 600 volt Circuit Breaker, mounted in the generator enclosure, GE Programmable VersaTrip of size as indicated on drawings with handheld programmer or inherent protection provided by microprocessor-based GenSet AmpSentry protection. Submittals shall demonstrate that the protective device provides proper protection for the alternator by a comparison of the trip characteristic of the breaker with the thermal damage characteristic of the alternator. Field circuit breakers shall not be acceptable for generator overcurrent protection.

B. An instrument panel mounted on top of the alternator shall contain the following:

1. Run-stop-remote switch
2. Lighted charge rate ammeter
3. Lighted oil pressure gauge
4. Lighted coolant temperature gauge
5. Remote start-stop terminals
6. Running time meter
7. Full A.C. instrument panel (A.C. ammeter, A.C. voltage, phase selector switch, frequency meter, and voltage adjusting rheostat.) All parameters shall have a readout that is not less than 2.5% accuracy.
8. Red alarm lights shall be provided for each fault and alarm condition.
9. Two sets of spare terminals shall be provided for customer selected faults.
10. An Emergency Shutdown contact shall be provided through which customer's push button or other momentary-closing switch contacts shall shutdown the generator set engine.
11. A fault reset switch contacts shall shutdown the generator set engine.
12. A fault reset switch shall be provided to clear fault indications and allow restarting of the engine after shutdown faults.
13. The control design shall be such that the fault indication shall remain until reset. The fault indicator memory shall not be dependent on the presence of either A-C or D-C voltage and shall retain the fault status memory even through complete removal and replacement of the starting batteries.
14. A battery warning that included load testing the battery on each crank shall be provided.
15. The fault reset function shall operate only when the RUN-STOP-REMOTE switch is in the STOP position.
16. All devices for interconnection and compatibility with digital accuracy and response shall be provided. Digital panels shall comply with electromagnetic interference requirements of Minimum Standard 461C – Part 9, and IEC Standard 801.2, 801.3 and 801.4.indication of voltage level
17. Include a full wave rectified automatic digital voltage regulation system matched and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase RMS

sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate, and be capable of being curve-matched to the engine torque curve with adjustments in the field.

18. The automatic voltage regulator shall be temperature compensated, solid-state design and include overvoltage and overexcitation protection functions. The voltage regulator shall be equipped with three phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. Overvoltage protection shall sense the AC generator output voltage and in the event of regulator failure or loss of reference, shut down regulator output on a sustained overvoltage of one (1) second duration. Overexcitation protection shall sense regulator output and shutdown regulator output if overloads exceed ten (10) seconds in duration. Both overvoltage and overexcitation protection shutdowns shall be latched, requiring the AC generator to be stopped for reset.
19. The regulator shall include an under frequency rolloff torque-matching characteristics, which shall reduce output voltage in proportion to frequency below a threshold of 58-59 Hz). The torque-matching characteristic shall include differential rate of frequency change compensation to use maximum available engine torque and provide optimal transient load response. Regulators which use a fixed volts per hertz characteristic are not acceptable.
20. An electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions.
21. All analog and digital metering shall be true-RMS indicating, and shall not be disrupted by non-linear load generated waveform distortion.
22. Digital metering set shall indicate generator RMS voltage and current, frequency, output current, output kW, kW-hours, and power factor. Generator output voltage shall be available in line-to-line neutral voltages, and shall display all three phase voltages (line to neutral or line-to-line) simultaneously.
23. An under frequency sensing and protection system shall be provided which causes a shutdown of the generator set if true RMS frequency falls below 90% of rated for more than 20 seconds.
24. The control system provided shall withstand the surge voltage produced by a 70A DC battery charging alternator operating at full load when the battery bank is disconnected. The test shall be successfully completed without tripping protective circuit breakers or blowing fuse protective devices.
25. All switches, lamps and meters shall be oil-tight and dust-tight and the enclosure door shall be gasketed.
26. All switches shall be provided with fully illuminated back-lit labels and all metering shall be individually lighted to allow for easy reading of functions in a completely dark room.
27. The field connections shall be made on permanently labeled terminal blocks, which are designed and tested by the manufacturer of the generator set to be suitable for use without wire termination lugs. Provisions shall be made for future addition of DIN-rail mounted components.
28. Control panel and interconnection enclosures shall be UL508 listed as a unit assembly.
29. Communications:
    a. Alarm Relay Mode: Provide Form C alarm contacts that can be individually linked to alarm or status outputs from the generator set to external devices.

b. Software: Provide software designed to operate on an IBM-compatible PC. Monitor and control the on-site power system either locally or from a remote location through a modem and dedicated telephone line or other communications link.

30. Interface to Site Monitoring System: Provide necessary electronic components and wiring to interface with and communicate the analog and digital status information to an owner provided 1 site monitoring system. Include in this contract all work required for translation of proprietary protocol required to achieve this interface, and all licensing or other fees associated with this interface.

2.04 ELECTRIC PLANT MOUNTING

The plant shall be provided with shock or anti-vibration mounts with the plant. Provide Korfund LKD spring-type isolators or type EU pads. Vibration isolation may be integrally a part of the generator set to skid packaged from the set manufacturer. The plants integral base shall have forklift sockets. Battery rack shall be integral part of plant base.

2.05 ACCESSORIES

A. All accessories needed for the proper operation of each plant shall be furnished. These shall include but not limited to the following:

1. Critical rated side inlet silencers with installation attachments for mounting within the set housing, flexible exhaust connection. Mount silencer on top of set housing.
2. Belt driven battery charging alternator.
3. Lead acid starting batteries
4. Battery cables.
5. Fully automatic 10 amp battery charger 120 volt, 325 watts (Onan Series 305-0813-01). Include in automatic transfer switch.
6. Fuel/water separator.
7. Separate aboveground skid mounted double wall fuel storage tank with 500 gallons capacity. Tank shall have 7 gauge steel walls. The tank shall include the following features:
   a. Low level switch
   b. Low level fuel alarm
   c. Leak detection alarm
   d. Vent, drain
   e. Fuel gauge.
   f. High level switch.
   g. The tank shall be constructed of corrosion resistant steel and shall be UL listed. The equipment, as installed, shall meet all local and regional requirements for above ground tanks.
8. Flexible fuel lines for return and supply of fuel to the engine from the tank, and detailed operation and maintenance manuals with parts list.
9. An oil drain valve with hose extension shall be provided for draining oil at the side of the plant.
10. Detailed operation and maintenance manuals with parts list.

2.06 REMOTE ALARM ANNUNCIATOR

Onan no. 541-0814-02 shall be provided for flush mounting at inside locations remote from the generator set located by the fire alarm control panel.

2.07 AUTOMATIC TRANSFER SWITCH

A. Scope

1. Furnish and install open transition automatic transfer switches (ATS) 4 poles, amperage, voltage and withstand current ratings as shown on the plans. Each automatic transfer shall consist of an inherently double throw power transfer switch unit and a control module interconnected to provide complete automatic operation.

B. Codes and Standards

1. UL 1008 - Standard for Automatic Transfer Switches
2. NFPA 70 - National Electrical Code
3. NFPA 99 - Essential Electrical Systems for Health Care Facilities
4. NFPA 110 - Emergency and Standby Power Systems

C. Acceptable Manufacturers

1. ASCO
2. Kohler
3. GE/Zenith
4. Cummins Power Generation/Onan

D. Mechanically Held Transfer Switch

1. The transfer switch unit shall be electrically operated and mechanically held. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.
2. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction and be protected by separate arcing contacts.
3. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes.
4. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof are not acceptable.

E. Microprocessor Control Panel

1. The control panel shall direct the operation of the transfer switch. The panel's sensing and logic shall be controlled by a built-in microprocessor.

F. Enclosure

1. The ATS shall be furnished in a NEMA type 3R enclosure.

G. Voltage and Frequency Sensing

1. The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85% to 100% of nominal and dropout adjustable from 75% to 98% of pickup setting.
2. Single-phase voltage sensing of the emergency source shall be provided, with pickup voltage adjustable from 85% to 100% of nominal and independent frequency sensing with pickup adjustable from 90% to 100% of nominal.

H. Time Delays

1. A time delay shall be provided to override momentary normal source outages and delay all transfer and engine starting signals. Adjustable from 0 to 6 seconds.
2. A time delay shall be provided on transfer to emergency, adjustable from 0 to 5 minutes for controlled timing of transfer of loads to emergency.
3. A time delay shall be provided on retransfer to normal, adjustable from 0 to 30 minutes. Time delay shall be automatically bypassed if emergency source fails and normal source is acceptable.
4. A time delay shall be provided on shutdown of engine generator for cool down, adjustable from 0 to 60 minutes.

I. Additional Features

1. A set of DPDT gold-flashed contacts rated 10 amps, 32 VDC shall be provided for a low-voltage engine start signal.
2. A momentary-type test switch shall be provided to simulate a normal source failure.
3. One set of auxiliary contacts, rated 10 amps, 250 VAC shall be provided.
4. Position indicating lights shall be provided.
5. An inphase monitor or delayed transition shall be provided for motor load applications.

J. Withstand and Closing Ratings

1. The ATS shall be UL listed in accordance with UL 1008 and be labeled in accordance with that standard's 3 cycle, long-time ratings. ATS's that are not tested and labeled with 3 cycle (any breaker) ratings and have series, or specific breaker ratings only, are not acceptable unless the switch performance is guaranteed and UL listed for molded case circuit breakers or current limiting fuses. If current limiting fuses are utilized, provide current limiting fuses and disconnect switch mounted in or on Automatic Transfer Switch.

K. The ATS manufacturer shall maintain a national service organization of company-employed personnel located throughout the contiguous United States. The service center's personnel must be factory trained and must be on call 24 hours a day, 365 days a year.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install generator on a 6 inch high reinforced concrete housekeeping pad. Provide blackouts as required.

B. Provide all power wiring, control wiring, additional contacts and relays required for a complete installation. All conduit shall be in a two hour enclosure. Underground conduits shall be concrete encased. The wall mounted dual rate battery shall be taken off line during the starting of the generator. The generator belt driven alternator shall charge the batteries when the generator is running.

C. Install generator set and transfer switches in accordance with manufacturer's instructions.

D. Ground and bond transfer switches under provisions of Division 26.

E. Provide engraved plastic nameplates under the provisions of Section 26 02 00.

3.02 WARRANTY

A. The complete standby electric power system, including engine-generator set equipped with set exerciser, and running time meter, shall be warranted for a period of five years form the date of initial start-up. Multiple warranties for individual components (engine, alternator, controls, etc.) will not be acceptable. Satisfactory warranty documents must be provided. This warranty shall be as detailed in available written documents. In the judgement of the specifying authority, the manufacturer supplying the warranty for the complete system must have necessary financial strength and technical expertise with all components supplied to provide adequate warranty support. All items of the engine, generator, and controls that are warranted in the first year shall be covered for the full five year term of the warranty.

B. Extensions of warranty term up to 10 years from start-up and inclusion of comprehensive terms shall be available for one year after start-up.

3.03 TESTS

A. Factory production model tests: Before shipment of the equipment, the generator sets shall be tested under rated load and power factor for performance and proper functioning of control and interfacing circuits. Testing at unity power factory only (resistance banks only) is not acceptable, since kW output is affected by the higher generator efficiency at unity power factor, and the kVAR for motor starting and regulation loads is not correlatable between unity and rated power factor. Other tests shall include:

1. Single step load pickup per NFPA 110.
2. Transient response and steady state governing.
3. Safety Shutdowns.
4. Prototype tests in accordance with NFPA 110 level 1 have been done on a complete and functional set, component level type tests will not substitute for this requirement.

The engineer shall be notified in advance of these test, and shall have the option of witnessing these tests. Certified copies of test results shall be forwarded to the engineer for review.

B. Field Test After Installation:

1. The complete installation shall be initially started and checked out for operational compliance by factory-trained representative(s) of the engine-generator set and transfer switch manufacturer. The engine lubrication oil and antifreeze, as recommended by the manufacturer for operation under environmental conditions specified shall be provided by the engine-generator set supplier.
2. Upon completion of initial start-up and system checkout, the supplier of the generator set shall perform a field test, with the engineer notified in advance, to demonstrate load carrying capability, stability, voltage, and frequency. The engineer shall be present during the field test.
3. The generator shall be run for four hours continuously with all available facilities emergency load connected to its output; in addition the generator set supplier must provide a portable load bank to supplement any existing load to enable full load testing. Load shall not exceed 50% of generator-set rating for first 1/2 hour, during first initial run for proper engine break-in. Records shall be maintained throughout this period to record water temperature, oil pressure, ambient air temperature, voltage, current, frequency, kilowatts, and power factor. The above

data shall be recorded at 15 minute intervals throughout the test. Generator set manufacturer shall confirm paralleling equipment is complete and performing properly. There shall be a 10 minute unloaded run at the conclusion of the test to allow engine to cool before shutdown. Three copies of the field test data shall be furnished to the engineer. The contractor shall make all necessary hook-ups to accomplish field tests and shall furnish all fuel necessary for field test and start-up. **The fuel oil tank shall be filled up at the completion of all testing and at the end of the project.**

C. Training

1. Provide training designed for a minimum of four persons, to include:
2. Training in the system operation in all possible configurations.
3. Training in the maintenance of the system.
4. Minimum of four hours of instruction, but sufficient to cover all items specified.
5. Four sets of instruction materials.
6. Provide DVD of all owner training and instruction.

END OF SECTION

SECTION 26 51 00
LIGHTING FIXTURES

PART 1 - GENERAL

1.01 SCOPE

A. Furnish and install general and emergency lighting fixtures as noted on the drawings. Fixtures shall be completely wired with lamps installed and shall be in perfect operating condition at the time of substantial completion.

B. The types of lighting fixtures required for this project include:

1. LED

1.02 STANDARDS

A. All fixtures shall conform to all applicable UL standards and shall be UL label including damp and wet location ratings.

B. NFPA 101

C. ANSI C82.1

D. NEMA-LE

E. IEEE Publication 587 Category "A" (Electronic Ballast)

F. All LED drivers shall be UL recognized Class 2 per UL1310 or non-Class 2 per UL 1012 as applicable.

G. All LED drivers shall comply with applicable requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, for Non-Consumer Equipment.

H. All LED drivers shall be RoHS compliant.

I. TM-21

J. LM-80

K. LM-79

L. L70

M. DLC

1.03 ACCEPTABLE MANUFACTURERS

A. Provide lighting fixtures produced by manufacturers as shown and scheduled.

B. LAMPS:
1. Provide one of the following manufacturers
   a. General Electric Company
   b. Osram Sylvania
   c. North American Philips

1.04 SUBMITTALS

A. Shop drawings shall include a brochure with a separate cut sheet for each fixture type arranged in alphabetical order with fixture and all accessories/options clearly labeled. Provide performance data for each fixture. Provide an independent test lab report for each fixture if requested by the Architect/Engineer.

B. Provide data brochures indicating which lamp and ballast (if required) will be used in each fixture type.

1.05 REQUIREMENTS OF REGULATORY AGENCIES

A. WORK IN ACCORDANCE WITH:

1. National Electrical Code.
2. Local, municipal, or state codes that have jurisdiction.
3. UL fire resistance directory.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. General:

Provide the size, type and rating of each light fixture shown and scheduled. All light fixtures shall complete with reflectors, lens, trim rings, flanges, lamps, lamp holders, ballast, starters, fuses, wiring, earthquake clips, etc. to provide a complete functioning light fixture.

B. Lighting Fixture Types:

1. LED Fixtures
   a. Fixtures shall be pre-wired with frame-in kit and integral thermal protection required by UL for recessed fixtures. Driver shall be encased in metal-can construction for optimal thermal performance.
   b. Total fixture lumen output is dependent on the chip, thermal management, driver current and optical system. LED fixtures shall be tested as a complete unit or system. Only DOE recognized CALiPER testing laboratory results shall be utilized.
   c. LED fixtures shall have integral common mode and differential mode surge protection of 3kV(1.2/50µs, 2 ohm combination wave).
2. Exit signs
   a. Exit signs shall meet all federal, state and local codes.
   b. Provide fire alarm interface relay when required to flash exit signs.
   c. Provide battery packs for emergency operation when not connected to emergency generator power.

2.02 DRIVERS - COORDINATE WITH LIGHT FIXTURE SCHEDULE

A. LED

1. Driver manufacturer shall have a 10-year history producing electronic drivers for the North American market.
2. Driver shall carry a five year limited warranty from date of manufacture against

defects in material or workmanship (including replacement) for operation at a maximum case temperature of 80 degrees Celsius.

3. Drivers shall not contain any Polychlorinated Biphenyl (PCB).
4. Provide driver with integral color-coded leads.
5. Driver shall operate from 50/60 Hz input source of 120 Volt through 277 Volt or 347 Volt through 480 Volt with sustained variations of +/- 10% (voltage) with no damage to the driver.
6. Driver output shall be regulated to +/- 5% across published load range. And shall have a power factor greater than .90 for primary application to 50% of full load rating with an input current Total Harmonic Distortion (THD) of less than 20% to 50% of full load rating.
7. Provide drivers with a Class A sound rating.
8. Provide LED drivers for outdoor fixtures with a minimum operating temperature of -40 degrees Celsius (-40 F). Provide LED drivers for indoor fixtures with a minimum operating temperature of -20 degrees Celsius (-2F).
9. Drivers shall tolerate sustained open circuit and short circuit output conditions without fail and auto-resetting without need for external fuses or trip devices.
10. Driver output ripple current shall be less than 15% measured peak-to-average, with ripple frequency being greater than 100Hz.
11. Driver performance requirements shall be met when operated to 50% of full load rating.
12. Driver shall have integral thermal foldback to reduce driver power above rated case temperature to protect the driver if temperatures reach unacceptable levels.
13. Drivers shall comply with NEMA 410 for in-rush current limits.
14. Dimmable drivers shall be controlled by a Class 2 low voltage 0-10VDC controller with dimming range controlled between 1 and 8VDC with source current 150μA.

PART 3 - EXECUTION

3.01 INSTALLATIONS

A. General

1. Install the type of light fixture where shown and indicated in accordance with manufacturer's written instructions.
2. Provide earthquake clips on all recessed lay-in light fixtures as required by building code.
3. Adjust all adjustable light fixtures, as directed by the Architect.
4. Provide safety chains and wire guards for light fixtures located in gymnasium, multi-purpose rooms, play areas, etc.

B. Coordination

1. The contractor shall verify the type of fixtures with the ceiling types as indicated on the drawings. Any discrepancies shall immediately be brought to the architect's attention before the contractor places his order and accepts delivery. Fixtures shall fit exact in the type of ceiling scheduled. Provide plaster frames, trim rings and other accessories required for a correct fit.
2. Provide supports attached to structural member to support fixtures when the ceiling system cannot maintain support.
3. Refer to architectural reflected ceiling plan for the exact location of all light fixtures. Notify the architect for any discrepancies or conflicts with structural, architectural, mechanical piping or ductwork before installation.

C. Mounting

1. Provide support channels to support outlet boxes used support surface mounted light fixtures such as exit signs or downlights.
2. Pendant or surface mounted fixture shall be provided with required mounting devices and accessories, including hickeys and stud-extensions, ball-aligners, canopies and stems. Locations of fixtures in mechanical areas shall be coordinated with mechanical contractor. Mounting stems of pendant fixtures shall be of the correct length to uniformly maintain the fixture heights shown on the drawings or established in the field. The allowable variation tolerance in mounting individual fixtures shall not exceed 1/4 inch and shall not vary more than 1/2 inch from the floor mounting height shown on the Drawings. Fixtures hung in continuous runs shall be installed absolutely level and in line with each other. Hanging devices shall comply with Code requirements. Fixtures shall employ single - not twin - stem hangers unless otherwise noted.
3. All structure mounted fixtures (i.e. bracket mounted, pipe mounted and surface mounted) shall be provided with cables of suitable size and weight to support the weight of the fixture. Cables shall be fastened around or fastened to the housing of the fixture. On pendant fixtures, one safety cable of suitable size and weight to support the weight of the fixture assembly shall connect the top of the pendant to the supporting structure by means of welding or bolting, and one safety cable shall connect the housing of the fixture to the bottom of the pendant. Where more than one pendant per fixture occurs, only one pendant must be cabled. Track fixtures for pendant mounted track shall also be supplied with clip-on safety cables of suitable size and weight to support the weight of the fixture.
4. Provide secondary support wires from all four (4) corners of the lay-in fixtures to the structure above. Do not support fixtures from ceiling grid wire supports, piping, conduit, side walls, or mechanical equipment. Ceiling specifications do not supersede this requirement.

D. Electrical Connection

1. All light fixtures installed in an accessible suspended ceiling shall be connected from a branch circuit junction box using 1/2" flexible metal conduit or MC cable fixture pigtails not exceeding 8'- 0". All fixtures must be grounded by using a grounding conductor. Fixture to fixture wiring of fixtures installed in an accessible ceiling is not permitted. Fixture whips shall not lay-on ceiling tile or grid. Provide caddy clips to provide additional support.

E. Fire Rated Ceiling

1. Provide fire rated canopy or enclosure for all fixtures recessed in a fire rated ceiling. The fire rated canopy or enclosure shall be as required by the UL design number listed in the UL fire resistance directory. Refer to architectural drawing for the UL design number. Coordinate with ceiling installer and manufacturer.

3.02 FINAL INSPECTION

A. Remove all plastic and protective coating from all fixtures. Fixtures shall be thoroughly cleaned. Replace any damaged fixture or fixture parts including reflectors, louvers, lens and metal parts that show signs of corrosion.

B. All final incandescent lamps used during construction shall be replaced with new lamps. Replace all other defective ballast, lamps or discolored lamps, showing signs of excessive usage.

C. Demonstrate proper operation of all fixtures and controls.

END OF SECTION

SECTION 27 1000

STRUCTURED CABLING SYSTEM

PART 1 - GENERAL

1.01 This section identifies the requirements, technical design, and specifications for the structured cabling system at the Williamson County & Cities Health District Office Renovations, located in Round Rock, Texas ("Owner"). The structured cabling system as specified is an Industry-Standard Category 6 structured cabling system and includes backbone cabling, horizontal cabling and equipment room hardware as specified.

1.02 The Contractor shall provide a Manufacturer's (minimum) 25-Year System Warranty for the installed structured cabling system.

1.03 Contractor shall include materials, equipment, and labor necessary to provide a complete and functional structured cabling system regardless of any items not listed or described in this specification or associated drawings.

1.04 Requirements

A. Contractor Experience Requirements

B. Submittal Requirements

C. Acceptable Manufacturers

D. Codes, Standards and Regulations

E. General Requirements

F. System Requirements

G. Testing Requirements

H. Project Closeout Documentation

I. Attachments

1.05 Related Requirements

A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 27, and shall be complied with in every respect. The Contractor shall examine all of the items which make up the Contract Documents, and shall coordinate them with the work on the project.

B. Contractor Experience Requirements

1. The Contractor shall be at least a Panduit Gold Partner prior to submitting a bid for the work.

2. The Contractor shall possess all relevant Manufacturer Certifications (i.e. structured cable systems, testing equipment, etc,) for both the company and individual technicians prior to submitting a bid for the work.

3. The Contractor's Project Manager shall be a Registered Communications Distribution Designer (RCDD) and available for all onsite coordination meetings.

4. The Contractor shall have been in business for a minimum of five (5) years.

5. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 50-mile radius of the project site.

6. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.

C. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.

1.06 Submittal Requirements

A. Pre-Installation Submittal

1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Engineer.

2. All submittals shall be submitted in the same sequence as they are listed in the specifications (i.e. product data in the sequence items are listed in the product data section, manufacturer product certifications for company, manufacturer product certifications for installers, etc.). Submittals not in the proper sequence will not be approved.

3. Manufacturer product data sheets for each proposed system component.

   a. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted. Product data sheets without the part number clearly identified will not be approved.

4. Manufacturer Product Certifications for Company.

5. Manufacturer Product Certifications for Installers.

6. Manufacturer Certifications for testing equipment technicians.

7. Manufacturer Certifications for testing equipment calibration.

8. RCDD Certificate for Contractor's Project Manager.

9. Manufacturer Warranty letter.

10. Documentation indicating that Contractor has been in business for (5) years.

11. Address of Contractor's local office within a 50-mile radius of the project site.

12. Quantity of full time local technicians within a 50-mile radius of the project site.

13. List of five (5) contractor-installed projects of a similar size and scope that have been in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project

Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.

14. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.

15. List of subcontractors performing any work on the project. List shall clearly identify the subcontractor's legal name and address, the scope of work to be performed by the subcontractors and the overall percentage of the project being provided by the subcontractor. If there are no subcontractors performing any work on the project, submit a statement on company letterhead clearly indicating no subcontractors will be performing any work on this project.

PART 2 - PRODUCTS

2.01 General Requirements

A. The following sections specifically list the acceptable equipment types and items for this project.

B. Architect/Engineer will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.

C. Proposed equivalent items must be approved in writing by the Architect/Engineer prior to purchase or installation. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.

D. In the event a manufacturer's specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer's part number.

E. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.

F. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.

G. All wiring, equipment, and installation materials shall be new and of the highest quality.

H. Labels on all cabling, materials, and equipment must indicate a nationally recognized testing laboratory.

I. Original Equipment Manufacturer (OEM) documentation must be provided to the Architect/Engineer which certifies performance characteristics and compliance with ANSI/TIA/EIA 568-C standards.

J. **Refer to the attached Williamson County Cabling Specification for additional information.**

2.02 Acceptable Manufacturers

A. Horizontal Cable

1. Category 6 UTP Plenum

a. Network Access (Blue Sheath)

1) General Cable PanGen 6 Part Number – 7131800

b. VoIP/Wall Phone (White Sheath)

1) General Cable PanGen 6 Part Number – 7131801

c. Wireless Access Point (Green Sheath)

1) General Cable PanGen 6 Part Number – 7131806

B. Fiber Optic Cable Termination

1. 2RU Fiber Enclosure

a. Panduit Opticom QuickNet Rack Mounted Fiber Optic Enclosure – Part Number FCE2U

2. 9µm Singlemode Fiber Adapter Plate

a. Panduit Singlemode OS1/2 FAP, Duplex LC, Zirconia Ceramic Split Sleeves Blue – Part Number – FAP12WBUDLCZ

3. Fiber Blank Plate

a. Panduit Blank Fiber Adapter Panel – Part Number FAPB

4. 9µm Singlemode LC Connectors

a. Panduit OptiCam LC Singlemode Duplex Connector, Blue – Part Number – FLCDSCBUY

5. Loose Tube Fiber Fan-Out Kit

a. Panduit 1 Meter Fiber Optic Fan-Out Kit, 12-fiber – Part Number – FO12CB

6. Rack Mounted Voice Patch Panels

a. Panduit 1RU NetKey 24-Port Flat Panel – Part Number NK6PP24P

7. Category 6 Horizontal Rack Mounted Patch Panels

a. Panduit 1RU NetKey 24-Port Flat Panel – Part Number NK6PP24P

b. Panduit 2RU NetKey 48-Port Flat Panel – Part Number NK6PP48P

8. Category 6 Modular Jacks

a. Network Access

1) Field End (Blue)

a) Panduit NetKey Category 6 Jack Module – Part Number NK688MBU

b. Voice Access

1) Field End (White)

a) Panduit NetKey Category 6 Jack Module – Part Number NK688MWH

c. Wireless Access Points

1) Field End (Green)

a) Panduit NetKey Category 6 Jack Module – Part Number NK688MGR

9. Telecommunications Faceplates with Designation Window

a. 2-Port Single Gang Flush (International White)

1) Panduit NetKey Wallplate with ID Window – Part Number NK2FIWY

b. 4-Port Single Gang Flush (International White)

1) Panduit NetKey Wallplate with ID Window – Part Number NK4FIWY

10. 2-Port Surface Mount Box (International White)

a. Panduit NetKey Surface Mount Box – Part Number NK2BXIW-A

11. Blank Insert (International White)

a. Panduit NetKey Blank Keystone Module – Part Number NKBMIW-X

C. Equipment Racks, Cabinets, Cable Management, and Accessories

1. Two-Post Rack - 19” x 84” Aluminum Rack (Black)

a. Panduit – Part Number R2P

2. Four-Post 45U Open Frame Rack – 20.3” x 84” x 23” (Black)

a. Panduit – Part Number ER4P23

3. Vertical Cable Managers (Black)

a. Panduit Double Sided Vertical Cable Manager - Part Number WMPV45E

4. Horizontal Cable Managers (Black)

a. Panduit 1RU Horizontal Cable Manager - Part Number WMPSE

b. Panduit 2RU Horizontal Cable Manager - Part Number WMP1E

5. Vertical Power Strip for 7’ Equipment Rack

a. Chatsworth 20 Outlet (5-20R) Power Strip with Meter and NEMA 5-20P – Part Number 12851-755

D. Cable Runway (Ladder Type)

1. Universal Cable Runway

a. 12-inch Panduit Wyr-Grid - Part Number WG12BL10

2. Mounting Brackets

a. 12-inch Panduit Wyr-Grid - Part Number WGTBS12BL

3. Cantilever Brackets

4. Wall Mount Termination Brackets

a. 12-inch Panduit Wyr-Grid - Part Number WGWMTB12BL

5. Splice Connectors

a. 12-inch Panduit Wyr-Grid - Part Number WGSPL1218BL

6. Snap-On Sidewalls (provide on all sections of tray)

a. 2-inch Sidewall Panduit Wyr-Grid - Part Number WGSW2BL

7. Waterfalls
    a. 4-inch Side Waterfall Panduit Wyr-Grid - Part Number WGSWF4BL
    b. Bottom Waterfall Panduit Wyr-Grid - Part Number WGBTMWFBL
8. Intersection Bend Radius Control (provide at all bends)
    a. 2-inch Sidewall Panduit Wyr-Grid - Part Number WGINTBRC2BL
9. Rack Hardware Kit
    a. Panduit Wyr-Grid - Part Number WGHRDWKTBL

E. Pathway Cable Support
1. Panduit J-Pro Cable Support System

F. Grounding and Bonding
1. Main Grounding Bus Bar, 20”
    a. Panduit - Part Number GB4B0624TPI-1
2. Grounding Bus Bar, 24”
    a. Panduit - Part Number GB2B0514TPI-1
3. Grounding Bus Bar, 12”
    a. Panduit - Part Number GB2B0306TPI-1
4. Cable Runway Ground Strap Kit
    a. Panduit
5. Two Mounting Hole Grounding Lug
    a. Panduit – LCC Series
6. #6 AWG Solid Green Insulation Ground Wire
    a. Panduit - Part Number ACG24K
7. #3/0 Stranded Green Insulation Ground Wire
8. Cable Sheath Bonding Clamp

G. Labeling
1. Permanent Labels for Fiber Optic Cables
    a. Panduit Self Laminating Labels – Part Number S100X650YAJ
2. Permanent Labels for Innerduct
    a. Panduit Dome-Top Ty Marker
3. Permanent Labels for Category 6 Cables

a. Panduit Self-Laminating Labels – S100X150YAJ

4. Permanent Labels for Patch Panels

a. Panduit Component Label – Part Number C261X035Y1J

5. Permanent Labels for Faceplates

a. Panduit Component Label – Part Number C195X040Y1J

H. Fire Stop

1. STI Spec Seal Part Number

2. 3M Products Part Number

I. Plywood

1. 8’ H x 4’ W x ¾” Sheets of BC grade fire-rated plywood

J. Fire Retardant Paint (White)

K. Fiber Patch Cables

1. Panduit OS1/OS2 2-Fiber Singlemode, Riser-Rated, LC to LC Fiber Optic Patch Cords – Part Number F92ERQNQNSNMXXX (contractor to provide appropriate length)

L. Copper Patch Cables

1. Panduit Cat 6 UTP Patch Cord – Part Number UTP28SPXXBU (contractor to provide appropriate length)

PART 3 - EXECUTION

3.01 Codes, Standards, Regulations

A. American National Standards Institute (ANSI)

B. American Society for Testing and Materials (ASTM)

1. ASTM B 1 (2001; R 2007) Standard Specification for Hard-Drawn Copper Wire

2. ASTM B 8 (2004) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

3. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)

4. ASTM D 709 (2001; R 2007) Laminated Thermosetting Materials

C. Alliance for Telecommunications Industry Solutions (ATIS)

D. Building Industry Consulting Service International (BICSI)

1. Telecommunications Distribution Methods Manual 13th Edition

2. Outside Plant Design Reference Manual 5th Edition

3. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices

4. NECA/BICSI 568-2006 – Standard for Installing Commercial Building Telecommunications Cabling

5. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

E. Electronics Industry Alliance (EIA)

F. Federal Communications Commission (FCC)

1. FCC Part 15, Radiated Emissions Limits, revised 1998

2. FCC Part 68, Connection of Terminal Equipment to the Telephone Network, revised 1998

3. FCC Part 76, Cable Television Service, revised 1998

G. Insulated Cable Engineers Association (ICEA)

1. ICEA S-87-640 (2006) Fiber Optic Outside Plant Communications Cable

2. ICEA S-98-688 (2006) Broadband Twisted Pair, Telecommunications Cable Aircore, Polyolefin Insulated Copper Conductors

3. ICEA S-99-689 (2006) Broadband Twisted Pair Telecommunications Cable Filled, Polyolefin Insulated Copper Conductors

H. International Electrotechnical Commission (IEC)

I. Institute of Electrical and Electronics Engineers, Inc. (IEEE)

1. IEEE Standard 81-1983, IEEE Guide for Measuring Earth Resistance, Ground Impedance, and Earth Surface Potential of a Ground System

2. IEEE Standard 1100-1999, Recommended for practice for Powering and Grounding Sensitive

3. Electronic Equipment in Industrial and Commercial Power Systems (IEEE Emerald Book)

4. IEEE C2 (2007; Errata 2007; INT 2008) National Electrical Safety Code

5. IEEE Std 100 (2000) The Authoritative Dictionary of IEEE Standards Terms

J. International Organization for Standardization (ISO)

1. International Organization of Standardization/International Electrotechnical Commission (ISO/IEC)

2. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995

3. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999

4. ISO/IEC 11801, Information Technology-Generic Cabling for Customer Premises, 1995

5. ISO/IEC 14763-1, Information Technology-Implementation and Operation of Customer Premises Cabling-Administration, 1999

K. National Cable Television Association (NCTA)

L. National Electrical Manufacturers Association (NEMA)

1. NEMA C62.61 (1993) Gas Tube Surge Arresters on Wire Line Telephone Circuits

M. National Fire Protection Association (NFPA)

1. NFPA-70, National Electrical Code

2. NFPA-75, Protection of Electronic Computer Data Processing Equipment.

3. NFPA-101, Life Safety Code

4. NFPA-297, Guide on Principles and Practices for Telecommunications Systems

5. NFPA-780, Standard for the Installation of Lightning Protection Systems.

N. National Institute Standards and Technology (NIST)

O. Occupational Safety and Health Administration (OSHA)

P. Telecommunications Industry Association (TIA)

1. ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises, 2009

2. ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard, 2009

3. ANSI/TIA -568-C.2, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, 2009

4. ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard, 2008

5. ANSI/TIA/EIA–569-B, Commercial Building Standard for Telecommunications Pathways and Spaces, 2005

6. ANSI/TIA–569-B Amendment 1, Commercial Building Standard for Telecommunications Pathways and Spaces, 2009

7. ANSI/TIA/EIA-606-B, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, 2012

8. ANSI/TIA/EIA-607-B, Commercial Building Grounding and Bonding Requirements for Telecommunications, 2011

9. ANSI/TIA-758, Customer-Owned Outside Plant Telecommunications Infrastructure Standard, 2004

Q. U.S. Department of Agriculture (USDA)

1. RUS 1755 Telecommunications Standards and Specifications for Materials, Equipment and Construction

2. RUS Bull 1751F-643 (2002) Underground Plant Design

3. RUS Bull 1751F-815 (1979) Electrical Protection of Outside Plant

4. RUS Bull 1753F-201 (1997) Acceptance Tests of Telecommunications Plant (PC-4)

5. RUS Bull 1753F-401 (1995) Splicing Copper and Fiber Optic Cables (PC-2)

6. RUS Bull 345-65 (1985) Shield Bonding Connectors (PE-65)

7. RUS Bull 345-72 (1985) Filled Splice Closures (PE-74)

8. RUS Bull 345-83 (1979; Rev Oct 1982) Gas Tube Surge Arrestors (PE-80)

R. Underwriters Laboratories, Inc. (UL)

1. UL 510 (2005; Rev thru Aug 2005) Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape

2. UL 910 (NFPA 262 1990) Applicable Flame Test

3.02 In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Architect/Engineer in writing of any such occurrences before purchasing or installing any equipment or materials. The Architect/Engineer will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to: design changes, equipment, materials and/or installation changes. In any event Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications. In the event

of any conflicts between Standards and Codes the more stringent shall take precedence.

3.03 General Requirements

A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of Texas, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Engineer for direction before proceeding with that part of the work.

B. The Contractor shall be responsible for coordination with other trades to ensure any conflicts or potential conflicts are resolved prior to any work beginning on the project.

C. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.

D. No deviations from the plans or specifications shall be made without full consent in writing of the Architect/Engineer. The Contractor shall have written approval from the Architect/Engineer for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Engineer prior to proceeding with the work, the contractor shall not be reimbursed for the work.

E. The Contractor shall obtain written permission from the Architect/Engineer before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.

F. Contractor shall notify the Architect/Engineer a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Engineer to perform a walkthrough, review the scope of work, schedule, and escalation procedures.

G. The Contractor shall maintain a work area free of debris, trash, empty cable reels, scrap cable, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.

H. Equipment and materials installed by the Contractor shall be free of defects and damage.

I. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.

J. Contractor shall test all cables prior to installation. By failing to perform this testing operation, the Contractor shall accept the cable as compliant and assume all liability for the replacement of the cable at no cost to the Owner should it be found defective at a later date.

K. Contractor shall maintain a set of working specifications, design drawings, and record drawings to be kept on site at all times and shall update the record drawings with any changes on a weekly basis. Record drawings shall be made available for inspection at the request of the Architect/Engineer.

L. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.

M. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.

N. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Engineer.

O. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.

P. Cables shall be properly supported in accordance with industry standards at all times. Improperly supported cables shall be corrected by the Contractor at no cost to the Owner.

Q. Contractor shall be responsible to properly protect information outlets from damage by other trades during construction.

R. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.

S. The Contractor shall not install cables in conduits or sleeves without nylon bushings. Cables installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.

3.04 System Requirements

A. Quantities listed are for reference only, contractor is responsible for furnishing materials as required to provide a complete and functioning system. Where quantities are not noted, they may be obtained from the drawings. In the event of a discrepancy between the specifications and the drawings, the greater quantity shall be furnished.

B. Inter-Building Cable Plant

1. Fiber Optic Termination

a. Contractor shall terminate fiber optic strands with fan-out kits when required and connectors and place into fiber optic enclosures as indicated in the technology drawings.

b. Contractor shall furnish fiber optic enclosures and coupler panels for all fiber optic strands and blank panels for all unused slots.

c. The Contractor shall furnish and install:

1) 2U fiber enclosure(s) inside IT 152 as indicated on the technology drawings.

2. Copper Cable

a. High Pair Count Termination

1) Patch Panels

a) The Contractor shall furnish and install rack mounted voice patch panels.

b) The Contractor shall extend all copper cable pairs from the building entrance terminals (RJ-21X) to the rack mounted voice

patch panels utilizing plenum rated high pair count cable with an amphenol on the RJ-21X side.

c) The Contractor shall furnish and install:

(1) 24 Port patch panel in IT 152 as indicated on the technology drawings.

C. Horizontal Cable

1. No horizontal cable shall be longer than two hundred ninety-five (295) feet. If any station cable will be longer than two hundred ninety-five (295) feet, Contractor shall stop installation of the cable and immediately notify Architect/Engineer in writing. If Contractor fails to notify the Architect/Engineer in writing, Contractor shall replace cable at no cost to the Owner.

2. The Contractor shall furnish and install horizontal cables from IT 152 to each outlet location as indicated in the technology drawings.

3. The Contractor shall install a 10-foot service loop to be coiled, mounted, and stored above the ladder rack in each respective Equipment Room or Telecommunications Room.

4. The Contractor shall provide a 2-foot service loop coiled and supported directly above the workstation outlet.

D. Horizontal Cable Termination

1. Contractor shall terminate cables as defined by the ANSI/TIA/EIA 568-A Commercial Building Wiring Standard with the EIA-568B sequence.

2. Workstations

a. Contractor shall furnish and install modular jacks to terminate UTP horizontal cables.

b. Contractor shall furnish and install faceplates, systems furniture faceplates, or surface-mount boxes to house modular jacks as indicated in the technology drawings.

1) Any unused faceplate positions shall have the appropriate number and color of blanks installed.

3. Equipment Rooms / Telecommunications Rooms

a. Horizontal Cable for Data

1) Contractor shall furnish and install patch panels and horizontal cable managers to terminate horizontal data cables as indicated in the technology drawings.

2) The Contractor shall provide and install:

a) 48-port rack mounted patch panel(s) in IT 152 as indicated on the technology drawings.

E. Patch Cables

1. Fiber

a. Equipment Rooms / Telecommunications Room

1) The Contractor shall furnish and store (1) patch cable in original manufacturer packaging for each strand terminated per Equipment Room / Telecommunications Room:

a) 100% of the patch cables shall be (3) meters in length and stored in the applicable Equipment Room / Telecommunications Room

2. Copper

a. Workstations

1) The Contractor shall furnish and store (1) patch cable in original manufacturer packaging for each cable terminated.

a) 50% of the patch cables shall be (7) feet in length and stored in the applicable Equipment Room / Telecommunications Room.

b) 50% of the patch cables shall be (15) foot in length and stored in the applicable Equipment Room / Telecommunications Room.

b. Equipment Rooms / Telecommunications Rooms

1) The Contractor shall furnish and store (1) patch cable in original manufacturer packaging for each cable terminated per Equipment Room / Telecommunications Room:

a) 50% of the patch cables shall be (5) foot in length and stored in the applicable Equipment Room / Telecommunications Room

b) 25% of the patch cables shall be (7) foot in length and stored in the applicable Equipment Room / Telecommunications Room

c) 25% of the patch cables shall be (10) foot in length and stored in the applicable Equipment Room / Telecommunications Room

F. Cable Support

1. All cables shall be installed and supported in conduit systems, cable trays, cores, sleeves, etc. as indicated in the technology drawings.

2. When cables leave the main pathway systems as indicated on the technology drawings, they shall be installed and supported in Contractor furnished and installed j-hooks or adjustable cable supports.

3. No cable pathway shall exceed 40% fill ratio.

4. The contractor shall furnish a separate j-hook or adjustable cable support pathway for each cable type (data, voice, video, and security).

5. J-hooks and adjustable cable supports shall be installed no more than five-feet (5') apart on center, using only manufacturer-approved installation methods and hardware.

6. J-hooks and adjustable cable supports shall be installed no higher than 3-feet above the accessible ceiling to allow for ease of access for future moves, adds and changes

7. If utilizing ceiling grid wire, that is contractor installed, both ends shall be supported and independent from the grid wire to provide support for the actual grid and ceiling tile. Grid wire shall be painted blue and attached to ceiling grid with a Caddy Component Support.

8. J-hooks shall be furnished with closure clips.

9. Maximum sag between supports shall not exceed twelve-inches (12”).

10. Contractor shall establish j-hook and adjustable cable supports pathways and shall coordinate pathways with all other disciplines. Under no-circumstances shall these pathways be used to support other low-voltage applications not included in this specification.

11. Cable Dressing

    a. No nylon cable ties shall be used at any time during the installation of the cable.

    b. Above Ceiling

        1) Contractor shall furnish and install plenum-rated hook & loop straps in plenum-rated airspaces.

            a) The Contractor shall install no more than (1) hook & loop strap between each j-hook or saddle strap or at service loop locations.

    c. Equipment Rooms / Telecommunications Rooms

        1) The Contractor shall bundle all visible cables with Contractor furnished and installed hook & loop straps.

            a) Hook & loop straps shall be installed twenty-four (24) inches apart on center.

G. Equipment Rooms / Telecommunications Room Build-Out

1. Plywood

    a. The Contractor shall furnish and install 8’ H x 4’ W x ¾” D sheets of BC grade fire-rated plywood as indicated in the technology drawings.

    b. The Contractor shall mount all plywood vertically starting at 24” AFF.

    c. The Contractor shall cover the plywood with two (2) coats of Contractor furnished white fire retardant paint leaving exposed (1) fire rating stamp per sheet.

2. Cable Runway (Ladder Type)

    a. Contractor shall furnish and install cable runway using manufacturer-approved hardware and installation methods as indicated in the technology drawings.

b. Contractor shall furnish and install vertical sections of cable runway using manufacturer-approved hardware and installation methods to provide transition and support where cables enter or exit the room using a vertical pathway.

c. Contractor shall furnish and install radius drops cross member and stringers above each rack using manufacturer-approved hardware and installation methods where cables exit the horizontal section of the ladder rack.

d. Contractor shall ground and bond each cable runway section to the next utilizing ground straps and ensure metal-to-metal contact.

3. Equipment Racks and Cabinets

a. Contractor shall furnish and install equipment racks with vertical management using manufacturer approved hardware and installation methods as indicated in the technology drawings.

b. Contractor shall secure relay racks to the concrete floor utilizing expandable concrete anchors.

c. Contractor shall secure the equipment racks to the cable runway using cable runway elevation kits and manufacturer approved hardware and installation methods.

d. Contractor shall bolt all equipment racks and vertical cable managers together.

e. Contractor shall individually ground and bond each equipment rack and ensure metal-to-metal contact.

f. Contractor shall furnish and install:

1) 20” x 84" x 23” 4-post equipment rack(s) in IT 152 as indicated on the technology drawings

H. Grounding and Bonding

1. General

a. The Contractor shall ensure metal-to-metal contact for all terminations.

b. All materials shall be UL Listed.

c. All connections shall be made with UL Listed compression 2-hole lugs.

d. Contractor shall use an anti-oxidation compound on all connections.

e. In a metal frame (structural steel) building, where the steel framework is readily accessible within or external to the room; each TMGB and TGB shall be bonded to the vertical steel metal frame using a minimum # 6 AWG plenum rated green insulated conductor.

f. A Grounding Equalizer conductor shall be installed when required by ANSI/TIA/EIA-607-B (Interconnects multiple TBBs on the top floor and every 3rd floor in between).

g. The connection to building steel does not eliminate the requirement for the TBB or EBC to the service ground.

2. Telecommunications Main Grounding Busbar (TMGB)

a. Contractor shall furnish and install a TMGB in the Equipment Room/Main Telecommunication Room as indicated in the technology drawings.

b. TMGB shall be insulated from its support using an insulator that is listed for the purpose by a nationally recognized testing laboratory (NRTL).

c. Only one lug shall occupy a hole. No stacking lugs or “Double Lugging” shall be accepted.

3. Telecommunications Grounding Busbar (TGB)

a. Contractor shall furnish and install a TGB in each Telecommunications Room as indicated in the technology drawings.

b. TGB shall be insulated from its support using an insulator that is listed for the purpose by a nationally recognized testing laboratory (NRTL).

c. Only one lug shall occupy a hole. No stacking lugs or “Double Lugging” shall be accepted.

4. Telecommunications Bonding Backbone (TBB)

a. The Contractor shall furnish and install a TBB consisting of a minimum #6 AWG plenum rated green insulated copper conductor in a star topology between the TMGB and each TGB as indicated in the Technology drawings.

b. When exceeding (13), feet the TBB shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil.

c. Where the TRs are stacked the TBB shall be continuous to the uppermost TR. “T” taps shall be used to tie TGBs on floors between the TMGB and the uppermost TGB.

d. Conductor shall be sized from the TMGB to the uppermost TGB and each conductor between a “T” tap and the TGB shall be the same size as the TBB it is fed from.

5. Equipment Bonding Conductor (EBC)

a. Contractor shall furnish and install a minimum #6 AWG plenum rated green insulated conductor from the TMGB or TGB as applicable to each ladder rack system, equipment rack, cabinet, metallic raceway, lightning protector, or multi-pair cable with a metallic element. Contractor shall use an anti-oxidation compound on all connections.

b. When exceeding (13) feet the EBC shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil.

6. Bonding Conductor for Telecommunications (BCT)

a. Contractor shall furnish and install a minimum #6 AWG plenum rated green insulated copper conductor from the TMGB to the main building electrical service ground as indicated in the Technology drawings.

b. The installation of the BCT to the main building electrical ground shall be performed by a licensed Electrical Contractor.

c. When exceeding (13) feet the BCT shall be sized at (2) kcmil per linear foot of conductor length up to a maximum of 750 kcmil

I. System Labeling

1. Contractor shall verify room numbers and confirm the final room numbering scheme prior to generating any labels.

2. Horizontal Cables shall be labeled within (12) inches from the termination point inside the Equipment Room/Telecommunications Rooms.

3. Horizontal Cables shall be labeled within (6) inches from the termination point at the workstation end.

4. Backbone Fiber and Copper Cables shall be labeled within (12) inches of the visible end of the jacket.

5. Fiber Innerduct shall be labeled within (12) inches of the point of entry of the fiber optic enclosure.

6. Bonding conductors shall be labeled within (12) inches from their termination point.

7. Cables shall be labeled identically at both ends.

8. Equipment Racks

a. Equipment racks in each Equipment/Telecommunication Room shall be labeled in sequential numeric order.

1) Labels shall be centered on the top front of the equipment rack.

9. Cabinets

a. Cabinets in each Equipment/Telecommunication Room shall be labeled in sequential numeric order.

1) Labels shall be centered on the top front of the Cabinet.

10. Fiber Optic Enclosures

a. Fiber optic enclosures shall be labeled alpha-numeric starting with the 1st fiber optic enclosure in the top of the 1st equipment rack.

b. A label for each terminated strand shall be securely placed inside each fiber optic enclosure.

11. Backbone Cable

a. Fiber Optic Cable

1) Fiber optic backbone cable labels shall contain the cable origin room number, the cable destination room number, fiber strand numbers, and type (refer to attached WilCo Cabling Specification for example).

2) Fiber optic couplers panels in fiber enclosures shall be labeled at each end by strand denoting building code, Equipment Room and/or Telecommunications Room, enclosure number, and strand number to and from respectively (refer to attached WilCo Cabling Specification for example).

b. High Pair Count Copper Cable

1) For high pair count copper backbone cables, the label scheme shall contain, cable origin room number, the cable destination room number, and cable pairs (refer to attached WilCo Cabling Specification for example).

12. Horizontal Cable

a. Inside Equipment Rooms

1) Horizontal cables shall be labeled at each end with the destination end and origin room number, patch panel number, and port number. (refer to attached WilCo Cabling Specification for example).

2) Patch panels in each closet shall be labeled sequentially starting with the first Patch Panel in the top of the first relay rack (A, B, C, D, E, etc.).

3) 110-type blocks shall contain the destination room number, pair numbers, and binder pair number under each pair termination. (example)

a) 110-type block labels shall be printed on product-specific label strips and placed into label holders.

13. Workstation Faceplates

a. Cables and wall plates shall be labeled denoting origin, Equipment Room/Telecommunications Room Number, Patch Panel, 110-type termination block, and Port Number. (refer to attached WilCo Cabling Specification for example).

14. TMGB and TGB

a. TMGB and TGB shall be labeled with a unique identifier (refer to attached WilCo Cabling Specification for example).

15. Bonding Conductors

a. The following conductors shall be labeled at each end with the destination end and origin room number (refer to attached WilCo Cabling Specification for example).

1) Bonding Conductor for Telecommunications

2) Telecommunications Bonding Backbone

3) Grounding Equalizer

3.05 Testing Requirements

A. Fiber Optic Cable

1. Installed strands shall be tested and certified in accordance with industry standards.

2. Only Manufacturer Certified Technicians shall perform testing.

3. The Contractor shall test and certify all fiber optic cable strands with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.

4. The Contractor shall provide calibration results from the manufacturer showing the current calibration of the testers.

5. The Contractor shall notify the Architect/Engineer a minimum of five (5) days in advance to observe cable testing.

6. The Architect/Engineer may randomly select 5% of the installed strands for test verification purposes. The Contractor shall re-test these strands in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed strands at no cost to the Owner.

B. Copper Backbone Cable

1. Installed pairs shall be tested and certified in accordance with industry standards.

2. Only Manufacturer Certified Technicians shall perform testing.

3. The Contractor shall test and certify all copper pairs with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.

4. The Contractor shall provide calibration results from the manufacturer showing the current calibration of the testers.

5. The Contractor shall notify the Architect/Engineer a minimum of five (5) days in advance to observe cable testing.

6. The Architect/Engineer may randomly select 5% of the installed pairs for test verification purposes. The Contractor shall re-test these pairs in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed pairs at no cost to the Owner.

C. Category 6 UTP Cable

1. Cable links shall be tested in accordance with industry standards.

2. Only Manufacturer Certified Technicians shall perform testing.

3. The Contractor shall test and certify the structured cable system with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with non-approved test equipment or tester(s) that are not within their calibration period.

4. No Fail or *Pass results will be accepted.

5. The Contractor shall notify the Architect/Engineer a minimum of five (5) days in advance to observe field testing.

6. The Architect/Engineer may randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. In the event that any of the verification tests differ in results from the previously-submitted test results, all testing shall be declared a failure and the Contractor shall re-test 100% of the installed links at no cost to the Owner.

D. Grounding and Bonding

1. Main Building Ground

a. Coordinate with electrical contractor and provide a copy of their test results for the main building ground. The results shall be below 25 Ohms.

2. Two-Point Ground/Continuity Testing

a. Prior to the two-point ground testing, a visual inspection shall be performed to verify that the bonding and grounding system is installed according to the drawings and specifications and in compliance with the TIA-607-B Standard.

b. All testing shall be conducted prior to any active equipment is installed.

c. The Contractor shall use an earth ground resistance tester that is configured for a continuity test. This is also known as a two-point tester or a “dead earth” test.

d. Prior to the two-point continuity test conduct a voltage test to ensure there is no stray voltage in the system.

e. The testing shall include but is not limited to the following points.

1) Building electrical grounding electrode and the TMGB.

2) TMGB/TGB to electrical ground in ER/TR.

3) TMGB/TGB to the building steel (if present).

4) TMGB to each TGB.

5) Building steel (if present) to the electrical ground.

f. Per the TIA-607-B, the maximum value for resistance between any point in the telecommunications bonding and grounding system and the building’s electrical grounding electrode system is 100 milliohms. In the case of long TBB and Grounding Equalizer conductor runs, the resistance of the conductor must be factored into the total resistance. For example 1 km of a

No. 3/0 conductor has a resistance of 0.2028 ohms. (0.06180 ohms per 1000 ft.)

g. The Contractor shall notify the Architect/Engineer a minimum of five (5) days in advance to observe field testing.

3.06 Project Closeout Documentation

A. As-Built Drawings

1. Drawings shall be provided to the Architect/Engineer at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect/Engineer.

2. Three (3) sets of drawings depicting the condition of the structured cabling system as installed.

3. As-Built drawings shall be produced in AutoCAD 2014 or higher and provided in hardcopy and electronically in .dwg and PDF format.

4. Hardcopy drawings shall be provided in the original size as issued by the Architect/Engineer.

5. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect/Engineer.

6. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of all equipment room/telecommunication room layouts, wall elevations, equipment rack elevations, ladder racks, cable tray, sleeves, backbone and horizontal cable pathways, workstation locations, and labeling scheme.

B. Test Documentation

1. Test documentation shall be provided to the Architect/Engineer at the time of substantial completion. Final payment will not be recommended until these test results are received and approved by the Architect/Engineer.

2. Three (3) sets of test documentation for the structured cabling system as installed.

3. Test results shall be provided in hard copy and electronic format (i.e., manufacturer's proprietary testing software along with applicable reader software) and PDF electronic format.

4. Test documentation shall be bound, sectioned, and tabbed in the following sequence as applicable:

a. Tester(s) Calibration Certificate(s)

b. Inter-Building Backbone Fiber Optic Cable

c. Inter-Building Backbone Copper Cable

d. Intra-Building Backbone Fiber Optic Cable

e. Intra-Building Backbone Count Copper

f. Horizontal Category 3 Cable

g. Horizontal Category 5e Cable

h. Horizontal Category 6 Cable

i. Horizontal Category 6A Cable

j. Main Building Ground

k. Two-Point Ground/Continuity Test

C. Manufacturer's Performance Certification

1. Certificate shall be provided to the Architect/Engineer at the time of final system acceptance. Final payment will not be recommended until the certificate of certification is received and approved by the Architect/Engineer.

a. The manufacturer of the solution shall furnish a performance certification for a period of no less than twenty (20) years starting at final system acceptance.

b. One original and two copies of the Manufacturer's Certificate shall be provided.

D. Manufacturer's Product Warranty

1. Certificate of product warranty shall be provided to the Architect/Engineer at the time of final system acceptance. Final payment will not be recommended until this certificate of product warranty is received and approved by the Architect/Engineer.

a. The manufacturer of the solution shall furnish an extended warranty for a period of no less than twenty (20) years starting at final system acceptance.

b. One original and two copies of the Manufacturer's product warranty shall be provided.

E. Contactor's Statement of Warranty

1. Statement of warranty shall be provided to the Architect/Engineer at the time of substantial completion. Final payment will not be recommended until statement of warranty is received and approved by the Architect/Engineer.

a. Contractor shall furnish a minimum of a one (1) year warranty on all materials, labor and workmanship starting at final system acceptance.

b. One original and two copies of Contractor's warranty terms and conditions to include contact information (i.e. Contractor name, Point of Contact, address, phone number and email address) and start and end date for warranty call outs.

END OF SECTION 27 10 00

WILLIAMSON COUNTY
1848

Cabling Specification

Department of Information Technologies

11-6-15

WILLIAMSON COUNTY CABLING SPECIFICATION

Bill Bingham
Telecom Manager

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WILLIAMSON COUNTY CABLING SPECIFICATION

I. GENERAL

A. Purpose

1. The purpose of this document is to provide a standard defining the structured communications cabling systems to be installed within Williamson County facilities. It is geared toward leveraging our legacy cabling infrastructure while upgrading to more recent technologies in new installations. The goal is to accomplish this in the most economic and systematic fashion possible, and in a manner compliant with the latest codes, cabling standards and industry best practices.

2. Within this document, the facilities owner is Williamson County, and shall be referred to as such, or as “WILCO”, or as the “Department of Information Technologies”. Bidding low-voltage installers shall be referred to as “Contractor”.

3. This specification defines quality standards and practices common to all Williamson County enterprise network cabling upgrades.

4. In addition to this global cabling standard, individual projects will also have associated documentation such as Requests for Proposals (RFP), facility drawings, project schedules and requirements pertaining to that particular job. Such collateral will be referred to in this document as “Project-specific Documentation”, “Project Documentation”, or simply “Construction Documents”. Any conflict between this general specification and any project-specific documentation shall be brought to the attention of Williamson County by the Contractor and must be resolved in writing.

5. It is the responsibility of the installing contractor to evaluate these general recommendations and adapt them effectively to actual projects. Contractor is responsible for identifying and bringing to the attention of Williamson County any design directions that may be improved. All such changes shall be approved in writing from Information Technologies.

6. Note that while many portions of this global specification are addressed to "The Contractor", these requirements apply equally to anyone doing the network cabling and infrastructure work within Williamson County, whether those persons are outside contractors or persons directly employed by Information Technologies.

B. Scope of Work - Typical

1. Contractor shall be solely responsible for all parts, labor, testing, documentation and all other processes and physical apparatus necessary to turn over the completed cabling system and associated infrastructure fully warranted and operational for acceptance by WILCO.

2. This specification includes structured cabling design considerations, product specifications and installation guidelines for low-voltage network systems and associated infrastructure including, but not limited to:

    a. Cabling Sub-system 1 – Horizontal Copper

    b. Cabling Sub-system 2 - Intrabuilding Fiber Backbone Cabling

c. Cabling Sub-system 3 – Interbuilding Fiber Backbone Cabling

d. Telecommunications Pathways

e. Communications Racks and Cable Managers

f. Communications Grounding Systems

g. Cabling Labeling and Administration

3. In addition to systems specifications, this document also addresses applicable codes and standards, contractor qualifications and requirements, system warranties and system testing and acceptance.

4. Products to be used in Williamson County telecommunications infrastructure projects are listed in “Appendix D” at the end of this document.

C. Applicable Regulatory References

1. Contractor is responsible for knowledge and application of current versions of all applicable standards and codes. In cases where listed standards and codes have been updated, Contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

2. ANSI/TIA:

a. TIA-526-7 (OFSTP-7) (2008) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

b. TIA-526-14-B (2010) (OFSTP-14) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant

c. ANSI/TIA/EIA-598-C (January 2005) Optical Fiber Cable Color Coding

d. ANSI/TIA-568-C.0 (September 2010) Generic Telecommunications Cabling for Customer Premises

e. TIA-568-C.0-1 (September 2010) Generic Telecommunications Cabling for Customer Premises-Addendum 1, Updated Reference for Balanced Twisted-Pair Cabling

f. ANSI/TIA-568-C.1 (February 2009) Commercial Building Telecommunications Cabling Standards

g. TIA-568-C.1-2 (November 2011) Commercial Building Telecommunications Cabling Standard, Addendum 2 General Updates

h. ANSI/TIA-568-C.2 (August 2009) Balance Twisted Pair Communications and Components Standards

i. TIA-568-C.2-2 (November 2014) Balanced Twisted-Pair Telecommunications Cabling and Components Standard, Addendum 2: Additional Considerations for Category 6A Patch Cord Testing

j. TSB-155-A: Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T

k. TSB-184: Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling

l. ANSI/TIA-568-C.3 (June 2008) Optical Fiber Cabling Components Standard

m. ANSI/TIA-568-C.3-1 (December 2011) Optical Fiber Cabling Component Standard- Addendum 1, Addition of OM4 Cabled Optical Fiber and array connectors

n. TSB-4979 (August 2013) Practical Considerations for Implementation of Multimode Launch Conditions in the Field

o. TIA, TSB-140 Additional Guidelines for Field-Testing Length, Loss and Polarity of Optical Fiber Cabling Systems

p. ANSI/TIA-1183 (August 2012) Test Fixtures for Balun-Less Measurements of Balanced Components and Systems

q. ANSI/TIA-568-C.4 (July 2011) Broadband Coaxial Cabling Components Standard

r. ANSI/TIA-942-A (August 2012) Telecommunications Infrastructure Standard for Data Centers

s. ANSI/TIA-942-A-1 (March 2013) Telecommunications Infrastructure Standard for Data Centers, Addendum 1 - Cabling Guidelines for Data Center Fabrics

t. TIA-569-C (May 2012) Telecommunications Pathways and Spaces

u. TIA-569-C.1 (February 2013) Telecommunications Pathways and Spaces Addendum 1- Revised Temperature and Humidity Requirements for Telecommunications Spaces

v. TSB-190: Guidelines on Shared Pathways and Shared Sheaths

w. ANSI/TIA-606-B (June 2012) Administration Standard for Telecommunications Infrastructure

x. TIA-607-B (September 2011) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises

y. TIA-607-B-1 (January 2013) Generic Telecommunications Grounding (Earthing) and Bonding for Customer Premises - External Grounding Addendum

z. TIA-607-B-2 (August 2013) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises Addendum 2 – Structural Metal

aa. TIA-758-B (April 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard

bb. ANSI/TIA-598-C-2005, Optical Fiber Cable Color-coding

cc. TIA-1152 (September 2009) Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling

dd. ANSI/TIA-862-A (April 2011) Building Automation Systems Cabling Standard

ee. TIA-1005-A (June 2012) Telecommunications Infrastructure Standard For Industrial Premises

ff. TSB-162-A (November 2013) Telecommunications Cabling Guidelines for Wireless Access Points

gg. ANSI/TIA-4966 (May 2014) Telecommunications Infrastructure Standard for Educational Facilities

3. ISO/IEC

a. ISO/IEC 11801 Edition 2.2: Information Technology – Generic Cabling For Customer Premises

b. ISO/IEC TR 11801-99-1 – Balanced cabling for 40Gbps channels – (2014-2015)

c. ISO/IEC 24764 Edition 1.0: Information Technology – Generic Cabling Systems For Data Centres

d. ISO/IEC 24764-1 - Data Centres - Amendment to add Intermediate Distributor (ID) for large or modular data centers

e. ISO/IEC 14763-2 Edition 1.0: Implementation and Operation of Customer Premises Cabling – Part 2: Planning and Installation

f. ISO/IEC 14763-3 Edition 2 – Testing of Optical Fibre Cabling – methods for inspection and testing of installed optical fiber

g. ISO/IEC TR 29125:2010 Information technology -- Telecommunications cabling requirements for remote powering of terminal equipment

4. National Electric Codes

a. National Electrical Safety Code (NESC) (IEEE C2-2012)

b. ANSI/NFPA 70-2011, National Electrical Code© (NEC©)

c. ANSI/IEEE C2-207, National Electrical Safety Code®

d. National Electrical Code (NEC) (NFPA 70)

5. OSHA Standards and Regulations – all applicable

6. Local Codes and Standards – all applicable

7. BICSI – Building Industry Consultative Services International

e. ANSI/BICSI 005-2013, Electronic Safety and Security (ESS) System Design and Implementation Best Practices

f. Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition

g. ANSI/BICSI 002-2011, Data Center Design and Implementation Best Practices

h. Network Systems and Commissioning (NSC) reference, 1st Edition

i. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling

j. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

k. BICSI-003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems

l. Telecommunications Distribution Methods Manual, 13th Edition

m. AV Design Reference Manual, 1st Edition

n. Network Design Reference Manual, 7th Edition

o. Outside Plant Design Reference Manual, 5th Edition

p. Wireless Design Reference Manual, 3rd Edition

q. Electronic Safety and Security Design Reference Manual, 3rd Edition

r. Commercial Installation On-the-Job Training Booklet

s. Telecommunications Project Management (TPM) reference, 1st Edition

8. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.

9. Knowledge and execution of applicable standards and codes is the sole responsibility of the Contractor.

10. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.

D. WILCO Substitution Policy

1. This is a performance-based specification developed from the experience of the Department of Information Technologies in providing exceptional solutions for all of our facilities and departments. As such, substitution of specified systems is discouraged, but allowed if Contractor strictly follows Substitution Policy outlined below.

2. Contractors offering product substitutions or equivalents are responsible for proving equal or superior mechanical and transmission performance to those products listed herein.

3. The process for substituting products other than those specified is as follows:

   a. Any Contractor wishing to offer structured cabling or associated infrastructure products other than those specified shall submit a request for product substitution in writing no less than one week in advance of bid.

   b. Written requests for substitution shall be accompanied by three samples of the substitution product along with associated drawings, specification sheets and engineering documents for evaluation by WILCO.

   c. Any copper or fiber cabling products that carry signal shall be accompanied by third party laboratory performance test reports from an ITS/ETL proving equivalency in transmission performance.

4. Equal product acceptance must be received from Williamson County in writing to be valid.

5. Contractor shall assume all costs for removal and replacement of any substituted product installed without prior written approval. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

E. Contractor Qualifications

WILLIAMSON COUNTY CABLING SPECIFICATION

1. General

a. Contractor must have at least 5 years documented experience installing and testing structured cabling systems of similar type and size. Contractor must also provide a list of key installation personnel, their hire dates, and a resume of their experience. Key installation personnel shall include at least one foreman and one journey level installer or technician. By submitting the names of these personnel, the contractor is committing them to the execution of the project outlined in this specification. No temporary labor shall be allowed, all contractor employees shall be full time, and proof showing full time employment must be on file.

b. Contractor shall have offices and service personnel based with a fifty mile radius of Williamson County and be capable of same-day response to service calls.

c. Contractor shall employ at least one BICSI Registered Communication Distribution Designer (RCDD.. The RCDD shall provide approval on the design, installation, and documentation of this communications system along with making sure all Panduit Certification Plus System Warranty documentation and requirements are met and submitted to Panduit upon completion of the project. The RCDD must be local to the office where work is taking place.

d. The contractor shall not subcontract voice/data/video/fiber cabling, termination or testing without the written permission of Panduit and Williamson County. If any work is subcontracted it shall be to a Panduit PCI certified installation company.

e. Contractor shall have all necessary permits, licenses, and inspections required for the performance of data, voice, and fiber optic cable installations

f. Contactor shall be a current Panduit Certified Installer (PCI) or accepted substitute manufacturer (See Substitution Policy). A copy of the corporate manufacturer certification must be included with all quotes.

g. At least 30 percent of the technicians on the job must have a current Panduit Certified Copper Technicians certificate, or accepted substitute manufacturer, to install copper distribution systems.

h. At least 30 percent of the technicians installing any Fiber Distribution Systems must have a current Panduit Certified Fiber Technicians certificate, or accepted substitute manufacturer certificate, to install fiber distribution systems

i. The Telecommunications contractor must provide a project manager to serve as the single point of contact to manage the installation, speak for the contractor and provide the following functions:

- Initiate and coordinate tasks with the Williamson County Project Manager and others as specified by the project schedule.
- Provide day to day direction and-site supervision of Contractor personnel.
- Ensure conformance with all contract and warranty provisions.
- Participate in weekly site project meetings.
- This individual will remain project manager for the duration of the project. The contractor may change Project Manager only with the written approval of Williamson County.

j. Contractor Project manager must be manufacturer certified in the copper and fiber information transport systems to be installed.

2. References

   a. Communications Contractor shall provide with bid, a list of three reference accounts where similar Data, Voice, Fiber Optic Cable, and related equipment installation work was performed within the last year (twelve month period).

3. Termination of Services

   a. Williamson County reserves the right to terminate the Communication Contractor's services if at any time WILCO determines the Communication Contractor is not fulfilling their responsibilities as defined within this document.

   b. Contractor's appearance and work ethics shall be of a professional manner, dress shall be commensurate with work being performed.

   c. Dress displaying lewd or controversial innuendos will strictly be prohibited.

   d. Conduct on Williamson County property will be professional in nature.

   e. Any person in the Contractor's employ working on a Williamson County project considered by Williamson County to be incompetent or disorderly, or for any other reason unsatisfactory or undesirable to the Department of Information Technologies, such person shall be removed from work on the Wilco project.

   f. Upon termination, the Communications Contractor shall be restricted from the premises and compensated for the percentage of work completed satisfactorily.

4. Other Contractor Responsibilities

   a. All Contractors working within a WILCO facilities are fully responsible for understanding and adhering to all rules and requirements listed in Appendix A – "WILCO Contractor/Vendor Rules and Regulations".

   b. All Contractors working within WILCO facilities are fully responsible for understanding and adhering to all rules and requirements listed in Appendix B – "POLICY & PROCEDURE CONCERNING ALL ELECTRICAL, TELECOMMUNICATIONS AND NETWORKING INSTALLATIONS AND/OR MODIFICATIONS".

   c. Confirmation of Pathway and Cable Manager Sizing:

      - Wherever cabling pathways or managers are installed, it is the Contractor's responsibility to confirm pathway or manager sizing to represent no more than 35% fill according to manufacturer's fill charts based on projected cable densities when racking systems and cabling pathways are fully populated.
      - Pathways overfilled upon installation will not be accepted and shall be remedied at Contractor expense.

   d. Contractor is responsible for the removal and disposal of all installation and construction debris created in the process of the job. All work areas will be cleaned at the conclusion of the workday and no tools or materials shall be left in a manner as to pose a safety hazard.

   e. Contractor must remove all abandoned cable per Article 800 of the National Electrical Code and per TIA and BICSI standards, recycling these materials where possible. Removal of orphaned cable is mandatory. Contractors must consider this when placing bids.

f. Contractor shall abide by the regulations set by local Williamson County's Security Policy pertaining to access and conduct while on WILCO property.

g. Contractor shall all obey all posted speed limits and parking regulations at the Williamson County facilities where the work is being performed.

F. Warranty

1. General

a. Contractor shall provide a 25 year PanGen ™ System Warranty (or Wilco approved equal) on all copper and fiber permanent cabling links.

b. It is understood the PanGen ™ System Warranty is a system performance warranty guaranteeing for 25 years from acceptance that the installed system shall support all data link protocols for which that Category of copper cabling system or fiber OM/OS designation of fiber optic system is engineered to support according to current and future IEEE and TIA standards.

c. The PanGen ™ System Warranty may be invoked only if the cabling channel links are comprised of continuous Panduit/General Cable components, including patch cords, equipment cords and fiber jumpers.

d. Upon acceptance of Warranty, Panduit will mail a notification letter to the installer and a notification letter and warranty certificate to Williamson County.

2. Contractor Warranty Obligations

a. Installation firm (Contractor) must be a current Panduit Certified Installer (PCI) or approved equivalent manufacturer in good standing and shall include a copy of the company installation certification with the bid.

b. Contractor shall name a supervisor to serve on site as a liaison responsible to inspect and assure all terminations are compliant to factory methods taught in Panduit Technician Certification Training, or approved equal, and according to all Standards cited in the Regulatory References section of this document.

c. Contractor liaison (project supervisor) shall have a current, up-to-date Panduit Certified Technician (PCT) certificate in both copper and fiber. Copies of the copper and fiber certificates of the Panduit liaison shall be submitted with the bid. These requirements are the same for accepted equivalent manufacturers. See "Substitution Policy" for mandatory procedure when offering substitutions.

d. Fiber optic cabling system additions and upgrade to existing facilities shall match the fiber type (OM/OS designation) of the system to which it is being installed. Contractor shall under no circumstances mix different OM/OS classes of cable or termination devices (connectors) within the same system.

e. All intra-building new fiber optic installations shall utilize an appropriate cable constructions as specified herein.

f. All UTP cable pulled and terminated shall be Category 6 cable and connectivity whether new or legacy systems.

g. All UTP terminations within the Williamson County (new) projects shall be terminated using the T568B pin-out (wire map). Legacy additions shall match the copper pin-out of the facility to which cabling is being added-to or upgraded.

h. Contractor shall install all racking and support structures according to cited Standards in such fashion as to maintain both cited industry standards as well as manufacturer recommendations for uniform support, protection, and segregation of different cable types,

i. Contractor is responsible for maintenance of maximum pulling tensions, minimum bend radius, and approved termination methods as well as adhering to industry accepted practices of good workmanship.

j. Contractor is responsible for understanding and submitting to Panduit all documents required prior to project start to apply for the PanGen ™ System Warranty. These include but are not limited to the project information form and SCS warranty agreement. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

k. Contractor is responsible for understanding and submitting to Panduit all documents required at project end. These include, but are not limited to: completed warranty forms, passing test reports and drawings of floor plans showing locations of links tested. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

l. Test results shall be delivered in the tester native format (not Excel) and represent the full test report, summaries shall not be accepted. Contact your Panduit representative for a current list of approved testers, test leads and latest operating systems.

m. The Communications Contractor will correct any problems and malfunctions that are warranty-related issues without additional charge to Williamson County for the entire warranty period.

n. The warranty period shall commence following the final acceptance of the project by Williamson County and written confirmation of Warranty from Panduit. These requirements are the same for accepted equivalent manufacturers. See “Substitution Policy” for mandatory procedure when offering substitutions.

<END OF SECTION>

II. Installation and Maintenance Guidelines

A. Maintenance of Patch Fields

1. Any persons, whether with a Contractor or Williamson County, adding or moving copper or fiber optic patch (equipment) cords shall do so in a neat, workmanlike fashion in keeping with the intended cable management concept and according to all industry best practices as outlined in cabling standards and applicable BICSI publications referenced in this document.

2. Persons performing such moves, adds or changes (MACs) shall further adhere to the following:

    a. Use existing cabling management pathways and take care to place cable like with like, maintaining original segregation strategies for separating fiber and copper cables as well as any separation necessary between different types of copper cables.

    b. Cables shall be dressed neatly within patch management pathways with care taken to maintain minimum bend radius of not less than 4 times the cord outer diameter for copper and not less than a 1" bend radius for fiber jumpers as per ANSI/TIA 568-C.0.

    c. All patch cords used shall be of same copper Category or fiber OM/OS designation as the media used in the permanent cabling links.

    d. Patching in all cases shall be done using factory terminated cords manufactured for that purpose. Hand terminated patch cords will not be accepted.

    e. All patch cords or jumpers must be completely contained within supplied cable management paths. Cables draped across the front cabinets or racks will not be accepted and shall be remedied at Contractor's expense.

    f. Any persons installing or moving fiber optic patch cords for any reason will clean the connector with lint-free wipes and 99% or higher isopropyl alcohol before replacing the connector in a patch or equipment port.

    g. Any technicians, whether with Williamson County or Contractors performing moves, adds or changes within patch field will label additions to the system according to the labeling conventions in place at that facility.

    h. Any persons with Williamson County or installing Contractor performing moves, adds or changes within patch field will record the move according to record system in place at that facility.

B. Cable Pulling and Termination

1. General

    a. Contractor is responsible for installing systems according to all applicable codes and the standards cited in this document.

    b. Contractor shall use grommets to protect the cable when passing through metal studs or any openings that can possibly cause damage to the cable. This includes grommets on ends of hard conduit where

used.

c. Do not deform the jacket of the cable. The jacket shall be continuous, free from pinholes, splits, blisters, burn holes or other imperfections.

d. Install proper cable supports, spaced less than 5 feet apart, and within manufacturer's requirements for fill ratio and load ratings.

e. Leave a pull string to the end of each conduit run. Replace pull string if it was used for a cable pull.

f. Note service loops may not touch the drop-ceiling assembly. Any portion of the communications cabling making contact with ceiling structures must be remedied at the Contractor expense.

g. Label every cable within 12 in. of the ends with self-laminating wire wrap cable appropriate to that cable size. Use a unique number for each cable segment as required by the project documentation and the labeling section of this document.

h. Dress the cables neatly with hook and loop cable ties in telecommunications rooms. Plastic ties are approved in pathways where cable bundles will not be reentered. Contractor responsible for using plenum ties and appliances in air-return (plenum) spaces as required by the local AHJ (Authority Having Jurisdiction).

i. Contractors installing cabling systems in Williamson County facilities shall install plenum rated cable in all instances. Non-plenum cable is not allowed and shall be removed at Contractor's expense.

2. Copper

a. When making additions to legacy systems, Contractor shall match the cabling configuration (pinout) of the existing systems. Legacy systems at Williamson County are in most cases T568B.

b. Within all new installations within Williamson County facilities, contactor shall use copper pinout T568B.

c. All four pair Category 6 cable runs shall be kept to a maximum permanent link length of 83 meters when using a total 10 meters of 28 awg "small diameter" patch cords.

d. Copper links that are 90 meters in permanent link, shall not exceed 6 meters (total) of patch cords when using 28 awg "small diameter" patch cords.

e. Use low to moderate force when pulling cable. Maximum tensile load may not exceed 25' lbs. maximum pulling force per 4 pair cable.

f. No pathway, including conduits shall have greater than a 35% fill per manufacturer fill charts. Contractor is responsible for bringing to the attention of Williamson County project manager any insufficiently sized conduit or cable pathways discovered on site or in project documentation.

g. Keep Category 6 cables as far away from potential sources of EMI (electrical cables, transformers, light fixtures, etc.) as required in cited TIA Standards.

h. All copper horizontal cabling shall have slack service loops no less than 12" at the work area (equipment outlet) and not less than 3 feet in the telecommunications room.

i. Service loops in the work area shall be stored behind the equipment outlet (faceplate).

j. Service loops in the telecommunications room may be wall mounted or contained in pathways or racking

systems if done in a neat, workmanlike fashion.

k. Service loops shall be stored in such fashion as to not violate bend radius, slack touching the drop ceiling is not allowed and must be remedied at Contractor expense.

l. Maintain the twists of the pairs all the way to the point of termination, or no more than 0.5" (one half inch) untwisted.

m. All UTP patching shall be accomplished using Category 6 rated modular patch panels as indicated elsewhere in this document.

n. All removed copper cable is to be disposed of in a Williamson County recycling bin designated for “copper”, or removed from the property to be disposed of by Contractor if this is the instructions in the project documentation.

3. Fiber

a. When making additions to legacy systems, Contractor shall match the fiber type and fiber connectors used within that system.

b. Within all new fiber installations within Williamson County, contactor shall use Panduit cam-style “Opti-cam” LC connectors. See product section and Appendix D for details.

c. When installing fiber cable, Contractor shall maintain a minimum bend radius, both under pulling load and static (installed), per requirements outlined within TIA standards, or manufacturer’s recommendations, whichever is the most stringent.

d. Fiber terminations shall be done according to recommendations of TIA, manufacturer’s requirements and accepted industry best practices.

e. All unjacketed fiber shall be contained within appropriate fiber enclosures. Exposed tight-buffered or loose-tube strands will not be tolerated and shall be remedied at Contractor’s expense.

f. Contractor shall perform test setup and testing according to guidelines in the “Testing and Acceptance” section of this document.

<END OF SECTION>

III. Cabling Systems and Associated Infrastructure

A. Cabling Subsystem I – Horizontal Cabling System

1. Slack (Service Loops) in Horizontal UTP Cable

    a. Horizontal cable in WILCO facilities are routed through conduit, but electrical boxes are not used for low-voltage communications cable.

    b. Contractor shall use low-voltage mounting brackets (“box-eliminators”) for mounting low-voltage communications faceplates.

    c. Contractor shall provide a minimum 12” slack or service loop at the equipment outlet (work area) on each terminated copper horizontal permanent link. Work area slack shall be contained within the wall behind the faceplate if this may be done easily without violating cable bend radius.

    a. Where there is not sufficient space behind the faceplate, Contractor may pull work area slack into the ceiling space and properly store service loop with appropriately rated hook and loop cable ties. Cable slack shall in no instances touch the ceiling grid or associated drop ceiling components or fixtures.

    b. Contractor shall provide a minimum of 10 feet slack or service loop in the horizontal telecommunications room on each terminated copper horizontal permanent link, to be stored on the wall backboard using appropriate mounting fixtures built for that purpose (i.e. D-rings).

    c. Contractor should consult project-specific documentation or the Williamson County project liaison for other mounting methods where wall mount is not an option.

2. Metal Conduit

    a. Cable in horizontal runs in offices shall be routed and contained in metal conduit.

    b. Contractor shall size conduit large enough to accommodate at least 50% growth. I.e. conduit for 4 cables shall be sized to accommodate 6 cables at less than 40% calculated fill based on cable OD.

3. Equipment Outlets (Faceplates)

    a. When adding horizontal cabling to existing facilities within Williamson County, Contractor shall match the existing cable plant in regards to color of existing raceway and faceplates.

    b. Flush mount faceplates in new projects shall be Panduit NetKey ® faceplates (or approved equivalent) with label fields in either electric ivory or international white as called for in the project documentation.

    c. NetKey ® Faceplates shall be available in one, two, four and/or six-port vertical single gang configurations. Faceplates shall further have the following characteristics:

        - Faceplates with no labels shall include painted combination head screws.
        - The faceplates shall mount to standard U.S. NEMA boxes and adapters with screw-to-screw dimensions of 3.28" (83.3mm).
        - Faceplates shall be available with or without labels.

- Dedicated sloped versions shall be available for improved bend radius control and decreased requirements in wall depth.
- Each faceplate shall accept NetKey ® modules that can be individually inserted and removed as required.

d. See Appendix C for faceplate typicals.

e. See Appendix D for faceplate part numbers.

4. Equipment Outlets – Surface Boxes

a. Wireless access points and IP cameras mounted on walls and ceilings utilize single Category 6 horizontal runs (drops) terminated in NetKey 2 hole surface mount boxes (or approved equivalent) having the following properties.

b. Two hole boxes shall further meet the following requirements:

- Boxes shall be in electric ivory or international white as called for in project-specific documentation.
- Able to accept all NetKey ® Modules
- Include mounting screws and adhesive tape
- Be compatible with Panduit® LD3, LD5, and LD10 Raceway.

5. Copper Jacks

a. Modular jacks shall be Panduit Category 6 NetKey ® Jack Modules (or approved equivalent) featuring 110-termination technology and have the following characteristics.

- The eight position modules shall be used in all work areas and shall meet the connector requirements of the TIA/EIA Category 6 standard.
- Termination shall be accomplished by use of a 110 termination.
- The wiring scheme label shall be available with both T568A and T568B wiring schemes.
- The modules shall terminate four pair 24 and 22 AWG 100 ohm solid unshielded twisted pair cable.
- The modules shall be universal in design, including complying with the intermateability standard IEC 60603-7 for backward compatibility.
- Category 6 modules shall have UL and CSA approval. The modules shall have ETL verified Category 6 performance and ISO Class E performance (as defined in ISO/IEC 11801) in both the basic and channel links.
- They shall be universal in design, accepting six or eight pair modular plugs without damage to the outer module contacts.
- The modules shall be able to be re-terminated a minimum of 10 times and be available in 11 standard colors for color-coding purposes.
- The module shall snap into all NETKEY ® outlets and patch panels.

b. Consult project documentation for jack color coding in use for that installation.

c. See Appendix D at the end of this document for part numbers.

6. Category 6 Unshielded Twisted Pair Cable

a. WILCO Category 6 UTP cable shall be plenum PanGen 6 manufactured by General Cable.

b. Standard blue version is part number 7131800. For other colors use table below:

General Cable Category 6 Cable

Jacket Color	GS 6 Pull-Pac® II CMR (Non-Plenum)	GS 6 Pull-Pac® II CMP (Plenum)
Blue	7133800	7131800
White	7133801	7131801
Yellow	7133802	7131802
Gray	7133803	7131803
Red	7133804	7131804
Orange	7133805	7131805
Green	7133806	7131806
Black	7133807	7131807
Pink	7133808	7131808
Purple	7133809	7131809

c. For cable colors on actual project, consult the project documentation.

d. See Appendix D at the end of this document for cable part numbers.

7. Distributor I (Horizontal Patch Panels) – standard density patch panels

a. Williamson County copper patch panels in the horizontal patch fields shall be flat 1 RU or 2 RU NetKey® type with frames of either metal or molded polymer.

b. If made of molded polymer construction, the patch panels shall have the following features:

- Punchdown patch panels shall be a molded design made of polymer material and mount to standard racks and cabinets.
- Punchdown modules shall meet Category 6/Class E performance levels and terminate unshielded twisted 4-pair, 22 – 26 AWG, 100 ohm cable.
- Punchdown tool properly terminates each conductor for optimum performance. Universal T568A and T568B color-coded wiring schemes included.
- Patch panels shall be available in standard density 24 and 48-port configurations.
- Patch panels include pre-numbered labels with writable surface on back.

- Additional numbering engraved in the front and back of the panel.

c. If made of metal frame construction, the patch panels shall have the following features:

- Category 6/Class E punchdown patch panels shall terminate unshielded twisted 4-pair, 22 – 26 AWG, 100 ohm cable and mount to standard EIA 19" or 23" racks.
- Punchdown tool shall properly terminate each conductor for optimum performance. Universal T568A and T568B.

d. For instructions for which patch panel to use consult project-specific documentation.

e. For detailed part numbers see “Appendix D” at the end of this document.

8. Small Diameter Category 6 Copper Patch Cords

a. Copper patching of Category 6 links in Williamson County facilities shall use Panduit 28 awg “small diameter” patch cords having the following characteristics:

- Cable diameter not more than 0.150 in. (3.8mm) nominal.
- Category 6/Class E channel and component performance.
- Exceeds all ANSI/TIA-568-C.2 Category 6 and ISO 11801 Class E Edition 2.1 electrical performance requirements for all frequencies from 1 to 250 MHz.
- FCC and ANSI compliance: Meets ANSI/TIA/EIA-1096-A; contacts plated with 50 micro inches of gold for superior performance.
- IEC compliance: Meets IEC 60603-7 c (UL) US listed: UL 1863, CSA standard C22.2.
- PoE compliance: Meets IEEE 802.3af and IEEE 802.3at for PoE applications in bundle sizes up to 48 cables.
- Operating temperature: 14°F to 140°F (-10°C to 60°C).
- Storage temperature: -40°F to 158°F (-40°C to 70°C).
- Plug housing: UL94V-0 rated clear Polycarbonate.
- Contacts: Gold plated phosphor bronze.
- RoHS compliance: Compliant.
- Flammability rating: CM/LSZH dual rated.

b. Due to miniature size of patch cords, utilize increased attenuation de-rating value of 1.9. These supports 96 meter channels that include 90 meter permanent links, and 6 meters of patch cord. A channel using 10 meters total of patch cord would support a 93 meter channels.

c. For in telecom patch fields, WILCO projects use color coded small diameter patch cords to indicate

various circuits. These colors and circuits they represent are as follows:

Blue = Adminstrative
Yellow = Academic
Green = Wireless
Orange/Red = Public Safety
Purple = Crossover
Grey = Printer
Black = Utility
White = VoIP/Wallphone

d. Consult project documentation for how color coding is to be used on that job.

e. For more detail on use of patch cord color coding in the telecommunications rooms, see Appendix C.

f. See Appendix D for part numbers.

9. Surface Mount Raceway – Wall Mount

a. See Appendix D at the end of this document for part numbers.

10. Modular Furniture Raceway

a. Office and administrative areas repurposing used modular furniture may require additional cable pathway space and shall utilize Pan-Way ® Office Furniture Raceway System, or approved equivalent.

b. Such modular furniture raceway shall provide cable paths along the top of modular furniture partitions dropping services (equipment outlets) at work surface level.

c. Modular furniture raceway must meet the following requirements:

- UL listed in accordance with UL-5C requirements for Class 2 Communication Cable Management Systems.
- Maintains bend radius control throughout the entire office furniture raceway system as required by TIA/EIA-568-B and 569-B.
- Faceplates are compliant with the labeling requirements of the TIA/EIA-606-A standard.
- Robust design and tamper resistant closure increases product stability and prevents damage to cabling during and after installation.
- Product supplied with adhesive backing for fast and easy installation.
- Creates a virtually invisible solution for routing data cables on panels from all common manufacturers with a top cap width between 1.88" and 2.30".
- Designed for use with Pan-Net ® Connectivity, also accepts all common manufacturers' connectivity with use of a NEMA standard 70mm faceplate or module frame.

d. Consult Appendix D for part numbers.

11. Power and Communications Poles

a. Many WILCO offices use power/communications poles to deliver power and data cables from the ceiling into the work area space below.

b. Power/communications poles shall be Pan-Way® Pan-Pole™ Aluminum Outlet Poles for Power and Communication (or WILCO approved equivalent), and must have the following properties:

- Dual channel aluminum pole is equipped with pre-terminated electrical outlets and provides channel separation for the installation of communication cabling and modules.
- UL and CSA rated 600 V.
- Available in 11 or 13 foot lengths and supplied with a non-metallic cover.
- Electrical outlets are pre-wired.
- Pre-installed components include: Blank non-metallic cover, two 20 A factory wired rectangular outlets with wiring fed through power channel to base of power entry box. power entry with 1/2" and 3/4" conduit breakouts, Removable plate for power wiring connections, ground screw pre-mounted behind removable plate.
- Supplied mounting hardware includes: Entry end bend radius fitting, ceiling T-bar bracket, ceiling tile trim plate, end cap, End cap floor grip pad.

c. See Appendix D for part numbers for 11’ and 13’ power/communications poles.

C. Cabling Subsystem II – Intrabuilding Fiber Backbone

a. Intrabuilding singlemode Fiber Trunks are for Use within Buildings.

b. On additions to existing Williamson County fiber cableplant , Contractor shall match existing fiber and connector types.

c. In new Williamson County projects, backbone fiber running between telecom spaces within buildings (cabling subsystem II) shall be singlemode 24 strand Opti-Core® Fiber Optic Indoor Interlocking Armored Cable Armored plenum-rated tight-buffered singlemode cable shall further have the following characteristics:

- Used in intrabuilding backbone, building backbone, and horizontal installations for riser (OFCR), plenum (OFCP), and harsh environments
- Interlocking aluminum armor eliminates the need for inner duct or conduit to provide a smaller crush resistant pathway for design flexibility and a lower installed cost
- Available in 6, 12, 24, 36, 48, 72, 96 and 144-fiber counts
- Multimode (OM4, OM3, OM2, and OM1) and singlemode (OS1/OS2) fiber available optimized) fiber available
- Sheath markings provide positive identification, quality traceability, and length verification

- 900µm standards-based color-coded buffer coating protects fibers during handling and allows for easy identification and stripping
- Cable design and flexible buffer tubes allow for quick breakout and ease of routing
- Opti-Core ® 10Gig ™ Fiber Optic Cable is designed to support network transmission speeds up to 10 Gb/s for link lengths up to 300 meters for OM3 and up to 550 meters for OM4 with an 850nm source per IEEE 802.3ae 10 GbE standard; backward compatible for use with all 50/125µm system requirements

d. Contractor shall terminate tight-buffered cable constructions with Panduit Opti-cam LC fiber connectors.

e. See Appendix D for part numbers.

D. Cabling Sub-system III – Interbuilding Fiber Backbone

1. Singlemode Fiber Trunks for Use Between Buildings

a. On additions to existing Williamson County fiber cableplant. Contractor shall match existing fiber and connector types.

b. In new Williamson County projects, backbone fiber running between buildings (cabling subsystem III) shall be Panduit 48 strand Opti-Core® Gel-Free Fiber Optic Indoor/Outdoor All-Dielectric Cable, or College approved equivalent.

c. Loose tube outside plant cable shall be terminated in the entrance facility using Panduit Opticam connectors with appropriate fan-out kits.

d. Fanout kits shall have the following properties:

- Used to build up 250µm fiber to 900µm loose buffered coating size for connector termination
- • Include 900µm hollow tubing and plastic housings
- • Include adhesive tape for mounting
- • Include TEFLON* powder for easy insertion of fibers

a. Length: 1 meter (39.37")

b. Refer to Appendix D for part numbers.

c. Interbuilding fiber trunks must have the following features:

- Allows installation using loose tube cable methods within buildings and outdoor environments for transitional aerial and duct applications, and in entrance facilities that require riser (OFNR) or plenum (OFNP) rated cable
- Eliminates the need for building entrance transition point
- All-dielectric cable construction requires no grounding or bonding
- UV resistant cable sheathing meets the light absorption requirement defined by Telcordia GR-20, Issue 2 to withstand harsh outdoor environmental demands
- Dry water-blocking technology allows rapid cable preparation and termination for lower termination

costs and time (no messy gel required)

- Available in 6 and 12-fiber counts in “central loose tube” design, and in 24, 36, 48, 72, 96 and 144-fiber counts in a “stranded loose tube” design
- Multimode (OM4,OM3, OM2, and OM1) and singlemode (OS1/OS2) fiber available
- Sheath markings provide positive identification, quality traceability, and length verification
- 250µm buffer coating protects fibers during handling and allows for ease of stripping
- Opti-Core ® 10Gig ™ Fiber Optic Cable is designed to support network transmission speeds up to 10 Gb/s for link lengths up to 300 meters for OM3 and up to 550 meters for OM4 with an 850nm source per IEEE 802.3ae 10 GbE standard; backward compatible for use with all 50/125µm system requirements
- Contractor shall terminate loose-tube cable constructions between buildings with LC pigtails as indicated elsewhere in this document.

d. See Appendix D part numbers.

E. Fiber Connectivity

1. LC Fiber Connectors

a. All LC terminations shall be done with Panduit fusion splice pigtails having the following properties:

- TIA/EIA-604 FOCIS-10 compatible connectors.
- Exceed TIA/EIA-568-B.3 requirements.
- Connector backbone and boot colors follow TIA/EIA-568-C.3 suggested color identification scheme.
- Insertion loss: 0.3dB average (multimode and singlemode).
- Return loss: >26dB (10Gig ™multimode), >20dB (multimode), >50dB (singlemode).
- Quick installation; provide field termination in less than half the time of field polish connectors.
- Patented re-termination capability provides yield rates approaching 100%.
- Factory pre-polished fiber endface eliminates time-consuming field polishing to reduce installation costs, labor, scrap and the number of tools required.
- Cable retention boot assemblies consistently provide higher than industry standard cable retention.
- Non-optical disconnect maintains data transmission under tensile loads for jacketed cable.

b. See Appendix D for part numbers on cam-style LC fiber connectors.

2. Fiber Enclosures

a. Fiber cable terminations shall be contained in 2 RU, or 4 RU Panduit FCE series rack mount fiber enclosures, or WILCO approved equal.

b. Contractor shall select enclosure size as needed for the number of fibers projected to be in that telecommunication space when fully populated.

c. Contractor shall fill any unused enclosure space with a blank fiber adapter panel (FAP).

d. FCE enclosures shall further have the following properties:

- Be able to hold QuickNet ™ Fiber Optic Cassettes, Opticom ® Fiber Adapter Panels, or splice modules.
- Have a slide-out, tilt-down drawer to provide full front access to all fibers and cables.
- Employ integral bend radius control and cable management appliances for fiber optic patch cords.
- Have rear cable management for proper slacking/spooling of trunk cable break-outs and interconnect cables.
- Have multiple trunk cable entry locations and include fiber optic cable routing kit (grommets, cable ties, spools, strain relief bracket, and ID/caution labels) for different installation configurations.

e. See Appendix D for part numbers.

3. Loose-tube cable and Fusion Splicing with LC Pigtails

a. Outdoor rated loose-tube fiber shall be terminated at the demarcation with fan-out kits and Panduit OptiCom cam-style connectors. The fan out kit shall meet the following requirements:

- Used to build up 250µm fiber to 900µm loose buffered coating size for connector termination.
- Include 900µm hollow tubing and plastic housings.
- Include adhesive tape for mounting.
- Include TEFLON* powder for easy insertion of fibers.
- Length: 1 meter (39.37").

4. Fiber Adapter Panels

a. FCE fiber enclosures shall be populated with fiber adapter panels containing either 6 LC singlemode duplex fiber adapters, or 12 LC singlemode duplex fiber adapters depending on the density needs of the telecom room.

b. Consult project documentation to determine whether 6 or 12 LC singlemode duplex adapters are to be used on a given job.

c. Contractor is responsible to blank out any enclosure spaces where adapter panels are not used.

d. Adapter panels shall further have the following features:

- Loaded with TIA/EIA-604 FOCIS-10 compatible adapters.
- Exceed TIA/EIA-568-B.3 requirements.
- Adapter housing colors follow TIA/EIA-568-C.3 suggested color identification scheme.
- Snap quickly into the front of all Opticom ® components

- LC fiber adapter panels are Sr/Jr. to conserve enclosure space.
- Accept FOCIS-10 compatible senior LC connectors at either end and FOCIS-10 junior LC connectors at the inside end for behind the wall applications.
- Both ends accept FOCIS-10 compatible senior LC connectors.
- Junior end also accepts FOCIS-10 compatible junior (fixed ferrule/springless) LC connectors.
- Choice of phosphor bronze or zirconia ceramic split sleeves to fit specific network requirements; zirconia ceramic split sleeves are recommended for OM4/OM4 multimode and OS1/OS2 singlemode applications.
- Every adapter is laser marked with Q.C. number to assure 100% traceability.
- LC adapters are also available in QuickNet ™ Fiber Optic Cassettes.

e. Consult Appendix D for fiber adapter panels and blank adapter panels.

5. Fiber Patch Cords

a. Fiber patch fields within Williamson County facilities shall utilize riser rated singlemode “push/pull” fiber jumpers (fiber patch cords) that have the following properties:

- Push-Pull LC Duplex Fiber Optic Patch Cords shall feature the push-pull strain relief boot and duplex clip, to allow users easy accessibility in tight areas when deploying very high density LC patch fields.
- Jumpers shall be available in OM3, OM4 and single-mode and be available in in riser (OFNR), plenum (OFNP), and low smoke zero halogen (LSZH) rated jacket materials.

b. See “Appendix D” at the end of this document for singlemode push/pull LC jumper part numbers.

F. Cable Pathways

1. Overhead Metallic Pathway

a. Cable delivery over racking systems in telecommunications rooms shall be done with Wyr-Grid® overhead cable tray routing system or College approved equal.

b. Any pathway offered must have the following properties:

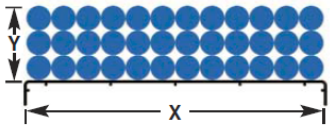
- Wyr-Grid® Pathways are provided in four widths: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm).
- Wyr-Grid® System incorporates non-integral snap-on sidewalls which minimize specification requirements and are offered in three different heights: 2" (50mm), 4" (102mm), and 6" (152mm).
- Wyr-Grid® Splice Connectors have an integral bonding screw that creates a mechanical-electrical bond between cable tray pathway sections.
- Wyr-Grid® Waterfalls are offered in two different configurations that attach to all pathway sections: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm) to facilitate bend radius control and cable management.

- Wyr-Grid® Support Brackets are offered in various widths to accommodate pathways: 12" (305mm), 18" (457mm), 24" (610mm), and 30" (762mm); have integral quick-clip retention; accommodate 1/2" or 12 mm threaded rods.

c. All metallic cable trays must be grounded and all sections bonded in accordance with listing requirements for the particular type of system and per TIA 607-B including most recent revisions, TSB and addenda.

d. Contractor is responsible sizing all pathways to represent no more than a 35% fill upon installation per manufacturer's fill chart below:

Wire Fill for Wyr-Grid® Overhead Cable Tray Routing System



X (in.)	Y (in.)	Internal Area (in^2)	Category 6A (SD) Diameter 6.1mm 0.240"	Category 6A Diameter 7.6mm 0.300"	Category 6 Diameter 6.1mm 0.240"	X (in.)	Y (in.)	Internal Area (in^2)	Category 6A (SD) Diameter 6.1mm 0.240"	Category 6A Diameter 7.6mm 0.300"	Category 6 Diameter 6.1mm 0.240"
12.2	2	24.3	269	172	269	24.2	2	48.3	534	342	534
	4	48.7	538	344	538		4	96.7	1069	684	1069
	6	73.0	807	516	807		6	145.0	1603	1026	1603
18.2	2	36.3	401	257	401	30.2	2	60.3	666	427	666
	4	72.7	804	514	804		4	120.7	1334	854	1334
	6	109.0	1205	771	1205		6	181.0	2000	1280	2000

"Y" equates to the height of the Wyr-Grid® Optional Sidewalls. The internal area defines the allowable fill capacity based on the Wyr-Grid® Pathway width and optional sidewall height. The Wyr-Grid® Pathway cable fill is based on NEC allowable fill of 50%.
The above cable diameters represent the nominal Panduit cable diameter per performance level.

e. All cable trays and grounding conductors should be clearly marked in accordance with manufacturer's instructions, applicable codes, standards and regulations.

f. Contractor shall take care to segregate and protect armored fiber from copper cabling in metallic pathway.

g. Bundled copper and fiber backbones shall be dressed to maintain segregation of cable types throughout the pathway. Innerduct or separate fiber duct is not necessary due to armored construction on fiber backbone.

h. See Appendix D for part numbers.

2. J-Hooks

a. Bundles of 120 Category 6 cables or less may be required to be routed above ceilings using J-hooks. Check project documentation for clarification.

b. J-hook systems used by Williamson County shall be Panduit "J-Pro" series, or Williamson County approved equivalent.

c. Contractor installing J-hook systems shall space them no more than 5 feet apart as per TIA 569-C standard.

d. Contractor is responsible for proper sizing of J-hook systems based upon cable count and manufacturers recommendations for fill, with new J-hooks to have not more than 30% fill per manufacturer's fill charts

based upon projected worst case future bundle size.

e. If J-hooks are deemed too small by above criteria, Contractor shall bring this to the attention of Williamson County for resolution in writing. J-hook pathways that will not have sufficient capacity should be replaced in the design with the proper sized basket tray for future cable additions and flexibility.

f. J-hook systems used by Williamson County shall have the following properties:

- Patented design provides complete horizontal and vertical 1" bend radius control that helps prevent degradation of cable performance.
- UL 2043 and CAN/ULC S102.2 listed and suitable for use in air handling spaces.
- Pre-riveted assemblies allow for attachment to walls, ceilings, beams, threaded rods, drop wires and underfloor supports to meet requirements of a variety of applications.
- Wide cable support base prevents pinch points that could cause damage to cables.
- Cable tie channel allows user to easily install 3/4" (19.1mm) Tak-Ty ® Cable Ties to retain cable bundle.
- Durable non-metallic J Hook materials provide the ability to manage and support a large number of cables.
- Material: Black Nylon 6.6 J Hook with metal attachments.

g. See Appendix D for part numbers.

G. 19” Racks and Rack-mount Cable Managers

1. General:

a. WILCO will often use a “active rack/passive rack” strategy, putting all active electronics on one rack and all associated patching on an adjacent rack. Consult project documentation for details on particular job.

2. Two-post Communications Racks

a. 2-post racks will be Panduit black-powdered aluminum (or WILCO approved equivalent) and have the following properties:

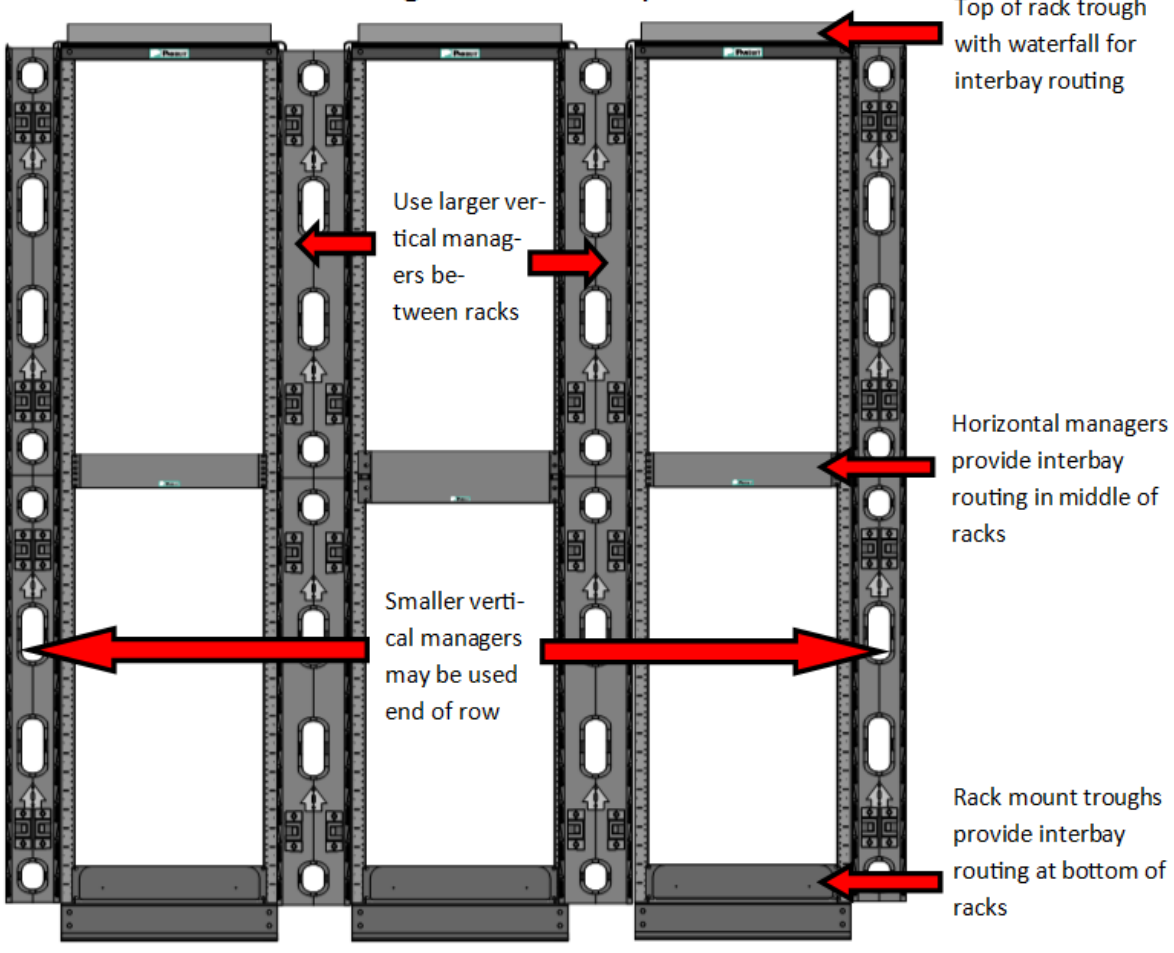
- 19" EIA rack, aluminum.
- Dimensions: 96.0"H x 20.3"W x 3.0"D (2134mm x 514mm x 76mm).
- Rack units numbering up from bottom to allow quick and easy location of rack mount items
- UL listed for 1,000 lbs. load rating.
- Double-sided #12-24 EIA universal mounting hole spacing with 24 #12-24 mounting screws included.
- Accepts all Panduit cable management and patch panel products in addition to any industry standard 19" components.
- Includes paint piercing washers for assembly to assure electrical continuity between components as

pert TIA 607-B Bonding and Grounding Standard.

b. In telecommunications rooms with multi-bay rack rows configured such that patching will take place between racks, Contractor is responsible to include in design interbay routing pathways at the top, middle and bottom of each bay to provide efficient and neat routing between any two points within rack rows.

Interbay routing shall be provided in the form of top troughs, interbay mid-rack path and flanged shelf at the bottom. See rack configuration example below.

Rack Configuration Example



Size all cable managers to contain no more than 35% fill per manufacturer's fill tables upon installation

c. For bottom-of-rack interbay routing where cable quantities exceed capacity of CMUT19 troughs, Contractor shall substitute 4RU trough CMLT19.

d. All racks shall be outfitted with a vertical grounding busbar along one rail, with all equipment bonded to ground according to TIA 607-B Bonding and Grounding Standard. See Bonding and Grounding section of this document for details.

e. See Appendix D for part numbers.

3. 4 Post Racks

a. Racks in large equipment rooms and data centers may require 4 post racks. These racks shall have the following properties:

- Independent adjustable front and rear mounting rails can be adjusted while the rack is secured to the floor
- Printed rack space identification on all equipment rails allows for quick location of rack spaces, speeding
- installation of rack mount items (shipped numbers up per TIA606 specifications; can be set to number down by flipping the rails)
- Rack is UL listed for 2,500 lbs. load rating
- Rear rail construction provides a clear ventilation path for side ventilated switches
- Multiple mounting holes in top flanges for securing ladder rack
- Weld nut construction eliminates the need for a second wrench increasing speed and ease of assembly
- Multiple mounting locations for vertical power strips on any of the four posts or on the adjustable mounting rails
- PatchRunner ™and NetRunner ™ Vertical Cable Managers mount directly to the 4 post rack at any of the four corners to provide a flexible end-to-end cable management solution
- Paint piercing washers included

b. See Appendix D for 4 post racks part numbers.

4. Rack-mounted Cable Management – Vertical Managers

a. Vertical cable managers shall be NetRunner™ Vertical Cable Management System in sizes 4.9” wide, 6.7” wide, or WILCO Williamson County approved equivalent.

b. Contractor will use double sided (front and back) vertical managers on 2-post racks.

c. All vertical cable managers shall have dual hinged doors.

d. Contractor shall choose vertical cable manager width according to manufacturer’s fill tables to not represent more than a 35% fill at installation based on projected worst-case density when racks are fully populated.

e. Contractor shall bring to the attention of WILCO any case where the populated rack will exceed 35% upon installation for resolution from the Department of Information Technologies.

f. Vertical cable managers shall have the following features:

- Large finger openings accommodate up to 24 Category 6 cables
- Integral cable retainers on the end of each finger to help contain cables within each rack unit
- Bend radius fingers align with rack spaces to support cables as they transition to the vertical pathway
- Dual hinged covers can be opened 110° to the left or right to provide complete access to the cables inside the vertical pathway
- Snap-on cable retainers can be placed on to fingers to help retain cables in channel during installation and maintenance
- Vertical managers include hinged covers, cable retainers, mounting brackets and #12-24 screws

g. Part numbers are listed in Appendix D.

5. Rack-mounted Cable Management – Horizontal Managers

a. Contractor shall user double-sided PatchLink ™ Horizontal Cable Managers (or WILCO approved equal) in sizes 1 RU and 2 RU having the following features:

- Lightweight plastic construction provides durability and easy installation.
- Patented dual hinged cover allows cable access without removing cover.
- Rounded edges on fingers protect cables from snags and damage to cable.
- Flexible fingers allows easy installation and removal of cables.
- Increased finger spacing provides larger area for high performance Category 6 cables.
- Pass-through holes allow front to rear cabling.
- Mount to standard 19" EIA racks and cabinets.
- Covers, #12-24 and M6 mounting screws included.

b. Part numbers are listed in Appendix D

H. Cable Accessories

1. Cable Ties

a. Cable bundles on racks and in pathways shall be bundled with re-enterable hook and loop cable ties that come in continuous rolls.

b. Contractor is responsible for using plenum hook and loop ties in air-return spaces.

c. See “Appendix D” for part numbers.

2. Physical Security Devices

    a. Some portions of Williamson County networks require additional physical security devices. These take three forms:

        - Devices that block-out copper and fiber ports in patch fields and faceplates that require a special tool for removal.
        - Devices that lock-in copper patch cords and require a special tool for removal of those patch cords.
        - Devices that temporarily or permanently block USB ports on laptops and computers.

    b. Areas where such devices are required will be called out in the project documentation.

    c. See Appendix D for part numbers.

I. Communications Grounding Network

1. General

    a. Contractor is responsible for bonding to ground all newly placed equipment and installed racks or cabinets per the TIA 607-B Standard.

2. Room Busbars

    a. All Telecommunications spaces and distributor rooms shall have installed an appropriately sized wall-mount busbar with BICSI hole spacing that bonds to the building bonding backbone.

    b. See Appendix D for appropriate room telecommunications grounding busbar.

3. Rack and Equipment Grounding

    a. Contractor is responsible for properly grounding all network equipment, racks and cabinets and bonding them to the wall mounted busbars as described in the TIA 607-B standard.

    b. All newly installed racks and cabinets shall have installed a vertical busbar mounted along one equipment rail to serve as a clean, low-resistance bonding place for any equipment not equipped with a designated grounding pad.

    c. Smaller equipment without an integrated grounding pad shall be bonded to the vertical busbar through the use of a thread-forming grounding screw that is anodized green and includes serrations under the head to cut through oxidation or paint on the equipment flange.

    d. Larger equipment (chassis switches) with a designated grounding terminal shall be bonded to the vertical busbar with an EBC (equipment bonding conductor) kit built to that purpose.

    e. Contractor shall take care to clean (wire brush, scotchbrite pads) any metallic surface to be bonded down to bare metal and apply a film of anti-oxidation paste to the surfaces prior to effecting the bond.

    f. All bonding lugs on racks and busbars shall be of two-hole irreversible compression type. Mechanical lugs and single-hole lugs will not be accepted and shall be removed and replaced at Contractor's expense.

g. Every rack or cabinet shall have an individual bonding conductor into the grounding network, serially connecting (daisy-chaining) of racks is expressly forbidden and will not be accepted.

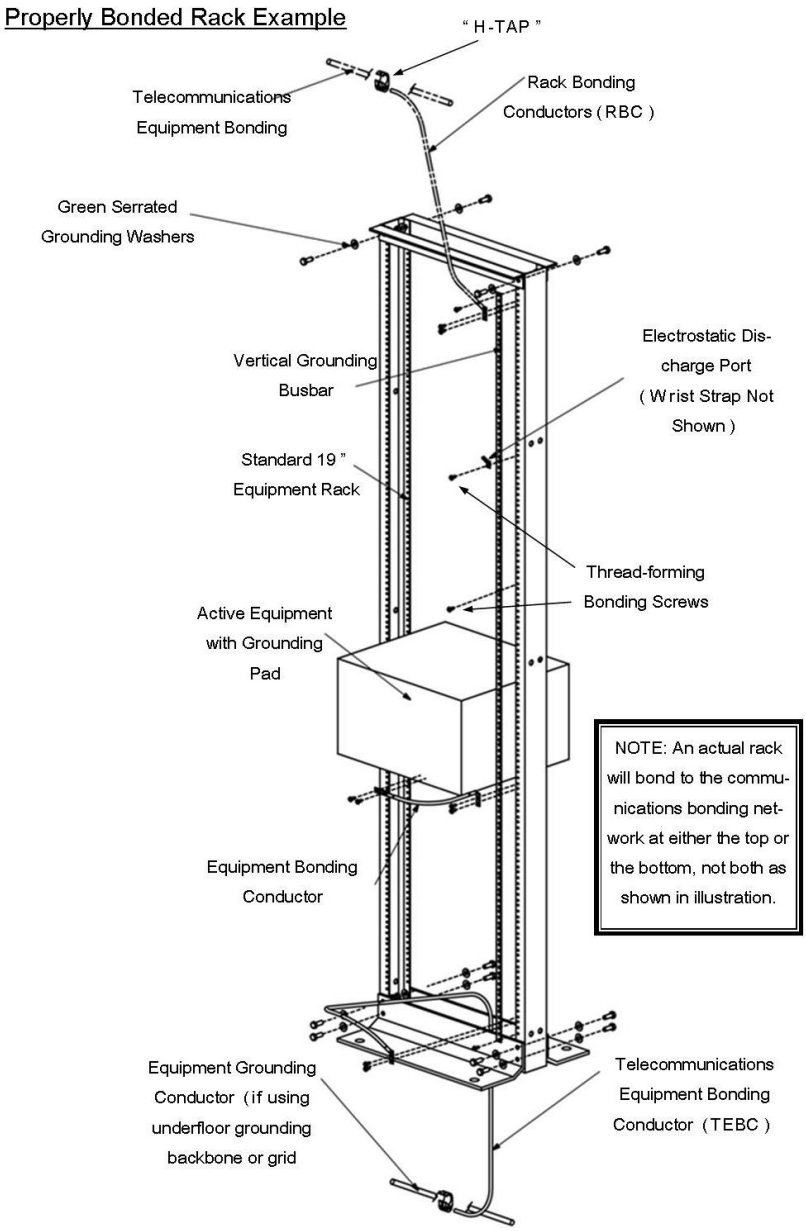
h. Rack Bonding Conductors (RBC) may tap into an overhead or underfloor aisle ground, or may run to the wall-mounted grounding busbar in smaller Telecommunications rooms containing 5 racks or less.

i. A minimum of every other rack or cabinet shall be outfitted with a properly installed and bonded ESD (electro-static discharge) port along with a wrist strap and lead to be used by any technicians servicing network equipment. On four post racks and cabinets these ESC ports and straps shall be provided on front and back to be accessible and able to reach any active equipment needing servicing.

j. Armored cables shall be properly bonded to the earthing system on both ends with a kit built to that purpose.

k. For examples of rack grounding refer to the illustrations below:

WILLIAMSON COUNTY CABLING SPECIFICATION



<END OF SECTION>

IV. Network Labeling

A. General Requirements

1. When labeling any Williamson County network system, Contractor shall adhere to the following requirements:

    a. All cabling added to existing “legacy” installations shall follow the labeling convention in place at that location.

    b. All labeling of installed cabling in new (Greenfield) projects shall satisfy all requirements of TIA 606-B, or be modified as indicated in the project specific documentation.

    c. Contractor shall, wherever possible pre-print labels using Panduit Easy-Mark software and laser jet printer, or WILCO approved equivalent.

    d. The Panduit PanTher (LS8E) hand-held thermal transfer printer or WILCO approved equivalent shall be used on site to print labels that were unanticipated, or that become damaged in application.

    e. This labeling strategy shall, at a minimum, clearly identify all components of the system: racks, cables, panels and outlets, grounding, pathways and spaces like telecommunications rooms.

    f. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.

    g. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme.

    h. All label printing will be machine generated by either hand-held labeling systems or computer generated using programs and materials built specifically for communications labeling.

    i. Hand written labels will not be accepted and must be remedied at Contractors expense.

    j. Cabling system labels shall utilize materials designed to outlast the cabling elements to which they attach. Office quality labels will not be accepted.

    k. Cable labels shall be self-laminating, appropriately sized to the outside diameter of the cable and placed within view at the termination point on each end.

    l. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.

    m. Machine-generated labels shall be installed behind the clear lens or cover on any device that provides such an option.

    n. All labels will be permanently affixed to installed cables, patch panels, racks, cabinets, and enclosures.

    o. Conduit shall be marked indicating the identification of the cable within.

    p. Labels shall be legible and placed in a position that insures ease or visibility.

    q. Label type must be as listed in Appendix D - Materials section at the end of this document.

<END OF SECTION>

V. Testing and Acceptance

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions.

2. All copper pairs or optical fibers of each installed cable shall be tested and verified prior to system acceptance.

3. Any defect in the cabling system performance or installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors or fibers in all cables installed.

4. All cables shall be tested in accordance with this document, the ANSI/TIA Standards, the PANDUIT® ™ System Warranty guidelines and best industry practice.

5. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Link Testing

1. All twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA 1152 and ANSI/TIA 568-C.2 for the appropriate Category of cabling installed using a test unit meeting a minimum IEC IIIe level of accuracy.

2. All testers used must have been factory calibrated by the manufacturer within one year of use or according to factory calibration recommendations, whichever is the more stringent.

3. Contractor shall set references according to manufacturer's recommendation prior to each day's testing and reset references anytime tester is left unused for more than two hours.

4. For warranty purposes, Contractor shall perform the appropriate Permanent Link test. Channel Link testing is rendered void by the movement of patch cords and can be run but not used for final acceptance criteria.

C. Fiber Testing

1. All installed fiber shall be tested for link-loss in accordance with ANSI/TIA-C.0 and shall be within limits specified within ANSI/TIA-C.3, or as spelled out in the project documentation.

2. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in **both directions** at 850 nanometer (nm) **and** 1300 nm using an LED light source and power meter.

3. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

4. Backbone & WAN single-mode fiber cabling shall be power tested at the 1310 and 1550 wavelengths in both directions. OTDR traces shall be performed in both directions at 1310 and 1550 wavelengths. End face termination/connector captures shall be performed on each connector with a passing result.

5. Test set-up and performance shall be conducted in accordance with ANSI/568-C.0 standard, Method B.

6. Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. Only basic link-loss testing with a power meter is required. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above.

7. The values for calculating loss shall be those defined in the ANSI/TIA 568-C.3 Standard. If the link loss requirements defined within the standard are in conflict with those referenced in the project documentation, Contractor shall immediately bring this to the attention of Information Technologies for resolution.

D. System Documentation

1. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to Williamson County for approval. Documentation shall include the items detailed in the sub-sections below.

2. Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

3. Contractor shall submit with drawings a diagram of each telecommunications room with indicating which cabling drops will terminate in which rooms (rooms). This is both to give an idea of contractor cableplant design, as well as to facilitate future troubleshooting.

4. At the request of the Information Technologies Engineer, the telecommunications contractor shall provide copies of the original test results in tester native format, not spreadsheet.

5. Information Technologies may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by Information Technologies, including a 100% re-test. This re-test shall be at no additional cost to Williamson County.

E. Test Results

WILLIAMSON COUNTY CABLING SPECIFICATION

1. Documentation shall be provided in electronic format within three weeks after the completion of the project. The media shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year).

2. The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). Documentation shall also include test equipment name, manufacturer, model number, serial number, software version and last factory calibration date.

3. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation.

4. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

5. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. Alternately, the telecommunications contractor may furnish this information in electronic form.

6. The media shall contain the electronic equivalent of the test results as defined by the specification along with the software necessary to view and evaluate the test reports.

7. When repairs and re-tests are performed, the action taken shall be noted, and both the failed and passed test data shall be documented.

8. The As-Built drawings are to include cable routes and outlet locations. Their sequential number as defined elsewhere in this document shall identify outlet locations.

9. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. Williamson County will provide floor plans in electronic (PDF) formats on which as-built construction information can be added.

10. These documents will be modified accordingly by the Telecommunications Contractor to denote as-built information as defined above and returned to Williamson County.

11. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (PDF) form.

<END OF DOCUMENT>

Appendix A – WILCO Contractor/Vendor Rules and Regulations

WILCO Contractor/Vendor Rules and Regulations

WILCO maintains specific rules and regulations that apply to all contractors and vendors who perform work or provide services. It is the responsibility of the contractor or vendor to insure that all rules and regulations are adhered to at all times. Any employee of the contractor or vendor who does not adhere to the rules and regulations will be asked to leave the property and will not be permitted to return. Poor conduct will not be tolerated.

You or your company may not perform any work or services in the building or on the grounds until the following mandatory requirements are met:

1. A certificate of liability insurance for your company must be filed in the Facilities Office. The certificate must be current and must meet building insurance requirements for coverage and indemnification.
2. All subcontractors must be approved by the Facilities Office.
3. Each worker, whether employed by your company or by a subcontractor, must possess an understanding of building safety procedures.
4. All permits must be displayed and a copy must be on file in the Facilities office.

The following general rules apply to all vendors, contractors and subcontractors:

1. **Smoking is not allowed. All Wilco Facilities are tobacco free areas.** No smoking in any area of the buildings, roof or loading docks.
2. All workers are expected to behave professionally. Please remember the importance of your appearance and professionalism to our community.
3. All contractors must wear proper attire while on the premises. Shirts or hats with profanity are not permitted on the property. All contractor employees must have identification with their company's name on it.
4. All combustible and flammable materials or liquids must be stored properly and the Facilities Office must be notified of the presence of such materials.
5. Please check in at the Facilities office for building access and/or prior to starting any work.

General Requirements:

1) All construction and construction related activities will conform to all State, Local, Federal & OSHA laws
2) Contractor shall ensure that the construction site and adjoining areas including hallways and access ways are kept clean at all times. Areas not under construction but affected by or used during construction are to be protected from damage. Floors and carpets are to be covered with protective materials.
3) Contractor shall be responsible for the repair of all damages caused by them or their subcontractors.
4) Construction signs and/or barriers visible to tenants and guests of the building must be approved by Facilities Office prior to installation.
5) Physical or verbal abuse or harassment of any individual is prohibited.
6) Workers will be allowed in area where construction is taking place. All work which requires entering other tenant areas or common areas will be coordinated with Facilities Office.

WILLIAMSON COUNTY CABLING SPECIFICATION

7) No food or coffee breaks are allowed in common areas of the building or in a tenant's space. The only approved break areas are designated within construction area if unoccupied, and the dining area of the café and the courtyard (weather permitting)
8) Work being done outside of the hours of 7:00 am – 4:00 pm must be coordinated with the Facilities Office. If it is determined by Facilities that a fire watch is needed the contractor will be responsible for those charges.

Cleaning

1) It is expected that all areas outside of the work area will be kept clean to include but not limited to:
   a) Common areas
   b) Elevator/Loading dock routes
   c) Exterior areas
2) Work areas must be kept clean at all times. Each contractor is responsible for removing any rubbish associated with their work activities. It is the contractors responsibility to vacuum and dust common areas if work activities create excessive dust and trash
3) It is expected that walk off mats will be used at all areas of entry and exit of the space. The mats should be changed frequently to keep a tidy appearance and upon request of the Facilities Office.
4) It is expected that if construction deliveries coming from the loading docks cause excessive dirt and damage to the existing finish of the common area floors as deemed by Facilities Office, the contractor will be expected to reimburse the facility for stripping and waxing or cleaning of the carpet. If this policy is not adhered to, the building will take appropriate action and charge back the contractor all costs associated with the activity.
5) If damage does not clean or is unable to be repaired the contractor will be responsible for the replacement of the goods.
6) Utility sinks are to be cleaned if used. No construction waste, paint thinner or other obstructing or hazardous materials are to be poured done the drain or left to clog the sinks
7) Carpets and flooring within the work area as well as the common areas must be maintained in a clean and undamaged condition at all times. Contractor shall be responsible for any damage and should report any preexisting conditions prior to the commencement of work.
8) Fire Exit doors and/or evacuation pathways must be open at all time and free of debris or clutter
9) There will be a mandatory post work inspection completed. This will consist of a representative from Facilities, along with a representative from the company completing the work. This will be to inspect the work completed, as well as the cleanliness of the area at the finish of the project. The associated post inspection form must be completed and signed by both representatives. Any requests made from the facilities department during this time must be met prior to receiving payment for work. If contractor does not comply with post work inspection, they will be back charged for any costs associated to correct the issues.

Construction

1) All Air Handling Returns must have additional filtering during heavy construction activity. Contractors must notify Facilities Office prior to using any products that could generate dust or odors that may migrate into the buildings HVAC system or other tenant spaces. Off hour restrictions may be required.
2) All construction related trash must be properly disposed of in a construction dumpster by contractor. Facilities will approve location.
3) A representative of the Facilities will be in attendance at all weekly job meetings.
4) The owner reserves the right of first refusal on all demo'd materials
5) Smoking is not allowed.

6) Any unused materials such as conduit, wiring, building materials must be disposed of by the contractor
7) Prevailing wage rates must be posted at the worksite in accordance with M.G.L. ch.149 sec.27. It is the responsibility of the contractor to maintain all state and local postings
8) Hot Works- will be coordinated and permitted through the Facilities Department. Prior to any welding, soldering or metal cutting, contractors must present the Facilities Office with a fire plan and proof of fire watch and permit.

- All Fire alarm wiring must be installed in conduit clearly labeled every 10'

Roof Access

1) Roof access must be coordinated with Facilities
2) There is no smoking on the roof
3) Clean up all debris including loose screws
4) Any damage to the roof will be the responsibility of the Contractor to repair

Shut Down coordination

1) All shut down's must be coordinated with the Facilities Office. If the building systems are shut down for any reason, the contractor must first coordinate through the Facilities Office such activities allowing time to notify all appropriate parties. At any time the contractor accidentally causes a building system to fail, the contractor will be responsible for all costs associated with that failure.
2) All shut downs must be back on line by the end of the day. Shut downs are NOT permitted overnight.
3) Facilities must approve that services are back on line to their satisfaction BEFORE the contractor leaves the property.

Noise coordination

1) All noise will be contained. Please keep all doors closed to help to contain sound as well as dust. No Music will be allowed
2) Employee occupied space will be handled with the utmost respect.
3) Complaints of excess noise will be handled immediately. Management reserves the right to stop all work if the work causes complaints from other tenants. Any charges, fees and/or other costs associated with scheduled or non-scheduled work stoppage is the responsibility of the contractor doing the work.
4) All floor and wall penetrations must be fire stopped.

Core Drilling

1) Core Drilling or any other work causing noise disruption must be coordinated with the Facilities Office. Absolutely no work will be permitted that in any way disrupts daily activities during normal working hours unless prior authorization from Facilities is granted

Elevator Use

1) The elevators will be used according to their proper designation and weight capacity. Freight Elevator will be used for all construction related materials and or utility carts
2) Priority use must be given to faculty and staff use. Please do not enter an elevator with construction equipment with faculty or staff.
3) Floor and wall protection must be used at all times

Loading dock

1) Use must be coordinated with the Facilities Office
2) Deliveries must be coordinated with the Facilities Office
3) Loading docks will be kept clean and free of construction materials. Storage is not allowed on or around the loading dock
4) Floor protection must be used when entering the common areas from the loading dock
5) No Smoking on or around the loading dock area

Security

1) A contact lists must be provided to the Facilities office of all Trades, to include emergency contact information
2) No smoking allowed. Absolutely no smoking in project area or within any building on site.
3) No alcohol is allowed in any project areas.
4) Entry to other non-project related spaces or unauthorized areas are strictly prohibited.

Insurance:

The Contractor shall purchase and maintain, in a company or companies licensed to do business in the state in which the contract services are to be performed, insurance as set forth below which will protect the Contractor, Owner, and the Agent, and their respective employees, agents, successors and assigns, from claims which may arise out of or resulting from Contractor's operations under the Agreement, whether such operations are to be performed by the Contractor, its subcontractors, or by anyone directly or indirectly employed by any of them for whose acts they may be liable. The Contractor must bring the insurance certificate to the Wilco Purchasing Office prior to any work commencing.

We require Certificate of Liability Insurance from each vendor we contract with. The following information should be included:

a. General Liability
b. Automobile Liability
c. Workers Comp& Employee Liability
d. Description of Operations must be filled out. Please include "It is hereby agreed that Williamson County is additionally insured and will be held harmless for all damages you create"

Life Safety Procedures

1) In the event of a medical emergency, fire or life threatening emergency, workers should call Facilities at 512-943-1599 or house phone 911

2) Facilities must be notified of any injuries that occur on the property

Life Safety Systems

1) If there is a possibility that the life safety equipment has been compromised, Facilities must be notified immediately.
   a) WILCO Facilities Office (512) 943-1599
2) No propping open fire doors.

3) Contractors must maintain the proper equipment to manage water from a broken sprinkler pipe

<END OF APPENDIX>

Appendix B – WILCO Cabling Policies and Procedures

Williamson County (WILCO)

POLICY & PROCEDURE CONCERNING ALL ELECTRICAL, TELECOMMUNICATIONS AND NETWORKING INSTALLATIONS AND/OR MODIFICATIONS

I. Policy

Permits are required for all Electrical, Telecommunication and Network wiring modifications within the WILCO Campus PRIOR to commencing work. By requiring prior authorization and pre and post implementation inspections, WILCO will better maintain the integrity and safety of the telecommunications system, alarms, cameras, elevator, fire alarms and electrical wiring. The goal of instituting this policy is to maintain strict control over the wiring and facilities to significantly reduce the probability of system issues, prevent damage to the facilities and maintain compliance with building and fire codes.

It is therefore, the policy of WILCO that existing telecommunications wiring, including electrical, voice, data, and video, as well as telecommunications facilities located in various buildings may not be altered in any way except by written permission from the Senior Director of Facilities or designee.

II. Procedure for Wiring (Telecommunications and Computer)

1. Existing telecommunications and/or computer wiring and cables may not be altered by anyone except an IT contractor, vendor or WILCO Electrician and must include permission from the Senior Director of Facilities or designee.

2. WILCO Senior Director of Facilities shall review and approve the telecommunications and computer wiring and electrical plans for new and existing buildings and projects.

3. Electrical Inspector shall inspect all telecommunications wiring in new and renovated buildings and projects to ensure proper installation.

4. Any unauthorized wiring found in telecommunication, electrical spaces or within buildings & grounds will be removed immediately at the cost of the department.

5. Any unauthorized wiring which interfaces with telecommunications, wiring or health and safety will be reported to Facilities Office for review. Working with the Information Technology Dept., if the wiring is found to be either a safety hazard; or not in conformance with applicable codes; or detrimental to the functioning of the telecommunications system; it shall be removed by the vendor authorized representative, at the expense of the vendor/contractor's or department that installed or authorized it.

6. All telecommunication will be marked identifying their terminal ends and owner.

III. Telecommunications Manholes and Closets

1. Any manholes or closets containing telecommunications conduit or electrical wiring shall be under the exclusive control of Senior Director of Facilities.

2. No equipment or storage may be placed in these areas without Facilities knowledge and consent. All confined spaces regulations will be complied with for manhole applications including those persons entering the manholes.

IV. Electrical Wiring

1. All electrical wiring will be installed and marked according to National, State and City codes. Only approved licensed and insured vendors/contractors will be approved for such work.

2. Abandoned or discontinued electrical wiring will be properly removed and circuitry identified of such discontinuance.

3. WILCO will review and approve plans for additional wiring before the vendors/contractors performs work.

4. Any unauthorized wiring will be removed at vendor/contractor/departments expense.

Summary of Policy and Procedure

A. Permits for all wiring will be required. NO EXCEPTIONS

B. Telecom or electrical wiring will be run in conduit, independently of all other conduit unless the conduit is specifically designated for that particular wiring. Wiring is never to be hung from or connected to HVAC piping or ducts or fire suppression equipment and piping.

C. All telecommunication and electrical closets are designated areas for Telecomm and network equipment. Closets will be organized and free of clutter. Wiring closets are not to be used for storage and will be readily accessible at all times.

D. All telecom and electrical wiring will be marked with project name and location name and demarcation points. Ends will be clearly marked with destination location.

E. All work will be completed with the approval of the Senior Director of Facilities or designee. As well as IT Approval for network and Telecomm wiring. Limit for Ethernet is 320 feet total.

F. All holes drilled through walls, ceilings and floors etc. will be fire stopped and labeled. Temporary use or construction means and methods still must be approved by Facilities and IT

G. All contractors must sign in at the Senior Director of Facilities or designee's office on a daily basis. Appropriate permits must be posted at the work area. Contractors must submit all hot works permits to Facilities at least 72 hours prior to work. Hot works permits are approved by Facilities.

WILLIAMSON COUNTY CABLING SPECIFICATION

Work may not be done without approval. Contract must arrange with Facilities to be able to take the fire alarm off line prior to any work being performed

H. Hours for drilling or any other work that will create noise/vibrations during work hours will only be allowed between 11 p.m. to 7 a.m. unless exceptions are made by the Senior Director of Facilities. Any work creating noise done outside those hours will be shut down by the Facilities office.

I. Intervals of labeling of conduits and wiring will be left to the discretion of the Senior Director of Facilities or designee and wiring code, however a minimum of every 8-10' is required. Labels should be clearly placed and the beginning and end of each run.

J. Access to office spaces must be requested at least 72 hours in advance to the Senior Director of Facilities or designee.

K. No employees of WILCO will run, pull, manipulate or extend power, terminated Ethernet or fiber (electrical and computer, phone etc.) with the exception of the WILCO Electrician.

L. Any work on or to power, Ethernet or fiber in any of 's buildings or grounds must be done by a Facilities Approved Vendor**. Facilities REQUIRES Notification by all vendors working on any installation of wiring or cabling, new or existing. Notification should include identifying the means and methods of routes.** It is expected that all wires and cables will be run according to State and Federal codes and laws without exception. Any work done that does not meet these requirements will be the responsibility of the contractor to correct.

Requests should be submitted to Facilities at least 2 weeks prior to any work being done. In an emergency, the Senior Director of Facilities or designee should be contacted before any work is done.

M. All IT departments (Applications, Infrastructure and Academic Computing) will coordinate vendor work with the Facilities Department. All bid documents (RFP, RFI etc.) will include WILCO Facilities policies, procedures, requirements and expectations.

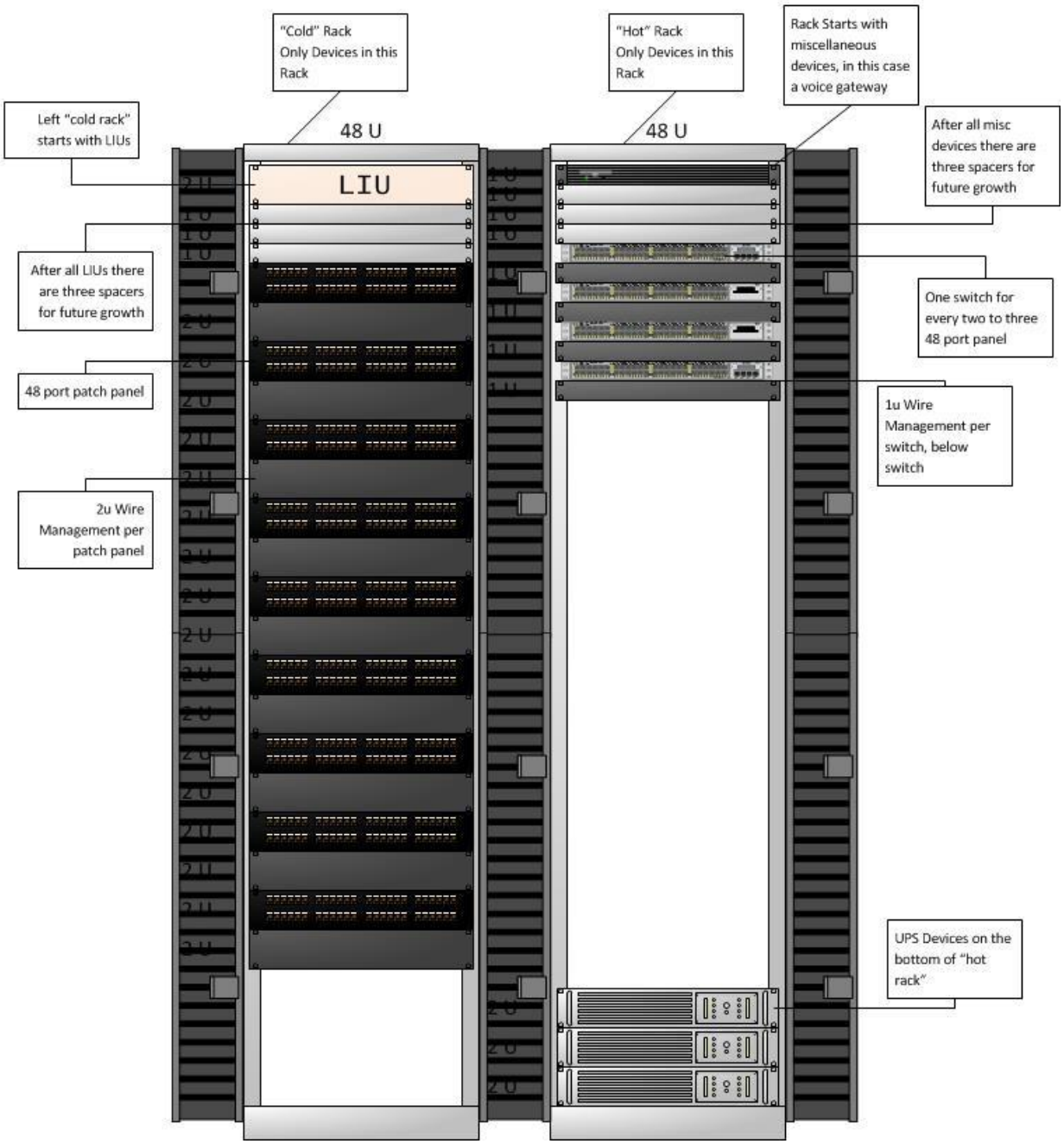
N. All Contractors must sign a Williamson County Contract and provide necessary insurance and certificates to include but not limited to, Terms and Conditions, Certificate of Liability Insurance, W9, etc.

<END OF APPENDIX>

WILLIAMSON COUNTY CABLING SPECIFICATION

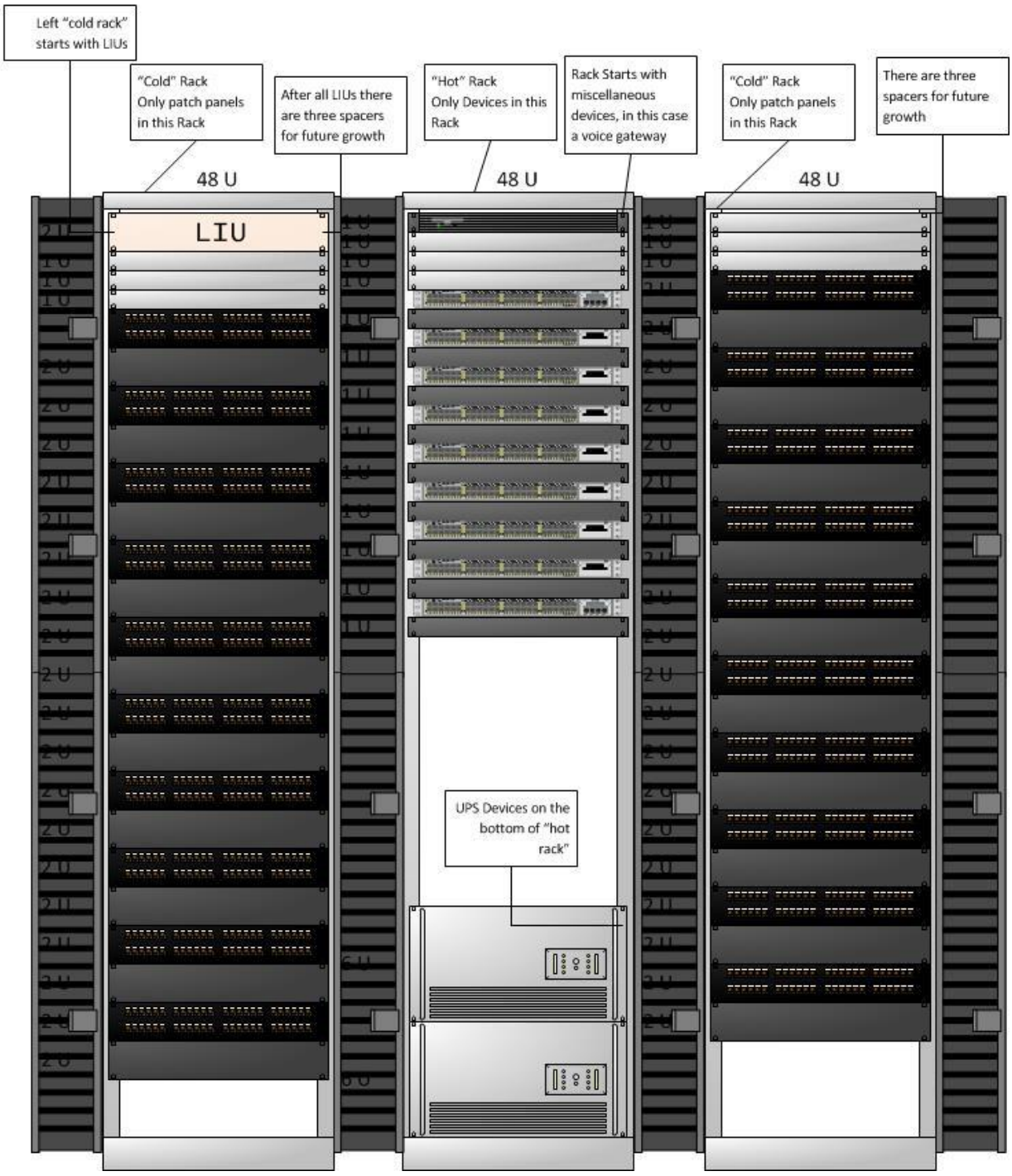
Appendix C – Typicals

STCC IDF Standards			
draft	48 to 480 Port Closet	By Jason J Alves	2014.5.24

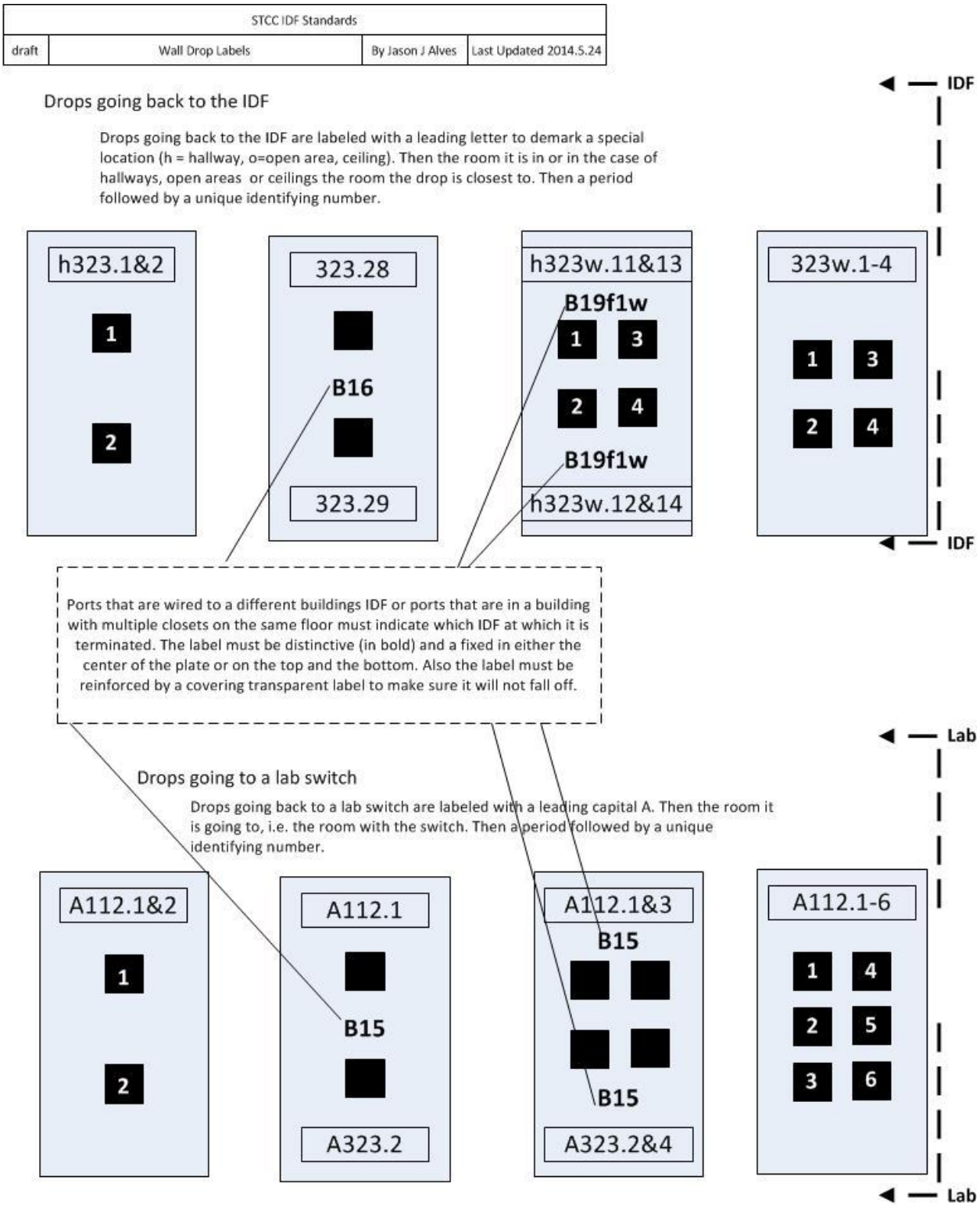


WILLIAMSON COUNTY CABLING SPECIFICATION

STCC IDF Standards			
draft	480 to 960 Port Closet	By Jason J Alves	2014.5.24



WILLIAMSON COUNTY CABLING SPECIFICATION



WILLIAMSON COUNTY CABLING SPECIFICATION

STCC IDF Standards			
draft	Closet Patch Cable Color Guide	By Jason J Alves	Last Updated 2014.5.24

Blue = Adminstrative

Yellow = Academic

Green = Wireless

Orange/Red = Public Safety

Purple = Crossover

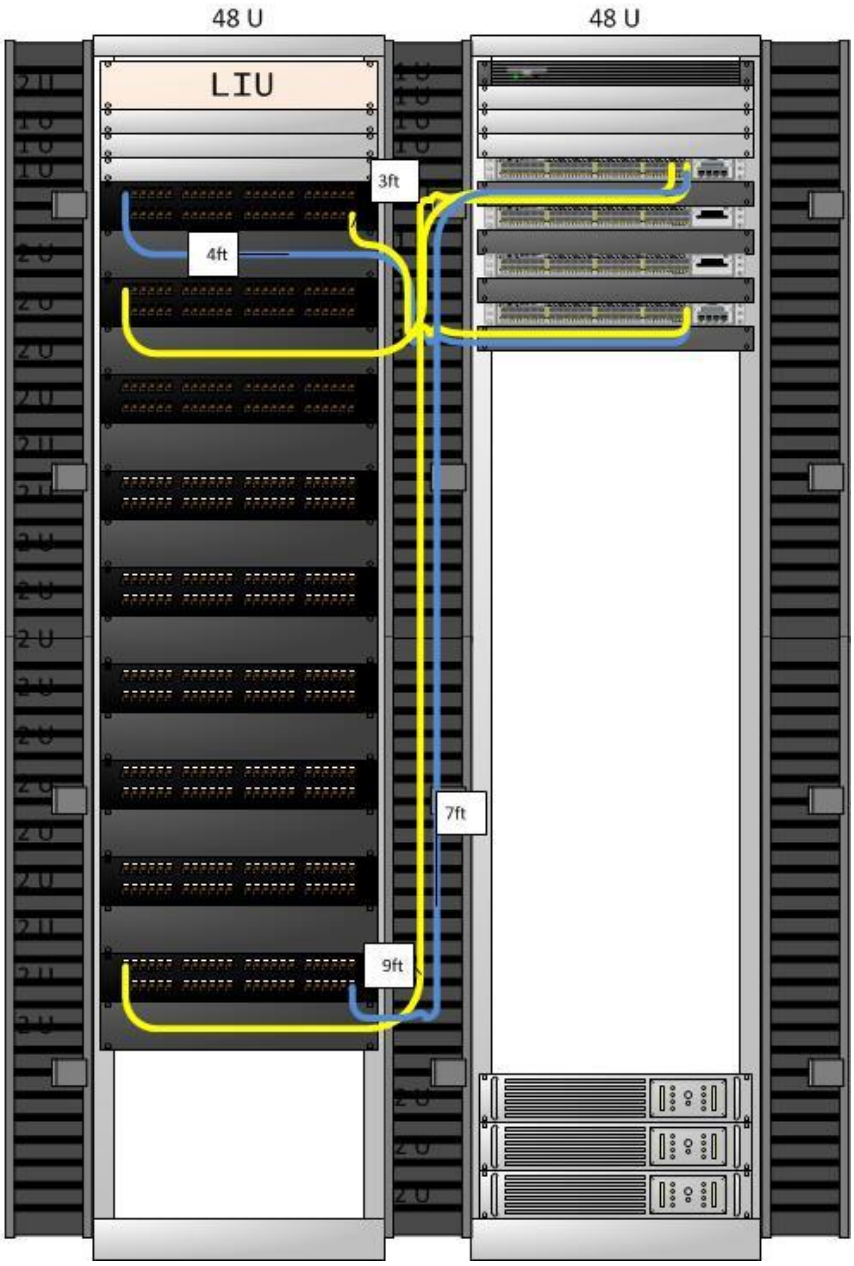
Grey = Printer

Black = Utility

White = VoIP/Wallphone

WILLIAMSON COUNTY CABLING SPECIFICATION

STCC IDF Standards			
draft	Patch Cable Run Routes	By Jason J Alves	Last Updated 2014.5.24



<END OF APPENDIX>

Appendix D – Materials List

Manufacturer	Part Number	Description
		COPPER DISTRIBUTION
General Cable	**7131800**	General PanGen 6 Blue Category 6 UTP cable. For other colors see table in copper section of this document.
Panduit	**NK6FIWY**	NeKey 6-port, single gang, flush mount vertical faceplate with labels. International White color. For Electric Ivory color, replace “IW” with “EI” in part number.
Panduit	**NK2FIWY**	NetKey 2-port, single gang, flush mount faceplate with labels. International White color. For Electric Ivory color, replace “IW” with “EI” in part number.
Panduit	**NK4FIWY**	NetKey 4-port, single gang, flush mount vertical faceplate with labels. International White color. For Electric Ivory color, replace “IW” with “EI” in part number.
Panduit	**NK688MBL**	NetKey Cat 6 punchdown jack module – Black. *For standard colors replace color suffix (BL) with IW (Off White), EI (Electric Ivory), IG (International Gray), WH (White), BL (Black), BU (Blue), RD (Red), YL (Yellow), GR (Green), OR (Orange) or VL (Violet).
Panduit	**NKBMIW-X**	Blank keystone module. Reserves faceplate space for future use. International White. For Electric Ivory substitute “IW” in part number for “EI”.
Panduit	**NK2BXIW-A**	Surface mount box accepts two NetKey® Modules. International White color. For Electric Ivory color, replace “IW” with “EI” in part number.
Panduit	**NK6PP24P**	NeKey All Molded Polymer Punchdown Patch Panel, Cat 6, Flat, 24 Port, 1 RU.
Panduit	**NK6PP48P**	NetKey All Molded Polymer Punchdown Patch Panel, Cat 6, Flat, 48 Port, 2 RU.
Panduit	**NK6PPG24Y**	NetKey Metal Punchdown Patch Panel, Cat 6, Flat, 24 Port, 1 RU.
Panduit	**NK6PPG48Y**	NetKey Metal Punchdown Patch Panel, Cat 6, Flat, 48 Port, 2 RU.
Panduit	**UTP28SP10BU**	Copper Patch Cord, Cat 6 Performance (SD), 28 AWG, Blue CM/LSZH UTP Cable, 10ft. *For lengths 1 to 50 feet (increments of one foot), and 55 to 150 feet (increments of five feet), change the length designation (10) in the part number to the desired length. ** For standard cable colors other than Blue (BU), add suffix IW (Off White), BL (Black), BU (Blue), RD (Red), YL (Yellow), GR (Green), OR (Orange), GY (Gray), PK (Pink), or VL (Violet).
		FIBER DISTRIBUTION SYSTEMS
Panduit	**FLCDMCXAQY**	LC OptiCam® 10Gig™ 50/125µm Multimode Duplex Fiber Optic Connector for 900µm tight-buffered fiber installation.
Panduit	**FLCDSCBUY**	LC OptiCam® Singlemode Duplex Fiber Optic Connector for 900µm tight-buffered fiber installation.
Panduit	**FSPP924Y**	24-fiber OS2 singlemode plenum rated indoor interlocking aluminum armored cable. For intrabuilding use between telecom rooms in the same building.
Panduit	**FSNR948Y**	48-fiber OS2 singlemode riser rated indoor/outdoor stranded cable. For use for between building fiber backbone.
Panduit	**FSNP948Y**	48-fiber OS2 singlemode plenum rated indoor/outdoor stranded cable. For use for between building fiber backbone.
Panduit	**FCE2U**	Opticom® QuickNet™ Rack Mount Fiber Enclosures, holds up to eight QuickNet™ Cassettes, FAP adapter panels, or FOSM splice modules. Dimensions: 3.48"H x 17.60"W x 16.30"D (88.4mm x 447.0mm x 414.0mm).

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Panduit	**FCE4U**	Opticom® QuickNet™ Rack Mount Fiber Enclosures, holds up to twelve QuickNet™ Cassettes, FAP adapter panels, or FOSM splice modules. Dimensions: 6.98"H x 17.60"W x 16.30"D (177.0mm x 447.0mm x 414.0mm)
Panduit	**FAP6WBUDLCZ**	LC FAP loaded with six LC duplex singlemode fiber optic adapters (Blue) with zirconia ceramic split sleeves.
Panduit	**FAP12WBUDLCZ**	LC FAP loaded with twelve LC duplex singlemode fiber optic adapters (Blue) with zirconia ceramic split sleeves.
Panduit	**F9B10-NM1Y**	LC to Pigtail – OS1/OS2 Singlemode Simplex Pigtails – 900µm Buffered Fiber LC to pigtail singlemode simplex pigtail, 900µm buffered fiber (one LC connector on one end and open on the other end) – 9/125µm.
Panduit	**FAPB**	Blank fiber adapter panel – reserves space for future use.
Panduit	**F92ERQNQNSNM001**	OS1/OS2 2-fiber, riser-rated, LC push-pull to LC push-pull, singlemode patch cord with custom push-pull strain relief boot and duplex clip, 1.6mm jacket, Std. IL. *** At end of part number is for length in meters. Comes in 1 M increments up to 20 meters, then in lengths of 20 M, 25 M, 30 M, and 35 M. Put length in the following (3 digit) format: 001 for 1 M, 020 for 20 M, etc.
Panduit	**FOSMF**	Fiber optic splice module holds and protects up to 24 fusion splices. Self-stacking modules with integral cable management and fiber slacking/spooling features. Black plastic base and clear plastic hinged cover. For use with Panduit Opticom ® FCE*U, FRME*U, and FMT series enclosures. Dimensions: 0.30"H x 14.03"W x 5.28"D (7.6mm x 356.4mm x 134.1mm).
Panduit	**FOSMH2U**	Fiber optic splice module handler, 2 RU. Holds up to eight FOSM splice modules. For use with FCE2U fiber cassette enclosure. Dimensions: 2.91"H x 0.72"W x 2.61"D (74.0mm x 18.3mm x 66.4mm).
Panduit	**FOSMH4U**	Fiber optic splice module holder, 4 RU. Holds up to twelve FOSM splice modules. For use with FCE4U fiber cassette enclosure. Dimensions: 5.50"H x10.42"W x 5.41"D (139.7mm x 264.7mm x 137.4mm)
		RACKS, ZONE ENCLOSURES AND CABLE MANAGERS
Panduit	**PZC12P**	Zone Cabling Wall Mount Cabinet with Perforated Front Door, BL 12 RU.
Panduit	**R2P**	19" EIA 2-post rack, aluminum. Dimensions: 84.0"H x 20.3"W x 3.0"D (2134mm x 514mm x 76mm).
Panduit	**R2PPRVWF**	Waterfall Trough for 2 Post Rack. FOR TOP-OF-RACK INTERBAY ROUTING.
Panduit	**ER4P23**	4 post EIA rack with #12-24 threaded rails. Dimensions: 84.0"H x 20.3"W x 23.0"D (2134mm x 515mm x 584mm). 45 RU.
Panduit	**WMPV45E**	Front and rear vertical manager. Dimensions: 83.0"H x 4.9"W x 12.0"D (2108mm x 125mm x 306mm).
Panduit	**WMPVHC45E**	Front and rear vertical manager. Dimensions: 83.0"H x 6.7"W x 14.1"D (2108mm x 170mm x 357mm).
Panduit	**WMPSE**	19”, 1RU Horizontal cable manager, 1.7"H x 19.0"W x 8.9"D (44mm x 483mm x 226mm).
Panduit	**WMP1E**	19”, 2RU Horizontal cable manager, 3.5"H x 19.0"W x 8.9"D (89mm x 483mm x 226mm).
Panduit	**CMUT19**	2 RU upper trough with 1.3" bend radius mounts to the top of a standard 19" EIA rack. Dimensions: 3.5."H x 19.0"W x 4.5"D (89mm x 483mm x 114mm). FOR BOTTOM-OF-RACK INTERBAY PATHWAY.
Panduit	**CMLT19**	4 RU lower trough with 1.3" bend radius mounts to the bottom of a standard 19" EIA rack. Dimensions: 8.0"H x 19.0"W x 4.5"D (203mm x 483mm x 114mm). FOR BOTTOM-OF-RACK INTERBAY PATHWAY. LARGER OPTION THAN CMUT19 IF NEEDED.
		CABLE PATHWAYS
Wiremold	**Held for metallic raceway**	**Metallic Raceway description here.**

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Panduit	**J-Pro J-Hook system**	Panduit J-Pro System. Plenum rated composite J-hooks with hardware available for various hardware applications. See www.panduit.com for variations.
Panduit	**JB1IW-A**	Single gang one-piece outlet box with adhesive backing. Box accepts Pan-Way ® Screw-On Faceplates or any NEMA standard single gang faceplate. For use with Pan-Way ® LD profile raceway. 5.09"L x 3.34"W x 1.75"H (129.4mm x 85.0mm x 44.4mm). Breakouts for 1/2", 3/4", or 1" diameter conduit.
Panduit	**OFR20OB8**	Beige modular furniture raceway. 8' sections. For fittings, instructions, other colors see www.panduit.com. One-piece single channel low voltage raceway with adhesive tape backing for data cable routing along top of modular furniture partitions.
Panduit	**PCPA13R20IW**	Pan-Pole ™ Power Pole assembly is supplied in 13' length for maximum ceiling heights of 12'. Dual channel design allows for the installation of communication outlets. For fittings see www.panduit.com.
Panduit	**PCPA11R20IW**	Pan-Pole ™ Power Pole assembly is supplied in 11' length for maximum ceiling height of 10'. Dual channel design allows for the installation of communication outlets. For fittings see www.panduit.com.
Panduit	**T70SDB-X**	Communications Pole standard faceplate bracket. For further fittings and accessories seewww.panduit.com.
Panduit	**WG12BL10**	Wyr-Grid 12" wide x 10' long pathway section used to carry cables horizontally throughout the system. Snap-on sidewalls attach for job specific height requirements. Uses splice connector WGSPL1218BL to connect straight sections and intersection splice WGINTSPLBL to connect pathways at an intersection. For fittings and accessories see www.panduit.com.
Panduit	**WG18BL10**	Wyr-Grid 18" wide x 10' long pathway section used to carry cables horizontally throughout the system. Snap-on sidewalls attach for job specific height requirements. Uses splice connector WGSPL1218BL to connect straight sections and intersection splice WGINTSPLBL to connect pathways at an intersection. For fittings and accessories see www.panduit.com.
		BONDING AND GROUNDING
Panduit	**ACG24K**	#6 AWG (16mm2) jumper for armored cable diameter up to 0.84" (21.3mm); 24" (609.6mm) length; factory terminated on one end with LCC6 two-hole copper compression lug and the other end with grounding terminal; provided with two each #12-24 and M6 thread-forming screws and a black polypropylene terminal cover.
Panduit	**LCC series**	Panduit two-hole compressing lugs for code conductors in BICSI hole spacing.
Panduit	**HTCT series**	Panduit HTAPs. Must be selected according AWG size of run and tap conductors.
Panduit	**CLRCVR series**	Panduit clear covers for HTAPs. Must be selected according to HTAP being covered.
Panduit	**RGS134-1Y**	Grounding strip (vertical busbar) for newly installed racks or cabinets with screw rails. 78.65" (2m) length; .67" (17mm) width; .05" (1.27mm)thickness; provided with .16 oz. (5cc) of antioxidant, one grounding sticker and three each #12-24 x 1/2" and M6 x 12mm thread-forming screws.
Panduit	**RGCBNJ660P22**	Jumper kit for bonding individual racks or cabinets into grounding backbone. #6 AWG (16mm²) jumper; 60" (1.52m) length; 45° bent lug on grounding strip side; provided with .16 oz. (5cc) of antioxidant, two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread forming screws and a copper compression HTAP* for connecting to a #6 to #2 awg sized bonding backbone.
Panduit	**GJ672UH**	Rack jumper (and cabinet) kits for smaller TR (5 bays or less) to bond individual rack or cabinet directly back to wall mounted busbar. One 72" length #6 AWG green wire with yellow horizontal stripe. Jumper is pre-terminated on one end with LCC6-14JAWH-L and the other end with LCC6-14JAW-L. This rack grounding jumper is 72" long. For other lengths replace the "72" in the part

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		number. Available lengths are 72, 96, 120, 144, 168, 192, 216, 240, 264 and 288 inches.
Panduit	**RGESD2-1**	Two-hole ESD port with 5/8" hole spacing; provided with an ESD protection sticker, .16 oz. (5cc) of antioxidant, and two each #12-24 x 1/2" and M6 x 12mm thread-forming screws. LOCATE ONE WITHIN REACH OF ALL EQUIPMENT. WORKS WITH WRIST STRAP RGESDWS.
Panduit	**RGESDWS**	Adjustable fabric ESD wrist strap with 6' coil cord, banana plug, 1 megaohm resistor and 4mm snap. LOCATE ONE WITHIN REACH OF ALL EQUIPMENT. WORKS WITH ESD PORT RGESD2-1.
Panduit	**RGTBSG-C**	Green thread-forming bonding screws for use to mount equipment that does not have a built-in grounding pad (terminal).
Panduit	**RGEJ1024PHY**	24" long pre-terminated equipment grounding jumper #10 AWG (6mm²) jumper; bent lug on grounding strip side to straight lug on equipment; provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws. FOR EQUIPMENT LIKE CHASSIS SWITCHES WITH BUILT-IN GROUNDING PAD (TERMINAL).
Panduit	**RGEJ1036PFY**	36" long pre-terminated equipment grounding jumper#10 AWG (6mm²) jumper; bent lug on grounding strip side to straight lug on equipment; provided with .16 oz. (5cc) of antioxidant and two each #12-24 x 1/2", M6 x 12mm, #10-32 x 1/2" and M5 x 12mm thread-forming screws. FOR EQUIPMENT LIKE CHASSIS SWITCHES WITH BUILT-IN GROUNDING PAD (TERMINAL).
Panduit	**GB2B0306TPI-1**	Wall mounted telecommunications busbar suitable for small telecom room. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 2" x 12" in size.
Panduit	**GB2B0514TPI-1**	Wall mounted telecommunications busbar suitable for med telecom room. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 2" x 24" in size.
Panduit	**GB4B0624TPI-1**	Wall mounted telecommunications busbar suitable for main grounding busbar in medium sized facility. Pre-assembled with BICSI/TIA-607-B hole spacing. Bar is 1/4" x 4" x 20" in size.
Panduit	**LTYK**	Wall mounted busbar label kit. Label kit includes printed tag and one flame retardant cable tie.
		NETWORK LABELING SOFTWARE – FOR INK JET/LASER PRINTER
Panduit	**PROG-EM2GO**	Easy-Mark Labeling Software for PC, supplied on USB Flash Drive. For preprinting communications labels on laser/inkjet printer.
Panduit	**S100X150YAJ**	Self-laminating cable labels for Category 6 cable for use with Easy-Mark software and laser/ink jet printer.
Panduit	**C261X035Y1J**	Patch Panel labels for use with Easy-Mark software and laser/ink jet printer.
Panduit	**C195X040Y1J**	Faceplate labels for single gang stainless or sloped plastic - use with Easy-Mark software and laser/ink jet printer.
Panduit	**C288X040Y1J**	Faceplate labels for double gang stainless - use with Easy-Mark software and laser/ink jet printer.
Panduit	**S100X650YAJ**	Cable label for indoor/outdoor tight-buffered armored fiber optic cable. For use with Easy-Mark software and ink jet printer.
Panduit	**S100X160YAJ and NWSLC-3Y**	Label and turn-tell sleeve for labeling fiber jumpers. For use with Easy-Mark software and ink jet printer.
Panduit	**C200X100FJJ**	1" high, white, vinyl tape labels for labeling grounding busbars, racks, cabinets and pathways. For use with laser/ink jet printer.
		NETWORK LABELING – HANDHELD LABELER
Panduit	**LS8EQ-KIT-ACS**	Panduit PanTher hand-held label printing system in kit. Includes LS8EQ printer with QWERTY keypad, one cassette of S100X150VAC self-laminating labels, six AA alkaline batteries, LS8E-ACS, LS8-CASE, LS8-PCKIT, LS8-IB, LS8-WS,

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		quick reference card and operator's manual. USE FOR LABELS THAT MUST BE PRINTED ON THE JOB SITE.
Panduit	**S100X150VAC**	Self-laminating cable labels for Category 6 cable for use with PanTher LS8E hand-held printer.
Panduit	**C261X035Y1C**	Handheld printer labels for modular faceplate patch panels.
Panduit	**C195X040Y1C**	Faceplate labels for single gang stainless - use with PanTher handheld labeler.
Panduit	**C288X040Y1C**	Faceplate labels for double gang stainless - use with PanTher handheld labeler.
Panduit	**S100X650VAC**	Cable label for indoor/outdoor tight-buffered armored fiber optic cable. For use with handheld labeler.
Panduit	**S100X160VAC and NWSLC-3Y**	Label and turn-tell sleeve for labeling fiber jumpers. For use with hand-held labeler.
Panduit	**T100X000VPC-BK**	1" high, continuous black on white, vinyl tape labels for labeling racks, cabinets and pathways with PanTher LS8E handheld labeler.
		PHYSICAL SECURITY LOCKING DEVICES
Panduit	**PSL-DCJB-C**	Package of 100 RJ45 jack blockout devices and one removal tool. Color red.
Panduit	**PSL-USBA-L**	Package of 50 USB Type 'A' blockout devices and one removal tool. Color red.
Panduit	**PSL-USBB-L**	Package of 50 USB Type 'B' blockout devices and one removal tool. Color red.
Panduit	**PSL-DCPLX-BL-C**	Package of 100 RJ45 plug lock-in devices compatible with flush mount jacks, and one installation/removal tool. Color black.
Panduit	**PSL-DCPLRX-BL-C**	Package of 100 RJ45 plug lock-in devices compatible with recessed jacks, and one installation/removal tool. Color black.
		CABLE TIES – HOOK AND LOOP
Panduit	**TTS-35RX0**	.75" wide, continuous roll Hook and Loop Cable Ties, black. 35 ft. roll. Carton qty 10 rolls.
Panduit	**HLSP1.5S-X12**	Plenum rated hook and loop cable ties for air return spaces. Maroon color, perforated at 6" length.
Panduit	**HLSP3S-X12**	Plenum rated hook and loop cable ties for air return spaces. Maroon color, perforated at 6" length.

<END OF DOCUMENT>

SECTION 28 1300

ACCESS CONTROL SYSTEM

PART 1 GENERAL

1.1 This section identifies the requirements, technical design, and specifications for the access control system at the Williamson County & Cities Health District Office Renovations, located in Round Rock, Texas ("Owner"). The access control system as specified is an industry-standard and includes card readers, electrified locksets, door position sensors, control panels, access control server, and access control cabling as specified.

1.2 The Contractor shall provide a Manufacturer's Performance Certification for the installed access control system.

1.3 Contractor shall include materials, equipment, and labor necessary to provide a complete and functional access control system regardless of any items not listed or described in this specification or associated drawings.

1.4 Requirements

A. Contractor Experience Requirements

B. Submittal Requirements

C. Acceptable Manufacturers

D. Codes, Standards and Regulations

E. General Requirements

F. System Requirements

G. Testing Requirements

H. Training Requirements

I. Project Closeout Documentation

J. Attachments

1.5 Related Requirements

A. The Drawings, Specifications, General Conditions, Supplementary General Conditions, and other requirements of Division 1 apply to the work specified in Division 28, and shall be complied with in every respect. The Contractor shall examine all of the items which make up the Contract Documents, and shall coordinate them with the work on the project.

B. Contractor Experience Requirements

1. The Contractor shall possess all relevant Manufacturer Certifications (i.e. hardware installation, software installation and programming, etc.) for both the company and individual technicians prior to submitting a bid for the work.

2. The Contractor shall have been in business for a minimum of five (5) years.

3. The Contractor shall have a local office with local technicians and an adequate workforce to complete this project within a 75-mile radius of the project site.

4. The Contractor shall have completed a minimum of five (5) projects similar in size and scope to the Owner's installation, where the systems have been in continuous satisfactory operation for at least one (1) year.

C. Subcontractors shall be identified at the time of bid and comply with the requirements and intentions of these specifications, associated drawings, and related contract documents.

1.6 Submittal Requirements

A. Proposal Submittal

1. Itemized list of all equipment, materials, and labor included in bid and required for the installation of the access control system as specified herein. This list shall be provided in printed and electronic format (Microsoft Excel) and contain: Part Number, Description, Unit of Measure, Unit Cost, Quantity, Labor Price, and Extended Price to provide a complete and functional access control system.

2. Estimated cable count required for the access control system listed per Equipment Room and or Telecommunications Room. This list shall be provided in printed and electronic format (Microsoft Excel).

3. Manufacturer Product Certifications for Company.

4. Manufacturer Product Certifications for Installers.

5. Manufacturer Warranty offering.

6. Documentation indicating Contractor has been in business for (5) years.

7. Address of Contractor's local office within a 75-mile radius of the project site.

8. Quantity of full-time local technicians within a 75-mile radius of the project site.

9. List of five (5) contractor-installed projects of a similar size and scope in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.

10. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.

B. Pre-Installation Submittal

1. Contractor shall not order, purchase, or install any equipment until pre-installation submittals have been accepted in writing by the Architect/Engineer.

2. Manufacturer product data sheets for each proposed system component.

a. For product data sheets containing more than one (1) part number or product, the Contractor shall clearly identify the specific part number or product being submitted Equipment schedules listing all system components, the manufacturer, model number and quantity of each.

3. Shop drawings of the proposed system installation.

a. Shop drawings shall include card reader locations, door position sensor locations, access control panel elevations to include layout and power supply locations, installation typical details, preliminary cable numbers, proposed cable pathways, system schematics, and riser diagrams. Shop drawings shall be submitted on 30” X 42” bond paper.

b. Contractor shall maintain a set of shop drawings on site at all times and shall update the shop drawings on a weekly basis. Shop drawings shall be made available for inspection at the request of the Architect/Engineer.

4. Manufacturer Product Certifications for Company.

5. Manufacturer Product Certifications for Installers.

6. Manufacturer Warranty letter.

7. Documentation indicating that Contractor has been in business for (5) years.

8. Address of Contractor’s local office within a 75-mile radius of the project site.

9. Quantity of full time local technicians within a 75-mile radius of the project site.

10. List of five (5) contractor-installed projects of a similar size and scope in operation for at least (1) year. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, Brief Description of Project, Client Point of Contact Name and Phone Number.

11. List of completed and ongoing projects with the Owner. The Contractor shall provide the following information for each project: Project Name, Project Location, Project Start Date, Project Completion Date, Project Start Cost, Project Completion Cost, and Brief Description of Project.

PART 2PRODUCTS

2.1 General Requirements

A. The following sections specifically list the acceptable equipment types and items for this project.

B. Architect/Engineer will have final determination of acceptability of all proposed equipment and must approve submitted equipment prior to purchase or installation.

C. Proposed equivalent items must be approved in writing by the Architect/Engineer prior to submitting a bid. Proposed equivalent items must meet or exceed these specifications and the specifications of the specified item.

D. In the event a manufacturer’s specified product or part number has changed or is no longer available, Contractor shall substitute the appropriate equivalent manufacturer’s part number.

E. In the event of a discrepancy between the specifications and the drawings, the greater quantity and/or better quality will be furnished.

F. For listed products with no part number specified, Contractor shall provide a product that meets the performance requirements of these specifications, industry standard practices, and intended application.

G. All wiring, equipment, and installation materials shall be new and of the highest quality.

H. Labels on all wiring, materials, and equipment must indicate a nationally recognized testing laboratory.

I. Original Equipment Manufacturer (OEM) documentation must be provided to the Architect/Engineer which certifies performance characteristics and compliance with industry standards.

2.2 Acceptable Manufacturers

A. Access Control System Software/Hardware

1. Access Control Software

a. Stanley B.A.S.I.S. ET 693

2. Access Control File Server

a. Per ACS manufacturers recommendation based on design parameters

3. Access Control Workstations

a. Operator Workstation

1) Per ACS manufacturers recommendation.

4. Printers

a. Report Printer

1) Fargo

2) Or approved equal

5. Control Panels

a. Per ACS manufacturers recommendation.

6. Card Reader

a. Proximity Reader

1) Wall Mount

a) HID multiclass SE RP40

7. Access Card

a. HID 35-bit

b. Or approved equal

8. Electrified Locking Mechanism Power Supply

a. Altronix

b. Or approved equal

B. Request-to-Exit (REX) Device

1. REX Pushbutton
    a. Delta Controls
    b. Designed Security, Inc.
    c. Securitron
    d. Security Door Controls
2. REX Infrared Motion Sensor
    a. Detection Systems Inc.
    b. Or approved equal

C. Device Power Supplies
1. Altronix/AL Series
2. Power-One/SPL Series
3. Or approved equal

D. Door Position Switches
1. Concealed Door Position Switch
    a. Sentrol model 1078
2. Surface Mount Door Position Switch
    a. Sentrol model 2500 Series
3. Tamper Switch (for ACMS panel)
    a. Ademco
    b. Flair
    c. Sentrol

E. Access Control System Cabling
1. Category 6 UTP
    a. Refer to Section 27 1000
2. Multi-Conductor Shielded Composite Cable
    a. Belden
    b. Or approved equal

F. Pathway Cable Support
1. Panduit J-Mod Cable Support System
2. Erico – CADDY CAT LINKS J-Hook Series

3. Panduit Plenum Rated Hook & Loop (Black)

G. Labeling

1. Permanent Labels for Copper Cables

a. Panduit Self-Laminating Labels

H. Fire Stop

1. STI Spec Seal

2. 3M Products

PART 3EXECUTION

3.1 Codes, Standards, Regulations

A. TIA/EIA-568-B.1 Commercial Building Telecommunications Cabling Standard Part 1: General Requirements – (May 2001)

B. TIA-569-B Commercial Building Standard for Telecommunications Pathways and Spaces - (October 2004)

C. TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure - (May 2002)

D. SIA

E. Local

F. NEC

G. ISO

H. FCC

I. UL

J. OSHA

K. NFPA

L. NEMA

M. Plenum Applications

N. Applicable Flame Test: UL 910 (NFPA 262 1990).

3.2 In the event of any conflicts between documents referenced herein and the contents of this specification, the Contractor shall notify the Architect/Engineer in writing of any such occurrences before purchasing or installing any equipment or materials. The Architect/Engineer will notify the Contractor of any actions required to resolve these conflicts. Such actions may include but are not limited to: design changes, equipment,

materials and/or installation changes. In any event Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications.

3.3 General Requirements

A. Contractor shall comply with the requirements of local Authority Having Jurisdiction (AHJ), State of Texas, the National Fire Protection Association (NFPA), and the National Electrical Code (NEC). If the Contractor identifies any item in the plans or specifications that will not strictly comply with the aforementioned laws, ordinances, and rules, the matter shall be referred to the Architect/Engineer for direction before proceeding with that part of the work.

B. The Contractor shall install the materials in accordance with these specifications and the manufacturer's installation guidelines.

C. No deviations from the plans or specifications shall be made without full consent in writing of the Architect/Engineer. The Contractor shall have written approval from the Architect/Engineer for any additional work beyond the Contract Documents prior to beginning such work. If the Contractor does not obtain written approval from the Architect/Engineer prior to proceeding with the work, the contractor shall not be reimbursed for the work.

D. The Contractor shall obtain written permission from the Architect/Engineer before proceeding with any work that would necessitate cutting into or through any part of the building structure such as, but not limited to girders, beams, floors, walls, roofs, or ceilings.

E. Contractor shall notify the Architect/Engineer a minimum of (2) weeks prior to beginning work and will participate in a pre-construction meeting with the Architect/Engineer to perform a walkthrough, review the scope of work, schedule, and escalation procedures.

F. The Contractor shall maintain a work area free of debris, trash, empty wire reels, scrap wire, etc., and dispose of such items on a daily basis and return the site to the original state of cleanliness. The Contractor shall not use Owner's facilities for the disposal of excess or scrap materials.

G. Equipment and materials installed by the Contractor shall be free of defects and damage.

H. Contractor shall be responsible for the repair of any damage caused by the contractor during the installation.

I. Contractor shall test all wires prior to installation. By failing to perform this testing operation, the Contractor shall accept the wire as compliant and assume all liability for the replacement of the wire at no cost to the Owner should it be found defective at a later date.

J. Contractor shall maintain a set of working specifications, design drawings, and shop drawings to be kept on site at all times and shall update the shop drawings on a weekly basis. Shop drawings shall be made available for inspection at the request of the Architect/Engineer.

K. Equipment and materials shall be consistent throughout the installation. Where multiple units of the same type of equipment and materials are required, these units shall be a standard product with the same manufacturer and model number.

L. Equipment and materials shall be delivered and stored in accordance with the manufacturer's guidelines at the Contractor's expense.

M. Contractor shall make all stored equipment and materials available for inspection at the request of the Architect/Engineer.

N. All equipment and material used in the installation shall be approved by the manufacturer for the environment in which it is being installed.

O. Wires shall be properly supported in accordance with industry standards at all times. Improperly supported wires shall be corrected by the Contractor at no cost to the Owner.

P. Contractor shall be responsible to properly protect wiring from damage by other trades during construction.

Q. Cables shall be routed at 90-degree angles to the building structure. At no time shall a diagonal pull be installed.

R. The Contractor shall not install wires in conduits or sleeves without nylon bushings. Wires installed through conduits or sleeves without nylon bushings shall be removed and replaced at no cost to the Owner.

3.4 Installation

A. Coordination

1. Coordinate with the Architect to ensure that adequate conduit is provided and that equipment backboxes are adequate for system installation.

2. Coordinate with the Architect to ensure that adequate power has been provided and properly located for the security system equipment.

3. Coordinate with the Architect to ensure that doors and door frames are properly prepared for electric locking hardware and door position switches.

4. Coordinate the provision key cylinders and cores for LAs, DMUs and bypass keyswitches with the Architect. Coordinate cylinder and master key requirements with the Architect and related trades.

5. Coordinate locations of all devices with the Architect prior to installation.

6. Coordinate and verify the location of each piece of rack mounted equipment with the Owner.

7. Coordinate custom ACS report requirements with the Owner. Submit report formats to the Owner for review and acceptance.

8. Coordinate all initial database partitioning and setup with the Owner prior to initial programming and card holder data entry.

9. Coordinate final camera locations, desired views, and camera housing and mount requirements with the Architect prior to installation.

10. Coordinate camera housing and mount finishes with the Architect prior to installation.

11. Coordinate finishes and colors of all equipment with the Architect. Submit all finish and graphics for all equipment in public areas to the Architect for approval prior to installation.

B. General

1. Verify acceptance of each type of specified request-to-exit hardware for each application with local life safety code officials.

2. Verify fail-safe and fail-secure lock requirements with the Architect.

3. Contractor or equipment manufacturer logos or names shall not be visible on equipment in public areas.

4. Provide tamper proof fasteners for all equipment in public areas. Fastener finish shall match equipment finish.

C. ACS Software

1. ACS Software shall be designed to support multi-tasking / multi-user applications for security systems management. Independent, simultaneous performance of multiple system functions from the File Server or system workstations shall not cause an appreciable reduction in system processing or response time.

2. All software shall be specifically designed for the security and access control industry. All application programs shall have been developed with a current, high level language.

3. The ACS Software shall be menu driven with help screens to assist the operator. The ACS File Server and system workstation keyboards shall be equipped with function keys to call up help screens and standard operator tasks such as arm / disarm, lock / unlock, card holder review, alarm acknowledge, map call up, etc., with a single key stroke or mouse click.

4. The ACS Software shall provide a user-friendly operator interface and provide for simple, logical movement through all applications and screens.

5. The ACS Software shall be fully Open Database Connectivity (ODBC) compliant and shall be capable of bi-directional interface with other external ODBC databases through 32 bit ODBC drivers.

6. The ACS File Server shall display and record the alarm message including the time, date, location, point number, event type, and point status for each point transaction.

7. The ACS history database shall not be editable.

8. The ACS software shall provide the following:

   a. A minimum of 50 password restricted operator access levels. This feature shall restrict access to sensitive programming functions to authorized personnel only.

   b. The ACS shall allow the Owner to independently assign access levels to each operator.

   c. The highest level “system administrator” password shall have access to all ACS databases and functions.

   d. Each password shall be individually programmable to restrict operator access to programming and operator functions, commands, database access and alarm point and control point functions.

e. An audit trail feature to maintain a historical record of what changes were made to the database, when the changes were made, and who made them.

f. Independent time programming of each alarm input, control output, and card reader input via software controls from the File Server / system workstation.

g. Programmable control of printing, displaying and archiving functions for each point transaction. The ACS shall allow the Owner to individually override printing, displaying, and archiving on a point by point basis for each function.

h. The ability to verify current status of any point in the ACS and change any of the programmable point descriptors via the ACS File Server / system workstation.

i. The ability to allow the operator to switch between the ACS Software and other applications while the ACS Software is running. Switching between applications shall be accomplished through the use of hot keys on the system workstation keyboard, and by a computer mouse or similar pointing device. Configure the system such that only an operator logged in at the “System Administrator” or the “Security Director” level can minimize the ACS Software and switch to other applications. If an alarm condition occurs while the ACS Software is minimized, the ACS Software shall be maximized, become the active window in the foreground, and display the map and associated device icon in alarm.

j. A schedule program that shall allow the Owner to automatically schedule events such as report printing, output commands, door access, alarm access, etc. on a time / day programmable basis up to one year in advance.

9. Status Screen

a. The ACS shall automatically display a status screen at the beginning of an operator session.

b. The ACS shall allow the operator to manually display the status screen any time during a session with a function key or mouse selection.

c. The ACS shall allow the operator to select any group from the status screen to view in more detail.

d. The status screen shall display the following:

1) The total number of points in alarm.

2) The total number of points in access (ACS time program access).

3) The total number of card readers in alarm.

4) The total number of card readers in access (ACS time program access).

5) The total number of card readers in access (operator manual bypass).

6) The total number of ACS points in a trouble state.

e. An activity log to allow operators to log events not generated by the ACS. This log shall allow operators to maintain an on-line event log with system generated time and date stamps. The event shall be recorded in the ACS history file with other system generated events.

D. Custom Graphic Displays

1. The ACS Software shall provide for unlimited custom graphic displays that graphically depict ACS status in real time. Icons placed on graphical backgrounds shall be used to indicate the real time status of each ACS connection including card reader inputs, alarm inputs, control point outputs, communication connections, etc.

2. Custom graphic displays shall provide for control of any system command and / or function through the use of icons. The ACS shall only allow users to access icon control and function as identified by the user login password.

3. The icon of the device in alarm shall be differentiated from other device symbols by enhancement, color change and / or flashing. Different enhancements shall indicate normal, alarm, trouble, time program shunt, manual shunt and other status conditions provided by the system.

4. The system shall be configured as to allow for manual call up of custom graphic displays by the operator and shall be easily accessed from the status screen. Navigation icons on the custom graphical displays shall allow the operator to select subsequent related graphics (e.g. more detail, less detail, control graphics, the main custom graphical display screen, etc.). The system shall be configured to automatically call-up a custom graphic display upon system generated alarms without request by the operator.

5. The ACS software shall provide for the assignment of a minimum of five displays / screens to each alarm point, each varying scale, icon size and icon location. When sequencing to a larger scale graphic / screen (zoom), each graphic / screen shall incorporate a key plan indicating what section of the overall plan is being enlarged.

6. Full graphic display shall occur within one second of request by the operator or ACS.

7. Custom graphic display quality shall be comparable to Security Drawings and shall illustrate partitions, doors and other major building structures.

8. The ACS shall include all tools required to create custom graphical displays.

9. The ACS shall provide for the import of graphics generated by other drawing programs. Provide a conversion program with the ACS to convert DXF or DWG files from CAD programs into the format used by the ACS.

10. The ACS shall support the import of pictures, photographs and other scanned images at the request of the Owner.

11. The ACS shall allow for the replacement of floor plan and other drawing backgrounds without recreating system map icons.

12. The ACS shall not require an operator to search through menus to locate a specific graphic. Logical graphics navigation shall be provided so as to allow users to efficiently move from one display to another.

13. Navigation and controls of custom graphic displays shall be by mouse selection.

14. Provide the device icons and controls for each device as follows:

    a. Alarm Input Points: Icon identifying open, closed, alarm, secure, and trouble status.

    b. Card Readers and Card Reader / Intercom units.

    c. Icon identifying open, closed, secure, propped open, intrusion, and trouble status of door.

    d. Icons identifying secure, bypass, and trouble status of card reader.

    e. Icon identifying locked and unlocked status of electric locking mechanism.

    f. Controls for lock, momentary unlock (preprogrammed for five second unlock time), timed unlock with selectable unlock time, and maintained unlock.

E. Door Controls

1. Electric Locks: Controls for lock, momentary unlock (preprogrammed for five second unlock time), timed unlock with selectable unlock time, and maintained unlock.

2. Parking Gates: Controls for open, close, and maintained open functions.

3. Overhead Doors: Controls for open, close, and stop functions.

F. Access Control

1. Card reader and remote control of doors as indicated in the Security Drawings.

2. Remote control of overhead doors as indicated in the Security Drawings.

3. Control point outputs for lock power control activated by card reader, File Server / system workstation keyboard or time schedule.

4. Control of access through card reader controlled devices based on the card user's access levels. An access level shall define a door or group of doors accessible by a card holder during a certain time period. Time periods shall include both authorized days and hours, and shall include independent holiday schedules. The ACS shall allow each card holder to have multiple access levels.

5. Automatic card invalidation after a programmable time period.

6. Alarm indication at the File Server / system workstation for unauthorized reader use attempts. Unauthorized reader use alarms shall be user selectable on an individual card reader basis.

7. System workstation display and event printing of card use (all transactions or violations only; by card and / or by card reader).

8. Momentary, programmable time, or maintained release of card reader controlled door locks via the system workstation keyboard.

9. Monitoring of the status of card reader controlled doors against intrusion or door propping.

10. Selective Card Reader and Card Holder Tracking

    a. Selective card holder tracking by individual cards or groups of cards (range of card numbers, department, access levels, etc.).

11. Selective card reader tracking by individual card reader or groups of card readers.

12. Import of card holder data with ASCII files created from other databases or systems.

13. Initial bulk loading of the cardholder database for large numbers of cards with the same access levels.

14. User programming of 50 card holder data fields (minimum) of 28 characters each (minimum), including but not limited to the following:

    a. Card number (internal and hot stamp)

    b. Access level(s)

    c. Authorized areas

    d. Effective date

    e. Expiration date

    f. Card holder name (separate fields for first, middle and last names)

    g. Card holder employee identification number

    h. Card holder department name

    i. Card holder automotive license number

    j. Card holder home telephone number

    k. Card holder business phone number

    l. Company name (if other than Owner)

    m. Employee status (active, retired, temporary, etc.)

G. Alarm Monitoring and Control Outputs

1. User programming of the following data for each alarm input point:
    a. Point number
    b. Point priority group
    c. Point description
    d. Point normal and abnormal status descriptions (secure, trouble, alarm, shunted, bypassed, etc.).
    e. Operator instructions to be displayed upon acknowledgment of the alarm (Provide a minimum of one page of programmable text).
2. Queuing of multiple alarms in their order of priority. Highest priority alarms shall annunciate from the top of the alarm queue and be displayed downward in order of decreasing priority. Coordinate with the Owner to develop priorities for each type of ACS alarm. Default priorities shall be defined as follows (highest to lowest):
    a. Duress buttons
    b. Delayed egress devices
    c. Auxiliary fire alarms
    d. Building perimeter devices
    e. Local alarm units
    f. Tamper switches
    g. Video loss
    h. UPS alarms
    i. Power supply alarms
3. Automatic and manual software routing of all alarm input points in the ACS for selective reporting at certain system workstations during certain time periods and at other system workstations during other time periods. Coordinate these requirements fully with the Owner prior to system programming.
4. "Transparent" alarms. These points, used to initiate other events within the ACS, shall not be annunciated at the system workstation or printer.
5. User programming of the following data for each control output point:
    a. Point number
    b. Point activation (alarm point, time schedule or real time)
    c. Maintained or momentary output
    d. Normally open or normally closed output
6. Time programmable and real time arming and disarming of all alarm input points and all control output points.

7. Alarm reporting shall take precedence over all other ACS functions. The ACS File Server and system workstation shall visually and audibly annunciate that an alarm condition exists, independent of any other current system activity. The transaction time shall not be more than one second from the time the alarm condition is initiated until it is reported on the system workstation. Response to an alarm condition shall under no circumstance require the operator to log out of one ACS application and log into another for alarm response. The use of a hot key shall be the maximum acceptable operator action.

8. Upon operator acknowledgment of an alarm, the system workstation shall display up to one page of text for each alarm. The first line shall be the alarm message as described above and the additional space shall be used for an Owner programmable response message or an operator instruction list unique to each alarm point. The ACS shall allow the user to move freely between pages of text.

9. The operator shall be required to enter a response / resolution acknowledgement message for each system event, before the event is cleared from the operator screen. The ACS shall allow for programming of a required acknowledgement message on an individual alarm point basis.

H. Badging Software

1. The software shall provide for the photograph capture, photograph preview and data enrollment of Owner employees via the Badging Workstation.

2. The software shall be specifically designed for integration with the ACS.

3. The software shall allow for photograph capture of Owner employees via a high-resolution digital camera.

4. The software shall be fully integrated with; share a common database with, and meet all of the audit trail requirements of the ACS.

5. The software shall provide, at a minimum, the following features:

a. Storage of compressed color video images for each cardholder in the SMS cardholder database.

b. Efficient production of identification badges containing a cardholder image, text, Owner logo / graphics and security hologram.

c. A badge editor package enabling the full customization of the identification badge, including, but not limited to background color(s), location of text and graphics, content and orientation of badge information.

d. The capability of printing identification badges with varying user defined security color backgrounds (5 different colors minimum). For example, a red background may visually designate a card with access to a computer room, a blue background may designate access to sensitive records, etc.

e. The capability of displaying a stored video image on the ACS file server, system workstations, the badge enrollment workstation or any future workstation that the Owner may elect to add to the ACS at a later date

under separate contract, either by manual operator command, or automatically on alarm annunciation (i.e. invalid card read).

6. The software shall incorporate a minimum of ten custom-defined standard identification badge formats. Coordinate with the Owner to establish the custom-defined badge formats and produce each badge format as a template resident within the software for use by the Owner.

7. Photographic images shall be captured using a high-resolution digital camera and high speed digitizing circuitry. The system shall provide for image adjustment including centering, color and brightness control prior to capture.

8. The simultaneous display and printing of multiple cardholder images. The operator shall be able to query multiple card holder images by any combination of card holder database fields. This feature shall allow the operator to simultaneously display and/or print groups of images. The ACS shall allow the operator to select card holder names and other card holder information to display/print simultaneously with the images.

9. Produce identification badges containing an image, text and card holder database fields. The ACS shall provide for individual control of print area for each printed item including font size and type, word wrapping, orientation, automatic sizing of text to fit in allotted space, etc.

10. Badge security shall include features such as full-feature image ghosting and graded background colors across the card.

11. The software shall provide for user entry of the following cardholder data from the ACS File server and Badge Enrollment Workstation:

    a. Card holder name: last name, first name, middle initial, suffix (separate fields)

    b. Employee number

    c. Department

    d. Employee status (active, terminated, temporary contractor)

    e. Company (if other than Owner)

    f. Personal auto license number(s)

    g. Business phone number

    h. Home phone number

    i. Access levels

    j. Authorized areas

    k. Access card number

    l. Badge number (if different from access card number)

    m. Compressed video image

12. The software shall be capable of re-issuing an identification badge by utilizing the previously stored image and record of the badge holder. As this re-issued

badge is printed, the software shall update the ACS database to designate the previous badge as lost, stolen or inactive.

13. The software shall be programmable to allow for automatic display of the video image during valid or invalid card read transactions. The video image shall be capable of being displayed on the ACS file server, system workstation or the badge enrollment workstation or any future ACS workstation the Owner may elect to add to the ACS at a later date under separate contract.

14. Installation, modification, and review of badge holder records shall be password protected and accessible from the SMS file server, the badge enrollment workstation or any system workstation.

15. The identification badge printer shall be capable of printing full color identification badges created by the badge enrollment workstation directly to the specified proximity access cards.

16. Should the initial badge printer fail, repair or replacement shall be accomplished in less than four hours during the initial badging process.

17. The software shall be specifically designed for integration with the ACS.

3.5 Equipment

A. Provide equipment as indicated on the drawings and specified herein. Additional specific installation requirements are as follows:

B. Server

1. Locate the ACS file server as indicated on the drawings.

2. The file server shall provide the following minimum features:

a. Centralized storage, retrieval, and archive of all database and history information.

b. Centralized control of operator access to the ACS.

c. Centralized means of software update downloads/uploads.

d. High availability Redundant Array of Inexpensive Disks (RAID) subsystem.

3. Redundant Array of Inexpensive Disks (RAID) Subsystem

a. The RAID Subsystem shall provide the following features and functions:

1) Full compatibility with the SMS file server and software.

2) Multiple hard disk drives arranged in a striped and mirrored configuration.

3) RAID Level 0 +1 disk subsystem in compliance with the RAID Advisory Board (RAB) RAID Level Definition.

4) Optimized for a request rate intensive application.

5) An integral non-volatile write back cache memory system on the RAID controller providing near memory write speeds.

6) Redundant, hot swappable and parity checked cache memory. Cache memory shall be expandable through the installation of additional industry standard RAM modules.

4. The RAID subsystem shall utilize industry standard drives and shall be housed in a mini tower enclosure located no more than one meter from the ACS file server. Neatly bundle and wrap all interconnecting cables.

5. Provide real time RAID management software on the ACS file server for physical and logical supervision of the RAID Subsystem. Drive errors, electrical faults and degraded modes of operation shall report on specified operator workstations. The RAID management software shall, at a minimum, report the following:

   a. Logical disk error and disposition

   b. Physical disk errors - Drive 1, 2, etc.

   c. Power supply failure, Unit 1 or 2

   d. Over temperature and cooling fan failure

   e. SCSI interface failure

C. Access Control Workstations

1. Operator

   a. Provide operator workstations as indicated on the drawings.

   b. All system workstations shall run on an ACS manufacturer recommended operating system platform.

   c. All operator interfaces with the system shall be through system workstations and shall display real-time system messages, data files and records, operator instructions, data programming information and custom graphic illustrations.

   d. A system workstation keyboard and mouse shall provide for entry of operator commands and acknowledgments, and system database queries.

   e. System workstations shall not be proprietary to the Contractor. The Owner shall be able to purchase additional system workstations from computer vendors other than the Contractor.

2. Badging

   a. Provide badging workstations as indicated on the drawings.

   b. All system workstations shall run on an ACS manufacturer recommended operating system platform.

   c. All operator interfaces with the system shall be through system workstations and shall display real-time system messages, data files and records, operator instructions, data programming information and custom graphic illustrations.

d. A system workstation keyboard and mouse shall provide for entry of operator commands and acknowledgments, and system database queries.

e. System workstations shall not be proprietary to the Contractor. The Owner shall be able to purchase additional system workstations from com.

D. Printers

1. Report

a. Provide report printers as indicated on the drawings.

b. The report printer shall be capable of producing a hard copy of any report that the ACS may generate.

c. The ACS shall provide for report printing and/or display of any group of events within any selectable time period. Reports shall include historical events, defined by any combination of the following categories:

1) All events

2) Location

3) Point number

4) Event type (e.g. intrusion, door open, etc.)

5) Point status (e.g. on, off, alarm, normal, shunted, etc.)

6) Management reports of transaction history by card number, card holder data, card reader number, time period, or invalid attempts

7) Audit trail reports

2. Badging

a. The Badge Printer shall be provided to print badges for use in all card readers.

b. The Badge Printer shall support dye sublimation printing of user selected text and images on all industry standard card technologies.

c. The Badge Printer shall have the following minimum specifications:

1) High-speed printing of 20 second per side in color and six (6) seconds per side in mono

2) Interfaces: Parallel and USB standard with Ethernet as option

3) Edge-to-edge printing in full color throughput on both sides of cad

4) Accepts all industry standard card formats for cards ranging from 0.015” to 0.063” in thickness; including, PCV ISO CR80 cards, magnetic stripe, contactless, smart, adhesive backed, and HoloPatch

5) Options shall include Anti-counterfeiting, magnetic stripe and smart card encoders

6) Card Capacity – 100 in card hopper, 50 in output bin (10 mil), 100 (30 mil)

7) Provide consumables to print number of card provided plus 50%.

E. Control Panels

1. The control panels shall collect alarm input point status and access control data, multiplex the information, and transmit that data back to the ACS System file server / system workstations.

2. The control panel shall incorporate Flash ROM to allow for efficient firmware update downloads from the system software and/or remotely from the ACS System manufacturer.

3. The control panels shall receive and execute instructions issued automatically or manually from the ACS System file server / system workstation.

4. The control panels shall have memory and logic circuits as required to ensure continued operation of connected devices without degradation in system security in the event that communications with the ACS System file server is interrupted.

5. All system control panels shall communicate with the ACS System file server over an Owner provided communications circuit.

6. The control panels shall provide the following:

a. Supervised alarm inputs to monitor the status of alarm circuits and report the status information to the ACS System file server.

b. Control relay outputs for controlling devices by remote command from the ACS System workstations, through time programming or on alarm point activation date on the ACS server. Control relay output contacts shall be rated for 2 A @ 24 VDC.

c. Flash ROM technology and shall provide for remote update of DGPs firmware.

d. Supervision of all wiring / circuits between the DGPs and monitored alarm devices. Wire / device supervision shall meet UL 1076 guidelines.

e. Enough RAM to maintain a minimum card database of 5,000 cards.

f. Automatic disconnection from the communication circuit upon a communication failure within the DGPs to prevent communication to other DGPs in the circuit from being interrupted.

g. Enough RAM to operate normally upon loss of communication with the ACS System file server. In addition, the DGPs shall store up to 5,000 card transactions and up to (16) events per potential alarm input, and transmit that data to the ACS System file server as soon as communication is restored.

h. Activation of a door control relay output and shunting of the intrusion alarm upon verification of a card authorization or request to exit.

i. Adjustable door control relay activation time through ACS System Software from 1 to 30 seconds on an individual card reader basis. The door shall automatically relock upon closure.

j. An intrusion alarm indication on the ACS System if the card reader controlled door is opened without an authorized card use or request to exit.

k. A door prop alarm indication if the card reader controlled door is held open past an adjustable time period after an authorized card use or request to exit. The door prop time delay shall be adjustable through ACS System Software from 1 to 60 seconds on an individual card reader basis.

l. A wiring chart delineating wire routings, labeling, and all termination points. The chart shall be produced by the Contractor, laminated and housed in a clear plastic sleeve affixed to the inside of the enclosure cover.

m. A tamper switch to sense the removal or opening of the enclosure cover.

7. Transaction time for authorized cards shall be less than 0.5 second from the time of card read until the door is unlocked.

8. Provide one spare card reader input point and 20 percent spare alarm input points and output point's after all specified points are initially connected. Sufficient modules shall be provided to accommodate only the number of card readers initially installed, as well as one spare input per control panel at each communications closet or consolidation point.

9. Configure the system such that devices can be connected to spare input points, output points and card reader inputs on the control panel without requiring reconfiguration of the ACS.

10. Configure the control panel communication chains such that no more than 48 card readers (including all possible spare card readers) shall be connected to each control panel chain.

11. Communications

a. Communications between servers, workstations, and control panel will be based on utilizing the Owner's LAN.

b. The ACS shall support 10 Base T Ethernet communications between the ACS File Server and the System Workstations, and between the ACS File Server and the control panel's.

c. Communications shall be encapsulated in a TCP/IP network transport layer in a client / server type Architecture.

F. Card Readers

1. Provide card reader as indicated on the drawings.

2. The card reader shall be smart card technology and shall read encoded data from access cards and transmit the data to the DGP.

3. A two-color LED on the face of the Card Reader and an audible tone shall indicate authorized and unauthorized reader uses.

4. Provide manufacturer recommended power to each reader directly from the DGP or a secondary supply. The power supply shall be UL Class 2, power limited and shall provide necessary output voltage to allow the card reader to operate at its maximum specified read range.

5. Wire card reader LEDs to indicate valid and invalid card reads, and door locked and unlocked conditions. All card reader LED indicators shall operate identically.

G. Access Card

1. The Access Card shall have only a hot stamp card number visible on the card and shall not indicate the Contractor or manufacturer name and/or logo.

2. Access Cards shall be PVC laminate construction.

3. Access Cards shall meet ISO thickness standards.

4. Access Cards shall be available in multi-technology formats, which combine proximity with, magnetic stripe, Wiegand, and / or bar code as required by the Owner.

5. Provide 200 Access Cards.

H. Card Reader Wiegand Signal Extender

1. Provide card reader Wiegand signal extension devices as necessary for card readers with cable distances to the DGP greater than 500 feet as required.

2. Card reader signal extenders shall amplify / extend the Wiegand signal for distances of up to 10,000 feet without signal degradation.

3. Monitor normally closed contacts from card reader, Wiegand, signal extenders for power and communication loss between the remote units and the centralized receiving units.

I. Electric Locking mechanical

1. Interface with electric locking mechanical provided by the door hardware supplier.

2. Wire electric locking mechanism as indicated on the drawings.

3. Wire fail-safe electric locking mechanical in accordance with local codes.

4. Wire fail-secure electric locking mechanical and power supplies such that a fire alarm condition or building power failure shall not affect operation of the lock.

J. Delayed Egress Locking Devices

1. Interface with delayed egress locking devices provided by the door hardware supplier.

2. Wire delayed egress locking devices as indicated on the Drawings.

3. Wire delayed egress locking devices for fail-safe operation in accordance with local codes.

4. Interface with a normally closed alarm contacts that shall open upon activation of the unlock timer.

5. Interface with sounder bypass control contacts. Wire ACS control output contacts to bypass sounder by system workstation.

6. Interface with lock control contacts activated by system workstation and / or time schedule. Wire ACS control output contacts to lock / unlock devices by time schedule and / or system workstation.

K. Electrified Locking Mechanism Power Supply

1. Provide power supplies for all ACS electric locking mechanisms as specified with the exception of those noted as having Time-Delay functions as defined by NFPA 101.

2. Power supplies for time-delay function locks shall be provided by others. The security Contractor shall coordinate with others as necessary to ensure proper ACS operation of all Time-Delay electric locking mechanisms to include the provision of, and final termination of, ACS control and monitoring wire and cable as necessary to facilitate desired operation and integration with the ACS.

3. Provide power supplies for all electric locking mechanisms (with the exception of fire stair doors). Fail-safe locking devices shall unlock automatically under the following conditions:

   a. Any building fire alarm

   b. Loss of building power

   c. Failure of the power supply

4. Provide battery chargers and batteries for all power supplies except those for fail-safe locks.

5. Monitor low battery and power fail alarms for each power supply.

6. Fire Alarm Interface

   a. Connect (hard wire) fail-safe electric and time delay locking mechanical to the building fire alarm system for fail-safe release upon any fire alarm.

   b. Interface with a single low voltage/low current normally closed dry contact from the fire alarm system provided by the fire alarm contractor in the Fire Command Center (FCC). The contact shall open on any fire alarm condition.

   c. Provide all additional UL listed fail-safe relays and power supplies necessary to interface to this contact and unlock all fail-safe doors.

d. Connect fail-safe relays and power supplies to standard building power. Connection of fail-safe devices to emergency or UPS power shall not be acceptable.

e. Reference the drawings for fire alarm interface requirements.

L. Request-to-Exit (REX) Device

1. Provide request-to-exit (REX) pushbuttons for unlocking card reader controlled doors with electromagnetic locks as indicated on the drawings. Wire the REX pushbuttons to the REX input of the associated control panel. Activation of the REX pushbutton shall release the lock and shall shunt the intrusion alarm output. The REX pushbutton shall contain an adjustable time delay relay for door unlock and shall be intrinsically fail-safe in order to release the door(s) in the event of a failure of the exit control circuitry within the control panel. All REX pushbuttons shall be labeled to meet local codes.

2. Provide request-to-exit (REX) infrared motion sensors for detecting authorized exits through card reader controlled doors as indicated on the drawings. Wire the REX motion sensor to the REX input of the control panel. For doors equipped with electromagnetic locks, activation of the REX motion sensor shall release the electric locking mechanism and shall shunt the intrusion alarm output. For doors equipped with electric locking mechanical that are free exiting at all times (i.e. mortise electric locks, electric strikes, etc.), the REX motion sensor shall only shunt the intrusion alarm output and shall not unlock the lock.

3. Provide the manufacturer recommended power supply. The power supply shall be UL Class 2, power limited.

M. Device Power Supply

1. Provide U.L. Listed power supplies for all ACS equipment as specified.

2. Provide battery chargers and batteries for all power supplies except those for fail-safe locks.

3. Monitor low battery and power fail alarms for each power supply.

N. Door Position Switches

1. Provide normally closed magnetic concealed door position switches, surface mount door position switches and overhead door position switches to monitor the open/closed status of doors as specified herein and as indicated on the drawings.

2. Provide double-pole / double-throw (DPDT) contacts if contact is monitored by ACS and Intrusion Detection system.

3. Provide armored cable (as required) from the switch location to the associated junction box in order to conceal the wire.

4. Alarm contact upon removal of the unit from the wall.

O. Access Control Cabling

1. The Contractor shall furnish and install cabling as indicated on the technology drawings, specified herein and on the associated equipment schedules and diagrams.

3.6 Pathway Cable Support

A. All cables shall be installed and supported in conduit systems, cable trays, cores, sleeves, etc. as indicated in the technology drawings.

B. When cables leave the main pathway systems as indicated on the technology drawings, they shall be installed and supported in Contractor furnished and installed j-hooks or saddle straps.

C. No cable pathway shall exceed 40% fill ratio.

D. The contractor shall furnish a separate j-hook or saddle strap pathway for each wire type.

E. J-hooks and saddle straps shall be installed no more than five-feet (5') apart on center, using only manufacturer-approved installation methods and hardware.

F. J-hooks shall be furnished with closure clips.

G. Maximum sag between supports shall not exceed twelve-inches (12").

H. Contractor shall establish j-hook and saddle strap pathways and shall coordinate pathways with all other disciplines. Under no-circumstances shall these pathways be used to support other low-voltage applications not included in this specification.

I. Cable Dressing

1. No nylon cable ties shall be used at any time during the installation of the wire.

2. Above Ceiling

a. Contractor shall furnish and install plenum-rated hook & loop straps in plenum-rated airspaces.

1) The Contractor shall install no more than (1) hook & loop strap between each j-hook or saddle strap or at service loop locations.

3. Security Controller Locations

a. The Contractor shall bundle all visible wires with Contractor furnished and installed hook & loop straps.

b. Hook & loop straps shall be installed twenty-four (24) inches apart on center.

3.7 Labeling

A. Contractor shall verify room numbers and confirm the final room numbering scheme prior to generating any labels.

B. Cables shall be labeled within (12) inches from the termination point inside the Equipment Room/Telecommunications/Security Control Location Rooms.

C. Cables shall be labeled within (6) inches from the termination point at the device end.

D. Cables shall be labeled identically at both ends.

E. Label all controls as necessary to agree with their function.

3.8 Fire Stop

A. Provide fire stop as required.

3.9 System Programming and Data Entry

A. Provide all initial system programming and setup of the ACS including, but not limited to the following:

1. Graphical maps and icons. Coordinate with the Architect to obtain AutoCAD architectural backgrounds for implementation as graphical maps. Import all AutoCAD background information provided by the Architect and produce a complete set of graphical maps depicting all ACS points.

2. ACS card reader information. Coordinate all card reader values and text, including descriptors, alarm messages, ESS Camera call up, map call up and identification with the Architect.

3. Input and output points for the ACS. Coordinate all input and output priorities and text, including descriptors, alarm messages, ESS Camera call up, and map call up and identification with the Architect.

4. Initial system users, including levels of access. This shall include the designation of a Owner’s representative at the "Super User" level immediately upon ACS initialization.

5. Initial ESS Camera call up and alarm information for interface with ESS System.

6. Initial ESS Camera call up and alarm information for interface with Intercom System.

7. Alarm monitoring and automatic shut down information for the UPS interface.

B. Enter all data needed to make the Security System operational. Deliver the data to the Owner on data entry forms, utilizing data from the Contract Documents, Contractor's field surveys and all other pertinent information in the Contractor's possession required for complete installation of the database. Identify and request from the Architect any additional data needed to make the Security System fully operational and integrated. The completed forms shall be delivered to the Owner for review and approval prior to the Contractor's scheduled need date.

3.10 Wiring Techniques

A. Furnish and install all ACS wire and cable with the exception of traveling cable for elevator control and monitoring.

B. Provide code compliant fire proofing techniques for all penetrations of fire rated partitions and slabs, where the penetrations are made by or used for installation of the ACS.

C. Coordinate the routing of wire and cable requiring isolation from power, radio frequency (RF), electromagnetic interference (EMI), telephone, etc. with the Architect.

D. Run all wire and cable continuous from device location to the final point of termination. No mid-run cable splices shall be allowed.

E. Where splicing and/or patching of coaxial cable is deemed necessary, it shall be accomplished through equalization and/or distribution amplifiers. Provide power for

the amplifiers as required. The exact location of all equalization/distribution amplifiers (as applicable) shall be indicated on the Record Drawings.

F. Furnish and install all coaxial cable such that ample slack is supplied at the device terminating end of the cable to compensate for any final field modifications in camera location. The extra cable (approximately three meters) shall be bundled and wrapped.

G. At no time shall any coaxial cable be subjected to a bend less than a 150 mm radius.

H. Wire and cable within DGPs, power distribution cabinets and other security enclosures shall be neatly installed, completely terminated, pulled tight with slack removed and routed in such a way as to allow direct, unimpeded access to the equipment within the enclosure. All wire and cable shall be bundled and tied. Ties shall be similar to T&B TyRap cable ties.

I. Provide heat-shrink to insulate all wire splices and connections. The use of electrical tape for splices and connections shall not be acceptable.

J. Visually inspect all wire and cable for faulty insulation prior to installation.

K. Provide grommets and strain relief material where necessary to avoid abrasion of wire and excess tension on Wire and Cable.

L. Make connections with solderless devices, mechanically and electrically secured in accordance with the manufacturers' recommendations. Wire nuts shall not be an acceptable means of connecting wire and cable.

M. Neatly bundle and wrap all horizontally run (above accessible ceilings and not within conduit) wire and cable at three meter intervals. Provide supports as required. All supports shall be UL listed for the application.

N. All system wiring within vertical riser shafts (as required) shall be bundled, wrapped and tied to the structure at three meter intervals in order to isolate it from other wire and cable within the shaft. Additionally, all wire and cable within the shaft shall be supported at least every two floors using Greenlee Slack Grips (Split Mesh Lace Closing) or approved equal. Provide all personnel and equipment necessary to install and support the cable. All equipment shall be UL listed for the application.

3.11 Conduit, Boxes and Raceways

A. Install all conduit necessary for a complete installation, but not provided for in the Security Conduit Drawings, in finished areas concealed in chases, furrings, concrete slabs and/or above suspended ceilings. No exposed conduit shall be installed within public areas.

B. Conduit shall be carefully installed, properly and adequately supported as required to comply with the requirements outlined herein and as required by the NEC to provide a neat, workmanlike installation. Horizontal conduit runs shall be supported by clamps, pipe straps, special brackets or heavy iron tie, tied to the black iron structural members supporting the ceiling. Fastening of conduit to masonry walls, floor or partitions require malleable pipe clips with screws and suitable expansion sleeves.

C. All conduit shall be cut accurately to measurements established at the building and shall be installed without springing or forcing.

D. All required inserts shall be drilled-in and all openings required through concrete or masonry shall be saw cut or core drilled with tools specifically designed for this purpose.

E. Swab out and remove all burrs from conduit before any wires are pulled.

F. Lay out and install conduit runs as to avoid proximity to hot pipes. In no case shall a conduit be run within 75 mm of such pipes, except where crossings are unavoidable and then the conduit shall be kept at least 25 mm from the covering of the pipe crossed.

G. Provide fire stops where conduits penetrate fire rated walls and/or floors.

H. All conduit installation, whether run exposed or concealed, shall be approved prior to installation by the Architect.

3.12 Power Requirements

A. 120VAC AC power dedicated to security shall be provided by the electrical contractor for the Security System as indicated on drawings. Coordinate with the Architect to establish locations of security dedicated 120VAC AC circuits.

B. Connect to the AC power (provided by electrical contractor) and provide UL listed power supplies and transformers to distribute low voltage power to the system components as required.

C. Provide hinged cover terminal cabinets with tamper switches for all power supplies, transformers and power distribution terminal strips. Provide all conduit and wiring from the AC power facilities to the terminal cabinets.

D. Surge Protection

1. Provide protection against spikes, surges, noise, and other line problems for all system equipment and components.

2. Protect all exterior video, control, power, signal cables and conductors against power surges. Each surge protector shall be UL Listed.

3.13 Labeled Doors and Frames

A. In no instance shall any UL labeled door or frame be drilled, cut, penetrated, or modified in any way.

B. The Contractor shall be responsible for replacing any labeled door or frame that is modified without written approval from the Architect.

3.14 Training

A. Coordinate with the Owner to establish a training outline and schedule. Submit a comprehensive training curriculum to the Owner once all preliminary coordination is complete. The Owner will revise and comment on the curriculum as required.

B. Provide a minimum of 8 hours of operator training, and 4 hours of administrative training, either on or off site on a complete and fully operational system parallel and equal to the system being provided, to representatives of the Owner.

C. Operator training shall include, but not be limited to the following:

1. All operating procedures

2. System configuration

3. Alarm acknowledgement, alarm response logging, and map graphics functionality

4. Image capture, badge printing, and print ribbon replacement

D. Administrative training shall include, but not be limited to the following:

1. All operating system procedures and configuration variables

2. Database functions and setup

3. Cardholder input and deletion procedures

4. Report generation

5. Maps generation and manipulation

6. Card format configuration

7. Badge creation and design

8. Driver loading

E. Record, label, and catalog all training on DVD. Provide the DVD to the Owner for future in-house training sessions and / or reviews. Furnish all temporary equipment necessary for recording all training sessions. Maintain accurate and up-to-date time sheets of all training sessions.

F. The Contractor shall be on call during the Warranty to answer any questions the Owner might have. The Owner reserves the right to use any excess training hours, not used by the time of system completion, for future training as requested by the Owner until the total number of training hours has been completed.

3.15 System Start-Up

A. The Work shall be complete and ready to operate prior to final acceptance.

B. Load all of the initial user database into all programmable systems up to the inaugural day of beneficial use of the Security System. The Architect shall assist in establishing procedural guidelines and in defining terminology and conditions unique to the Owner's operation.

3.16 Substantial Completion

A. In order to qualify for the Architect's consideration of Substantial Completion, the Work must, at a minimum, meet the following requirements:

1. The initial card holder database must be fully loaded into the ACS.

2. All sub-system interfaces must be complete and operational.

3. All required operator training must have been provided to the Owner and/or its representatives.

B. Substantial Completion shall not be construed as final acceptance of the Work.

3.17 System Acceptance

A. Final acceptance testing of the Work will be conducted by the Architect.

B. Prior to any final acceptance testing, the Contractor shall submit two sets of preliminary (draft) Record Drawings to the Architect. The preliminary Record Drawings are to be used by the Architect to conduct the system final test.

C. Submit a paragraph by paragraph completion matrix indicating completion or delinquency for each item included in the Specification and all subsequent addenda and bulletins as part of the Work. Indicate completion of the requirement by the word "Completed" following each paragraph number. Indicate delinquency for the requirement by the words "To Be Completed" following the applicable paragraph number. Should work on any item be under way, but not yet fully complete, indicate the extent (or lack thereof) of completion to date, and the proposed date of completion.

D. Conduct a complete test of the entire Security System and provide the Architect with a written report on the results of that test. During the course of this test, place the integrated Security System in service, and calibrate and test all equipment.

E. Following completion of the initial testing and correction of any noted deficiencies, conduct a five day burn-in test. The intent of the burn-in test shall be to prove the Security System by placing it in near real operating conditions. During this period the Security System shall be fully functional and programmed such that all points, interfaces, controls, reports, messages, prompts, etc. can be exercised and validated. Record and correct any system anomaly, deficiency, or failure noted during this period. Scheduling of the final acceptance test shall be based on a review of the results of this burn-in test.

F. Deliver a report describing the results of functional tests, burn-in tests, diagnostics, calibrations, corrections, and repairs including written certification to the Architect that the installed complete Security System has been calibrated, tested, and is fully functional as specified herein.

G. Prior to the final acceptance test, coordinate with the Architect for security related construction clean-up and patch work requirements. Security equipment closets and similar areas should be free of accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, remove all waste materials, rubbish, the Contractor's and it's subcontractors' tools, construction equipment, machinery and all surplus materials.

H. Upon written notification from the Contractor that the Security System is completely installed, integrated and operational, and the burn-in testing completed, the Architect will conduct a final acceptance test of the entire system.

I. During the course of the final acceptance test by the Architect, the Contractor shall be responsible for demonstrating that, without exception, the completed and integrated system complies with the contract requirements. All physical and functional requirements of the project shall be demonstrated and shown. This demonstration will begin by comparing "as built" conditions of the Security System to requirements outlined in the Specification, item by item. Following the Specification compliance review, all Security System head-end equipment will be evaluated.

J. The functionality of the various interfaces between systems will be tested.

K. Following the Security System head-end equipment and console review, the installation of all field devices will be inspected. This field inspection will weigh heavily on the general neatness and quality of installations, complete functionality of each individual device, and mounting, backbox and conduit requirements compliance.

L. All equipment shall be on and fully operational during any and all testing procedures. Provide all personnel, equipment, and supplies necessary to perform all site testing. Provide a minimum of two employees familiar with the system for the final acceptance test. One employee shall be responsible for monitoring and verifying alarms while the other will be required to demonstrate the function of each device. Supply at least two two-way radios for use during the test. A manufacturer's representative may be present on site to answer any questions that may be beyond the technical capability of the Contractor's employees, if the Contractor so elects or by specific request of the Architect or Owner, at no charge to the Architect or Owner.

M. Upon successful completion of the final acceptance test (or subsequent punch list retest) the Architect will issue a letter of final acceptance.

N. The Architect retains the right to suspend and/or terminate testing at any time when the system fails to perform as specified. In the event that it becomes necessary to suspend the test, all of the Owner's/Architect's fees and expenses related to the suspended test will be deducted from the Contractor's retainage. Furthermore, in the event it becomes necessary to suspend the test, the Contractor shall work diligently to complete/repair all outstanding items to the condition specified in the Specification and as indicated on the Drawings. The Contractor shall supply the Architect with a detailed completion schedule outlining phase by phase completion dates and a tentative date for a subsequent punch list retest. During the final acceptance test, no adjustments, repairs or modifications to the system will be conducted without the permission of the Architect.

3.18 Project Closeout Documentation

A. As-Built Drawings

1. Drawings shall be provided to the Architect/Engineer at the time of substantial completion. Final payment will not be recommended until drawings are received and approved by the Architect/Engineer.

2. Three (3) sets of drawings depicting the condition of the access control system as installed.

3. As-Built drawings shall be produced in AutoCAD 2010 or higher and provided in hardcopy and electronically in .dwg and PDF format.

4. Hardcopy drawings shall be provided in the original size as issued by the Architect/Engineer.

5. Drawings shall retain the formatting and title block of the original drawings as issued by the Architect/Engineer.

6. Drawings shall be provided utilizing the original scale and shall include the exact dimensions and locations of all equipment room/telecommunication room layouts, wall elevations, equipment rack elevations, ladder racks, cable tray, sleeves, pathways, card reader locations and labeling scheme.

SECTION 32 1216
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface sealer.

1.02 RELATED REQUIREMENTS

A. Section 32 1723.13 - Painted Pavement Markings: Concrete bumpers.

1.03 REFERENCE STANDARDS

A. AI MS-19 - A Basic Asphalt Emulsion Manual; Fourth Edition.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with State of _____ Highways standard.

B. Mixing Plant: Conform to State of _____ Highways standard.

C. Obtain materials from same source throughout.

1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for paving work on public property.

PART 2 PRODUCTS

2.01 MATERIALS

A. Seal Coat: AI MS-19, mineral type. Provide MasterSeal manufactured by SealMaster or approved substitute.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing asphalt paving is ready to receive seal coat per manufacturer's required conditions.

3.02 SEAL COAT

A. Apply seal coat to surface in accordance with AI MS-19.

3.03 PROTECTION

A. Immediately after placement, protect pavement from mechanical injury until seal coat has set/dried.

END OF SECTION

SECTION 32 1713
PARKING BUMPERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Precast concrete parking bumpers and anchorage.

1.02 REFERENCE STANDARDS

A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2015.

B. 11

C. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.

D. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.

PART 2 PRODUCTS

2.01 MATERIALS

A. Parking Bumpers: Precast concrete, conforming to the following:
   1. Cement: ASTM C150/C150M, Portland Type I - Normal; white color.
   2. Concrete Materials: ASTM C330/C330M aggregate, water, and sand.
   3. Reinforcing Steel: ASTM A615/A615M, deformed steel bars; unfinished, strength and size commensurate with precast unit design.
   4. Air Entrainment Admixture: ASTM C260/C260M.
   5. Concrete Mix: Minimum 5,000 psi compressive strength after 28 days, air entrained to 5 to 7 percent.
   6. Use rigid molds, constructed to maintain precast units uniform in shape, size and finish. Maintain consistent quality during manufacture.
   7. Embed reinforcing steel, and drill or sleeve for two dowels.
   8. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
   9. Minor patching in plant is acceptable, providing appearance of units is not impaired.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install units without damage to shape or finish. Replace or repair damaged units.

B. Install units in alignment with adjacent work.

C. Fasten units in place with 2 dowels per unit.

END OF SECTION

SECTION 32 1723.13
PAINTED PAVEMENT MARKINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parking lot markings, including parking bays, arrows, and handicapped symbols.

1.02 RELATED REQUIREMENTS

A. Section 32 1216 - Asphalt Paving.

1.03 REFERENCE STANDARDS

A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.

B. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration; Current Edition.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Paint: 2 containers, 1 gallon size, of each type and color.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver paint in containers of at least 5 gallons accompanied by batch certificate.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MATERIALS

A. Line and Zone Marking Paint: MPI (APL) No. 97 Latex Traffic Marking Paint; white.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

B. Clean surfaces thoroughly prior to installation.
   1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
   2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.

3. Sandblasting: Use equipment of size and capacity necessary, providing not less than 150 cfm of air at pressure not less than 90 psi at each nozzle used.

C. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.

3.03 INSTALLATION

A. Begin pavement marking as soon as practicable after surface has been cleaned and dried.

B. Do not apply paint if temperature of surface to be painted or the atmosphere is less than 50 degrees F or more than 95 degrees F.

C. Apply in accordance with manufacturer's instructions using an experienced technician that is thoroughly familiar with equipment, materials, and marking layouts.

D. Comply with FHWA MUTCD manual (http://mutcd.fhwa.dot.gov) for details not shown.

E. Apply markings in locations determined by measurement from survey control points; preserve control points until after markings have been accepted.

F. Apply uniformly painted markings of color(s), lengths, and widths as indicated on the drawings true, sharp edges and ends.
1. Apply paint in one coat only.
2. Wet Film Thickness: 0.015 inch, minimum.
3. Width Tolerance: Plus or minus 1/8 inch.

G. Parking Lots: Apply parking space lines, entrance and exit arrows, painted curbs, and other markings indicated on drawings.
1. Mark the International Handicapped Symbol at indicated parking spaces.
2. Hand application by pneumatic spray is acceptable.

H. Symbols: Use a suitable template that will provide a pavement marking with true, sharp edges and ends, of the design and size indicated.

3.04 DRYING, PROTECTION, AND REPLACEMENT

A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.

B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.

C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.

D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.

E. Replace removed markings at no additional cost to Owner.

END OF SECTION

Bid 1701-139

Williamson County, Texas

ABBREVIATIONS:

A

ABV	ABOVE
ACOUST	ACOUSTICAL
ACCU	AIR COOLED CONDENSING UNIT
ACT	ACOUSTICAL CEILING TILE
AD	ACCESS DOOR
ADA	AMERICAN WITH DISABILITIES ACT
ADJ	ADJUSTABLE OR ADJACENT
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
ALUM	ALUMINUM
AP	ACCESS PANEL
ARCH	ARCHITECT, ARCHITECTURAL

B

BFF	BELOW FINISHED FLOOR
BFE	BRACKET MOUNTED FIRE EXTINGUISHER
BLDG	BUILDING
BOC	BACK OF CURB
BP	BASE PLATE
BRG	BEARING
BRKT	BRACKET
BS	BOTH SIDES
BW	BOTH WAYS
BO	BOTTOM OF

C

CAB	CABINET
CIP	CAST IN PLACE
CJ	CONTROL OR CONSTRUCTION JOINT
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CORR	CORRIDOR
CT	CERAMIC TILE
CTR	CENTER

D

D	DEPTH
DEG	DEGREES
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DN	DOWN
DP	DAMP PROOFING
DS	DOWN SPOUT
DWG	DRAWING
DWL	DOWEL

E

E	EAST
EA	EACH
EF	EACH FACE
EIFS	EXTERIOR INSULATION FINISH SYSTEM
EFS	EXTERIOR FINISH SYSTEM
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
EQ	EQUAL
EQUIP	EQUIPMENT
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR

F

FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FCO	FLOOR CLEAN OUT
FD	FLOOR DRAIN
FDC	FIRE DEPARTMENT CONNECTION
FDV	FIRE DEPARTMENT VALVE
FE	FIRE EXTINGUISHER
FEC	FIRE EXTINGUISHER CABINET
FF	FINISHED FLOOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FP	FIRE PROTECTION
F/R	FIRE RATED
FRP	FIBERGLASS REINFORCED PLASTIC
FRT	FIRE TREATED

G

GALV	GALVANIZED
GB	GRADE BEAM
GC	GENERAL CONTRACTOR
GFRC	GLASS FIBER REINFORCED CONCRETE
GND	GROUND
GRS	GALVANIZED RIGID STEEL
GTR	GUTTER
GWB	GYPSUM WALL BOARD

H

HT	HEIGHT
HB	HOSE BIB
HC	HANDICAP
HDW	HARDWARE
HDWD	HARD WOOD
HM	HOLLOW METAL
HORIZ	HORIZONTAL
HYD	HYDRANT

I

IBC	INTERNATIONAL BUILDING CODE
ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH OR INCHES
INCAND	INCANDESCENT
INSUL	INSULATION
INT	INTERIOR

J

JAN	JANITOR
JST	JOIST
JT	JOINT

K

KO	KNOCKOUT

L

L	LENGTH
LAV	LAVATORY
LB.#	POUNDS
LDG	LANDING
LF	LINEAR FEET
LG	LONG
LH	LEFT HAND
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LONG	LONGITUDINAL
LT	LIGHT
LTG	LIGHTING

M

MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MEZZ	MEZZANINE
MFR	MANUFACTURER
MID	MIDDLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MK	MARK
MO	MASONRY OPENING
MTL	METAL
MTD	MOUNTED

N

N	NORTH
N/A	NOT APPLICABLE
NF	NEAR FACE
NIC	NOT IN CONTRACT
NOM	NOMINAL
NTS	NOT TO SCALE

O

OC	ON CENTER
OD	OVERFLOW DRAIN
OF	OUTSIDE FACE
OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED OWNER INSTALLED
OH	OPPOSITE HAND
OPG	OPENING
OPP	OPPOSITE
OS	OVERFLOW THROUGH WALL SCUPPER

P

PC	PRE-CAST CONCRETE
PERIM	PERIMETER
PERP	PERPENDICULAR
PI	POINT OF INTERSECTION
P	PLATE
PL	PROPERTY LINE
PLAM	PLASTIC LAMINATE
PLBG	PLUMBING
PLYWD	PLYWOOD
PNL	PANEL
PR	PAIR
PREFAB	PREFABRICATED
PRELIM	PRELIMINARY
PTD	PAINTED

Q

QT	QUARRY TILE
QTY	QUANTITY
R	

R

	RADIUS
RCP	REFLECTED CEILING PLAN
RD	ROOF DRAIN
REF	REFERENCE, REFER
REINF	REINFORCING
REQD	REQUIRED
REV	REVISION, REVISE
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
RP	RADIUS POINT
RTU	ROOF TOP UNIT
S	

S

	SOUTH
SCHED	SCHEDULED
SECT	SECTION
SF	SQUARE FEET
SHT	SHEET
SIM	SIMILAR
SHT MTL	SHEET METAL
SJ	SAW JOINT
SL	SLOPE
SPEC	SPECIFICATION
SS	STAINLESS STEEL
STC	SOUND TRANSMISSION CLASS
STD	STANDARD
STL	STEEL
STRUCT	STRUCTURAL
SURF	SURFACE
T	

T

	TREAD OR TOP
TO	TOP OF
TAS	TEXAS ACCESSIBILITY STANDARDS
TC	TOP OF CURB
TEL	TELEPHONE
TEMP	TEMPORARY
THK	THICKNESS
THRD	THREADED
THRU	THROUGH
TYP	TYPICAL

U

UON	UNLESS OTHERWISE NOTED
UR	URINAL

V

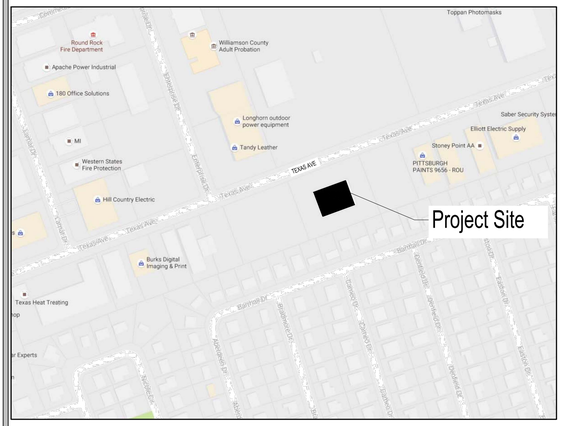
VB	VAPOR BARRIER
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
VR	VAPOR RETARDER
VT	VINYL TILE
VTR	VENT THROUGH ROOF

W

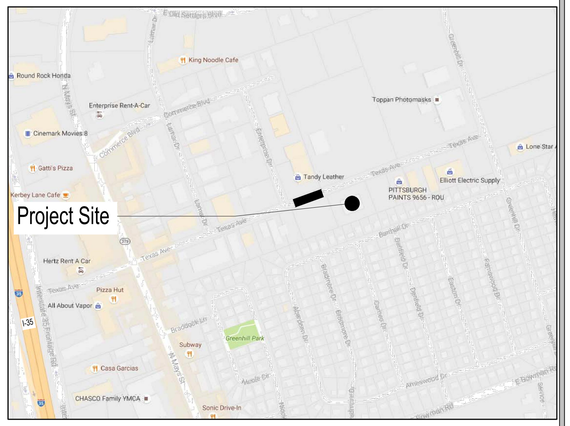
w/	WITH
WC	WATER CLOSET
WH	WATER HEATER
WP	WORK POINT

X,Y, & Z

RESERVED



Site Map



Round Rock, Texas

Vicinity Map

WCCHD Office Renovations

355 Texas Avenue | Round Rock, Texas

100% Construction
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January 16, 2017

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REGISTERED ARCHITECT
STATE OF TEXAS

1/16/2017

SHEET INDEX

SHEET NO.	TITLE
G0.00	COVER SHEET & SHEET LIST
G0.01	LIFE SAFETY PLAN
	ARCHITECTURE
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A0.02	2ND FLOOR DEMOLITION PLAN
A1.01	ROOF & SITE PLAN
A2.01	1ST FLOOR RENOVATION PLAN
A2.02	2ND FLOOR RENOVATION PLAN
A3.01	1ST FLOOR REFLECTED CEILING PLAN
A3.02	2ND FLOOR REFLECTED CEILING PLAN
A5.01	DOOR SCHEDULE & DETAILS
A7.01	ROOM FINISH SCHEDULE & LEGEND
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A7.03	2ND FLOOR FINISH PLAN
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	TECHNOLOGY/SECURITY
T001	TECHNOLOGY SYMBOLS & LEGEND
T101	1ST FLOOR PLAN-TECHNOLOGY
T102	2ND FLOOR PLAN-TECHNOLOGY
T301	TECHNOLOGY DETAILS
T302	SECURITY DETAILS
T303	SECURITY DIAGRAMS/SCHEDULES
	MEP
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DM2.02	2ND LEVEL DEMO MECHANICAL PLAN
DEL2.01	1ST LEVEL DEMO LIGHTING PLAN
DEL2.02	2ND LEVEL DEMO LIGHTING PLAN
DEP2.01	1ST LEVEL DEMO POWER PLAN
DEP2.02	2ND LEVEL DEMO POWER PLAN
DP2.01	1ST LEVEL DEMO PLUMBING PLAN
DP2.02	2ND LEVEL DEMO PLUMBING PLAN
M0.00	MECHANICAL SYMBOLS & ABBREVIATIONS
M2.01	1ST LEVEL MECHANICAL PLAN
M2.02	2ND LEVEL MECHANICAL PLAN
M3.01	MECHANICAL DETAILS
M3.02	MECHANICAL CONTROL SCHEMATICS
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M4.02	MECHANICAL SCHEDULES
M4.03	MECHANICAL LOAD CALCULATIONS
E0.00	ELECTRICAL SYMBOL & ABBREVIATIONS
E3.01	ELECTRICAL NOTES, DETAILS & LIGHT FIXTURE SCHEDULE
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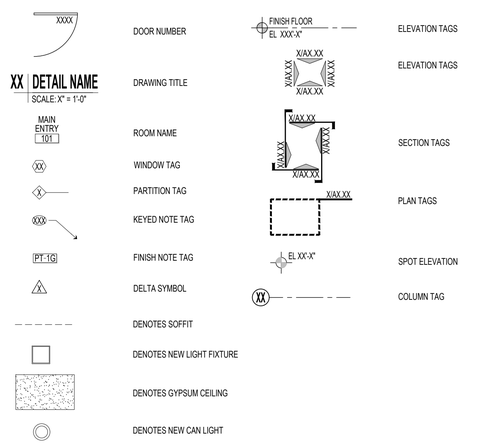
EL2.01	1ST LEVEL LIGHTING PLAN
EL2.02	2ND LEVEL LIGHTING PLAN
EP2.01	1ST LEVEL POWER PLAN
EP2.02	2ND LEVEL POWER PLAN
P0.00	PLUMBING SYMBOLS AND ABBREVIATIONS
P2.01	1ST LEVEL PLUMBING PLAN
P2.02	2ND LEVEL PLUMBING PLAN
P3.01	PLUMBING RISERS
P5.01	PLUMBING SCHEDULES
P6.01	PLUMBING DETAILS

GENERAL NOTES:

1. ALL CONSTRUCTION AND DEMOLITION SHALL BE IN COMPLIANCE WITH THE 2015 INTERNATIONAL BUILDING CODE WITH LOCAL AMENDMENTS AND WITH ALL OTHER CODES, ORDINANCES AND REQUIREMENTS SET FORTH BY THE CITY OF ROUND ROCK. SUBCONTRACTOR TO VERIFY REQUIREMENTS / AMENDMENTS PER CITY OF ROUND ROCK PRIOR TO STARTING WORK.
2. ALL WORK RELATING TO THIS CONSTRUCTION AND DEMOLITION SHALL COMPLY WITH U.S. DEPARTMENT OF LABOR, THE OCCUPATIONAL SAFETY AND HEALTH STANDARDS AND ALL RELATED LOCAL BUILDING CODES AND ORDINANCES.
3. DO NOT SCALE THE DOCUMENTS.
4. ALL DIMENSIONS ARE TO BE FIELD VERIFIED AND BACK CHECKED FOR CORRECTNESS. IF ANY DEVIATIONS OR DISCREPANCIES OCCUR, CONTACT THE GENERAL CONTRACTOR FOR VERIFICATION PRIOR TO PROCEEDING WITH THE WORK.
5. ALL SUBCONTRACTORS SHALL CAREFULLY REVIEW THE DRAWINGS, SPECIFICATIONS, DETAILS AND NOTES FOR INFORMATION REGARDING THE SCOPE OF THE WORK INTENDED PRIOR TO PROCEEDING WITH THE WORK.
6. ALL PENETRATIONS THROUGH FIRE RATED PARTITIONS, FIRE RATED CEILING ASSEMBLIES SHALL BE INSTALLED ACCORDING TO U.L. STANDARDS AND PER APPLICABLE CODES FOR REQUIRED HOUR FIRE RATED CONSTRUCTION.
7. ALL MATERIALS SHALL BE INSTALLED ACCORDING TO INDUSTRY STANDARDS, ALL AGENCIES OR "STANDARD" RECOMMENDATIONS REFERENCED IN THE SPECIFICATIONS, OR MANUFACTURERS RECOMMENDED INSTALLATION PROCEDURES, WHICHEVER IS THE MOST STRINGENT, IN ORDER TO PROVIDE A COMPLETE AND HIGH QUALITY PROJECT.
8. THE CONTRACTOR AND SUBCONTRACTORS REPRESENTS AND WARRANTS THAT IT HAS EXAMINED THE PLANS, DRAWINGS, SPECIFICATIONS AND ALL CONSTRUCTION CRITERIA OF OWNER AND HAS SATISFIED ITSELF THAT THE INFORMATION CONTAINED THEREIN IS SUFFICIENT TO FULLY AND COMPLETELY CONSTRUCT THE PROJECT.

ARCHITECTURAL SYMBOLS:



WCCHD Office Renovations | 100% CD ISSUE BID SET | JAN 16, 2017

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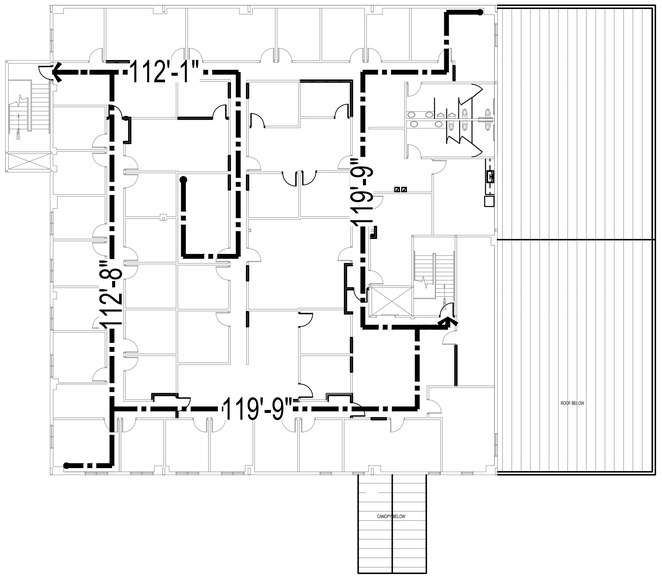
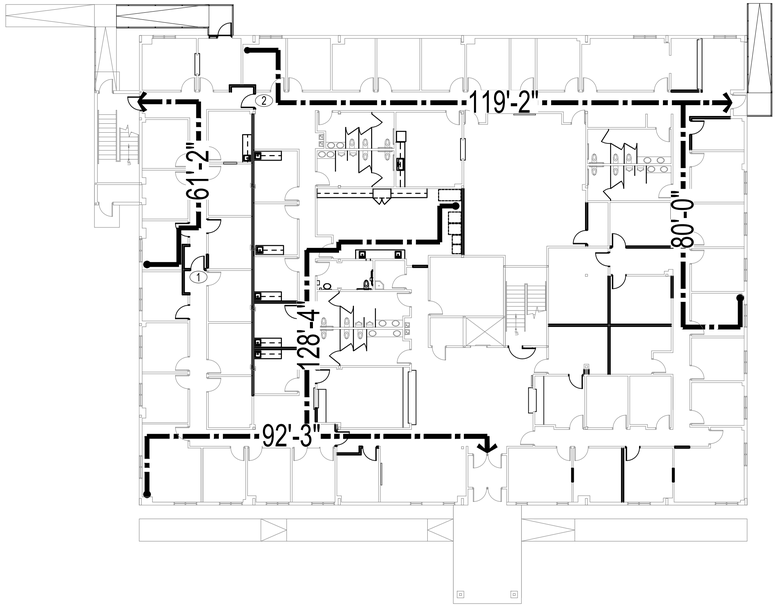
Bid 1701-139

Williamson County, Texas



2 2ND FLOOR LIFE SAFETY PLAN

SCALE: 1/8" = 1'-0"



① DOOR HARDWARE TO BE DELAYED ACCESS TO MEET REQUIREMENTS OF IFC 2015 1010.1.9.7
② DOOR TO BE SIGNED "NOT AN EXIT"

1 1ST FLOOR LIFE SAFETY PLAN

SCALE: 1/16" = 1'-0"

PLUMBING FIXTURE CALCULATIONS:

PLUMBING FIXTURES AND FIXTURE FITTINGS [CHAPTER 4]:

MINIMUM NUMBER OF REQUIRED FIXTURES [SECT 422] PLUMBING FIXTURES SHALL BE PROVIDED FOR THE TYPE OF BUILDING OCCUPANCY AND IN THE MINIMUM NUMBER SHOWN IN TABLE 422.1. THE TOTAL OCCUPANT LOAD SHALL BE DETERMINED IN ACCORDANCE WITH THE BUILDING CODE.

THE MINIMUM NUMBER OF FIXTURES SHALL BE CALCULATED AT 50 PERCENT MALE AND 50 PERCENT FEMALE BASE ON THE TOTAL OCCUPANT LOAD.

BUILDING OCCUPANCY PER IBC TABLE 1004.1.4 = 252 OCCUPANTS

PLUMBING FIXTURE CALCULATIONS:
PER TABLE 2902.1 MINIMUM PLUMBING FACILITIES PER CITY OF ROUND ROCK AMENDMENTS

252 OCCUPANTS = 126 MEN AND 126 WOMEN						
OCCUPANCY		WATER CLOSETS		URINALS	LAVATORIES	
		MALE	FEMALE	MALE	MALE	FEMALE
B BUSINESS OCCUPANCY GREATER THAN 5,000 SF	FIXTURES REQUIRED	3: 101-200	5: 101-200	1: 1-150	1: 1-200	1: 1-200
	EXISTING FIXTURES	8	12	8	8	8
		0 UNISEX			0 UNISEX	
		28 TOTAL FIXTURES			16 TOTAL FIXTURES	
	FIXTURES PROVIDED	0	0	0	0	0
		1 UNISEX			1 UNISEX	
		1 TOTAL FIXTURE			1 TOTAL FIXTURE	

PROJECT DATA:

PROJECT: WCCHD Office Renovations
ADDRESS: 355 Texas Avenue
Round Rock, Texas

PROPOSED RENOVATION: 25,232 SF

LOCATION ON PROPERTY -
GREATER THAN 60'-0" ON THREE SIDES

OCCUPANCY CLASSIFICATION -
GROUP "B" BUSINESS

CONSTRUCTION CLASSIFICATION -
TYPE IIB

FIRE EXTINGUISHING SYSTEM -
BUILDING IS SPRINKLERED

BUILDING CODES:

2015 INTERNATIONAL BUILDING CODE
2015 INTERNATIONAL MECHANICAL CODE
2015 INTERNATIONAL PLUMBING CODE
2015 INTERNATIONAL FIRE CODE
2014 NATIONAL ELECTRICAL CODE
2015 INTERNATIONAL ENERGY CONSERVATION CODE
TEXAS ACCESSIBILITY STANDARDS

THESE RENOVATIONS DO NOT CHANGE THE OCCUPANCY OR USE OF THE FACILITY

CODE REVIEW:

BUILDING OCCUPANCY CLASSIFICATION [CHAPTER 3]:

OCCUPANCY CLASSIFICATION [SECT 302]: GROUP "B"

GENERAL BUILDING HEIGHTS AND AREAS [CHAPTER 5]:

GENERAL HEIGHT AND AREA LIMITATIONS [SECT 503]: SECT 503.1 GENERAL - THE HEIGHT AND AREA FOR BUILDINGS OF DIFFERENT CONSTRUCTION TYPES SHALL BE GOVERNED BY THE INTENDED USE OF THE BUILDING AND SHALL NOT EXCEED THE LIMITS IN TABLE 504.

PER TABLE 504 & 506 AND FOR TYPE "B" OCCUPANCY, THE FOLLOWING IS ALLOWED:

TYPE "B":
CONSTRUCTION TYPE: IIB
ALLOWED AREA PER FLOOR: 69,000 SF
MAXIMUM HEIGHT: 4 STORIES

PROPOSED BUILDING HEIGHT AND AREA:
TYPE "B" 25,232 SF, 2 STORIES
TOTAL BUILDING AREA 25,232 SF, 2 STORIES

TYPES OF CONSTRUCTION [CHAPTER 6]:

CONSTRUCTION CLASSIFICATION [SECT 602]: SECT 602.1 GENERAL - BUILDING AND STRUCTURES ERECTED OR TO BE ERECTED, ALTERED OR EXTENDED IN HEIGHT OR AREA SHALL BE CLASSIFIED IN ONE OF THE FIVE CONSTRUCTION TYPES DEFINED IN SECT 602.2 THROUGH 602.5. THE BUILDING ELEMENTS SHALL HAVE A FIRE-RESISTANCE RATING NOT LESS THAN THAT SPECIFIED IN TABLE 601 AND EXTERIOR WALLS SHALL HAVE A FIRE-RESISTANCE RATING NOT LESS THAN THAT SPECIFIED IN TABLE 602.

PER TABLE 601 FOR "TYPE IIB" CONSTRUCTION:

BUILDING ELEMENT	FIRE-RESISTANCE RATING
STRUCTURAL FRAME	0 HR
BEARING WALLS	
EXTERIOR	0 HR
INTERIOR	0 HR
NON BEARING EXTERIOR PARTITIONS	0 HR
NON BEARING INTERIOR PARTITIONS	0 HR*
FLOOR CONSTRUCTION	0 HR
ROOF CONSTRUCTION	0 HR

*NOT LESS THAN REQUIRED BY OTHER SECTIONS OF THE CODE [EGRESS]

INTERIOR FINISHES [CHAPTER 8]:

WALL AND CEILING FINISHES [SECT 803]: SECT. 803.1 GENERAL - INTERIOR WALL AND CEILING FINISHES SHALL BE CLASSIFIED IN ACCORDANCE WITH ASTM E84. SUCH INTERIOR FINISH MATERIALS SHALL BE GROUPED IN THE FOLLOWING CLASSES IN ACCORDANCE WITH THEIR FLAME SPREAD AND SMOKE-DEVELOPMENT INDEXES.

CLASS A - FLAME SPREAD 0-25; SMOKE-DEVELOPED 0-450
CLASS B - FLAME SPREAD 26-75; SMOKE-DEVELOPED 0-450
CLASS C - FLAME SPREAD 76-200; SMOKE-DEVELOPED 0-450

MEANS OF EGRESS [CHAPTER 10]:

OCCUPANT LOAD [SECT 1004]: SECT 1004.1.2 NUMBER BY TABLE 1004.1.2 - THE NUMBER OF OCCUPANTS COMPUTED THE RATE OF ONE OCCUPANT PER UNIT OF AREA AS PRESCRIBED IN TABLE 1004.1.2.

OCCUPANCY CALCULATIONS PER TABLE 1004.1.2:

OCCUPANCY	FLOOR AREA PER OCCUPANT [SF]	SF	OCCUPANTS
BUSINESS AREA (B)	100 GROSS	25,232	252
	TOTAL OCCUPANCY		252

EXIT ACCESS TRAVEL [SECT 1016.1] TRAVEL DISTANCE LIMITATIONS - EXITS SHALL BE LOCATED ON EACH STORY SUCH THAT THE MAXIMUM LENGTH OF DISTANCE [SECT 1016] EXIT ACCESS SHALL NOT EXCEED THE DISTANCES GIVEN IN TABLE 1017.2

PER TABLE 1017.2 IN A FULLY SPRINKLERED BUILDING, A MAXIMUM TRAVEL DISTANCE FOR GROUP "B" IS 300'-0".

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WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

REGISTERED ARCHITECT — STATE OF TEXAS

1/16/2017

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/5/2016
2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	1/16"=1'-0"
Drawn	
Checked	
Approved	

TITLE

Life Safety Plan

SHEET

G0.01

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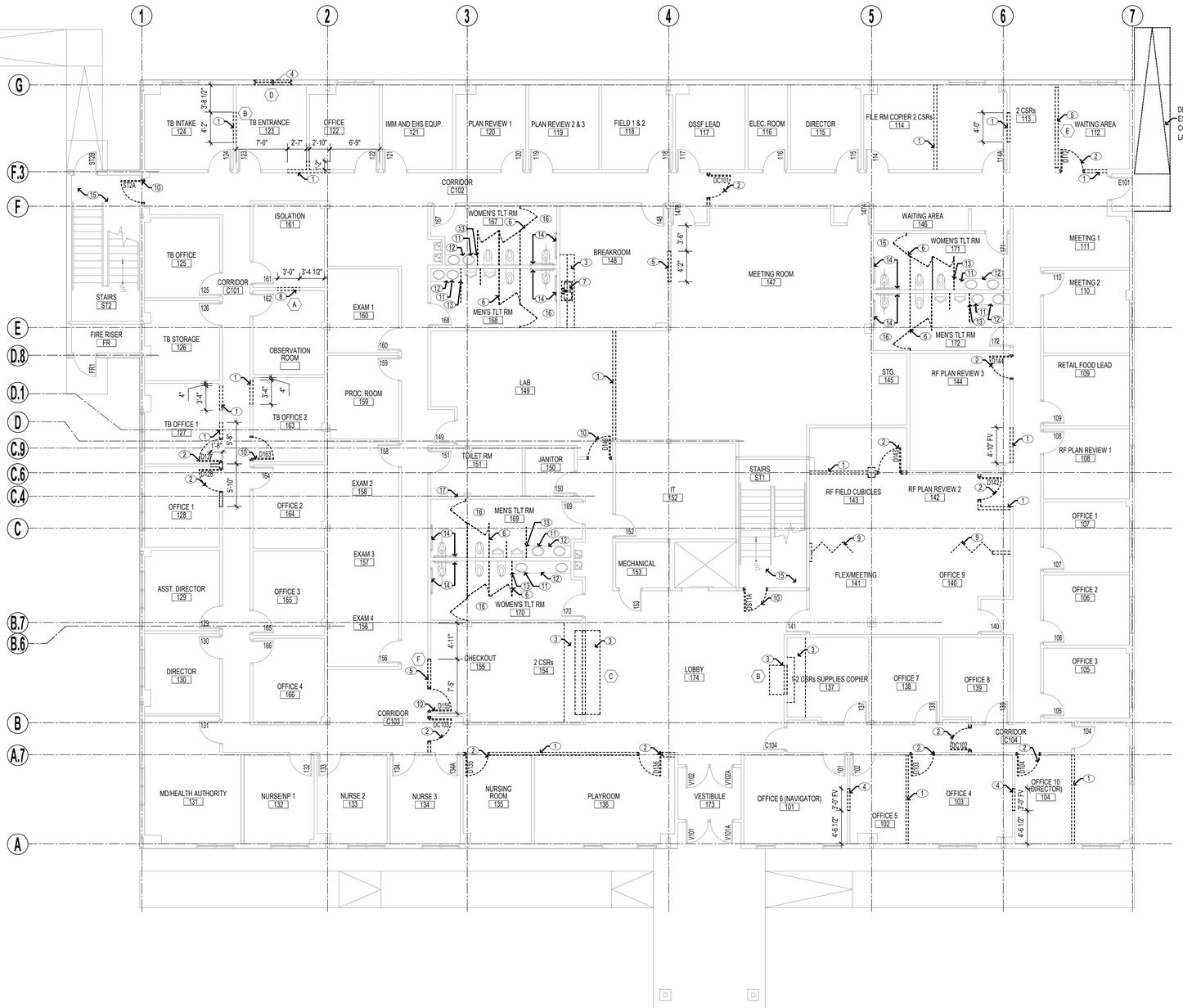
Bid 1701-139

Williamson County, Texas



1 1ST FLOOR DEMOLITION PLAN
SCALE: 1/8" = 1'-0"

GENERAL DEMOLITION NOTES:

1. ALL FLOORS, FINISHES, CEILINGS, EXISTING BATT INSULATION ABOVE CEILING ASSOCIATED LIGHTING, EQUIPMENT & HVAC TO BE REMOVED. REF MEP SHEETS FOR ADDITIONAL INFO.
2. ALL AREAS SCHEDULED TO RECEIVE NEW FINISHES ARE TO BE INSPECTED FOR ANY PATCHING THAT MAY BE REQUIRED DUE TO EXISTING CONDITIONS. PERFORM ALL PATCHING AS REQUIRED PRIOR TO APPLICATION OF NEW FINISHES.
3. COORDINATE THE LOCATIONS OF THE LIGHTS WITH THE DUCTWORK, AND OTHER CEILING ELEMENTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS. DRAWN INFORMATION SHALL NOT SUPERCEDE ACTUAL CONDITIONS.
5. PROTECT AREAS NOT SCHEDULED FOR RENOVATION FROM DEMOLITION AND CONSTRUCTION ACTIVITIES.
6. SALVAGE DEMOLISHED DOORS ACCORDING TO THE DOOR SCHEDULE ON AS.01. THEY ARE TO BE REMOVED AND STORED WITH PROPER CARE FOR REUSE.
7. EXISTING FURR-OUTS ARE TO REMAIN UNLESS OTHERWISE NOTED. PATCH AND REPAIR TO MAKE FLUSH AND REF. FINISH PLANS/SCHEDULE
8. REFER TO MEP & TECHNOLOGY DRAWINGS FOR ADDITIONAL DEMOLITION SCOPE

LEGEND

CONSTRUCTION TO REMAIN

CONSTRUCTION TO BE REMOVED

DEMOLITION KEYED NOTES:

1. WALL TO BE DEMOLISHED, AND POWER AND DATA, IF PRESENT, NEEDS TO BE REMOVED BACK TO PANEL
2. DOOR TO BE SALVAGED & RE-INSTALLED. REFER TO "RELOCATED & NEW" DOOR SCHEDULE ON SHEET A5.01 FOR NEW LOCATION/DESIGNATION.
3. MILLWORK TO BE DEMOLISHED INCLUDING HARDWARE, BACKSPLASH, ETC.
4. WINDOW TO BE DEMOLISHED. COORDINATE ADDITIONAL DEMOLITION TO BE COMPLETED IN THIS AREA WITH PROPOSED WINDOW TYPE "D".
5. PORTION OF WALL TO BE DEMOLISHED TO ADD WINDOW AND COUNTER @ 36" HIGH MAX. REFER TO 15/A10.01 FOR SIZE AND LOCATION
6. TOILET PARTITIONS TO BE DEMOLISHED
7. PLUMBING FIXTURE TO BE DEMOLISHED
8. DEMO WALL FOR WINDOW OPENING. REFER TO A5.01 FOR SIZE AND LOCATION.
9. DEMO MOBILE PARTITION WALL INCLUDING SUPPORTS, PANELS AND HARDWARE
10. DOOR AND FRAME TO BE DEMOLISHED
11. PROTECT COUNTERTOP FROM TOILET PARTITION DEMO
12. DEMO HORIZONTAL PLAM TRIM PIECE DIRECTLY AFF. PROTECT THE SURROUNDING PLAM BRACING
13. SALVAGE PLAM BACKSPLASH ATTACHED TO TOILET PARTITION DURING DEMO
14. REMOVE & SALVAGE GRAB BARS
15. REMOVE EXISTING RUBBER BASE TREADS
16. REMOVE EXISTING FRP FROM TOILET ROOMS
17. DEMO EXISTING WALL AS REQ'D FOR NEW PLUMBING FIXTURES. REF. PLUMBING

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SHEET INFORMATION

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Checked	
Approved	

TITLE

1st Floor Demolition Plan

SHEET

A0.01

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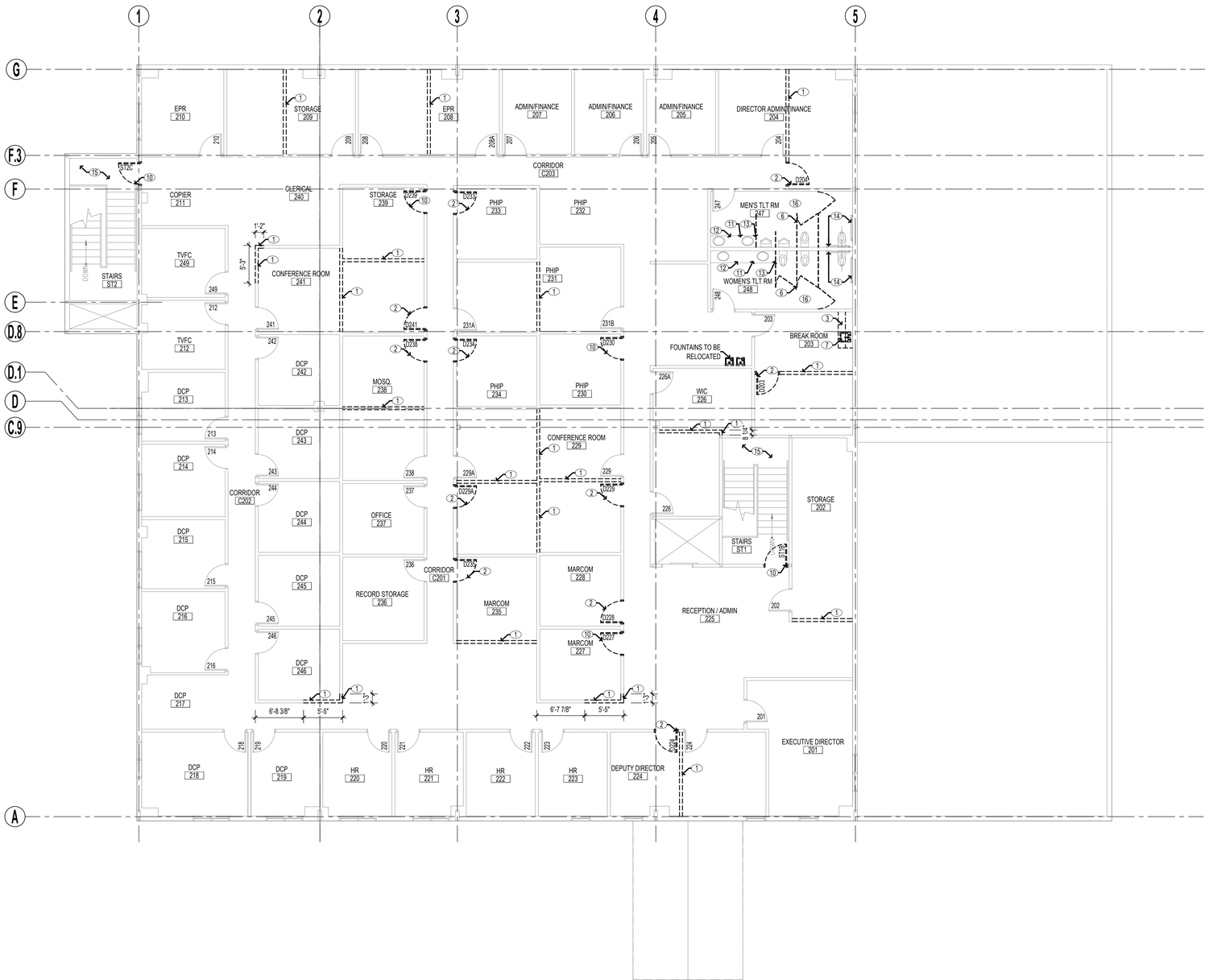

1 2ND FLOOR DEMOLITION PLAN

SCALE: 1/8"= 1'-0"

GENERAL NOTES:

1. ALL FLOORS, FINISHES, CEILINGS, EXISTING BATT INSULATION ABOVE CEILING, ASSOCIATED LIGHTING, EQUIPMENT & HVAC TO BE REMOVED. REF MEP SHEETS FOR ADDITIONAL INFO.
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SHEET INFORMATION

Date	January 16, 2017
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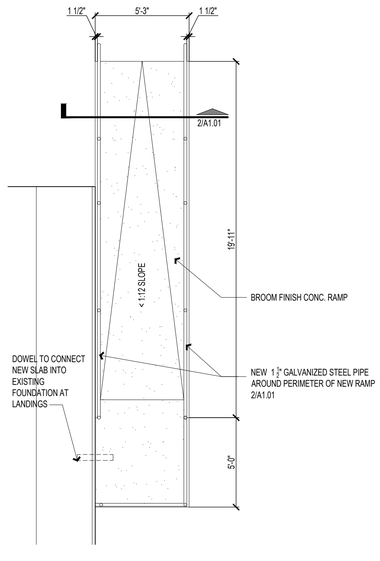
Scale	1/8"=1'-0"
Drawn	
Checked	
Approved	

TITLE

2nd Floor Demolition Plan

SHEET

A0.02



ENTRANCE 4 RAMP 2

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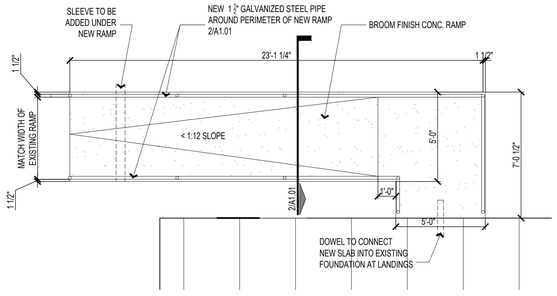
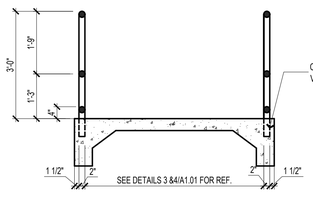


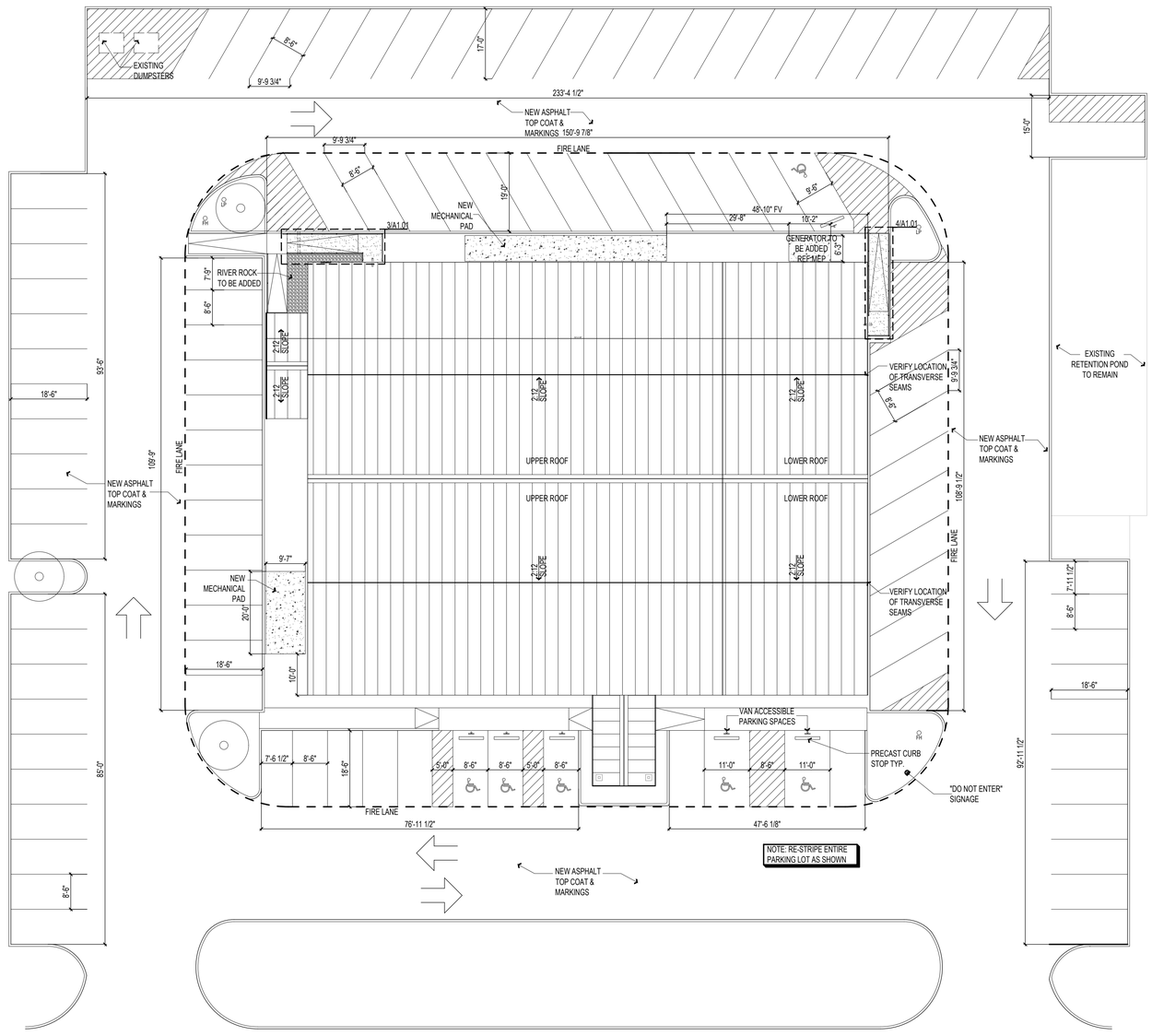
ENTRANCE 3 RAMP 1

SCALE: 1/4"= 1'-0"



RAMP 2 HANDRAILS

SCALE: 1/2"= 1'-0"



1 ROOF & SITE PLAN

SCALE: 1/16"= 1'-0"

GENERAL SITE NOTES:

1. RE-USE EXISTING ACCESSIBLE PARKING SIGNS
2. RE-CENTER ACCESSIBLE PARKING SIGNS ON NEW RE-STRIPED HANDICAPPED PARKING SPACES

LEGEND

- EXISTING TREE
- ACCESSIBLE PARKING SIGN
- FH — EXISTING FIRE HYDRANT
- LP — EXISTING LAMP POST

ROOFING SCOPE: REPAIR RECOMMENDATIONS

1. REPLACE ALL SCREWS AND NEOPRENE GROMMETS
2. TRANSVERSE SEAM REPAIR/RECAULK
3. RESEAL RAKE FLASHING JOINTS
4. REPLACE ROOF PENETRATION FLASHINGS

ROOFING SCOPE INSULATION

OPEN-CELL SPRAY FOAM W/ IGNITION BARRIER COVERING ENTIRE ~14,678 SF OF ROOF AREA

PARKING

EXISTING
97 STANDARD SPACES
5 HANDICAP SPACES
TOTAL: 102 SPACES

RENOVATED
93 STANDARD SPACES
6 HANDICAP SPACES
TOTAL: 99 SPACES

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355 Texas Avenue
Round Rock, Texas

REGISTERED ARCHITECT — STATE OF TEXAS

1/16/2017

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/5/2016
2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	Varies
Drawn	
Checked	
Approved	

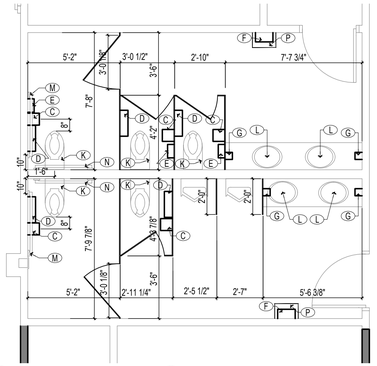
TITLE

Roof & Site Plan

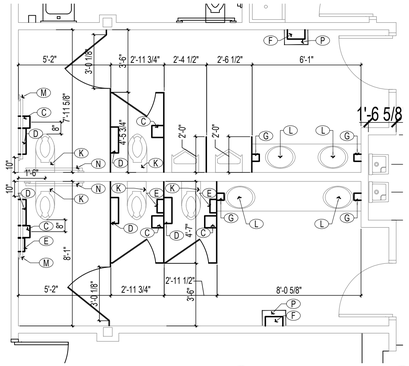
SHEET

A1.01

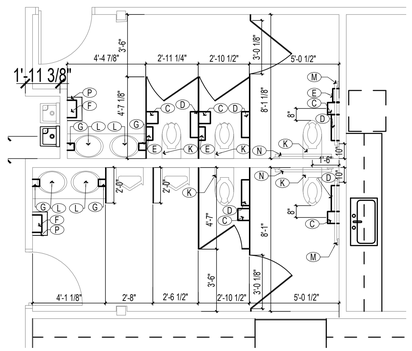
NOTE: INSTALL NEW FRP AND TRIM AT FINISH FLOOR TO 48" AFF



NOTE: INSTALL NEW FRP AND TRIM AT FINISH FLOOR TO 48" AFF



NOTE: INSTALL NEW FRP AND TRIM AT FINISH FLOOR TO 48" AFF



GENERAL NOTES:

1. ALL FLOORS, FINISHES, CEILINGS, ASSOCIATED LIGHTING, EQUIPMENT & HVAC TO BE REMOVED. REF MEP SHEETS FOR ADDITIONAL INFO
2. ALL AREAS SCHEDULED TO RECEIVE NEW FINISHES ARE TO BE INSPECTED FOR ANY PATCHING THAT MAY BE REQUIRED DUE TO EXISTING CONDITIONS. PERFORM ALL PATCHING AS REQUIRED PRIOR TO APPLICATION OF NEW FINISHES.
3. COORDINATE THE LOCATIONS OF THE LIGHTS WITH THE DUCTWORK, AND OTHER CEILING ELEMENTS.
4. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS. DRAWN INFORMATION SHALL NOT SUPERCEDE ACTUAL CONDITIONS
5. PROTECT AREAS NOT SCHEDULED FOR RENOVATION FROM DEMOLITION AND CONSTRUCTION ACTIVITIES.
6. SALVAGE DEMOLISHED DOORS ACCORDING TO THE DOOR SCHEDULE ON AS.01. THEY ARE TO BE REMOVED AND STORED WITH PROPER CARE FOR REUSE.
7. REFER TO FINISH PLANS FOR NEW FINISHES AND CONDITIONS
8. EXISTING FURR-OUTS ARE TO REMAIN UNLESS OTHERWISE NOTED. PATCH AND REPAIR TO MAKE FLUSH AND REF. FINISH PLAN/SCHEDULE
9. PROVIDE BLOCKING FOR TOILET ROOM ACCESSORIES AS REQ'D
10. REINSTALL SALVAGED PLAM BACKSPLASH IN SAME LOCATION ONTO NEW TOILET PARTITIONS
11. ALL TOILET ROOM COMPARTMENT DOORS ARE TO BE SELF-CLOSING WITH A HANDLE ON BOTH SIDES OF THE DOOR

LEGEND

CONSTRUCTION TO REMAIN

CONSTRUCTION TO BE ADDED

TOILET ROOM ACCESSORIES:

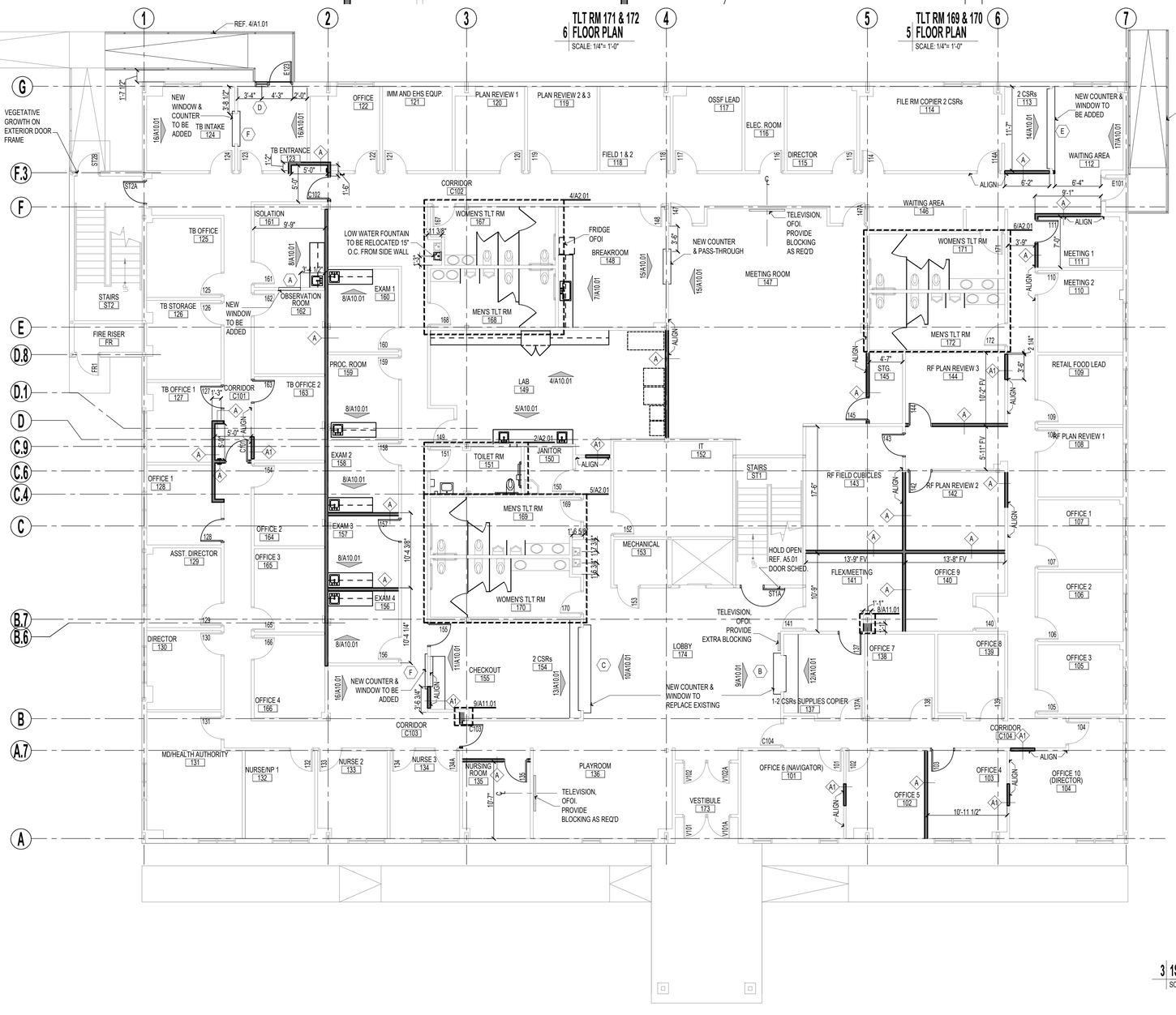
NOTE: REF. 2/A2.02 FOR TOILET ROOM ACCESSORY MOUNTING HEIGHTS

- (A) 42" GRAB BAR
- (B) 36" GRAB BAR
- (C) TOILET PAPER DISPENSER, SAN JAMAR R3590TBK
- (D) TOILET SEAT COVER DISPENSER, HEALTH GARDS HALF-FOLD
- (E) SANITARY NAPKIN DISPOSAL, TECH3
- (F) PAPER TOWEL DISPENSER, SAN JAMAR T1790TBK
- (G) SOAP DISPENSER, SAN JAMAR S890TBK, BOTTOM OF DISPENSER
- (H) 24" x 36" GLASS MIRROR
- (K) FLUSH VALVE LOCATED ON THE OPEN SIDE OF THE WATER CLOSET
- (L) ADA PIPE WRAP
- (M) 42" GRAB BAR TO BE REINSTALLED IN PREVIOUS LOCATION
- (N) 36" GRAB BAR TO BE REINSTALLED IN PREVIOUS LOCATION
- (P) SURFACE MOUNTED WASTE RECEPTACLE TO BE MOUNTED UNDER PAPER TOWEL DISPENSER

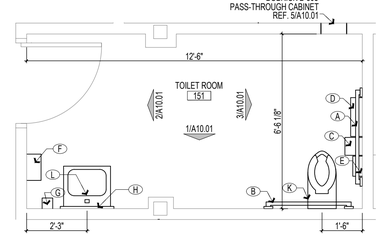
6 TLT RM 171 & 172 FLOOR PLAN
SCALE: 1/4"= 1'-0"

5 TLT RM 169 & 170 FLOOR PLAN
SCALE: 1/4"= 1'-0"

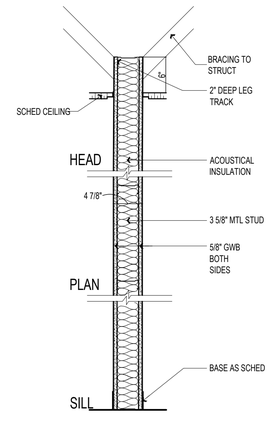
4 TLT RM 167 & 168 FLOOR PLAN
SCALE: 1/4"= 1'-0"



3 1ST FLOOR RENOVATION PLAN
SCALE: 1/8"= 1'-0"



2 TOILET RM 154
SCALE: 3/8"= 1'-0"



A - 4 7/8" PARTITION TO 6" ABOVE CLG., WITH INSULATION

A1 - 4 7/8" PARTITION DOOR INFILL

1 PARTITION TYPES
SCALE: 1"= 1'-0"

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Round Rock, Texas

1/16/2017

REVISIONS

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1	100% Construction Documents	12/5/2016
2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	1/8"=1'-0"
Drawn	
Checked	
Approved	

TITLE

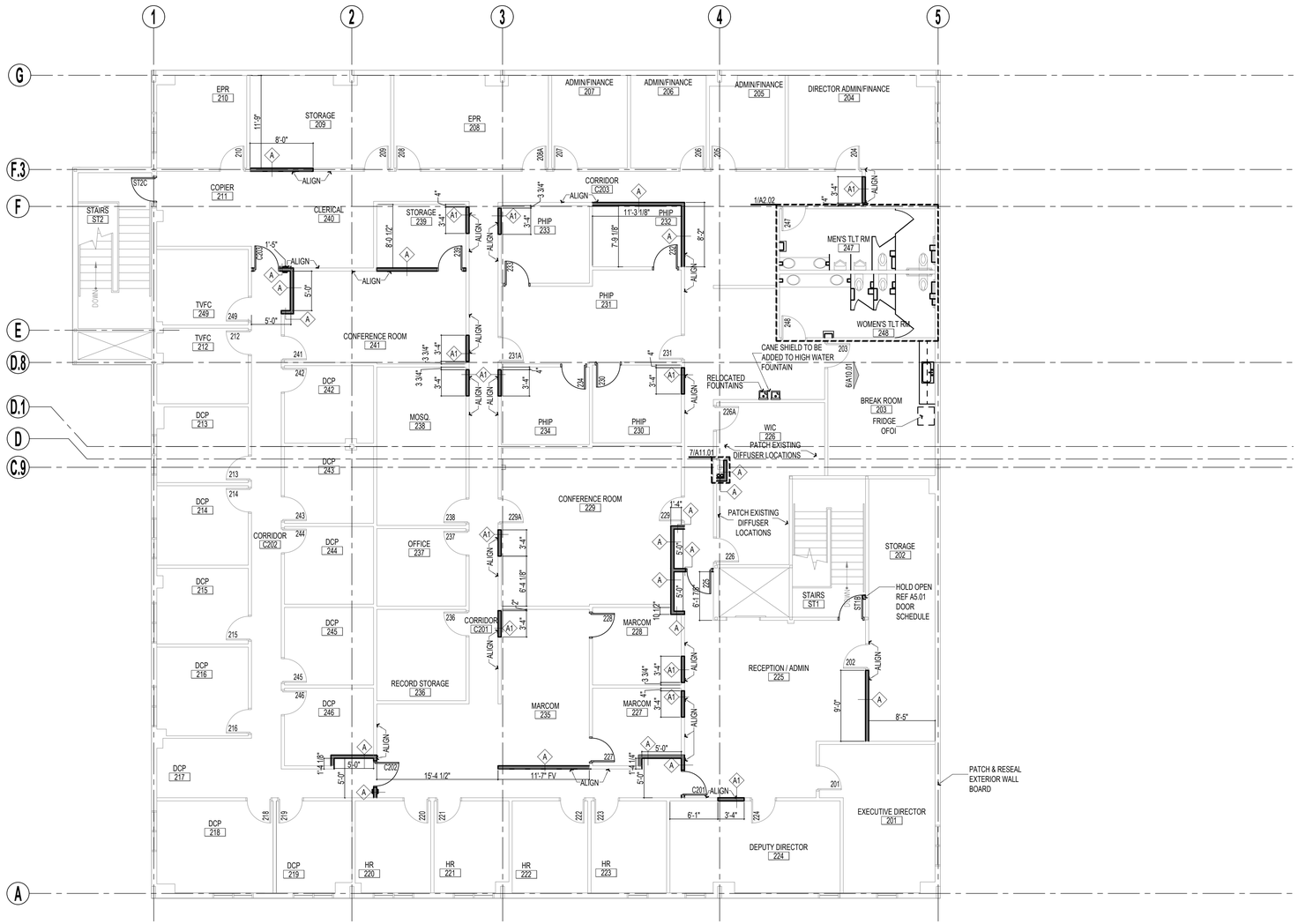
1st Floor Renovation Plan

SHEET

A2.01

Bid 1701-139

Williamson County, Texas



NOTE: REFER TO A2.01 FOR PARTITION TYPE DETAILS

3 2ND FLOOR RENOVATION PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

1. ALL FLOORS, FINISHES, CEILINGS, ASSOCIATED LIGHTING, EQUIPMENT & HVAC TO BE REMOVED. REF MEP SHEETS FOR ADDITIONAL INFO
2. ALL AREAS SCHEDULED TO RECEIVE NEW FINISHES ARE TO BE INSPECTED FOR ANY PATCHING THAT MAY BE REQUIRED DUE TO EXISTING CONDITIONS. PERFORM ALL PATCHING AS REQUIRED PRIOR TO APPLICATION OF NEW FINISHES.
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6. SALVAGE DEMOLISHED DOORS ACCORDING TO THE DOOR SCHEDULE ON A5.01. THEY ARE TO BE REMOVED AND STORED WITH PROPER CARE FOR REUSE.
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8. EXISTING FURR-OUTS ARE TO REMAIN UNLESS OTHERWISE NOTED. PATCH AND REPAIR TO MAKE FLUSH AND REF. FINISH PLAN/SCHEDULE
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10. REINSTALL SALVAGED PLAM BACKSPLASH IN SAME LOCATION ONTO NEW TOILET PARTITIONS
11. ALL TOILET ROOM COMPARTMENT DOORS ARE TO BE SELF-CLOSING WITH A HANDLE ON BOTH SIDES OF THE DOOR

LEGEND

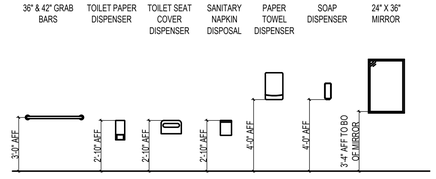
CONSTRUCTION TO REMAIN

CONSTRUCTION TO BE ADDED

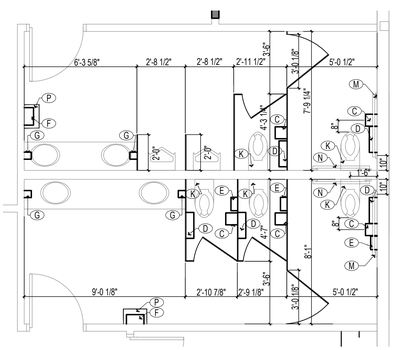
TOILET ROOM ACCESSORIES:

NOTE: REF. 2/A2.02 FOR TOILET ACCESSORY MOUNTING HEIGHTS

- (A) 42" GRAB BAR
- (B) 36" GRAB BAR
- (C) TOILET PAPER DISPENSER, SAN JAMAR R3590TBK
- (D) TOILET SEAT COVER DISPENSER, HEALTH GARDS HALF-FOLD
- (E) SANITARY NAPKIN DISPOSAL, 1ECK9
- (F) PAPER TOWEL DISPENSER, SAN JAMAR T1750TBK
- (G) SOAP DISPENSER, SAN JAMAR S890TBK, BOTTOM OF DISPENSER
- (H) 24" x 36" GLASS MIRROR
- (K) FLUSH VALVE
- (L) ADA PIPE WRAP
- (M) 42" GRAB BAR TO BE REINSTALLED IN PREVIOUS LOCATION
- (N) 36" GRAB BAR TO BE REINSTALLED IN PREVIOUS LOCATION
- (P) SURFACE MOUNTED WASTE RECEPTACLE TO BE MOUNTED UNDER PAPER TOWEL DISPENSER



TLT RM ACCESSORIES
2 MOUNTING HEIGHTS
SCALE: 1/8" = 1'-0"



TLT RM 247 & 248
1 FLOOR PLAN
SCALE: 1/4" = 1'-0"

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355 Texas Avenue
Round Rock, Texas

REGISTERED ARCHITECT STATE OF TEXAS

1/16/2017

REVISIONS

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2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	1/8"=1'-0"
Drawn	
Checked	
Approved	

TITLE

2nd Floor Renovation Plan

SHEET

A2.02

2/2/2017 8:32:

GENERAL NOTES:

1. ALL AREAS SCHEDULED TO RECEIVE NEW FINISHES ARE TO BE INSPECTED FOR ANY PATCHING THAT MAY BE REQUIRED DUE TO EXISTING CONDITIONS. PERFORM ALL PATCHING AS REQUIRED PRIOR TO APPLICATION OF NEW FINISHES.
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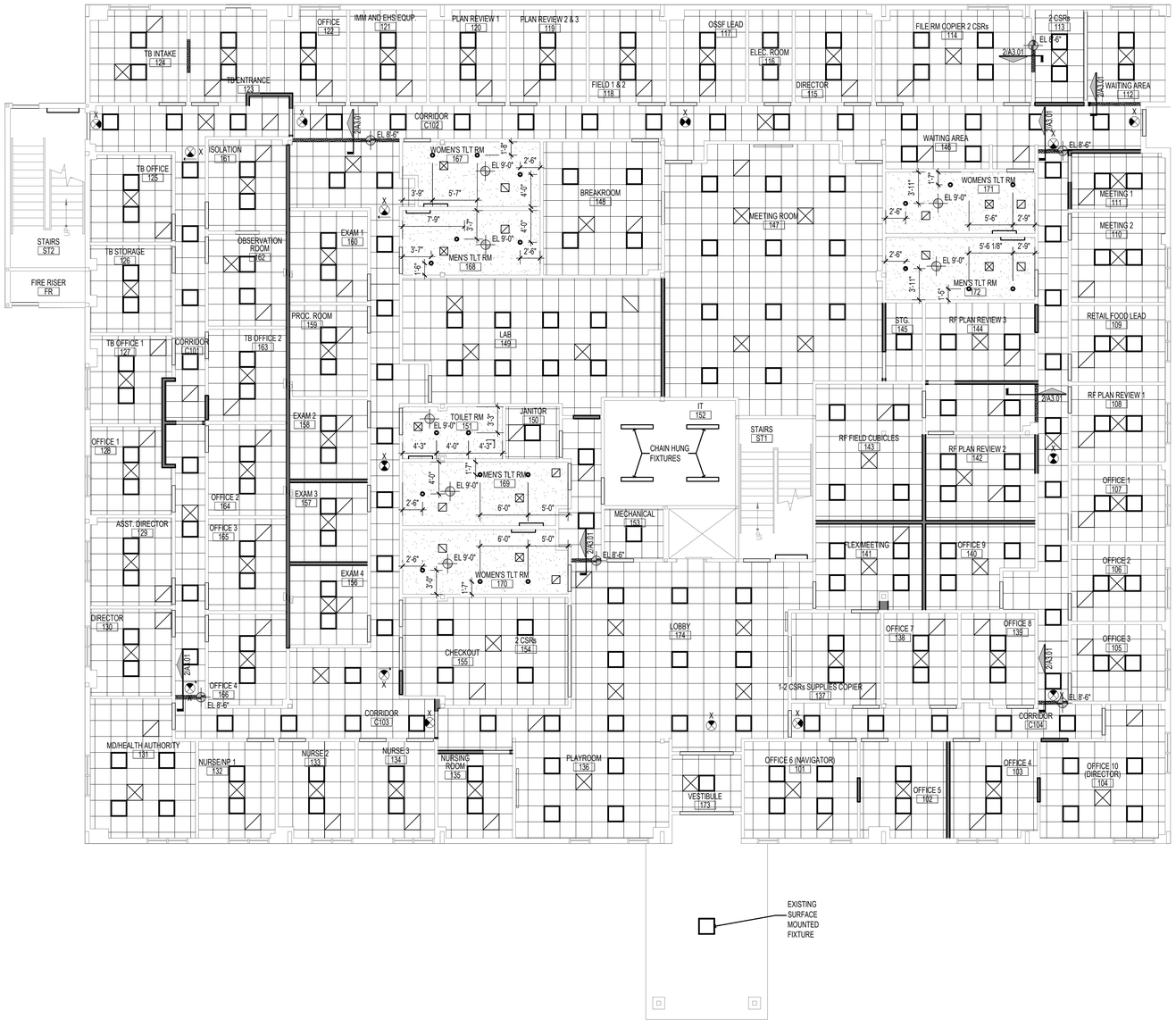
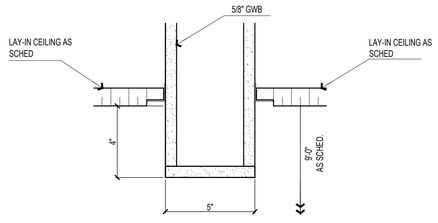
4. PROTECT AREAS NOT SCHEDULED FOR RENOVATION FROM DEMOLITION AND CONSTRUCTION ACTIVITIES.

LEGEND

- DENOTES NEW 2X2 LAY-IN CEILING
- DENOTES NEW 2X2 LIGHT
- DENOTES NEW RECESSED CAN LIGHT
- DENOTES NEW GYPSUM CEILING
- TYPICAL SOFFIT REF. 2/A3.01
- EXIT SIGN. ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S)
- NEW DIFFUSER REF. MEP
- NEW EXHAUST REF. MEP
- NEW WALL MOUNTED FIXTURE





2 TYPICAL SOFFIT
SCALE: 3" = 1'-0"

1 1ST FLOOR REFLECTED CEILING PLAN
SCALE: 1/8" = 1'-0"

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STATE OF TEXAS
1/16/2017

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SHEET INFORMATION

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Job Number	16-1010
Scale	1/8"=1'-0"
Drawn	
Checked	
Approved	

TITLE

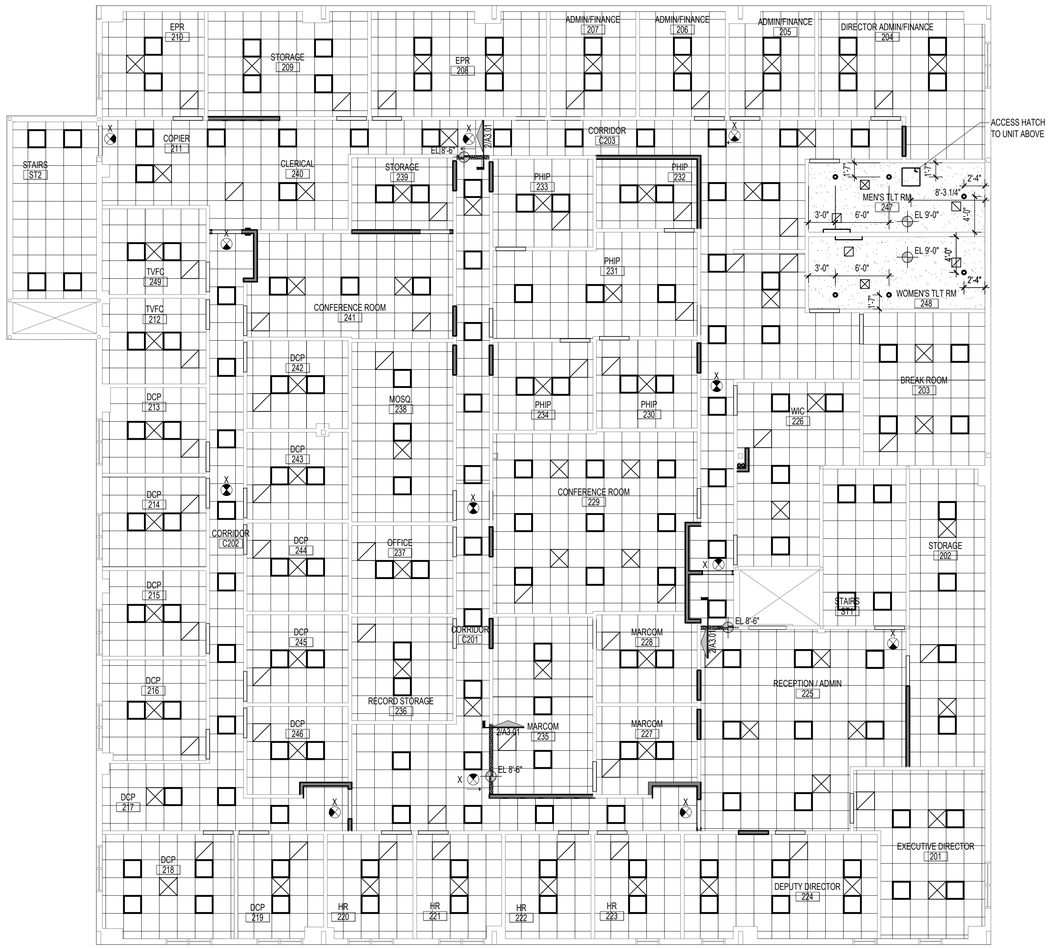
1st Floor Reflected Ceiling Plan

SHEET

A3.01

Williamson County, Texas

Bid 1701-139
Williamson County, Texas



1 2ND FLOOR REFLECTED CEILING PLAN
SCALE: 1/8" = 1'-0"

GENERAL NOTES:

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LEGEND

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- DENOTES NEW 2X2 LIGHT
- DENOTES NEW RECESSED CAN LIGHT
- DENOTES NEW GYPSUM CEILING
- TYPICAL CEILING HEADER REF. 2/A3.01
- EXIT SIGN. ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S)
- NEW DIFFUSER REF. MEP
- NEW EXHAUST REF. MEP
- NEW WALL MOUNTED FIXTURE

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REGISTERED ARCHITECT STATE OF TEXAS 24404

1/16/2017

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SHEET INFORMATION

Date	January 16, 2017
Job Number	15-1010
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Drawn	
Checked	
Approved	

TITLE

2nd Floor Reflected Ceiling Plan

SHEET

A3.02

2/2/2017 8:32 AM

Bid 1701-139

Williamson County, Texas

DOOR SCHEDULE - 1ST FLOOR INTERIOR DOORS

MARK	DOOR																FRAME											HARDWARE	REMARKS
				SIZE			MATERIAL											MATERIAL										NOTE: ALL LOCKSETS TO HAVE 7 PIN INTER-CHANGEABLE CORE	
	DOOR NUMBER	RATING - LABEL	TYPE	WIDTH	HEIGHT	THICKNESS	EXISTING WOOD	HOLLOW METAL	ALUMINUM & GLASS	ST = STAIN TO MATCH EXIST	FINISH	TYPE	HOLLOW METAL 1	STEEL 2	ALUMINUM 3	WOOD 4	FINISH	HARDWARE SETS	
							1	2	3								G1 = GLASS BLACK ANODIZED G2 = CLEAR ANODIZED PT = PAINTED PF = PAINT		
	101		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	102		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	104		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	105		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	106		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	107		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	108		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	109		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	110		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	114		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	114A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	115		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	116		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	117		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	118		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	119		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	120		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	121		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	122		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	123		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	124		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	125		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	126		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	129		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	130		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	131		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	132		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	133		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	134		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	134A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	137A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	138		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	139		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	140		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	141		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	147		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.05	
	147A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.05	
	148		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	149		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	150		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	151		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.03	
	152		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	153		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	156		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	158		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	159		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	160		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	161		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	162		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	164		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	165		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	166		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	167		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	168		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	169		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	170		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	171		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	172		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	V101		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	V101A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	V102		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	V102A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	ST2A	45 MIN	-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	ST2B		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.10	
	E101		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.10	
	FR1		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	C104		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	

DOOR SCHEDULE - 2ND FLOOR INTERIOR DOORS

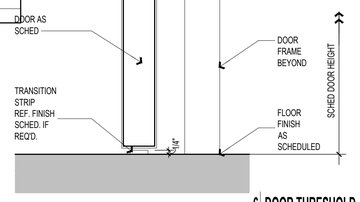
MARK	DOOR																FRAME											HARDWARE	REMARKS
				SIZE			MATERIAL											MATERIAL										NOTE: ALL LOCKSETS TO HAVE 7 PIN INTER-CHANGEABLE CORE	
	DOOR NUMBER	RATING - LABEL	TYPE	WIDTH	HEIGHT	THICKNESS	EXISTING WOOD	HOLLOW METAL	ALUMINUM & GLASS	ST = STAIN TO MATCH EXIST	FINISH	TYPE	HOLLOW METAL 1	STEEL 2	ALUMINUM 3	WOOD 4	FINISH	HARDWARE SETS	
							1	2	3								G1 = GLASS BLACK ANODIZED G2 = CLEAR ANODIZED PT = PAINTED PF = PAINT		
	201		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	202		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	203		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	204		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	205		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	206		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	207		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	208		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	208A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	209		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	210		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	212		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	213		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	214		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	215		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	216		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	218		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	219		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	220		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	221		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	222		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	223		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	224		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	226		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	226A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.01	
	229		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	229A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	231		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	231A		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	236		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.02	
	237		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	238		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	241		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	0.04	
	242		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	243		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	244		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	245		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	246		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	247		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	248		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	
	249		-	-	-	-	-	-	-	-	-	FT1	-	-	-	-	-	-	

GENERAL NOTES:

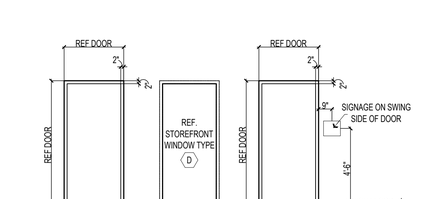
1. GENERAL CONTRACTOR TO CONFIRM EXISTING DOOR SIZE, CONDITION & HARDWARE. COORDINATE ANY DISCREPANCIES WITH DOOR SCHEDULE WITH ARCHITECT
2. ALL DOORS TO BE PREPPED FOR CYLINDRICAL LOCKS
3. SEAL, PATCH & PAINT DOOR WHERE TRIM REMOVE DOES NOT COVER

DOOR SCHEDULE - RELOCATED AND NEW DOORS

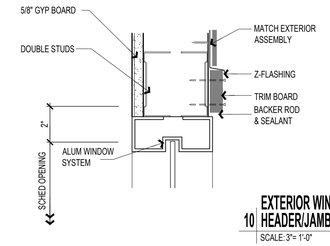
MARK	DOOR											NEW FRAME						HARDWARE	DETAIL REFERENCE			NOTES
				SIZE		MATERIAL						MATERIAL										
	NEW DOOR NUMBER	RATING - LABEL	TYPE	WIDTH	HEIGHT	THICKNESS	WOOD 1	HOLLOW METAL 2	ALUMINUM & GLASS 3	ST = STAIN TO MATCH EXIST P = PAINTED	FINISH	TYPE	HOLLOW METAL 1	STEEL 2	ALUMINUM 3	WOOD 4	G1 = GLASS BLACK ANODIZED G2 = CLEAR ANODIZED PT = PAINTED PF = PAINT	HARDWARE SETS	HEAD	JAMB	THRESHOLD	
	103		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D103 to be used
	111		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	DC101 to be used
	E123		DT1	3' - 0"	7' - 0"	1 3/4"			3			FT2			3		BA	3.02	12/A5.01	12/A5.01	13/A5.01	
	127		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.01	11/A5.01	11/A5.01	6/A5.01	D104 to be used
	128		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D112 to be used
	135		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.03	11/A5.01	11/A5.01	6/A5.01	D136 to be used
	137		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.01	11/A5.01	11/A5.01	6/A5.01	D127 to be used
	142		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D135 to be used
	143		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D143 to be used
	144		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D142 to be used
	145		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.02	11/A5.01	11/A5.01	6/A5.01	DC102 to be used
	155		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.01	11/A5.01	11/A5.01	6/A5.01	D235 to be used
	157		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D144 to be used
	163		DT2	3' - 0"	6' - 8"	1 3/4"	1			ST		FT1	2				PF	3.01	11/A5.01	11/A5.01	6/A5.01	
	C101		DT2	3' - 0"	6' - 8"	1 3/4"	1			ST		FT1	2				PF	8.01	11/A5.01	11/A5.01	6/A5.01	
	C102		DT2	3' - 0"	6' - 8"	1 3/4"	1			ST		FT1	2				PF	8.02	11/A5.01	11/A5.01	6/A5.01	
	C103		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	DC103 to be used
	225		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D228 to be used
	227		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D203 to be used
	228		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D229A to be used
	230		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D229 to be used
	232		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.04	11/A5.01	11/A5.01	6/A5.01	D204 to be used
	233		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D224 to be used
	234		DT2	3' - 0"	6' - 8"	1 3/4"	1			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	
	239		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.02	11/A5.01	11/A5.01	6/A5.01	D128 to be used
	C201		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.07	11/A5.01	11/A5.01	6/A5.01	D238 to be used
	C202		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.06	11/A5.01	11/A5.01	6/A5.01	D234 to be used
	C203		-	3' - 0"	6' - 8"	1 3/4"	-			ST		FT1	2				PF	0.06	11/A5.01	11/A5.01	6/A5.01	D233 to be used
	ST1A	45 MIN	DT3	3' - 0"	7' - 0"	1 3/4"		2		P		FT3	1				PT	6.01	11/A5.01	11/A5.01	6/A5.01	Fire-rated
	ST1B	45 MIN	DT3	3' - 0"	7' - 0"	1 3/4"		2		P		FT3	1				PT	0.08	11/A5.01	11/A5.01	6/A5.01	Fire-rated
	ST2A	45 MIN	DT3	3' - 0"	7' - 0"	1 3/4"		2		P		FT3	1				PT	0.09	11/A5.01	11/A5.01	6/A5.01	Fire-rated
	ST2C	45 MIN	DT3	3' - 0"	7' - 0"	1 3/4"		2		P		FT3	1				PT	0.08	11/A5.01	11/A5.01	6/A5.01	Fire-rated



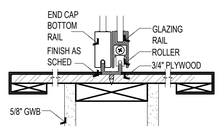
6 DOOR THRESHOLD
SCALE: 3"= 1'-0"



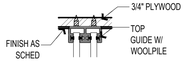
3 FRAME TYPES
SCALE: 1/4"= 1'-0"



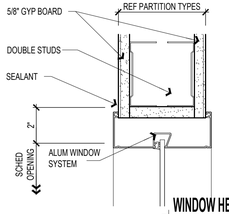
EXTERIOR WINDOW 10 HEADER/JAMB SIM
SCALE: 3"= 1'-0"



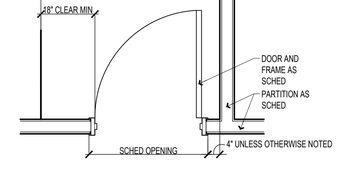
SLIDING 8 WINDOW SILL TYP.
SCALE: 3"= 1'-0"



SLIDING 9 WINDOW HEADER TYP.
SCALE: 3"= 1'-0"

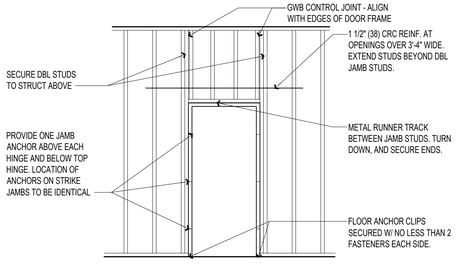


7 WINDOW HEADER/ JAMB SIM
SCALE: 3"= 1'-0"



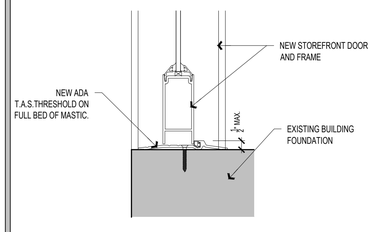
NOTES:
1. TYPICAL DOOR LOCATION UNLESS OTHERWISE NOTED.

TYPICAL 5 DOOR LOCATION
SCALE: 1/2"= 1'-0"

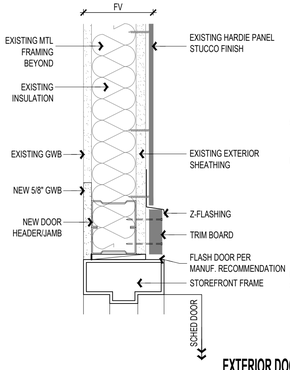


NOTES:
1. PROVIDE FRAME ANCHORS AT HEAD

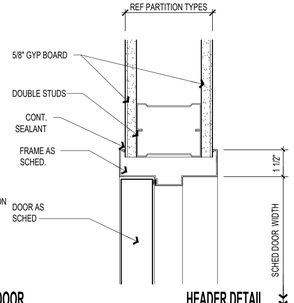
TYPICAL 2 FRAMING DETAIL
SCALE: 1/4"= 1'-0"



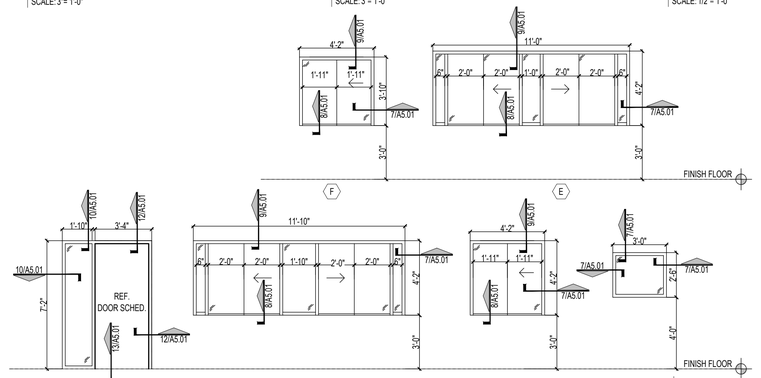
STOREFRONT DOOR 13 THRESHOLD
SCALE: 3"= 1'-0"



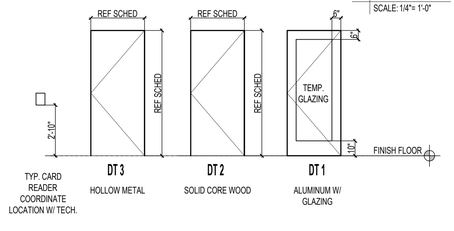
EXTERIOR DOOR 12 HEADER/JAMB SIM
SCALE: 3"= 1'-0"



HEADER DETAIL 11 JAMB SIM
SCALE: 3"= 1'-0"



4 WINDOW TYPES
SCALE: 1/4"= 1'-0"



1 DOOR TYPES
SCALE: 1/4"= 1'-0"

HADDON+COWAN ARCHITECTS
2301 E. Riverside Drive, Bldg A, Suite 80
Austin, TX 78741 | haddoncowan.com

In Association w/

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COMBS Consulting Group
10 years technology & security
SAN ANTONIO
8200 IH-10 West, Ste. 103
San Antonio, Texas 78230
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AUSTIN
901 S. Mopac
Bldg. 3, Ste. 400
Austin, Texas 78746
Phone : 512-433-2696

Edwards + Mulhausen INTERIOR DESIGN
2301 E. Riverside Drive, Austin, Texas 78741
Building A, Suite 80
Ph. 512.291.6657

In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rounds, Texas

1/16/2017

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/5/2016
2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	Varies
Drawn	
Checked	
Approved	

TITLE

Door Schedule & Details

SHEET

A5.01

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ROOM FINISH LEGEND

COUNTERS AND MILLWORK

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
PLASTIC LAMINATE	PL-1	WILSONART	4877-38	GREY MESH		4'X8' SHEET	COUNTERTOPS AND BACKSPLASH U.N.O.
PLASTIC LAMINATE	PL-2	WILSONART	4941K-18	COSMIC STRANDZ		4'X8' SHEET	VERTICAL SURFACES
PLASTIC LAMINATE	PL-3	WILSONART	7975K-12	RAW CHESTNUT		4'X8' SHEET	VERTICAL SURFACES

FLOORING

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
CARPET TILE	CPT-1	TANDUS CENTIVA / SYLLABUS	10965	POWER GRID 76504		24X24	INSTALLATION
CARPET TILE	CPT-2	TANDUS CENTIVA / OVERLAY ACCENT II	02977	CLEAN COAL 44030		24X24	INSTALLATION
VINYL COMPOSITION TILE	VCT-1	ARMSTRONG EXCELON	-	FIELD GRAY 51927		-	FIELD COLOR
VINYL COMPOSITION TILE	VCT-2	ARMSTRONG EXCELON	-	COOL WHITE 51899			ACCENT COLOR
CERAMIC TILE	CT-1	DALTILE KEYSTONES		WATERFALL D169		2X2	RESTROOM FLOOR TILE
RUBBER TILE	RT-1	JOHNSONITE SOLID COLOR RUBBER FLOORING		20 CHARCOAL	BAMBOO	24X24	STAIRWELL LANDING

BASE

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
RUBBER WALL BASE	RB-1	JOHNSONITE / TRADITIONAL WALL BASE	DC-121-4	20 CHARCOAL WG		4" HIGH COIL LENGTH WITH TOE	
CERAMIC WALL BASE	CWB-1	DALTILE WALL SEMI-GLOSS COVE BASE	FLAT TOP COVE A-301	MATTE ARCTIC WHITE	MATTE	4-1/4" X 4-1/4"	
CERAMIC WALL BASE	CWB-2	DALTILE WALL SEMI-GLOSS COVE BASE	SANITARY TOP COVE S-3419T	MATTE ARCTIC WHITE	MATTE	4-1/4" X 6"	

WALLS

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
INTERIOR PAINT LATEX	PT-1	SHERWIN WILLIAMS - LATEX	SW7671	ON THE ROCKS	EGGSHELL		FIELD COLOR
INTERIOR PAINT LATEX	PT-2	SHERWIN WILLIAMS - LATEX	SW6710	MELANGE GREEN	EGGSHELL		ACCENT COLOR
INTERIOR PAINT LATEX	PT-3	SHERWIN WILLIAMS - LATEX	SW6493	EBBTIDE	EGGSHELL		ACCENT COLOR
INTERIOR PAINT LATEX	PT-4	SHERWIN WILLIAMS - LATEX	SW6669	YARROW	EGGSHELL		ACCENT COLOR
CERAMIC WALL TILE	CT-2	DALTILE WALL SEMI-GLOSS		MATTE ARCTIC WHITE	MATTE	4-1/4" X 4-1/4"	FIELD COLOR
CERAMIC WALL TILE	CT-3	DALTILE WALL SEMI-GLOSS		WATERFALL 0169	SEMI-GLOSS	4-1/4" X 4-1/4"	ACCENT COLOR
WALL PROTECTION	WP-1	CS ACROVYN WALL PROTECTION		262 DRIFTWOOD	SUEDE		REPLACING EXISTING WALL PROTECTION 48" AFF

CEILING

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
ACOUSTIC CEILING TILE	ACT-1	ARMSTRONG/ DUNE	1774	WHITE	PROFILE: ANGLED TEGULAR	24"X24"X5/8"	SUSPENDED CEILING GRID: ARMSTRONG PREDLUDE XL EXPOSED TEE SYSTEM, COLOR WHITE
INTERIOR PAINT LATEX	PT-5	SHERWIN WILLIAMS - INTERIOR LATEX	SW7005	PURE WHITE	FLAT FINISH/EPOXY AT CLEAN AREAS		PAINT AT GYP. CEILING - U.N.O.

MISC

MATERIAL	CODE	MANUFACTURE / PATTERN	PRODUCT NO.	COLORS	FINISH	DIMENSIONS	REMARKS
PHENOLIC PARTITIONS	PH-1	SCRANTON PRODUCTS HINY HIDERS		NICKEL	ROTARY BRUSHED		TOILET PARTITIONS
TRANSITION STRIP	TR-1	SCHLUTER SYSTEMS RENO-U	EU80	BRUSHED STAINLESS STEEL	-	5/16"	VCT TO CERAMIC TILE
TRANSITION STRIP	TR-2	JOHNSONITE SLIM LINE TRANSITION	SLT-121-H	20 CHARCOAL WG	-		VCT TO CARPET
TRANSITION STRIP	TR-3	JOHNSONITE SLIM LINE TRANSITION	SLT-121-J	20 CHARCOAL WG	-		VCT TO CONCRETE
TRANSITION STRIP	TR-4	JOHNSONITE STAIR NOSING	DTN-80	20 CHARCOAL			VCT TO STAIR TREADS
PLASTIC LAMINATE PARTITIONS	PL-4	WILSONART	4878-38	PEWTER MESH	-		TOILET PARTITIONS
STAIR TREADS	ST-1	JOHNSONITE VISUALLY IMPAIRED RUBBER STAIR TREAD WITH INTEGRATED	VIBMTRS	20 CHARCOAL	BAMBOO		STAIR TREAD WITH SOLID COLOR RUBBER INSERT 55 SILVER GREY
WINDOW BLINDS	WB-1	BALI HORIZONTAL MINI BLINDS		BRUSHED ALUMINUM 121		1"	LOCATED ON ALL EXTERIOR WINDOWS

2 **FINISH LEGEND**
SCALE: NTS

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOORS: FLOOR FINISH	FLOORS: BASE	WALLS: NORTH	WALLS: EAST	WALLS: SOUTH	WALLS: WEST	CEILING: FINISH	MILLWORK: MLWK	MILLWORK: CTR TOPS	NOTES
101	OFFICE 6 (NAVIGATOR)	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
102	OFFICE 5	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
103	OFFICE 4	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
104	OFFICE 10 (DIRECTOR)	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
105	OFFICE 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
106	OFFICE 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
107	OFFICE 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
108	RF PLAN REVIEW 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
109	RETAIL FOOD LEAD	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
110	MEETING 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
111	MEETING 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
112	WAITING AREA	VCT-1 / VCT-2	RB-1	PT-1	PT-3	PT-1	PT-1	ACT-1			
113	2 CSRs	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
114	FILE RM COPIER 2 CSRs	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
115	DIRECTOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
116	ELEC. ROOM	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
117	OSSF LEAD	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
118	FIELD 1 & 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
119	PLAN REVIEW 2 & 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
120	PLAN REVIEW 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
121	IMM AND EHS EQUP.	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
122	OFFICE	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
123	TB ENTRANCE	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1		PL-1	
124	TB INTAKE	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1		PL-1	
125	TB OFFICE	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
126	TB STORAGE	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
127	TB OFFICE 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
128	OFFICE 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
129	ASST. DIRECTOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			

ROOM FINISH SCHEDULE

ROOM NUMBER	ROOM NAME	FLOORS: FLOOR FINISH	FLOORS: BASE	WALLS: NORTH	WALLS: EAST	WALLS: SOUTH	WALLS: WEST	CEILING: FINISH	MILLWORK: MLWK	MILLWORK: CTR TOPS	NOTES
130	DIRECTOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
131	MD/HEALTH AUTHORITY	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
132	NURSE/NP 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
133	NURSE 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
134	NURSE 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
135	NURSING ROOM	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
136	PLAYROOM	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-4	ACT-1			
137	1-2 CSRs SUPPLIES COPIER	VCT-1	RB-1	PT-1	PT-3	PT-1	PT-1	ACT-1	PL-2	PL-1	
138	OFFICE 7	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
139	OFFICE 8	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
140	OFFICE 9	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
141	FLEX/MEETING	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
142	RF PLAN REVIEW 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
143	RF FIELD CUBICLES	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
144	RF PLAN REVIEW 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
145	STG.	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
146	WAITING AREA	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-3	PT-1	ACT-1			
147	MEETING ROOM	CPT-1 / CPT-2	RB-1	PT-4	PT-1	PT-1	PT-1	ACT-1			
148	BREAK ROOM	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	PL-3	PL-1	
149	LAB	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	PL-2	PL-1	
150	JANITOR	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
151	TOILET ROOM	CT-1	CWB-1 / -2	PT-1	CT-2 / -3	CT-2 / -3	PT-1	ACT-1			
152	IT	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
153	MECHANICAL	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
154	2 CSRs	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
155	CHECKOUT	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
156	EXAM 4	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
157	EXAM 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
158	EXAM 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
159	PROC. ROOM	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
160	EXAM 1	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1	PL-2	PL-1	
161	ISOLATION	VCT-1 / VCT-2	RB-1	PT-2	PT-1	PT-1	PT-1	ACT-1	PL-2	PL-1	
162	ANTEROOM	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
163	TB OFFICE 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
164	OFFICE 2	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
165	OFFICE 3	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
166	OFFICE 4	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
167	WOMEN'S TLT RM	EXISTING	EXISTING	PT-1	PT-1 / WP-1	PT-1 / WP-1	PT-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
168	MEN'S TLT RM	EXISTING	EXISTING	PT-1 / WP-1	PT-1 / WP-1	PT-1	PT-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
169	MEN'S TLT RM	EXISTING	EXISTING	PT-1	PT-1	EXISTING	PT-1 / WP-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
170	WOMEN'S TLT RM	EXISTING	EXISTING	EXISTING	PT-1	PT-1	PT-1 / WP-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
171	WOMEN'S TLT RM	EXISTING	EXISTING	PT-1	PT-1	PT-1 / WP-1	PT-1 / WP-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
172	MEN'S TLT RM	EXISTING	EXISTING	PT-1 / WP-1	PT-1 / WP-1	PT-1	PT-1	PT-5	PH-1		TOILETS PARTITION TO BE PH-1
173	VESTIBULE	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
174	LOBBY	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
201	EXECUTIVE DIRECTOR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
202	STORAGE	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
203	BREAK ROOM	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	PL-3	PL-1	
204	DIRECTOR ADMIN/FINANCE	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
205	ADMIN/FINANCE	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
206	ADMIN/FINANCE	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
207	ADMIN/FINANCE	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
208	EPR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
209	STORAGE	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
210	EPR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
211	COPIER	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-2	PT-1	ACT-1			
212	TVFC	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
213	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
214	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
215	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
216	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
217	DCP	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1			
218	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
219	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
220	HR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
221	HR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
222	HR	CPT-2	RB-1	PT-1	PT-1	PT-3	PT-1	ACT-1			
223	HR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
224	DEPUTY DIRECTOR	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
225	RECEPTION / ADMIN	VCT-1 / VCT-2	RB-1	PT-1	PT-3	PT-1	PT-1	ACT-1			
226	WIC	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
227	MARCOM	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
228	MARCOM	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
229	CONFERENCE ROOM	CPT-1/ CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
230	PHIP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
231	PHIP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
232	PHIP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
233	PHIP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
234	PHIP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
235	MARCOM	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
236	RECORD STORAGE	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
237	OFFICE	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
238	MOSQ.	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
239	STORAGE	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
240	CLERICAL	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-2	PT-1	ACT-1			
241	CONFERENCE ROOM	CPT-1 / CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
242	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
243	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
244	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
245	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
246	DCP	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
247	MEN'S TLT RM	EXISTING	EXISTING	PT-1	PT-1 / WP-1	PT-1 / WP-1	PT-1	PT-5	PL-4		TOILETS PARTITION TO BE PL-4
248	WOMEN'S TLT RM	EXISTING	EXISTING	PT-1 / WP-1	PT-1 / WP-1	PT-1	PT-1	PT-5	PL-4		TOILETS PARTITION TO BE PL-4
249	TVFC	CPT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
C101	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
C102	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-3	PT-1	ACT-1			
C103	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-2	ACT-1			
C104	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
C201	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
C202	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1			
C203	CORRIDOR	VCT-1 / VCT-2	RB-1	PT-1	PT-1 / PT-3	PT-1 / PT-3	PT-1	ACT-1			
ST1	STAIRS	VCT-2	RB-1	PT-4	PT-1	PT-1	PT-1	ACT-1			
ST2	STAIRS	VCT-2	RB-1	PT-1	PT-1	PT-4	PT-1	ACT-1			

1 **FINISH SCHEDULE**
SCALE: NTS

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ph. 512-374-9120 www.architectscollaborative.net

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San Antonio, Texas 78230
Phone : 210-698-7887
AUSTIN
901 S. Mopac
Bldg. 3, Ste. 400
Austin, Texas 78746
Phone : 512-433-2696

Edwards + Mulhausen
INTERIOR DESIGN
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Building A, Suite 80
Ph. 512.291.6657

In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

REGISTERED ARCHITECT — STATE OF TEXAS

1/16/2017

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/5/2016
2	100% Construction Documents Issued for Bid	1/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	1/8"=1'-0"
Drawn	
Checked	
Approved	&

TITLE

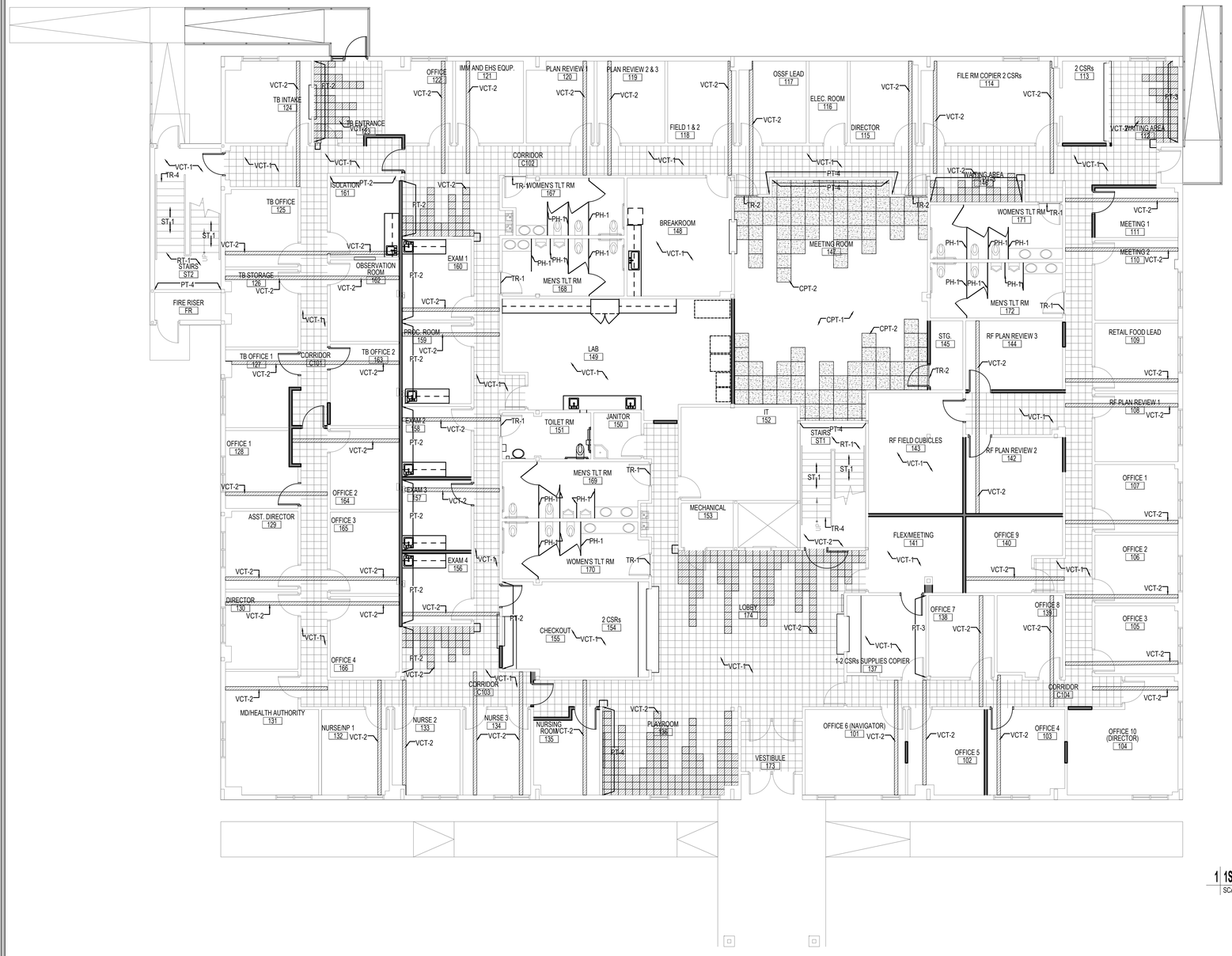
Room Finish Schedule & Legend

SHEET

A7.01

GENERAL NOTES:

1. INSTALL ALL FINISHES PER MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS.
2. FINISHES ON SCHEDULE TO BE LOCATED PER PLAN NORTH, NOT DIRECTION NORTH
3. ALL WINDOWS TO THE EXTERIOR TO HAVE BLINDS (WB-1)



1 **1ST FLOOR FINISH PLAN**
SCALE: 1/8"= 1'-0"

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Drawn	
Checked	
Approved	

TITLE

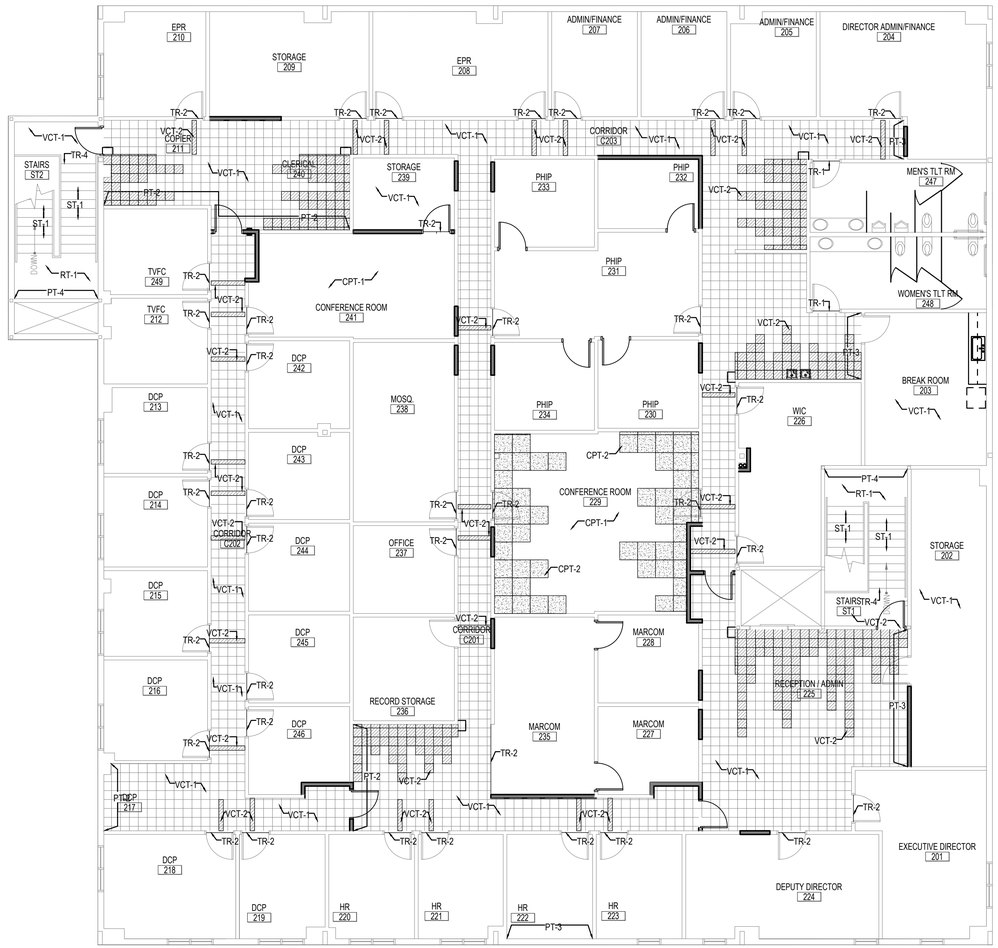
1st Floor Finish Plan

SHEET

A7.02

GENERAL NOTES:

1. INSTALL ALL FINISHES PER MANUFACTURER'S RECOMMENDATIONS AND INSTRUCTIONS
2. FINISHES ON SCHEDULE TO BE LOCATED PER PLAN NORTH, NOT DIRECTION NORTH
3. ALL WINDOWS TO THE EXTERIOR TO HAVE BLINDS (WB-1)



1 2ND FLOOR FINISH PLAN
SCALE: 1/8" = 1'-0"

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REGISTERED ARCHITECT STATE OF TEXAS
1/16/2017

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Drawn	
Checked	
Approved	

TITLE

2nd Floor Finish Plan

SHEET

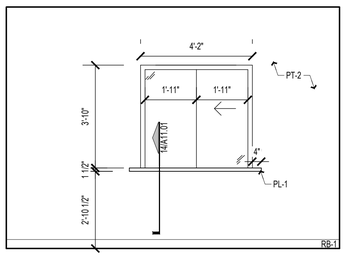
A7.03

Williamson County, Texas

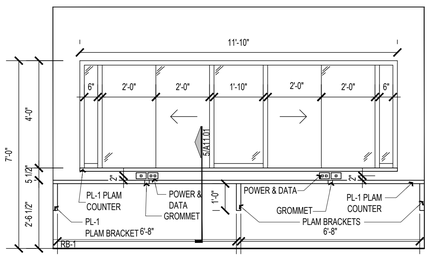
Bid 1701-139
Williamson County, Texas
p. 488

TOILET ROOM ACCESSORIES:

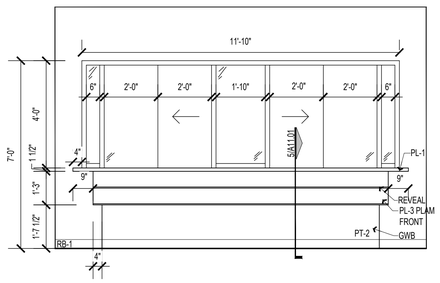
- (A) 42" GRAB BAR
- (B) 36" GRAB BAR
- (C) TOILET PAPER DISPENSER, SAN JAMAR R3590TBK
- (D) TOILET SEAT COVER DISPENSER, HEALTH GARDS HALF-FOLD
- (E) SANITARY NAPKIN DISPOSAL, 1ECK9
- (F) PAPER TOWEL DISPENSER, SAN JAMAR T17909TBK
- (G) SOAP DISPENSER, SAN JAMAR S890TBK
- (H) 24" x 36" GLASS MIRROR
- (K) FLUSH VALVE
- (L) ADA PIPE WRAP



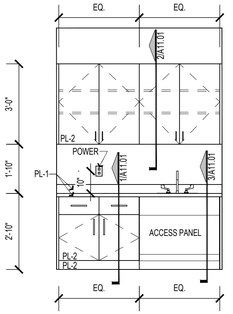
RM 123/124/C103
18 COUNTER
SCALE: 3/8"= 1'-0"



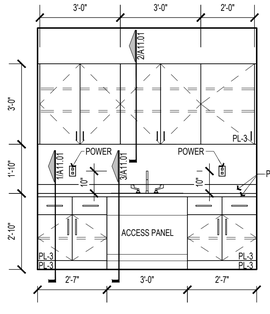
RM 154
13 RECEPTION DESK
SCALE: 3/8"= 1'-0"



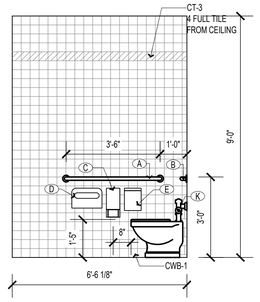
RM 174 LOBBY
10 COUNTER 1
SCALE: 3/8"= 1'-0"



STANDARD EXAM
8 MILLWORK TYP.
SCALE: 3/8"= 1'-0"



RM 203
6 BREAKROOM
SCALE: 3/8"= 1'-0"



TLT RM
3 151 C
SCALE: 3/8"= 1'-0"

RM 112
17 COUNTER
SCALE: 3/8"= 1'-0"

RM 147/148
15 COUNTER
SCALE: 3/8"= 1'-0"

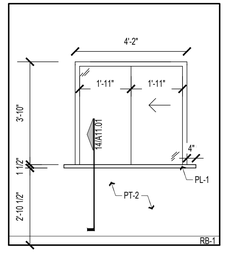
RM 137
12 RECEPTION DESK
SCALE: 3/8"= 1'-0"

RM 174 LOBBY
9 COUNTER 2
SCALE: 3/8"= 1'-0"

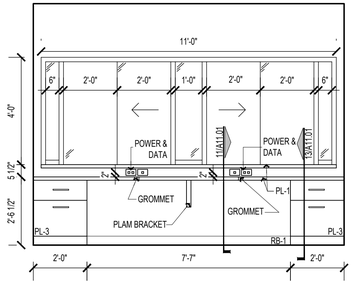
RM 148
7 BREAKROOM
SCALE: 3/8"= 1'-0"

RM 149
5 LAB A
SCALE: 3/8"= 1'-0"

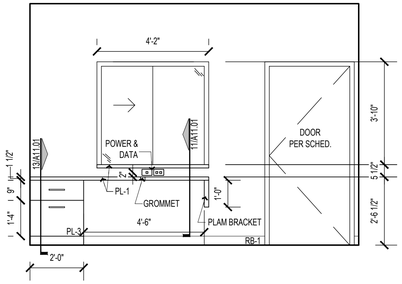
TLT RM
2 151 B
SCALE: 3/8"= 1'-0"



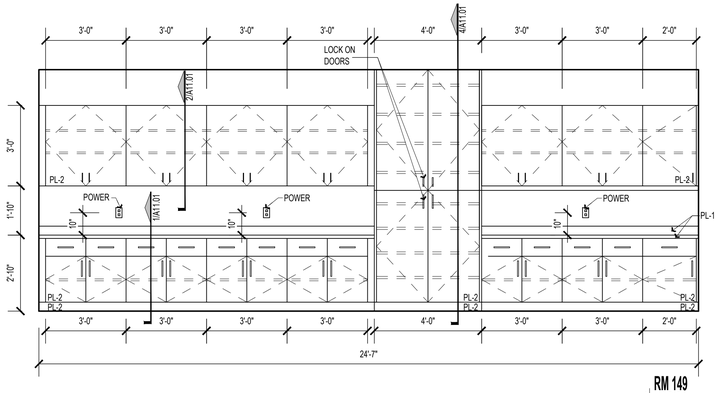
RM 123/124
16 RECEPTION DESK
SCALE: 3/8"= 1'-0"



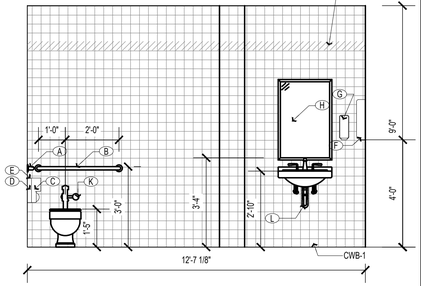
RM 113
14 RECEPTION DESK
SCALE: 3/8"= 1'-0"



RM 155
11 RECEPTION DESK
SCALE: 3/8"= 1'-0"



RM 149
4 LAB B
SCALE: 3/8"= 1'-0"



TLT RM
1 151 A
SCALE: 3/8"= 1'-0"

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REGISTERED ARCHITECT — STATE OF TEXAS — 1/16/2017

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SHEET INFORMATION

Date	January 16, 2017
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Drawn	
Checked	
Approved	

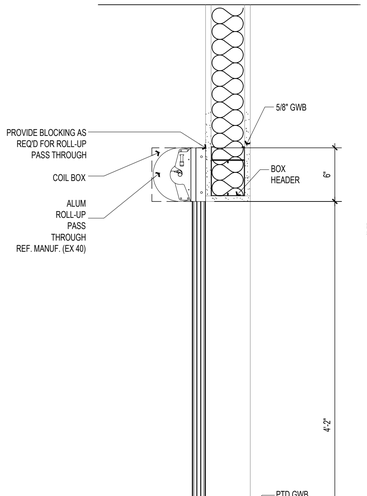
TITLE

Interior Elevations

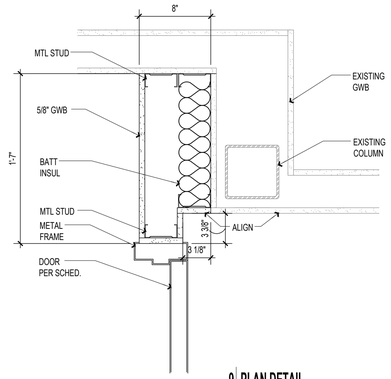
SHEET

A10.01

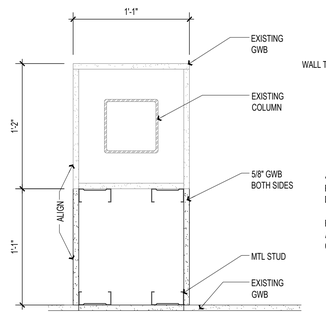
2/22/2017 8:32 AM



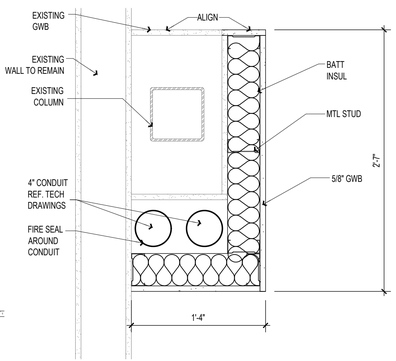
RM 148
12 COUNTER
SCALE: 1 1/2"= 1'-0"



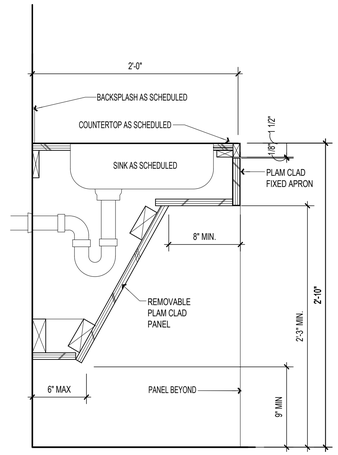
9 PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



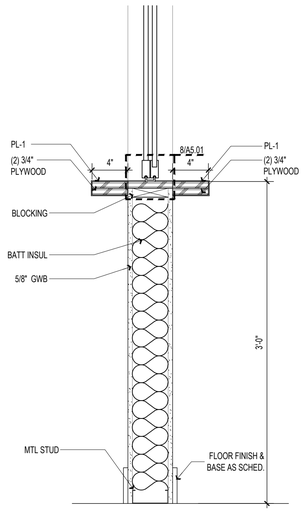
8 PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



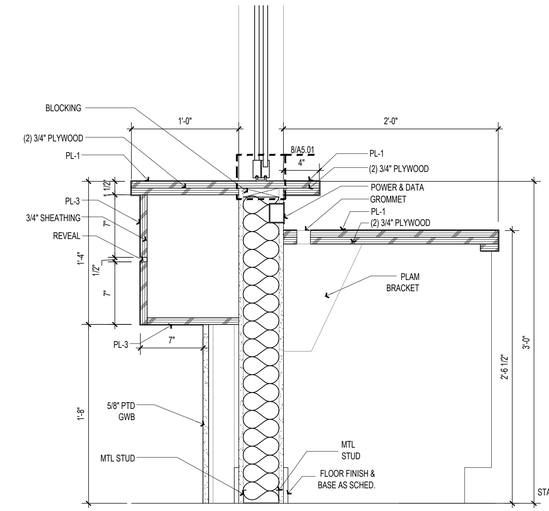
7 PLAN DETAIL
SCALE: 1 1/2"= 1'-0"



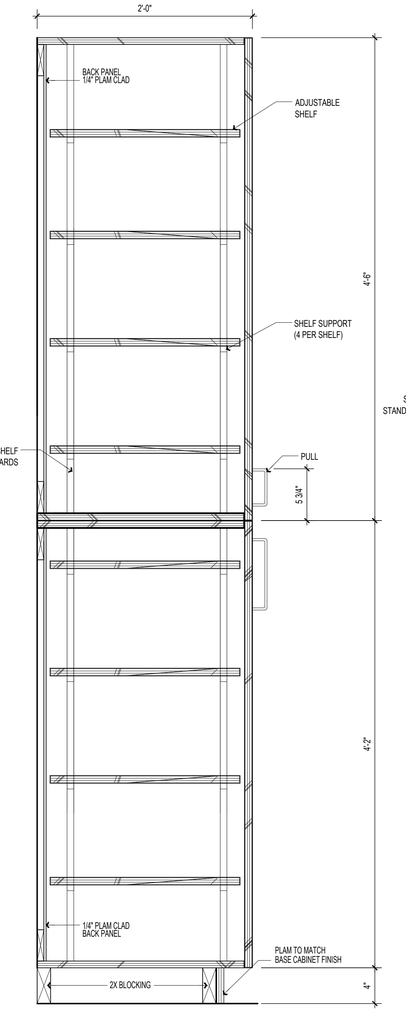
3 ADA SINK
SCALE: 1 1/2"= 1'-0"



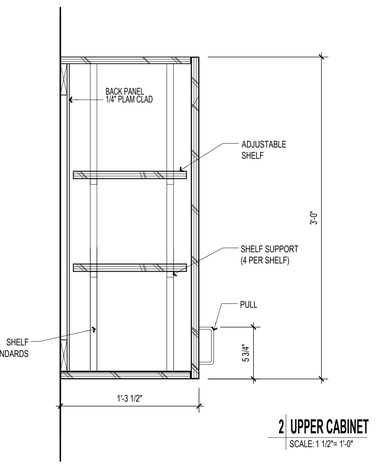
RM 123
14 COUNTER
SCALE: 1 1/2"= 1'-0"



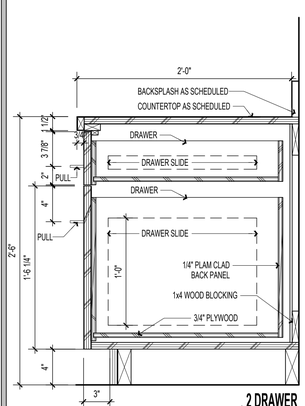
RM 137
6 COUNTER
SCALE: 1 1/2"= 1'-0"



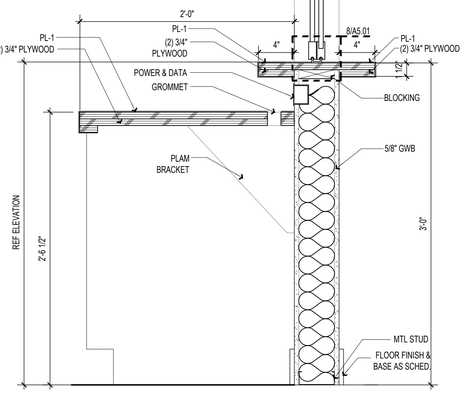
4 LAB CABINET
SCALE: 1 1/2"= 1'-0"



2 UPPER CABINET
SCALE: 1 1/2"= 1'-0"



2 DRAWER
13 BASE CABINET
SCALE: 1 1/2"= 1'-0"



11 WINDOW COUNTER
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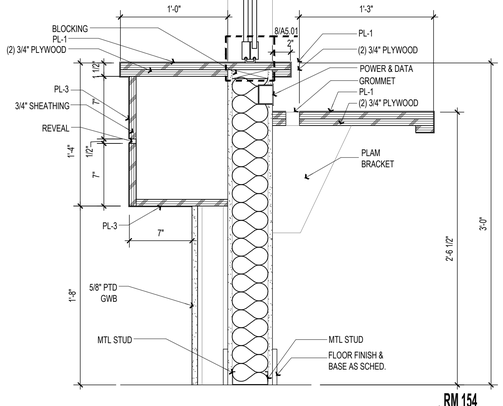
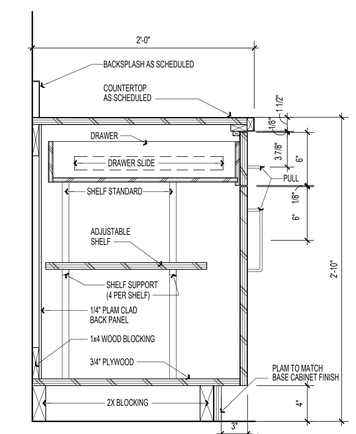


RM 154
5 COUNTER
SCALE: 1 1/2"= 1'-0"



1 BASE CABINET
SCALE: 1 1/2"= 1'-0"

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Approved	

TITLE

Millwork Sections & Plan Details

SHEET

A11.01

TECHNOLOGY/SECURITY SYMBOL LEGEND

VOICE SYMBOLS

▼	SINGLE VOICE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +18-INCHES A.F.F. UNLESS NOTED OTHERWISE.
▼X	VOICE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +18-INCHES A.F.F. UNLESS NOTED OTHERWISE. X-NUMBER OF CABLE TERMINATIONS PER LOCATION AS INDICATED.
▼	SINGLE VOICE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +6-INCHES ABOVE COUNTER OR SPLASH UNLESS NOTED OTHERWISE.
▼X	VOICE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +6-INCHES ABOVE COUNTER OR SPLASH UNLESS NOTED OTHERWISE. X-NUMBER OF CABLE TERMINATIONS PER LOCATION AS INDICATED.
▼	POWER/COMMUNICATIONS POLE WITH A SINGLE VOICE TERMINATION PER LOCATION, CABLE TYPE AS SPECIFIED.
▼X	POWER/COMMUNICATIONS POLE WITH X-NUMBER OF VOICE TERMINATIONS PER LOCATION, CABLE TYPE AS SPECIFIED.
▽	SINGLE VOICE OUTLET, CABLE TYPE AS SPECIFIED, FLOOR MOUNTED.
X ▽	VOICE OUTLET, CABLE TYPE AS SPECIFIED, FLOOR MOUNTED WITH X-NUMBER OF VOICE TERMINATIONS PER LOCATION.
W ▼	SINGLE VOICE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +52-INCHES A.F.F. UNLESS NOTED OTHERWISE.
P ▼	SINGLE PUBLIC TELEPHONE OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED HEIGHT AS SPECIFIED.

DATA SYMBOLS

▽	SINGLE DATA OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +18-INCHES A.F.F. UNLESS NOTED OTHERWISE.
X ▽	DATA OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +18-INCHES A.F.F. UNLESS NOTED OTHERWISE. X-NUMBER OF CABLE TERMINATIONS PER LOCATION AS INDICATED.
▽	SINGLE DATA OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +2-INCHES ABOVE COUNTER OR SPLASH UNLESS NOTED OTHERWISE.
X ▽	DATA OUTLET, CABLE TYPE AS SPECIFIED, MOUNTED +2-INCHES ABOVE COUNTER OR SPLASH UNLESS NOTED OTHERWISE. X-NUMBER OF CABLE TERMINATIONS PER LOCATION AS INDICATED.
▽	POWER/COMMUNICATIONS POLE WITH A SINGLE DATA TERMINATION PER LOCATION, CABLE TYPE AS SPECIFIED.
X ▽	POWER/COMMUNICATIONS POLE WITH X-NUMBER OF DATA TERMINATIONS PER LOCATION, CABLE TYPE AS SPECIFIED.
▽	SINGLE DATA OUTLET, CABLE TYPE AS SPECIFIED, FLOOR MOUNTED.
X ▽	DATA OUTLET, CABLE TYPE AS SPECIFIED, FLOOR MOUNTED WITH X-NUMBER OF DATA TERMINATIONS PER LOCATION.
	SINGLE CEILING DATA OUTLET, CABLE TYPE AS SPECIFIED.
X	CEILING DATA OUTLET, CABLE TYPE AS SPECIFIED WITH X-NUMBER OF CABLE TERMINATIONS PER LOCATION.
▽	EXISTING DATA OUTLET, CABLE TO BE DEMOLISHED, CONDUIT AND BACK BOX TO REMAIN AND BE COVERED WITH CONTRACTOR PROVIDED BLANK PLATE, UNLESS OTHERWISE NOTED.

ROUGH-IN & MISC. SYMBOLS

▽	ROUGH-IN LOCATION, INFRASTRUCTURE AS SPECIFIED, MOUNTED +18-INCHES A.F.F. UNLESS NOTED OTHERWISE.
▽	ROUGH-IN LOCATION, INFRASTRUCTURE AS SPECIFIED, MOUNTED +6-INCHES ABOVE COUNTER OR SPLASH UNLESS NOTED OTHERWISE.
▽	ROUGH-IN LOCATION, INFRASTRUCTURE AS SPECIFIED, FLOOR MOUNTED.
WAP	WIRELESS ACCESS POINT. CABLING AND EQUIPMENT AS SPECIFIED.
EP	EMERGENCY PHONE. CABLING AND EQUIPMENT AS SPECIFIED.
M/M	MULTIMEDIA OUTLET. CABLING AND INSERTS AS SPECIFIED.

INTRUSION DETECTION SYMBOLS

AL	PROVIDE ALARM ANNUNCIATOR LIGHT MOUNTED 96" A.F.F.
AP	PROVIDE ANNUNCIATOR PANEL AS INDICATED IN BLOCK DIAGRAMS AND/OR DETAILS.
AV	PROVIDE AUDIO VISUAL ANNUNCIATOR MOUNTED 96" A.F.F.
GB	PROVIDE GLASS BREAK SENSOR MOUNTED TO CEILING.
GB	PROVIDE GLASS BREAK SENSOR WALL MOUNTED 96" A.F.F.
KP	PROVIDE PERSONAL IDENTIFICATION NUMBER KEYPAD MOUNTED 48" A.F.F.
M	PROVIDE SOUND DETECTION MICROPHONE MOUNTED TO CEILING.
MS	PROVIDE 360° MOTION SENSOR MOUNTED TO CEILING.
MD	PROVIDE MOTION SENSOR MOUNTED 96" A.F.F.
MD LR	PROVIDE LONG RANGE MOTION SENSOR MOUNTED 96" A.F.F.
ST	PROVIDE STROBE LIGHT SURFACE MOUNTED TO CEILING.
ST	PROVIDE STROBE LIGHT MOUNTED 96" A.F.F.
V	PROVIDE VIBRATION DETECTOR MOUNTED 96" A.F.F.

ACCESS CONTROL SYMBOLS

AD	INTERFACE TO AUTOMATIC DOOR CONTROL AND MONITORING.
DC	PROVIDE CONCEALED DOOR POSITION SWITCH FLUSH MOUNTED IN HEAD OF DOOR FRAME 6" FROM STRIKE SIDE OF FRAME.
DR	PROVIDE SINGLE DOOR RELEASE PUSHBUTTON MOUNTED IN KNEE SPACE OF DESK, TABLE OR COUNTER PROVIDE ARMORED CABLE FROM PUSHBUTTON TO JUNCTION BOX.
DR1	PROVIDE MULTIPLE DOOR RELEASE UNIT, AS INDICATED IN DETAILS, MOUNTED IN KNEE SPACE OF DESK, TABLE OR COUNTER. PROVIDE ARMORED CABLE FROM PUSHBUTTON TO JUNCTION BOX.
EI	INTERFACE TO EXIT DEVICE WITH ELECTRIC LATCH RETRACTION AND POWER TRANSFER.
EL	INTERFACE TO ELEVATOR CONTROL/MONITORING.
FA	INTERFACE TO FIRE ALARM SYSTEM.
L1	INTERFACE TO 24VDC ELECTROMECHANICAL MORTISE LOCKSET AND POWER TRANSFER HINGE.
L2	INTERFACE TO 24VDC ELECTROMECHANICAL MORTISE LOCKSET WITH INTEGRAL DOOR POSITION SWITCH.
M1	INTERFACE TO 24VDC ELECTROMAGNETIC LOCK.
M2	INTERFACE TO 24VDC ELECTROMAGNETIC LOCK WITH INTEGRAL DOOR POSITION SWITCH.
MH	INTERFACE TO 24VDC MAGNETIC DOOR HOLD-OPEN.
CR	PROVIDE CARD READER MOUNTED 42" A.F.F.
FR	PROVIDE ROUGH-IN FOR FUTURE CARD READER MOUNTED 42" A.F.F.

ACCESS CONTROL SYMBOLS

REX	REQUEST-TO-EXIT IS INTEGRAL WITH ELECTRIFIED LOCKING HARDWARE.
ES	INTERFACE TO 24VDC FAIL SECURE ELECTRIC STRIKE.
SD	INTERFACE TO SLIDING DOOR CONTROL/MONITORING.
SR	SECURITY SYSTEM RISER, DATA GATHERING PANEL AND LOW VOLTAGE POWER SUPPLY DISTRIBUTION LOCATION.
VI	PROVIDE VIDEO INTERCOM SUBSTATION MOUNTED 54" A.F.F.
VM	PROVIDE DESKTOP VIDEO INTERCOM MASTER STATION.
WD	PROVIDE WIRELESS DURESS BUTTON MOUNTED IN KNEE SPACE OF DESK, TABLE, OR COUNTER.
WR	PROVIDE WIRELESS DURESS BUTTON RECEIVER ABOVE SUSPENDED CEILING.
	PROVIDE PRE-WIRE AND BLANK COVER PLATE FOR FUTURE DEVICE.
ACMW	ACCESS CONTROL MONITORING CLIENT WORKSTATION.

ELECTRONIC SURVEILLANCE SYMBOLS

	FIXED SURVEILLANCE CAMERA, CAMERA MODEL AND MOUNTING HEIGHT AS SPECIFIED.
	PAN, TILT & ZOOM SURVEILLANCE CAMERA, CAMERA MODEL AND MOUNTING HEIGHT AS SPECIFIED.
	180° SURVEILLANCE CAMERA, CAMERA MODEL AND MOUNTING HEIGHT AS SPECIFIED.
	360° SURVEILLANCE CAMERA, CAMERA MODEL AND MOUNTING HEIGHT AS SPECIFIED.
VMMW	VIDEO MONITORING CLIENT WORKSTATION.

GENERAL SYMBOLS

# SHEET DRAWING TITLE SCALE: SCALE	DRAWING TITLE CALLOUT, # = DETAIL NUMBER.
# SHEET	DETAIL CALLOUT, # = DETAIL NUMBER.
# SHEET	SECTION CALLOUT, # = DETAIL NUMBER.
SHEET #	ELEVATION CALLOUT, # = DETAIL NUMBER.
#	KEYED NOTE.
#	REVISION TRIANGLE, # = REVISION NUMBER (PER SHEET).

ABBREVIATIONS

A.F.F.	ABOVE FINISHED FLOOR
A.F.G.	ABOVE FINISHED GRADE
AER	AERIAL
B	BURIED
CAT.3/5	CATEGORY 3/5
CATV	COMMUNITY ANTENNA TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
CLT	CLOSET
CO	CENTRAL OFFICE
DEMARC	DEMARCATION POINT
DPDT	DOUBLE PULL DOUBLE THROW
EMT	ELECTRIC METALLIC TUBE
F.O.C.	FIBER OPTIC CABLE
GIP	GALVANIZED IRON PIPE
HE	PA/INTERCOM HEAD-END
IRC	INTERMEDIATE RIGID CONDUIT
ISP	INSIDE CABLE PLANT
IDF	INTERMEDIATE DISTRIBUTION FRAME
MDF	MAIN DISTRIBUTION FRAME
MH	MANHOLE
MM	MULTIMODE
OSP	OUTSIDE CABLE PLANT
PB	PULLBOX
PR	PAIR
PBX	PRIVATE BRANCH EXCHANGE
PVC	POLYVINYL CHLORIDE
SM	SINGLE MODE
SP	SERVICE PROVIDER
STP	SHIELDED TWISTED PAIR
TB	TERMINAL BLOCK
UTP	UNSHIELDED TWISTED PAIR

NOTES

1. CONTRACTOR SHALL REVIEW DRAWINGS AND SPECIFICATIONS THAT MAKE UP THE CONTRACT DOCUMENTS AND COMPLETE ALL WORK INCLUDED THEREIN.
2. SCALE OF TECHNOLOGY DRAWINGS IS PROVIDED FOR REFERENCE ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER CABLE LENGTHS, SIZE OF PATHWAYS, DIMENSIONS, ETC.
3. TECHNOLOGY DRAWINGS SHALL BE USED TO COMPLEMENT THE WRITTEN SPECIFICATIONS.
4. DISCREPANCIES BETWEEN THE TECHNOLOGY DRAWINGS AND THE WRITTEN SPECIFICATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER IN WRITING PRIOR TO SUBMITTING A BID/PROPOSAL FOR THE WORK.
5. IN THE EVENT OF A DISCREPANCY BETWEEN THE TECHNOLOGY DRAWINGS AND SPECIFICATIONS THE GREATER QUANTITY AND COST SHALL BE FURNISHED.
6. VERIFY THE EXACT MOUNTING LOCATION OF ALL DEVICES WITH ARCHITECT.
7. THE MOUNTING HEIGHTS ARE TO THE CENTERLINE OF THE DEVICE UNLESS NOTED OTHERWISE.
8. SEE THE SECURITY CONDUIT DRAWINGS FOR SECURITY DEVICE BACKBOXES AND CONDUIT PROVIDED BY THE ELECTRICAL CONTRACTOR.
9. ALL MOUNTING SPECIFICS SHALL BE AS INDICATED IN THE LEGEND UNLESS OTHERWISE NOTED IN THE PLAN DRAWINGS. MOUNTING CONDITIONS IDENTIFIED ON THE PLANS SHALL TAKE PRECEDENCE OVER THE LEGEND DESCRIPTIONS.

INDEX OF DRAWINGS

T001	TECHNOLOGY SYMBOLS & LEGEND
T101	1ST FLOOR PLAN - TECHNOLOGY
T102	2ND FLOOR PLAN - TECHNOLOGY
T301	TECHNOLOGY DETAILS
T302	SECURITY DETAILS
T303	DIAGRAMS/SCHEDULES - SECURITY

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SHEET INFORMATION

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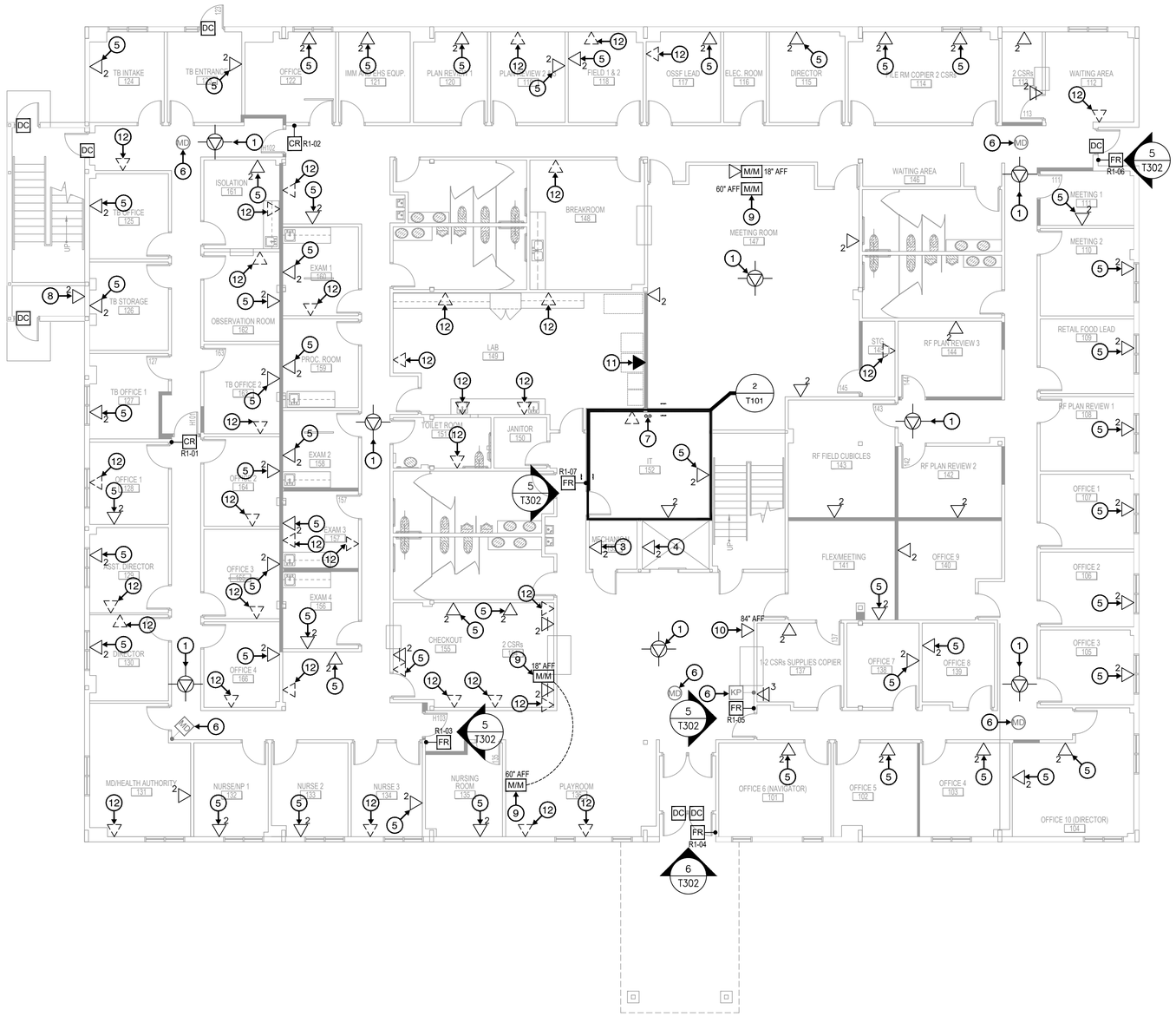
Drawn	EC
Checked	MT
Approved	MT

TITLE

Technology Symbols & Legend

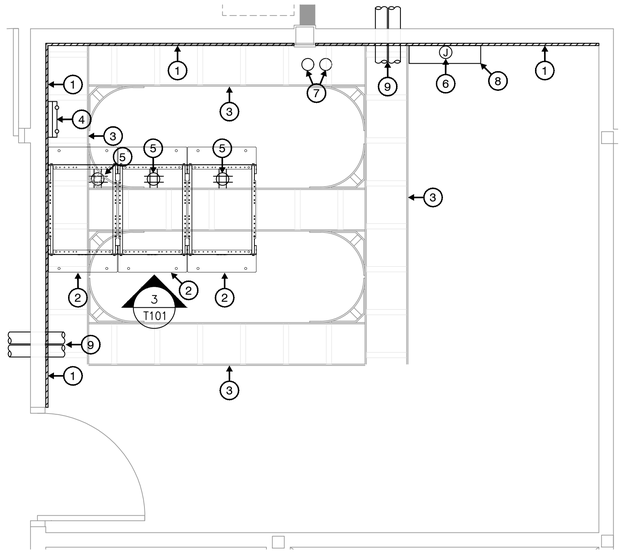
SHEET

T001



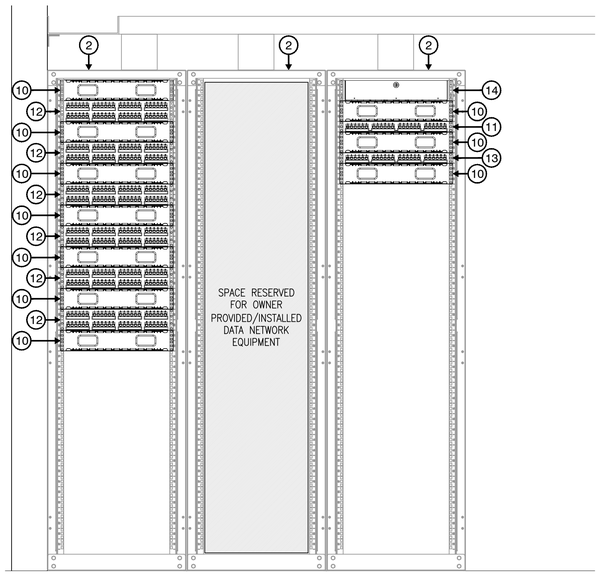
1 T101 **1ST FLOOR PLAN - TECHNOLOGY**

SCALE: 1/8" = 1'-0"



2 T101 **ENLARGED IDF PLAN - TECHNOLOGY**

SCALE: 1/8" = 1'-0"



3 T101 **ELEVATION PLAN - TECHNOLOGY**

SCALE: 1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. CONTRACTOR SHALL RESTORE ALL PENETRATIONS PROVIDED THROUGH FIRE RATED WALLS/STRUCTURES FOR DATA AND VOICE CABLING BACK TO THE ORIGINAL RATING.
2. CONTRACTOR SHALL RESTORE ALL PENETRATIONS PROVIDED THROUGH NON-RATED WALLS/STRUCTURES FOR DATA AND VOICE CABLING FOR SOUND TO REDUCE NOISE TRAVELING THROUGH PENETRATIONS.
3. CABLING FOR DATA AND VOICE SHALL BE ROUTED IN SEPARATE PATHWAYS IN J-HOOKS, CONDUITS, CONDUIT SLEEVES, CORES, ETC. THROUGHOUT THE ENTIRE PATHWAY. DIFFERENT MEDIA TYPES (DATA, VOICE, VIDEO, SECURITY, ETC.) SHALL NOT SHARE THE SAME J-HOOK, CONDUIT, CONDUIT SLEEVE, CORE, ETC.
4. ALL CONDUITS FOR DATA AND VOICE SHALL ROUTE FROM THE DEVICE LOCATION AND TERMINATE ABOVE AN ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE DATA ROOM TO MINIMIZE THE CABLE LENGTH.
5. CONDUIT SEGMENTS SHALL BE NO MORE THAN 100-FEET IN LENGTH WITH NO MORE THAN THE EQUIVALENT OF (2) 90 DEGREE BENDS BETWEEN PULLING POINTS.
6. CONDUITS SHALL MAINTAIN A BEND RADIUS OF 6 TIMES THE DIAMETER OF THE CONDUIT FOR CONDUITS 2-INCHES OR SMALLER AND 10 TIMES THE DIAMETER OF THE CONDUIT FOR CONDUITS GREATER THAN 2-INCHES.
7. ALL CONDUITS SHALL HAVE A PULL STRING INSTALLED FOR PULLING OF CABLE.
8. ALL SPARE CONDUITS OR CONDUITS FILLED WITH LESS THAN THE MAXIMUM ALLOWED FILL RATIO SHALL HAVE A PULL STRING INSTALLED AND LEFT FOR FUTURE PULLING OF CABLE. CLEARLY LABEL AS "PULL STRING" INDICATING OPPOSITE END LOCATION.
9. ALL CABLING INSTALLED IN OR BELOW SLAB, REGARDLESS OF THE USE OF CONDUIT, SHALL BE RATED FOR USE IN A WET ENVIRONMENT.
10. ALL EXISTING DATA/VOICE CABLING SHALL BE REMOVED ENTIRELY, FROM END-TO-END. NO ABANDONED DATA CABLING SHALL REMAIN ABOVE CEILING. ANY EXISTING CONDUIT(S) AND/OR JUNCTION BOXES SERVING DATA DROPS SHALL REMAIN. EXISTING JUNCTION BOXES SHALL BE COVERED WITH A BLANK FACEPLATE - COLOR TO MATCH NEW DATA FACEPLATES SPECIFIED.
11. ALL NEW DATA CABLING SHALL ORIGINATE IN IT ROOM 152 ON LEVEL 1.

FLOOR PLAN KEYED NOTES

1. DATA CABLE WITH 20-FEET OF SLACK NEATLY COILED AND STORED ON J-HOOK ABOVE ACCESSIBLE CEILING FOR OWNER PROVIDED / OWNER INSTALLED CEILING MOUNTED WIRELESS ACCESS POINT. CONTRACTOR SHALL PLACE A GREEN ADHESIVE DOT ON THE CEILING GRID DIRECTLY BELOW THE OUTLET LOCATION FOR FUTURE IDENTIFICATION OF THE OUTLET.
2. DATA CABLE WITH 20-FEET OF SLACK NEATLY COILED AND STORED ON J-HOOK ABOVE ACCESSIBLE CEILING FOR OWNER PROVIDED / OWNER INSTALLED CEILING MOUNTED IP CAMERA. CONTRACTOR SHALL PLACE A GREEN ADHESIVE DOT ON THE CEILING GRID DIRECTLY BELOW THE OUTLET LOCATION FOR FUTURE IDENTIFICATION OF THE OUTLET.
3. DATA CABLE FOR MECHANICAL CONTROLS. COORDINATE EXACT CONDUIT ROUGH-IN LOCATION, HEIGHT AND TERMINATION REQUIREMENTS WITH THE MECHANICAL CONTRACTOR PRIOR TO INSTALLATION.
4. VOICE CABLE FOR ELEVATOR EMERGENCY TELEPHONE. COORDINATE EXACT CONDUIT ROUGH-IN LOCATION, HEIGHT AND TERMINATION REQUIREMENTS WITH THE ELEVATOR CONTRACTOR PRIOR TO INSTALLATION.
5. EXISTING ROUGH-IN LOCATION TO REMAIN. CONTRACTOR SHALL DEMOLISH EXISTING DATA CABLES FEEDING THIS OUTLET IN THEIR ENTIRETY, FROM END-TO-END, AND PROVIDE NEW CATEGORY-6 DATA CABLES IN THE QUANTITY INDICATED, TERMINATED ON NEW INFORMATION OUTLETS WITH A NEW FACEPLATE.
6. EXISTING INTRUSION DETECTION DEVICE TO BE DEMOLISHED. DEVICE AND ALL ASSOCIATED CABLING SHALL BE REMOVED FROM END TO END.
7. (2) TWO 4-INCH EMT CONDUIT SLEEVES THROUGH SLAB OF LEVEL 2 TO FEED DATA DEVICES ON LEVEL 2.
8. DATA CABLE FOR IRRIGATION CONTROLLER. COORDINATE EXACT CONDUIT ROUGH-IN LOCATION, HEIGHT AND TERMINATION REQUIREMENTS WITH THE OWNER / IRRIGATION CONTROL CONTRACTOR PRIOR TO INSTALLATION.
9. MULTIMEDIA OUTLET LOCATION WITH HDMI PLATE LOCATED AT 18-INCHES ABOVE FINISHED FLOOR, AND HDMI PLATE LOCATED AT 60-INCHES ABOVE FINISHED FLOOR WITH PLENUM RATED HDMI CABLE BETWEEN THE TWO.
10. DATA OUTLET MOUNTED AT 84" AFF FOR OWNER PROVIDED / OWNER INSTALLED WALL MOUNTED DISPLAY.
11. ANALOG LINE FOR OWNER PROVIDED / OWNER INSTALLED LAB EQUIPMENT. TERMINATE CATEGORY 6 CABLE ON NEW 24-PORT RACK MOUNTED PATCH PANEL.
12. EXISTING ROUGH-IN LOCATION TO REMAIN. CONTRACTOR SHALL DEMOLISH EXISTING DATA CABLES FEEDING THIS OUTLET IN THEIR ENTIRETY, FROM END-TO-END, AND PROVIDE NEW BLANK FACEPLATE.

ENLARGED/ELEVATION PLAN KEYED NOTES

1. 4-FEET X 8-FEET X ¾-INCH BC GRADE VOID FREE FIRE RATED PLYWOOD INSTALLED VERTICALLY STARTING AT 24-INCHES ABOVE FINISHED FLOOR. THE PLYWOOD SHALL BE INSTALLED WITH THE "B" GRADE SIDE EXPOSED AND THE "C" GRADE SIDE AGAINST THE BUILDING WALL OR STRUCTURE. FIRE RATED PLYWOOD SHALL BE PAINTED WITH TWO COATS OF FIRE RETARDANT PAINT. FIRE RATED STAMPS SHALL BE VISIBLE FOR INSPECTION AFTER INSTALLATION. (BY DIV. 27)
2. 19-INCH WIDE X 84-INCH TALL X 29-INCH DEEP 4-POST EQUIPMENT RACK . (BY DIV. 27)
3. 12-INCH LADDER RACK MOUNTED AT 84-INCH ABOVE FINISHED FLOOR. (BY DIV. 27)
4. GROUND BUS BAR MOUNTED AT 84-INCHES ABOVE FINISHED FLOOR. (BY DIV. 27)
5. DEDICATED 20 AMP CIRCUIT WITH QUAD RECEPTACLE NEMA 5-20R FLUSH MOUNTED TO THE LADDER RACK. (BY DIV. 26)
6. DEDICATED 20 AMP CIRCUIT IN JUNCTION BOX FLUSH MOUNTED TO THE FINISHED WALL SURFACE AT 48-INCHES ABOVE FINISHED FLOOR FOR ACCESS CONTROL PANEL. (BY DIV. 26)
7. (2) FOUR INCH EMT CONDUIT SLEEVES ROUTED THROUGH LEVEL 2 SLAB TO ABOVE ACCESSIBLE CEILING OF LEVEL 2. SLEEVES SHALL BE USED FOR DATA CABLING TO LEVEL 2 DEVICES ONLY. PROVIDE FIRE STOP AS REQUIRED. (BY DIV. 26)
8. ACCESS CONTROL PANEL. (BY DIV. 28)
9. (2) FOUR INCH EMT WALL SLEEVES/CONDUITS WITH BUSHING ON EACH END AND FIRESTOP AS REQUIRED. SLEEVES ARE FOR HORIZONTAL DATA/VOICE/SECURITY CABLE ONLY. (BY DIV. 26)
10. DOUBLE-SIDED 2U HORIZONTAL CABLE MANAGER. (BY DIV. 27)
11. RACK MOUNTED 24-PORT CATEGORY 3 PATCH PANEL FOR HIGH PAIR COUNT COPPER BACKBONE CABLING FROM INCOMING SERVICE RJ-21X ON WALL. CONTRACTOR SHALL PROVIDE AMPHENOL CABLE FROM RJ-21X TERMINATED ON THIS PATCH PANEL. (BY DIV. 27)
12. RACK MOUNTED 48-PORT CATEGORY 6 PATCH PANEL FOR DATA. (BY DIV. 27)
13. RACK MOUNTED 24-PORT PATCH PANEL FOR ANALOG TIE CABLING. ALL ANALOG DROPS SHALL TERMINATE ON THIS PATCH PANEL. (BY DIV 27)
14. RACK MOUNTED 2U FIBER OPTIC ENCLOSURE FOR INCOMING FIBER SERVICE. (BY DIV 27)

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Drawn	EC
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Approved	MT

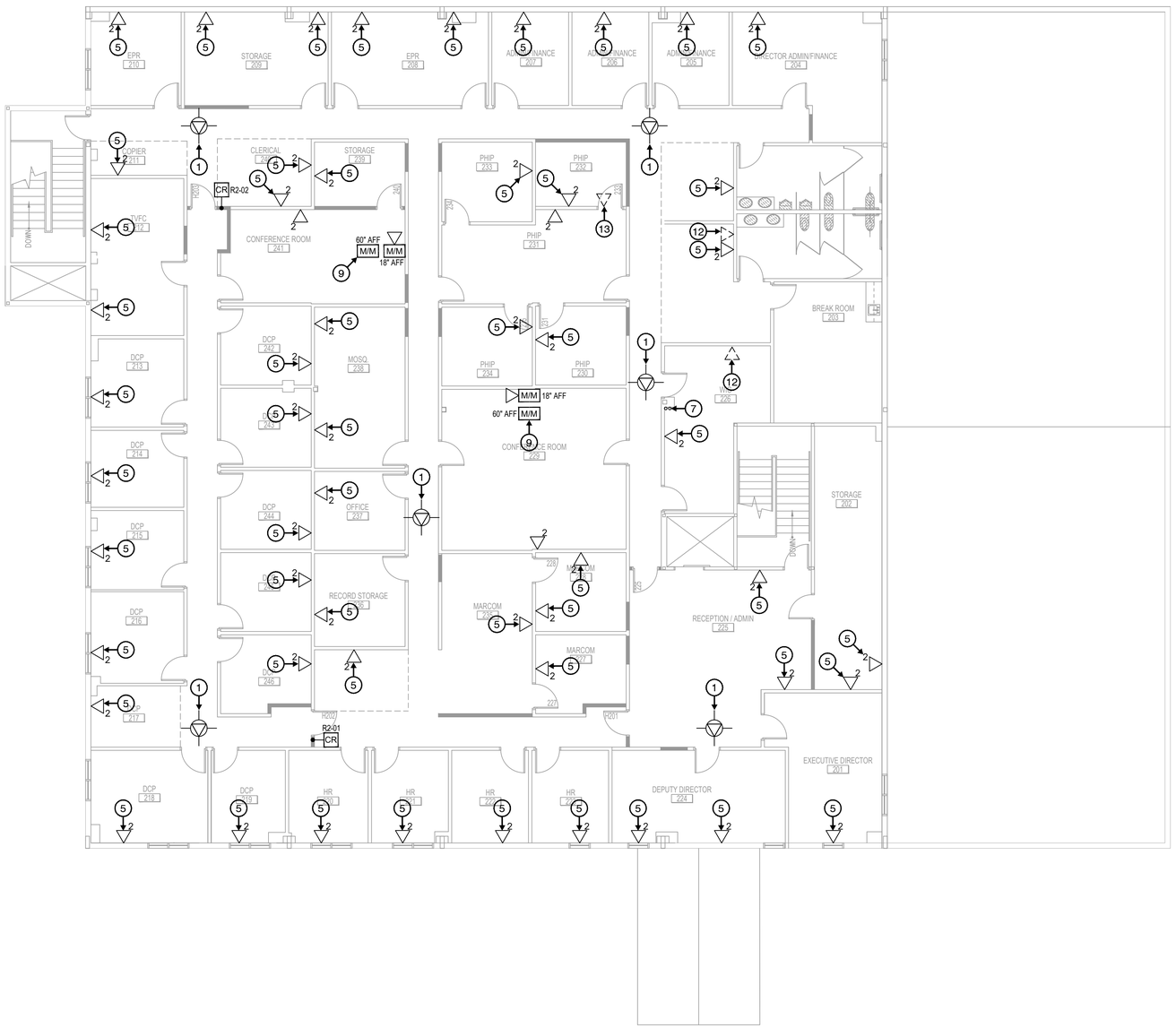
TITLE

1st Floor Plan - Technology

SHEET

T101

2/22/2017 8:32 AM



1 / T102 2ND FLOOR PLAN - TECHNOLOGY

SCALE: 1/8" = 1'-0"

FLOOR PLAN GENERAL NOTES

1. CONTRACTOR SHALL RESTORE ALL PENETRATIONS PROVIDED THROUGH FIRE RATED WALLS/STRUCTURES FOR DATA AND VOICE CABLING BACK TO THE ORIGINAL RATING.
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FLOOR PLAN KEYED NOTES

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11. ANALOG LINE FOR OWNER PROVIDED / OWNER INSTALLED LAB EQUIPMENT. TERMINATE CATEGORY 6 CABLE ON NEW 24-PORT RACK MOUNTED PATCH PANEL IN IDF.
12. EXISTING ROUGH-IN LOCATION TO REMAIN. CONTRACTOR SHALL DEMOLISH EXISTING DATA CABLES FEEDING THIS OUTLET IN THEIR ENTIRETY, FROM END-TO-END, AND PROVIDE NEW BLANK FACEPLATE.
13. EXISTING ROUGH-IN LOCATION TO BE DEMOLISHED COMPLETELY, FROM END-TO-END, INCLUDING BACK BOX AND CONDUIT.

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TITLE

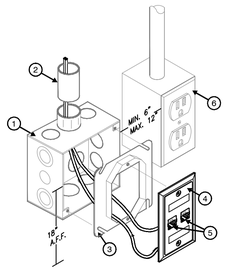
2nd Floor Plan - Technology

SHEET

T102

Williamson County, Texas

2/22/2017 8:32:

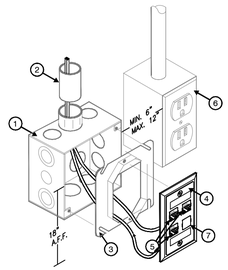


KEYED NOTES:

1. 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26)
2. 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE MDF/IDF ROOM TO MINIMIZE THE CABLE LENGTH. (BY DIV 26)
3. SINGLE GANG REDUCER RING (BY DIV 26)
4. SINGLE GANG WALL PLATE WITH DESIGNATION IN WINDOW (BY DIV 27)
5. DATA INSERT (BY DIV 27)
6. ELECTRICAL RECEPTACLE, GANG BOX AND CONDUIT SHOWN FOR REFERENCE ONLY (REFER TO DIV 26)

1 / T301 TYPCIAL DUAL DATA OUTLET CONFIGURATION

SCALE: N.T.S.



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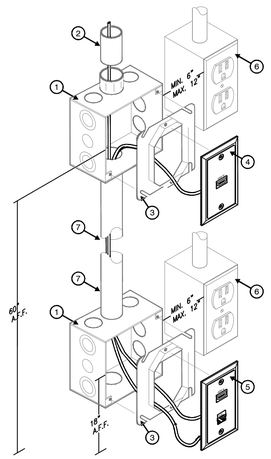
3. SINGLE GANG REDUCER RING (BY DIV 26)
4. SINGLE GANG WALL PLATE WITH DESIGNATION IN WINDOW (BY DIV 27)
5. DATA INSERTS (BY DIV 27)
6. ELECTRICAL RECEPTACLE, GANG BOX AND CONDUIT SHOWN FOR REFERENCE ONLY (REFER TO DIV 26)
7. BLANK INSERT (BY DIV 27)

2 / T301 TYPCIAL THREE DATA OUTLET CONFIGURATION

SCALE: N.T.S.



KEYED NOTES:

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2. 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE MDF/IDF ROOM TO MINIMIZE THE CABLE LENGTH. (BY DIV 26)
3. SINGLE GANG REDUCER RING (BY DIV 26)
4. SINGLE GANG HDMI WALL PLATE (BY DIV 27)
5. SINGLE GANG WALL PLATE WITH HDMI AND CATEGORY 6 INSERTS (BY DIV 27)
6. ELECTRICAL RECEPTACLE, GANG BOX AND CONDUIT SHOWN FOR REFERENCE ONLY (REFER TO DIV 26)
7. 1-INCH EMT CONDUIT FROM "LOW" DOUBLE GANG BOX TO "HIGH" DOUBLE GANG WALL BOX FRO ROU. PROVIDE AND NYLON BUSHING ON THE THROAT OF EACH CONDUIT.(BY DIV 26)

3 / T301 TYPCIAL HDMI FACEPLATE CONFIGURATION

SCALE: N.T.S.

KEYED NOTES:

1. 4 11/16" X 4 11/16" X 2 1/8" RECESSED DOUBLE GANG BOX (BY DIV 26).
2. 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE MDF/IDF ROOM TO MINIMIZE THE CABLE LENGTH (BY DIV 26).
3. DOUBLE GANG PLASTER RING (BY DIV 26).
4. SURFACE MOUNT BOX INSIDE THE 4 11/16-IN X 4 11/16-IN X 2 1/8-IN DOUBLE GANG BOX (BY DIV 27).
5. RJ-45 INSERT (BY DIV 27).

4 / T301 TYPICAL CONDUIT ROUGH-IN FOR SURVEILLANCE CAMERA/ACCESS POINT WITHOUT ACCESSIBLE CEILING

SCALE: N.T.S.

KEYED NOTES:

1. J-HOOK ABOVE ACCESSIBLE CEILING (BY DIV 27)
2. DATA CABLE ABOVE ACCESSIBLE CEILING (BY DIV 27)
3. 20 FOOT SERVICE LOOP ABOVE ACCESSIBLE CEILING NEATLY COILED AND SECURED TO J-HOOK (BY DIV 27)
4. SURFACE MOUNT BOX ABOVE ACCESSIBLE CEILING SECURED TO BUILDING STRUCTURE (BY DIV 27)
5. DATA INSERT (BY DIV 27)

5 / T301 TYPICAL ABOVE CEILING DATA OUTLET

SCALE: N.T.S.

KEYED NOTES:

1. J-HOOK ABOVE ACCESSIBLE CEILING (BY DIV 27).
2. DATA CABLE ABOVE ACCESSIBLE CEILING (BY DIV 27).
3. A/V CABLE ABOVE ACCESSIBLE CEILING (BY DIV 27).
4. SECURITY CABLE ABOVE ACCESSIBLE CEILING (BY DIV 28).
5. SPARE J-HOOK (BY DIV 27).

6 / T301 TYPICAL J-HOOK CABLE PATHWAY

SCALE: N.T.S.

KEYED NOTES:

1. SCHEDULED WALL.
2. SCHEDULED CEILING.
3. SCHEDULED DECK ABOVE.
4. 4 11/16" x 4 11/16" x 2 1/8" RECESSED DOUBLE GANG BOX WITH DOUBLE GANG PLASTER RING (BY DIV 26)
5. 1-INCH EMT CONDUIT FROM DOUBLE GANG BOX WITH 200 LBS PULL STRING AND NYLON BUSHING STUBBED OUT ABOVE ACCESSIBLE CEILING IN THE SAME ROOM WHERE THE DEVICE IS LOCATED. IF THE ROOM WHERE THE DEVICE IS LOCATED DOES NOT HAVE AN ACCESSIBLE CEILING, THE CONDUIT SHALL ROUTE TO THE NEAREST ACCESSIBLE CEILING OFF OF A MAIN CORRIDOR. CONDUIT PATHWAY SHALL TAKE THE SHORTEST ROUTE TO THE APPLICABLE MDF/IDF ROOM TO MINIMIZE THE CABLE LENGTH. (BY DIV 26)

7 / T301 TYPICAL TECHNOLOGY CONDUIT ROUGH-IN

SCALE: N.T.S.

KEYED NOTES:

1. SCHEDULED FLOOR OR DECK.
2. CONDUIT SLEEVE (BY DIV 26).
3. NYLON BUSHING (BY DIV 26).

8 / T301 TYPICAL CONDUIT SLEEVE THROUGH FLOOR OR DECK DETAIL

SCALE: N.T.S.

KEYED NOTES:

1. SCHEDULED WALL.
2. SCHEDULED CEILING.
3. CONDUIT SLEEVE (BY DIV 26).
4. NYLON BUSHING (BY DIV 26).

9 / T301 TYPICAL CONDUIT SLEEVE GOING THROUGH WALL

SCALE: N.T.S.

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Austin, Texas 78746
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In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

REVISIONS

No.	Issue	Date
1	100% Construction Documents	11/21/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

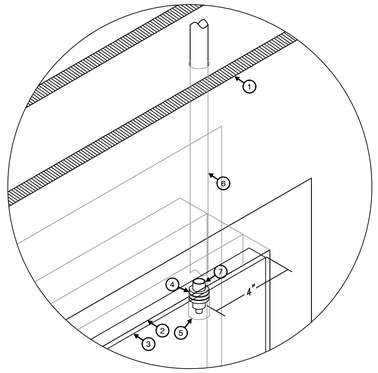
Date	November 21, 2016
Job Number	16-1010
Scale	VARIES
Drawn	EC
Checked	MT
Approved	MT

TITLE

Technology Details

SHEET

T301

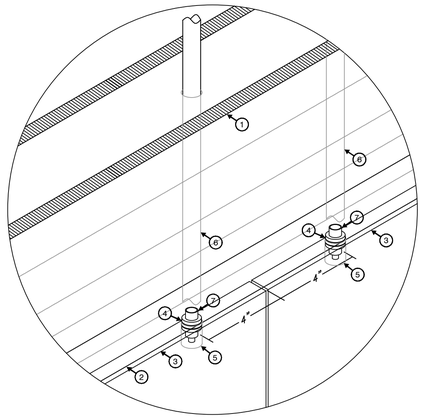


KEYED NOTES:

1. SCHEDULED PARTITION.
2. HEAD OF DOOR FRAME. PROVIDE TAB AT DOOR FRAME TO SECURE CONDUIT DIRECTLY ABOVE DOOR POSITION SWITCH.
3. SCHEDULED DOOR.
4. 15/16" DIAMETER HOLE IN THE HEAD OF FRAME FOR CONCEALED DOOR CONTACT.
5. 15/16" DIAMETER X 1 5/8" DEEP HOLE IN TOP OF DOOR FOR CONCEALED DOOR CONTACT MAGNET.
6. 1/2" CONDUIT FROM 6" X 6" X 4" JUNCTION BOX ABOVE DOOR. (BY DIV 26)
7. DOOR CONTACT (REFERENCE SPECIFICATION).

DOOR CONTACT - SINGLE DOOR RECESSED

1 / T302 SCALE: SCALE



KEYED NOTES:

1. SCHEDULED PARTITION.
2. HEAD OF DOOR FRAME. PROVIDE TAB AT DOOR FRAME TO SECURE CONDUIT DIRECTLY ABOVE DOOR POSITION SWITCH.
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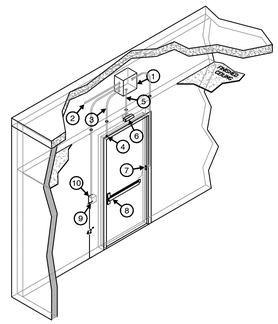
5. 15/16" DIAMETER X 1 5/8" DEEP HOLE IN TOP OF DOOR FOR CONCEALED DOOR CONTACT MAGNET.
6. 1/2" CONDUIT FROM 6" X 6" X 4" JUNCTION BOX ABOVE DOOR (BY DIV 26).
7. DOOR CONTACT (REFERENCE SPECIFICATION).

DOOR CONTACT - DOUBLE DOOR RECESSED

2 / T302 SCALE: SCALE

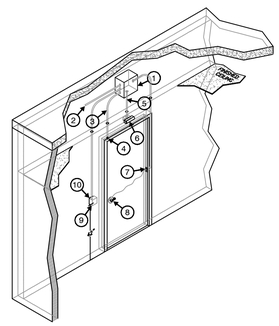


KEYED NOTES:

1. (1) 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX MOUNTED ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR (BY DIV. 26).
2. (1) 1-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR FOR ACCESS CONTROL CABLE (BY DIV. 26).
3. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO HEAD OF DOOR FRAME FOR CONCEALED DOOR POSITION SWITCH. STUB CONDUIT INTO HEAD OF DOOR FRAME 6-INCHES FROM THE STRIKE SIDE OF THE DOOR. PROVIDE A 3-INCH BLOCKOUT FOR GROUTED DOORS (BY DIV. 26).
4. CONCEALED DOOR POSITION SWITCH (BY DIV. 28).
5. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 12-INCH DEEP JUNCTION BOX TO A RECESSED SINGLE GANG BOX WITH A SINGLE GANG PLASTER RING INSTALLED HORIZONTALLY 6-INCHES ABOVE HEAD OF DOOR FRAME ON CENTERLINE OF DOOR AND ON SECURE SIDE OF DOOR FOR REQUEST TO EXIT MOTION SENSOR (BY DIV. 26).
6. (1) REQUEST TO EXIT MOTION SENSOR ON SECURE SIDE OF DOOR (BY DIV. 28).
7. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX DOWN DOOR FRAME FOR POWER TRANSFER HINGE (BY DIV. 26).
8. (1) ELECTRIFIED EXIT DEVICE ON SECURE SIDE OF DOOR (BY DIV. 8).
9. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO A RECESSED DOUBLE GANG BOX WITH A SINGLE GANG PLASTER RING FOR CARD READER ON UNSECURE SIDE OF DOOR (BY DIV. 26).
10. (1) CARD READER ON UNSECURE SIDE OF DOOR (BY DIV. 28).

WALL MOUNTED CARD READER WITH ELECTRIFIED EXIT DEVICE AND WALL MOUNTED REQUEST TO EXIT MOTION SENSOR

3 / T302 SCALE: N.T.S.



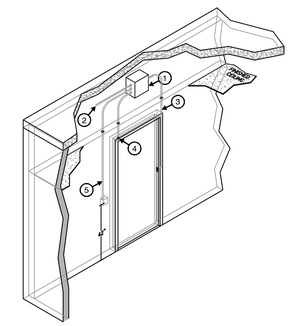
KEYED NOTES:

1. (1) 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX MOUNTED ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR (BY DIV. 26).
2. (1) 1-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR FOR ACCESS CONTROL CABLE (BY DIV. 26).
3. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO HEAD OF DOOR FRAME 6-INCHES FROM THE STRIKE SIDE OF THE DOOR. PROVIDE A 3-INCH BLOCKOUT FOR GROUTED DOORS (BY DIV. 26).

   CONCEALED DOOR POSITION SWITCH (BY DIV. 28).
4. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 12-INCH DEEP JUNCTION BOX TO A RECESSED SINGLE GANG BOX WITH A SINGLE GANG PLASTER RING INSTALLED HORIZONTALLY 6-INCHES ABOVE HEAD OF DOOR FRAME ON CENTERLINE OF DOOR AND ON SECURE SIDE OF DOOR FOR REQUEST TO EXIT MOTION SENSOR (BY DIV. 26).
5. (1) REQUEST TO EXIT MOTION SENSOR ON SECURE SIDE OF DOOR (BY DIV. 28).
6. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX DOWN DOOR FRAME FOR POWER TRANSFER HINGE (BY DIV. 26).
7. (1) ELECTRIFIED LEVERSET ON SECURE SIDE OF DOOR (BY DIV. 8).
8. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO A RECESSED DOUBLE GANG BOX WITH A SINGLE GANG PLASTER RING FOR CARD READER ON UNSECURE SIDE OF DOOR (BY DIV. 26).
9. (1) CARD READER ON UNSECURE SIDE OF DOOR (BY DIV. 28).

WALL MOUNTED CARD READER WITH ELECTRIFIED LEVERSET AND WALL MOUNTED REQUEST TO EXIT MOTION SENSOR

4 / T302 SCALE: N.T.S.



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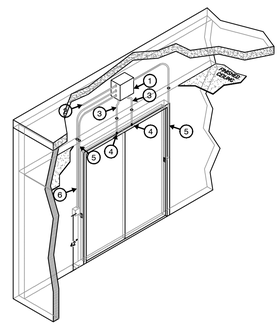
2. (1) 1-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR FOR FUTURE ACCESS CONTROL CABLE (BY DIV. 26).
3. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX DOWN DOOR FRAME FOR FUTURE POWER TRANSFER HINGE (BY DIV. 26).
4. CONCEALED DOOR POSITION SWITCH (BY DIV. 28).
5. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO A RECESSED DOUBLE GANG BOX WITH A SINGLE GANG PLASTER RING FOR FUTURE CARD READER ON UNSECURE SIDE OF DOOR (BY DIV. 26).

FUTURE SINGLE DOOR CARD READER ROUGH-IN

5 / T302 SCALE: N.T.S.

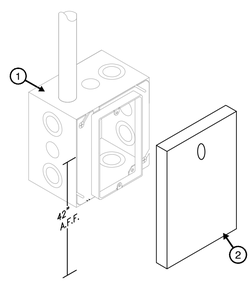


KEYED NOTES:

1. (1) 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX MOUNTED ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR (BY DIV. 26).
2. (1) 1-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO ABOVE ACCESSIBLE CEILING ON SECURE SIDE OF DOOR FOR FUTURE ACCESS CONTROL CABLE (BY DIV. 26).
3. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX TO HEAD OF DOOR FRAME FOR CONCEALED DOOR POSITION SWITCH. STUB CONDUIT INTO HEAD OF DOOR FRAME 6-INCHES FROM THE STRIKE SIDE OF THE DOOR. PROVIDE A 3-INCH BLOCKOUT FOR GROUTED DOORS (BY DIV. 26).
4. CONCEALED DOOR POSITION SWITCH (BY DIV. 28).
5. (1) 3/4-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX DOWN DOOR FRAME FOR FUTURE POWER TRANSFER HINGE (BY DIV. 26).
6. (1) 1/2-INCH EMT CONDUIT FROM 12-INCH WIDE X 12-INCH HIGH X 8-INCH DEEP JUNCTION BOX DOWN DOOR FRAME TO 3/8-INCH HOLE IN FRAME AT 42-INCH A.F.F. FOR FUTURE CARD READER (BY DIV. 26).

FUTURE DOUBLE DOOR CARD READER ROUGH-IN

6 / T302 SCALE: N.T.S.

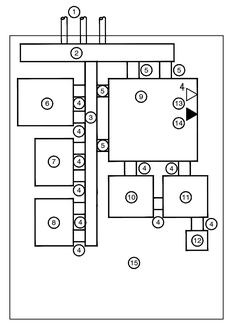


KEYED NOTES:

1. (1) 3/4-INCH EMT CONDUIT FROM 6-INCH WIDE X 6-INCH HIGH X 4-INCH DEEP JUNCTION BOX TO A RECESSED DOUBLE GANG BOX WITH A SINGLE GANG PLASTER RING FOR CARD READER ON UNSECURE SIDE OF DOOR. (BY DIV. 26)
2. CARD READER ON UNSECURED SIDE OF DOOR (BY DIV. 28).

CARD READER - WALL MOUNTED DETAIL

6 / T302 SCALE: N.T.S.



KEYED NOTES:

1. CONDUIT FEEDS FROM FIELD.
2. 8-IN H X 8-IN D X 4-FT W GUTTER RACEWAY WITH COVER.
3. 4-IN FINGERDUCT RACEWAY WITH COVER.
4. 2-IN METALLIC CONDUIT.
5. 4-IN METALLIC CONDUIT.
6. ACCESS CONTROL PANEL.
7. INTRUSION DETECTION CONTROL PANEL.
8. INPUT/OUPUT PANEL.
9. DEMARCATION ENCLOSURE.
10. DEVICE POWER SUPPLY.
11. LOCK POWER SUPPLY.
12. 120VAC EMERGENCY POWER QUAD RECEPTACLE, NON-SWITCHED, DEDICATED 20AMP.
13. NETWORK OUTLET (BY DIV 27).
14. TELEPHONE INTERFACE (BY DIV 27).
15. 8-FT H X 4-FT W 3/4 -IN FIRE RATED PLYWOOD BACKBOARD.

TYPICAL SECURITY RISER BACKBOARD DETAIL

7 / T302 SCALE: N.T.S.

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AUSTIN
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Austin, Texas 78746
Phone : 512-433-2696

In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

REVISIONS

No.	Issue	Date
1	100% Construction Documents	11/21/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	November 21, 2016
Job Number	16-1010
Scale	VARIES
Drawn	EC
Checked	MT
Approved	MT

TITLE

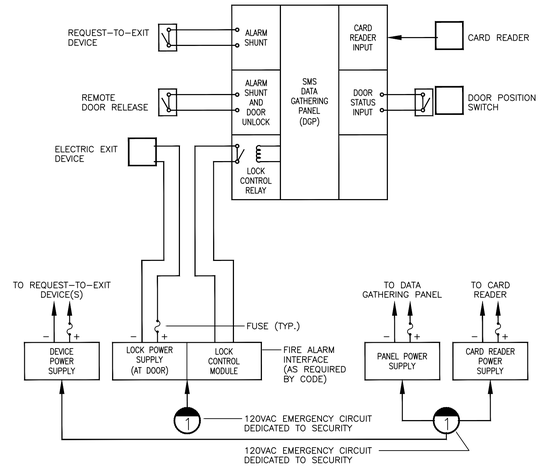
Security Details

SHEET

T302

Bid 1701-139

Williamson County, Texas

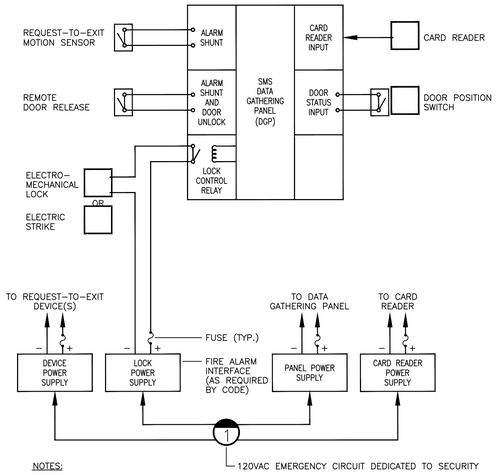


NOTES:

1. BLOCK DIAGRAM REPRESENTS TYPICAL CONTROLLED DOOR WITH ELECTRIC EXIT DEVICE SEE THE PLANS FOR THE EXACT DEVICES ASSOCIATED WITH EACH DOOR.
2. ALL POWER SUPPLIES AND RELAYS SHALL BE U.L. LISTED. PROVIDE INDIVIDUALLY FUSED OUTPUTS TO EACH LOCK/DEVICE. PROVIDE 4 HOUR BATTERY BACK–UP FOR EACH POWER SUPPLY.
3. BLOCK DIAGRAM REPRESENTS FAIL–SECURE LOCK CONDITION FOR FAIL–SAFE WIRE LOCK POWER THROUGH NORMALLY OPEN (CLOSES WHEN PANEL IS ENERGIZED) LOCK CONTROL RELAY CONTACTS, ADD INTERFACE WITH FIRE ALARM SYSTEM (AS REQUIRED BY APPLICABLE CODES), CONNECT POWER SUPPLY TO NON–EMERGENCY BUILDING POWER, AND OMIT BATTERY BACKUP FOR THE LOCK POWER SUPPLY.

1 / T303 CARD READER - ELECTRIC EXIT DEVICE BLOCK DIAGRAM

SCALE: N.T.S.



NOTES:

1. BLOCK DIAGRAM REPRESENTS TYPICAL CONTROLLED DOOR WITH ELECTROMECHANICAL LOCK OR ELECTRIC STRIKE. SEE THE PLANS FOR THE EXACT DEVICES ASSOCIATED WITH EACH DOOR.
2. ALL POWER SUPPLIES AND RELAYS SHALL BE U.L. LISTED. PROVIDE INDIVIDUALLY FUSED OUTPUTS TO EACH LOCK/DEVICE. PROVIDE 4 HOUR BATTERY BACK–UP FOR EACH POWER SUPPLY.
3. BLOCK DIAGRAM REPRESENTS FAIL–SECURE LOCK CONDITION. FOR FAIL–SAFE WIRE LOCK POWER THROUGH NORMALLY OPEN (CLOSES WHEN PANEL IS ENERGIZED) DGP LOCK CONTROL RELAY CONTACTS, ADD INTERFACE WITH FIRE ALARM SYSTEM (AS REQUIRED BY APPLICABLE CODES), CONNECT POWER SUPPLY TO NON–EMERGENCY BUILDING POWER, AND OMIT BATTERY BACKUP FOR THE LOCK POWER SUPPLY.

2 / T303 CARD READER - ELECTROMECHANICAL LOCK OR ELECTRIC STRIKE BLOCK DIAGRAM

SCALE: N.T.S.

FA FIRE ALARM / SECURITY SYSTEM INTERFACE

A. AUTOMATIC UNLOCK OF ELECTRIC LOCKING MECHANISMS
   1. ELECTRIC LOCKING MECHANISMS CONTROLLED BY THE SECURITY SYSTEM SHALL BE AUTOMATICALLY UNLOCKED UPON A FIRE ALARM CONDITION AS REQUIRED BY APPLICABLE CODES AND THE LOCAL AUTHORITY HAVING JURISDICTION (AHJ).
   2. THE FIRE ALARM CONTRACTOR SHALL PROVIDE NORMALLY CLOSED AUXILIARY DRY OUTPUT CONTACTS SUCH THAT UPON A FIRE ALARM CONDITION, THE CONTACTS SHALL OPEN AND THE SECURITY SYSTEM SHALL UNLOCK THE ELECTRIC LOCKING MECHANISMS. THE CONTACTS SHALL REMAIN OPEN UNTIL THE FIRE ALARM SYSTEM IS MANUALLY RESET.
B. AUXILIARY MONITORING OF FIRE ALARM AND TROUBLE CONDITIONS
   1. THE SECURITY SYSTEM SHALL PROVIDE AUXILIARY MONITORING OF THE FIRE ALARM SYSTEM ALARM AND TROUBLE CONDITIONS.
   2. THE FIRE ALARM CONTRACTOR SHALL PROVIDE SEPARATE NORMALLY CLOSED AUXILIARY DRY OUTPUT CONTACTS FOR ALARM AND TROUBLE CONDITIONS. UPON AN ALARM CONDITION OR TROUBLE CONDITION, THE CONTACTS SHALL OPEN AND THE SECURITY SYSTEM SHALL ANNUNCIATE THE CONDITION. THE CONTACTS SHALL REMAIN OPEN UNTIL THE FIRE ALARM SYSTEM IS MANUALLY RESET.
C. FIRE ALARM/SECURITY SYSTEM INTERFACE
   1. THE FIRE ALARM CONTRACTOR SHALL PROVIDE FIRE ALARM/SECURITY SYSTEM INTERFACE CABINETS IN THE FOLLOWING LOCATIONS:

LOCATION	INTERFACE TERMINALS
SECURITY RISER CLOSETS	AUTOMATIC UNLOCK
DELAYED EXIT DEVICE DOORS	AUTOMATIC UNLOCK

D. INTERFACE CABINETS
   1. PROVIDE A LOCKABLE CONTINUOUS HINGE COVER ENCLOSURE WITH DUAL SCREW BARRIER TERMINAL STRIPS FOR EACH INTERFACE POINT.
   2. THE FIRE ALARM CONTRACTOR SHALL PROVIDE THE INTERFACE CABINETS IN A READILY ACCESSIBLE LOCATION NO MORE THAN 6'-0" A.F.F. COORDINATE THE EXACT INTERFACE CABINET LOCATION WITH THE SECURITY CONTRACTOR.
   3. THE FIRE ALARM CONTRACTOR SHALL LABEL THE COVER OF THE INTERFACE CABINET TO IDENTIFY ITS FUNCTION AND LABEL ALL TERMINALS WITHIN THE CABINET TO IDENTIFY THEIR FUNCTION.
   4. THE FIRE ALARM CONTRACTOR SHALL PROVIDE ANY HARDWARE/SOFTWARE REQUIRED TO INTERFACE THE FIRE ALARM SYSTEM TO THE SECURITY SYSTEM. ALL SECURITY INTERFACE OUTPUTS AND WIRING SHALL BE SUPERVISED BY THE FIRE ALARM SYSTEM.
   5. THE FIRE ALARM CONTRACTOR SHALL PROVIDE AND TERMINATE ALL CONDUIT, POWER AND WIRING REQUIRED FOR THE INSTALLATION OF THE INTERFACE CABINETS. ALL WIRING SHALL BE UL LISTED FOR FIRE ALARM APPLICATIONS.
   6. THE SECURITY CONTRACTOR SHALL PROVIDE AND TERMINATE ALL WIRING FROM THE INTERFACE CABINET TO THE SECURITY SYSTEM. ALL WIRING SHALL BE UL LISTED FOR FIRE ALARM APPLICATIONS.

3 / T303 FIRE ALARM/SECURITY SYSTEM INTERFACE

SCALE: N.T.S.

WILLIAMSON COUNTY - ACCESS CONTROL SYSTEM SCHEDULE

CARD READER POINT NUMBER	SHEET NUMBER	LEVEL	ARCHITECTURAL DOOR NUMBER	ROOM NAME	TERMINATION ROOM NUMBER	DOOR DETAIL NUMBER	NOTES
R1-01	T101	LEVEL 1	C101	CORRIDOR C101-SOUTH	IT 152	3/T302	REQUEST TO EXIT INTEGRAL TO LOCK. DO NOT PROVIDE HEADER MOUNTED PIR REQUEST TO EXIT.
R1-02	T101	LEVEL 1	C102	CORRIDOR C101-NORTH	IT 152	4/T302	REQUEST TO EXIT INTEGRAL TO LOCK. DO NOT PROVIDE HEADER MOUNTED PIR REQUEST TO EXIT.
R1-03	T101	LEVEL 1	C103	CORRIDOR C103	IT 152	5/T302	FUTURE CARD READER LOCATION. PROVIDE CONDUIT AND BACKBOX FOR FUTURE DEVICES AS NOTED. INSTALL DOOR POSITION SWITCH ONLY.
R1-04	T101	LEVEL 1	V101/101A	VESTIBULE 173	IT 152	6/T302	FUTURE CARD READER LOCATION. PROVIDE CONDUIT AND BACKBOX FOR FUTURE DEVICES AS NOTED. INSTALL DOOR POSITION SWITCH ONLY.
R1-05	T101	LEVEL 1	C104	CORRIDOR C104	IT 152	5/T302	FUTURE CARD READER LOCATION. PROVIDE CONDUIT AND BACKBOX FOR FUTURE DEVICES AS NOTED. INSTALL DOOR POSITION SWITCH ONLY.
R1-06	T101	LEVEL 1	E101	WAITING 112	IT 152	5/T302	FUTURE CARD READER LOCATION. PROVIDE CONDUIT AND BACKBOX FOR FUTURE DEVICES AS NOTED. INSTALL DOOR POSITION SWITCH ONLY.
R1-07	T101	LEVEL 1	152	IT 152	IT 152	5/T302	FUTURE CARD READER LOCATION. PROVIDE CONDUIT AND BACKBOX FOR FUTURE DEVICES AS NOTED. INSTALL DOOR POSITION SWITCH ONLY.
R2-01	T102	LEVEL 2	C202	CORRIDOR C202-SOUTH	IT 152	4/T302	REQUEST TO EXIT INTEGRAL TO LOCK. DO NOT PROVIDE HEADER MOUNTED PIR REQUEST TO EXIT.
R2-02	T102	LEVEL 2	C203	CORRIDOR C203-NORTH	IT 152	4/T302	REQUEST TO EXIT INTEGRAL TO LOCK. DO NOT PROVIDE HEADER MOUNTED PIR REQUEST TO EXIT.

4 / T303 ACCESS CONTROL SYSTEM SCHEDULE

SCALE: N.T.S.

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REVISIONS

No.	Issue	Date
1	100% Construction Documents	11/21/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	November 21, 2016
Job Number	16-1010
Scale	VARIES
Drawn	EC
Checked	MT
Approved	MT

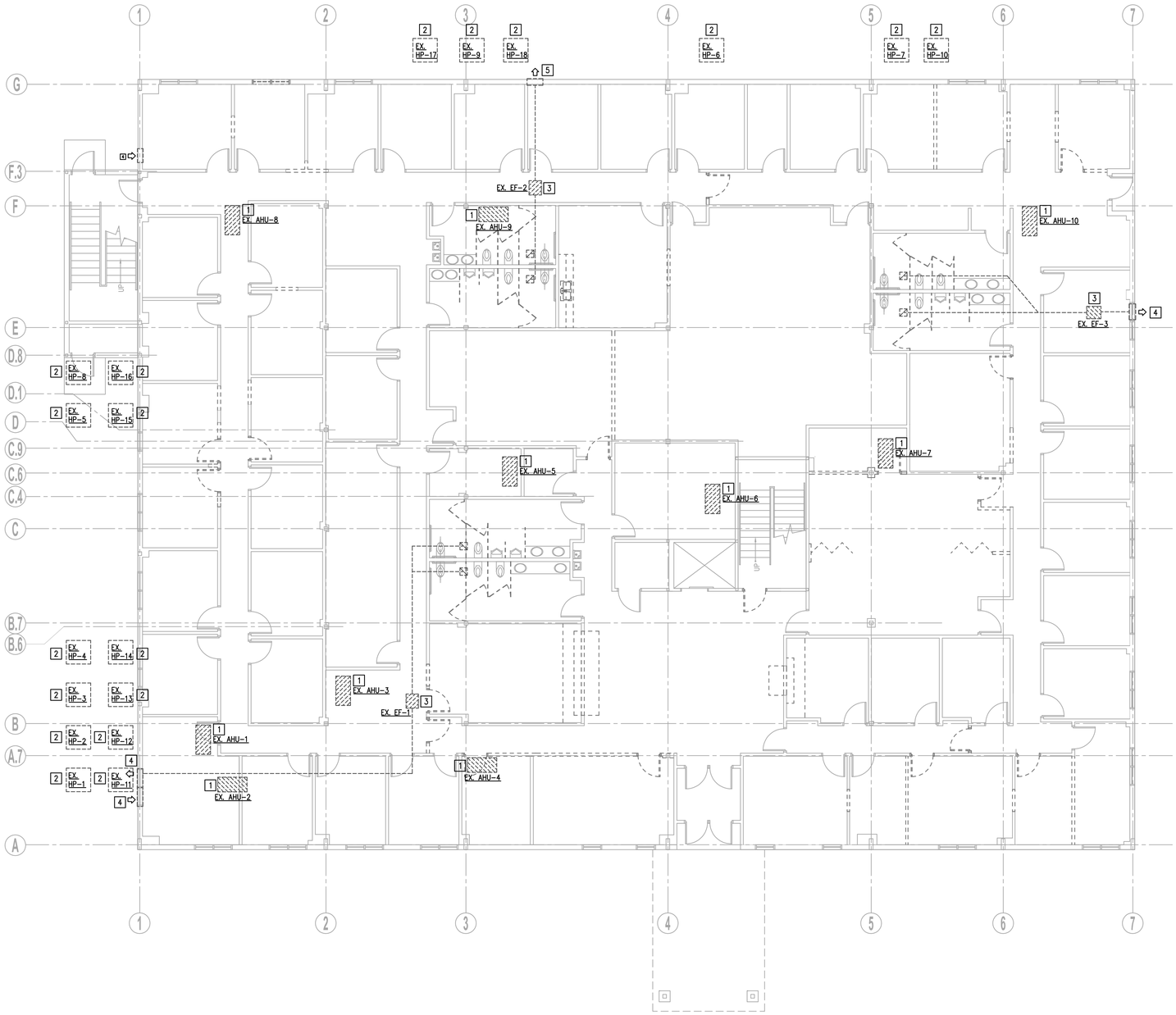
TITLE

Security Diagrams/Schedules

SHEET

T303

2/22/2017 8:32:



MECHANICAL GENERAL NOTES:

A. CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS BEFORE ANY DEMOLITION WORK BEGINS.

B. SCHEDULING SHALL BE CLOSELY COORDINATED WITH THE OWNER AND NO WORK SHALL PROCEED WITHOUT AN OWNER-APPROVED SCHEDULE. SCHEDULE ALL SHUTDOWNS AT LEAST 48 HOURS IN ADVANCE WITH OWNER IN WRITING. REFER TO SPECIFICATIONS FOR AREAS REQUIRING SPECIAL ACCESS, SCHEDULING, AND/OR SECURITY.

C. PROTECTION OF FURNISHINGS AND SYSTEMS FROM HAZARD AND/OR CONTAMINATION ASSOCIATED WITH DEMOLITION AND CONSTRUCTION SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE SPECIFICATIONS.

D. CONTRACTOR SHALL COORDINATE REMOVAL AND OFF-SITE DISPOSAL OF EXISTING MATERIALS AND ROUTING OF ANY NEW PIPING, CONDUIT, DUCTWORK AT THE JOB SITE TO AVOID DAMAGE OR CONFLICT WITH EXISTING SYSTEMS AND STRUCTURE. OBTAIN APPROVAL OF OWNER'S REPRESENTATIVE BEFORE DISPOSING OF ITEMS. ITEMS TO KEEP SHALL BE DELIVERED TO THE OWNER.

MECHANICAL KEYED NOTES:

1. REMOVE EXISTING AIR HANDLING UNIT AND ASSOCIATED DUCTWORK, PIPING, AND DIFFUSERS.
2. REMOVE EXISTING CONDENSING UNIT, EQUIPMENT SUPPORT AND ASSOCIATED PIPING AT GRADE LEVEL. PATCH WALL OPENING WATER TIGHT AND RE-FINISH TO MATCH EXISTING.
3. REMOVE EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK, CONTROLS AND GRILLES.
4. REMOVE EXISTING LOUVER AND ASSOCIATED DUCTWORK.

DEMO HVAC LEGEND:

- EXISTING DUCTWORK, DIFFUSER, AND DAMPER TO BE REMOVED OR RELOCATED. (WORK SHOWN IN DASHED LINES)
- EXISTING DUCTWORK, DIFFUSER, AND DAMPER TO REMAIN. (WORK SHOWN IN SOLID LINES)

1 DM2.01 1ST LEVEL DEMO MECHANICAL PLAN

1/8"=1'-0"

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DBR Project Number 165026.000

MC	SN	NF	AH	--

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REGISTERED PROFESSIONAL ENGINEER
1/12/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

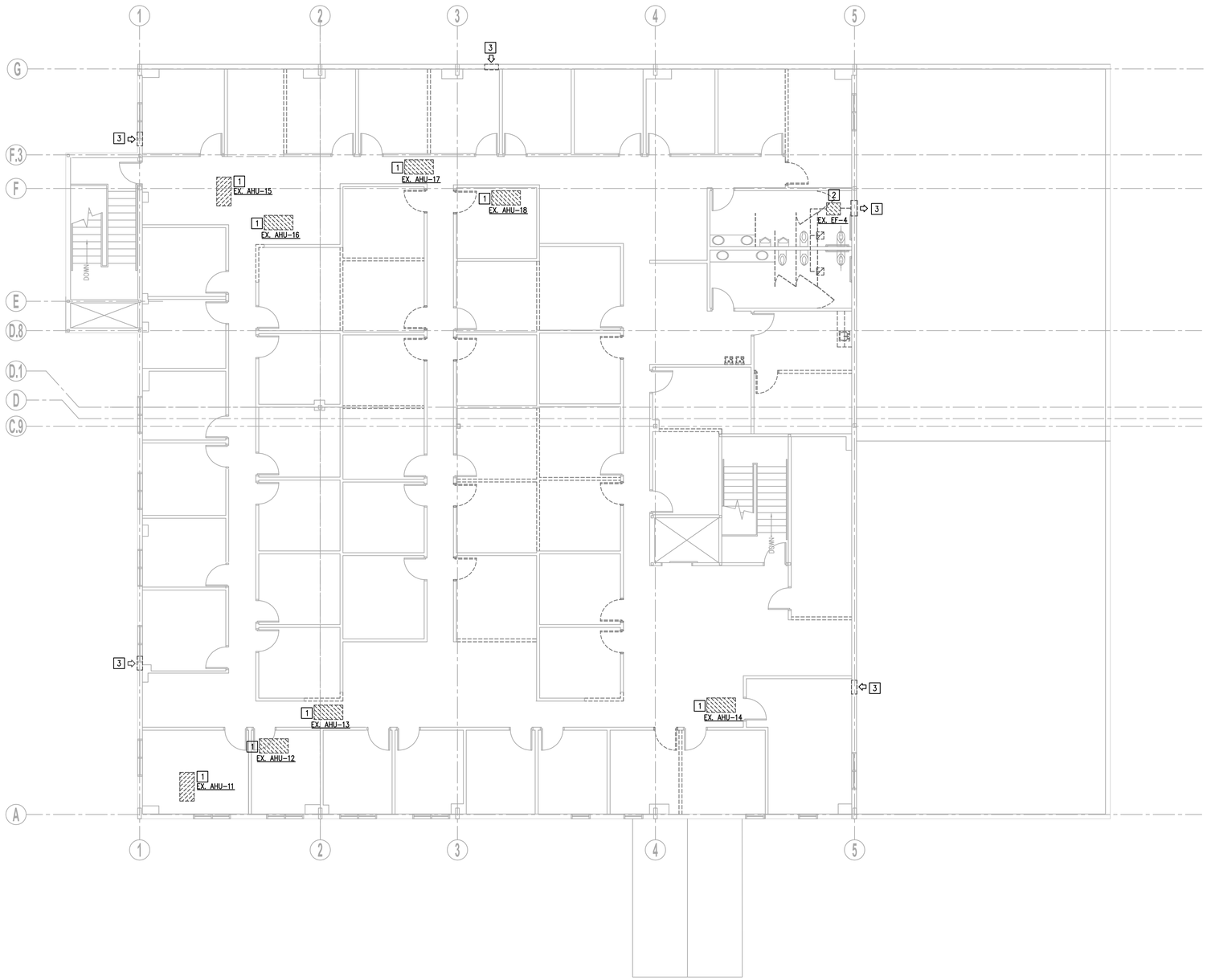
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

1ST LEVEL DEMO MECHANICAL PLAN

SHEET

DM2.01



MECHANICAL GENERAL NOTES:

A. CONTRACTOR TO FIELD VERIFY ALL EXISTING CONDITIONS BEFORE ANY DEMOLITION WORK BEGINS.

B. SCHEDULING SHALL BE CLOSELY COORDINATED WITH THE OWNER AND NO WORK SHALL PROCEED WITHOUT AN OWNER-APPROVED SCHEDULE. SCHEDULE ALL SHUTDOWNS AT LEAST 48 HOURS IN ADVANCE WITH OWNER IN WRITING. REFER TO SPECIFICATIONS FOR AREAS REQUIRING SPECIAL ACCESS, SCHEDULING, AND/OR SECURITY.

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D. CONTRACTOR SHALL COORDINATE REMOVAL AND OFF-SITE DISPOSAL OF EXISTING MATERIALS AND ROUTING OF ANY NEW PIPING, CONDUIT, DUCTWORK AT THE JOB SITE TO AVOID DAMAGE OR CONFLICT WITH EXISTING SYSTEMS AND STRUCTURE. OBTAIN APPROVAL OF OWNER'S REPRESENTATIVE BEFORE DISPOSING OF ITEMS. ITEMS TO KEEP SHALL BE DELIVERED TO THE OWNER.

MECHANICAL KEYED NOTES:

1 REMOVE EXISTING AIR HANDLING UNIT AND ASSOCIATED DUCTWORK, PIPING, AND DIFFUSERS.

2 REMOVE EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK, CONTROLS AND GRILLES.

3 REMOVE EXISTING OUTSIDE AIR LOUVER AND ASSOCIATED DUCTWORK.

DEMO HVAC LEGEND:

- - - - - - - - EXISTING DUCTWORK, DIFFUSER, AND DAMPER TO BE REMOVED OR RELOCATED. (WORK SHOWN IN DASHED LINES)

———— EXISTING DUCTWORK, DIFFUSER, AND DAMPER TO REMAIN. (WORK SHOWN IN SOLID LINES)

1 DM2.02 2ND LEVEL DEMO MECHANICAL PLAN

1/8"=1'-0"

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DBR Project Number	165026.000

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1/13/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

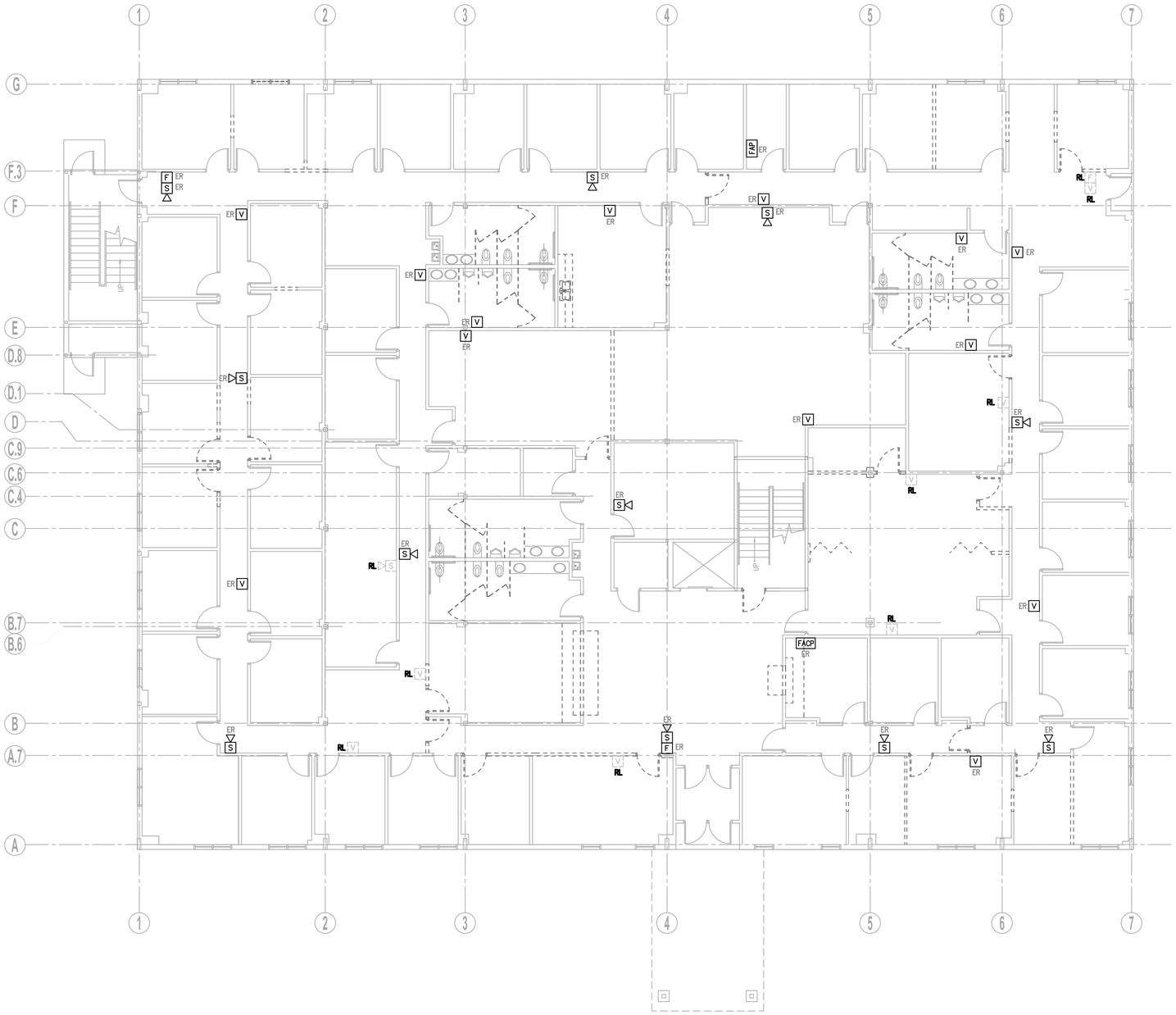
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

2ND LEVEL DEMO MECHANICAL PLAN

SHEET

DM2.02



1 DEL2.01 1ST LEVEL DEMO LIGHTING PLAN

1/8"=1'-0"

GENERAL LIGHTING DEMOLITION NOTES:

A. ALL EXISTING LIGHT FIXTURES ARE TO BE REMOVED. DISCONNECT EXISTING WIRING AND CONDUIT AND LEAVE IN PLACE FOR RECONNECTION TO NEW LIGHTING.

B. EXISTING FIRE ALARM EQUIPMENT AND DEVICES ARE EXISTING TO REMAIN, UNLESS NOTED OTHERWISE.

C. ELECTRICAL CONTRACTOR SHALL CONSULT ARCHITECTURAL DRAWINGS FOR FULL EXTENT OF DEMOLITION TO BE PERFORMED.

D. OWNER SHALL RESERVE THE RIGHT TO CLAIM ALL EQUIPMENT AND CABLING REMOVED DURING DEMOLITION.

E. CONTRACTOR SHALL REMOVE ALL DEVICES WITHIN DEMOLISHED WALLS INCLUDING SWITCHES, FIRE ALARM DEVICES, CONDUIT AND WIRING. REMOVE CONDUIT AND WIRING BACK TO PANEL OR LAST ACTIVE JUNCTION BOX. REFER TO ARCHITECTURAL DEMO PLAN.

F. EXCEPT FOR ITEMS OR MATERIALS THAT ARE INDICATED TO BE REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED LANDFILL. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. REMOVE FROM OWNER OCCUPIED AREAS DAILY. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT DAMAGE TO ADJACENT SURFACES AND AREAS.

G. CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING FIRE ALARM DEVICES. PROVIDE ADDITIONAL DEVICES AS REQUIRED PER NEW FIRE ALARM DESIGN. EXISTING FIRE ALARM CONTROL PANEL SHALL BE SALVAGED AND REINSTALLED. PROVIDE 120V POWER.

H. REMOVED AND REINSTALLED ITEMS (RL): CLEAN AND REPAIR ITEMS TO FUNCTIONAL CONDITION ADEQUATE FOR INTENDED REUSE. PACK OR CRATE ITEMS AFTER CLEANING. IDENTIFY CONTENTS OF CONTAINERS. STORE ITEMS IN A SECURE AREA TO PROTECT FROM DAMAGE. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS MATERIALS NECESSARY TO MAKE ITEM FUNCTIONAL FOR USE INDICATED.

I. EXISTING TO REMAIN ITEMS (ER): PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY ARCHITECT, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION AND REINSTALLED IN THEIR ORIGINAL LOCATIONS AFTER SELECTIVE DEMOLITION OPERATIONS ARE COMPLETE.

J. COORDINATE ALL DEMO ACTIVITIES WITH OWNER AND ARCHITECT. PROVIDE 10 DAYS NOTICE FOR ANY POWER OUTAGES.

K. ALL DEVICES INDICATED 'ER' ARE EXISTING TO REMAIN. DEVICES INDICATED 'RL' ARE RELOCATED EXISTING. DEVICES INDICATED 'RE' ARE TO BE REMOVED.

L. PATCH ALL WALLS REQUIRED TO BE MODIFIED BY DEMOLITION OF RACEWAYS. REMOVE ALL BACK BOXES FOR ABANDONED SWITCH LOCATIONS AND PATCH WALLS TO MATCH FINISH AS SPECIFIED BY ARCHITECT. REINSTALL LOCAL SOUND REINFORCING WHERE POSSIBLE.

M. ANY EXISTING CONDUIT NOT BEING REUSED THAT IS ROUTED BELOW GRADE SHALL BE ABANDONED.

N. CONTRACTOR SHALL REPORT ANY DAMAGED DEVICES THAT ARE SHOWN AS EXISTING TO REMAIN TO THE OWNER BEFORE STARTING WORK. ALL DEVICES FOUND TO BE DAMAGED AT THE TIME OF SUBSTANTIAL COMPLETION THAT ARE NOT REPORTED PRIOR TO STARTING WORK SHALL BE REPLACED BY THE CONTRACTOR AT HIS COST.

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11/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

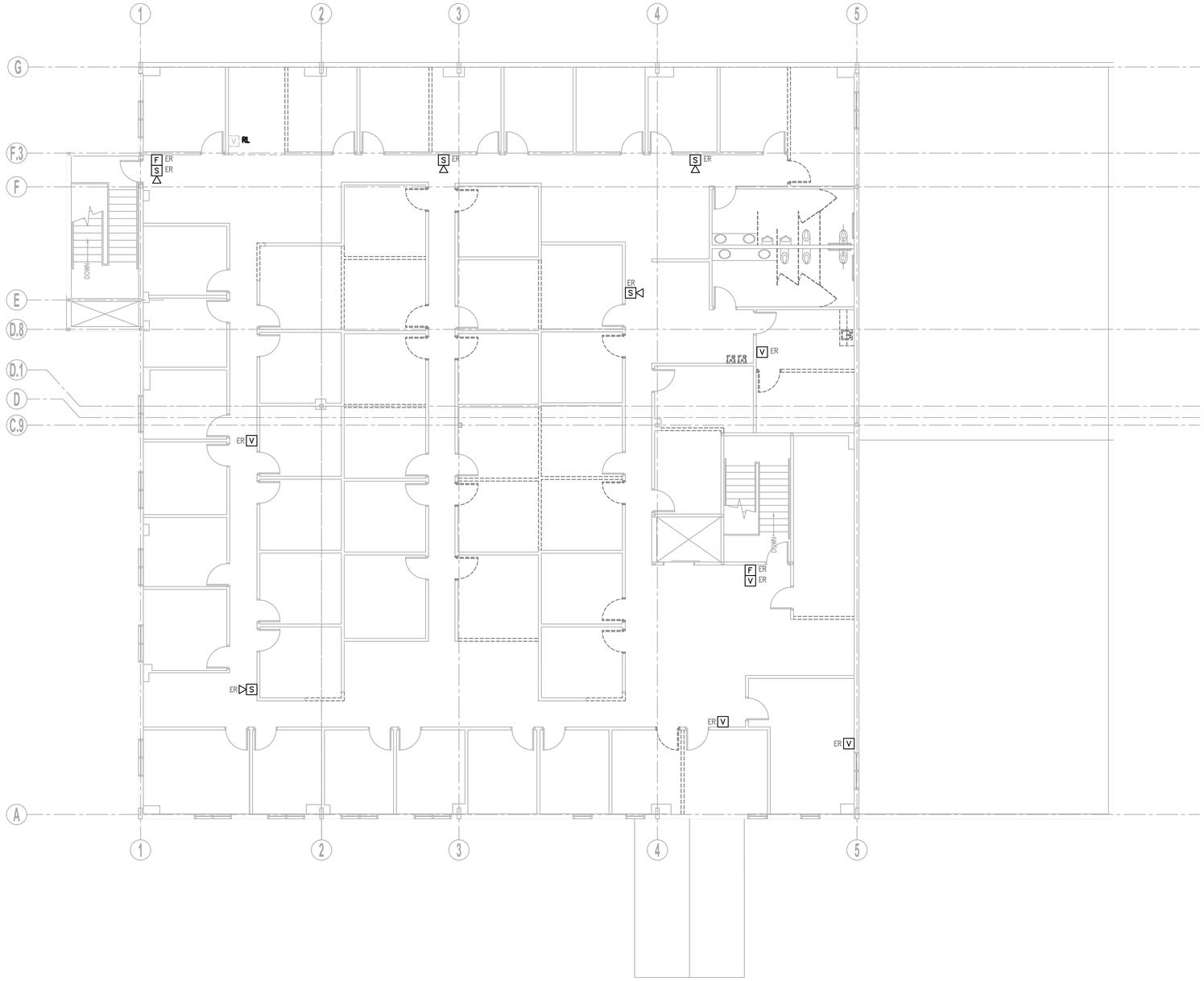
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

1ST LEVEL DEMO LIGHTING PLAN

SHEET

DEL2.01



GENERAL LIGHTING DEMOLITION NOTES:

A. ALL EXISTING LIGHT FIXTURES ARE TO BE REMOVED. DISCONNECT EXISTING WIRING AND CONDUIT AND LEAVE IN PLACE FOR RECONNECTION TO NEW LIGHTING.

B. EXISTING FIRE ALARM EQUIPMENT AND DEVICES ARE EXISTING TO REMAIN, UNLESS NOTED OTHERWISE.

C. ELECTRICAL CONTRACTOR SHALL CONSULT ARCHITECTURAL DRAWINGS FOR FULL EXTENT OF DEMOLITION TO BE PERFORMED.

D. OWNER SHALL RESERVE THE RIGHT TO CLAIM ALL EQUIPMENT AND CABLING REMOVED DURING DEMOLITION.

E. CONTRACTOR SHALL REMOVE ALL DEVICES WITHIN DEMOLISHED WALLS INCLUDING SWITCHES, FIRE ALARM DEVICES, CONDUIT AND WIRING. REMOVE CONDUIT AND WIRING BACK TO PANEL OR LAST ACTIVE JUNCTION BOX. REFER TO ARCHITECTURAL DEMO PLAN.

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H. REMOVED AND REINSTALLED ITEMS (RL): CLEAN AND REPAIR ITEMS TO FUNCTIONAL CONDITION ADEQUATE FOR INTENDED REUSE. PACK OR CRATE ITEMS AFTER CLEANING. IDENTIFY CONTENTS OF CONTAINERS. STORE ITEMS IN A SECURE AREA TO PROTECT FROM DAMAGE. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS MATERIALS NECESSARY TO MAKE ITEM FUNCTIONAL FOR USE INDICATED.

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M. ANY EXISTING CONDUIT NOT BEING REUSED THAT IS ROUTED BELOW GRADE SHALL BE ABANDONED.

N. CONTRACTOR SHALL REPORT ANY DAMAGED DEVICES THAT ARE SHOWN AS EXISTING TO REMAIN TO THE OWNER BEFORE STARTING WORK. ALL DEVICES FOUND TO BE DAMAGED AT THE TIME OF SUBSTANTIAL COMPLETION THAT ARE NOT REPORTED PRIOR TO STARTING WORK SHALL BE REPLACED BY THE CONTRACTOR AT HIS COST.

1 DEL2.02 **2ND LEVEL DEMO LIGHTING PLAN**

1/8"=1'-0"

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DBR Project Number	165026.000

MC	SN	NF	AH	--

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1/13/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

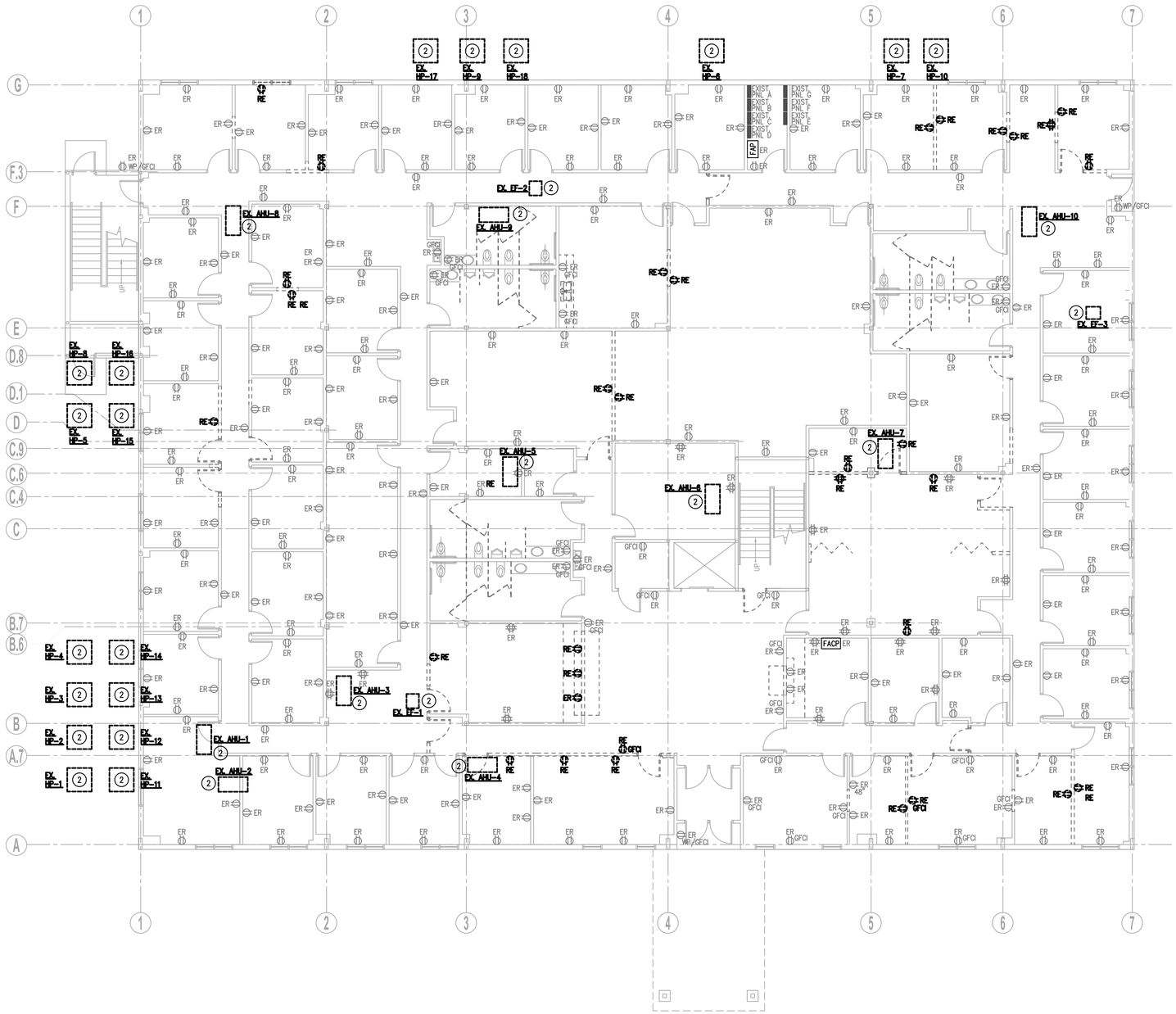
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

2ND LEVEL DEMO LIGHTING PLAN

SHEET

DEL2.02



1 1ST LEVEL DEMO POWER PLAN
DEP2.01 1/8"=1'-0"

GENERAL POWER DEMOLITION NOTES:

A. ALL EQUIPMENT IS EXISTING TO REMAIN, UNLESS NOTED OTHERWISE.

B. ELECTRICAL CONTRACTOR SHALL CONSULT ARCHITECTURAL DRAWINGS FOR FULL EXTENT OF DEMOLITION TO BE PERFORMED.

C. CONTRACTOR SHALL REMOVE ALL ELECTRICAL CONNECTIONS TO EXISTING PREWIRED FURNITURE. REMOVE CONDUIT AND WIRING BACK TO LAST ACTIVE JUNCTION BOX. ALL DATA CABLING SHALL BE REMOVED BACK TO LAST ACTIVE JUNCTION BOX AND SALVAGED FOR REINSTALLATION.

D. OWNER SHALL RESERVE THE RIGHT TO CLAIM ALL EQUIPMENT AND CABLING REMOVED DURING DEMOLITION.

E. CONTRACTOR SHALL REMOVE ALL DEVICES WITHIN DEMOLISHED WALLS INCLUDING RECEPTACLES, DATA/TELEPHONE DROPS, CONDUIT AND WIRING. REMOVE CONDUIT AND WIRING BACK TO PANEL OR LAST ACTIVE JUNCTION BOX. REFER TO ARCHITECTURAL DEMO PLAN.

F. EXCEPT FOR ITEMS OR MATERIALS THAT ARE INDICATED TO BE REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED LANDFILL. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE, REMOVE FROM OWNER OCCUPIED AREAS DAILY. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT DAMAGE TO ADJACENT SURFACES AND AREAS.

G. ELECTRICAL CONTRACTOR SHALL CIRCUIT TRACE AND IDENTIFY ALL EXISTING CIRCUITS WITHIN THE TENANT SPACES PRIOR TO DEMOLITION. EXISTING WIRING AND CONDUIT SHALL REMAIN IN PLACE IN AREAS OF THE SPACE THAT ARE NOT PART OF THE DEMOLITION. IF CIRCUITS ARE IN BOTH "TO REMAIN" AND "TO BE REMOVED" AREAS, REMOVE WIRING AND CONDUIT BACK TO NEAREST "TO REMAIN" JUNCTION BOX.

H. EXISTING TO REMAIN ITEMS (ER): PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY ARCHITECT, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION AND REINSTALLED IN THEIR ORIGINAL LOCATIONS AFTER SELECTIVE DEMOLITION OPERATIONS ARE COMPLETE.

I. COORDINATE ALL DEMO ACTIVITIES WITH OWNER AND ARCHITECT. PROVIDE 10 DAYS NOTICE FOR ANY POWER OUTAGES.

J. ALL DEVICES INDICATED 'ER' ARE EXISTING TO REMAIN. DEVICES INDICATED 'RL' ARE RELOCATED EXISTING. DEVICES INDICATED 'RE' ARE TO BE REMOVED.

K. PATCH ALL WALLS REQUIRED TO BE MODIFIED BY DEMOLITION OF RACEWAYS. REMOVE ALL BACK BOXES FOR ABANDONED SWITCH LOCATIONS AND PATCH WALLS TO MATCH FINISH AS SPECIFIED BY ARCHITECT. REINSTALL LOCAL SOUND REINFORCING WHERE POSSIBLE.

L. ANY EXISTING CONDUIT NOT BEING REUSED THAT IS ROUTED BELOW GRADE SHALL BE ABANDONED.

M. CONTRACTOR SHALL REPORT ANY DAMAGED DEVICES THAT ARE SHOWN AS EXISTING TO REMAIN TO THE OWNER BEFORE STARTING WORK. ALL DEVICES FOUND TO BE DAMAGED AT THE TIME OF SUBSTANTIAL COMPLETION THAT ARE NOT REPORTED PRIOR TO STARTING WORK SHALL BE REPLACED BY THE CONTRACTOR AT HIS COST.

KEYED POWER DEMOLITION NOTES:

1. LEAVE EXISTING WIRING AND CONDUIT IN PLACE FOR CONNECTION TO NEW RECEPTACLES.
2. DISCONNECT AND COMPLETELY REMOVE ALL EXISTING WIRING AND CONDUIT TO EXISTING HVAC EQUIPMENT TO BE REMOVED. LABEL CIRCUIT BREAKER AS SPARE. COORDINATE DEMOLITION WITH HVAC CONTRACTOR.
3. DISCONNECT EXISTING FEEDER TO EXISTING RECEPTACLE TO REMAIN. RECEPTACLE SHALL BE REFED FROM NEW CIRCUIT.

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1	100% Construction Documents	12/05/2016
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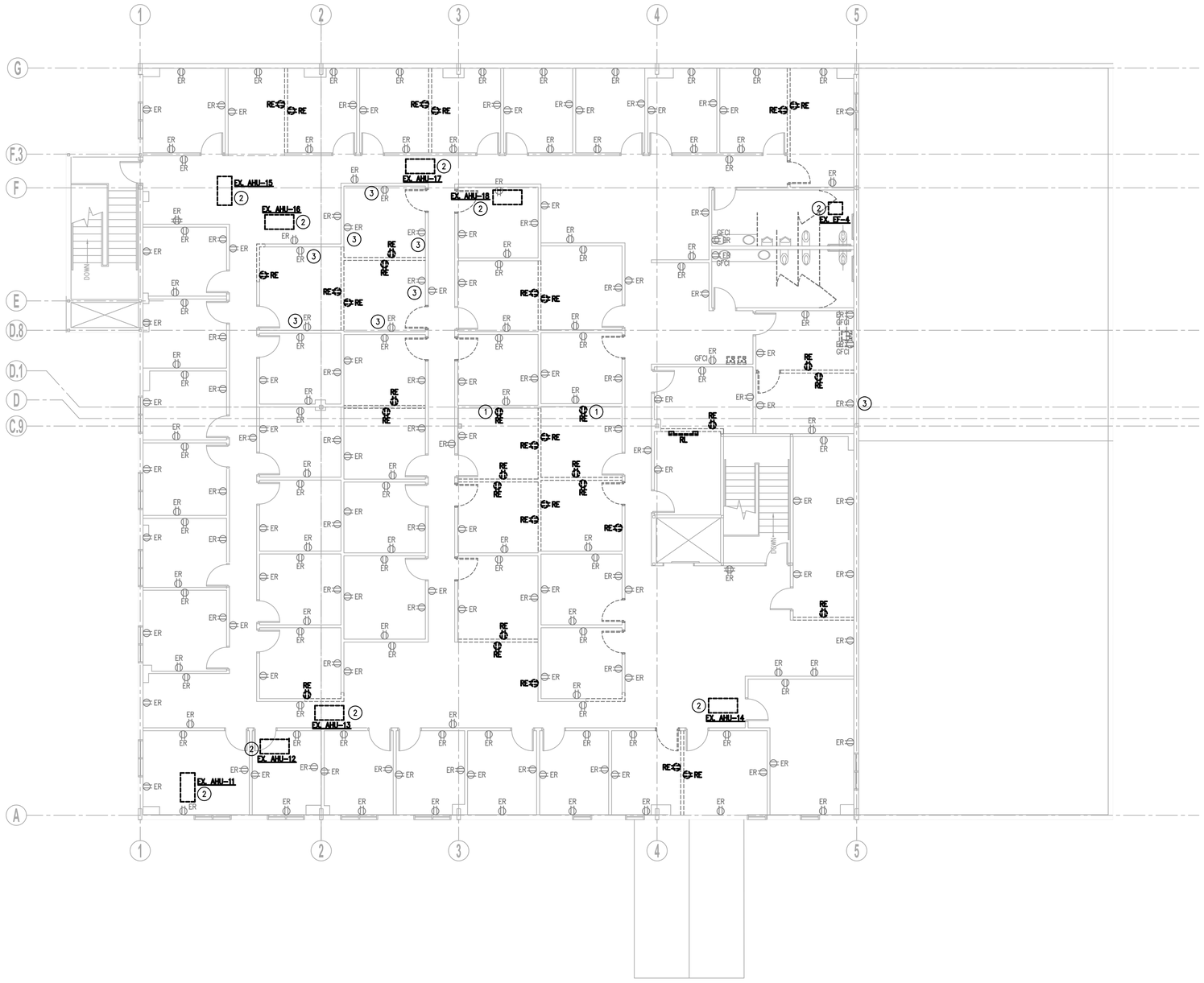
1ST LEVEL DEMO POWER PLAN

SHEET

DEP2.01



1 DEP2.02 2ND LEVEL DEMO POWER PLAN

1/8"=1'-0"

GENERAL POWER DEMOLITION NOTES:

A. ALL EQUIPMENT IS EXISTING TO REMAIN, UNLESS NOTED OTHERWISE.

B. ELECTRICAL CONTRACTOR SHALL CONSULT ARCHITECTURAL DRAWINGS FOR FULL EXTENT OF DEMOLITION TO BE PERFORMED.

C. CONTRACTOR SHALL REMOVE ALL ELECTRICAL CONNECTIONS TO EXISTING PREWIRED FURNITURE. REMOVE CONDUIT AND WIRING BACK TO LAST ACTIVE JUNCTION BOX. ALL DATA CABLING SHALL BE REMOVED BACK TO LAST ACTIVE JUNCTION BOX AND SALVAGED FOR REINSTALLATION.

D. OWNER SHALL RESERVE THE RIGHT TO CLAIM ALL EQUIPMENT AND CABLING REMOVED DURING DEMOLITION.

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F. EXCEPT FOR ITEMS OR MATERIALS THAT ARE INDICATED TO BE REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED LANDFILL. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. REMOVE FROM OWNER OCCUPIED AREAS DAILY. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT DAMAGE TO ADJACENT SURFACES AND AREAS.

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I. COORDINATE ALL DEMO ACTIVITIES WITH OWNER AND ARCHITECT. PROVIDE 10 DAYS NOTICE FOR ANY POWER OUTAGES.

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L. ANY EXISTING CONDUIT NOT BEING REUSED THAT IS ROUTED BELOW GRADE SHALL BE ABANDONED.

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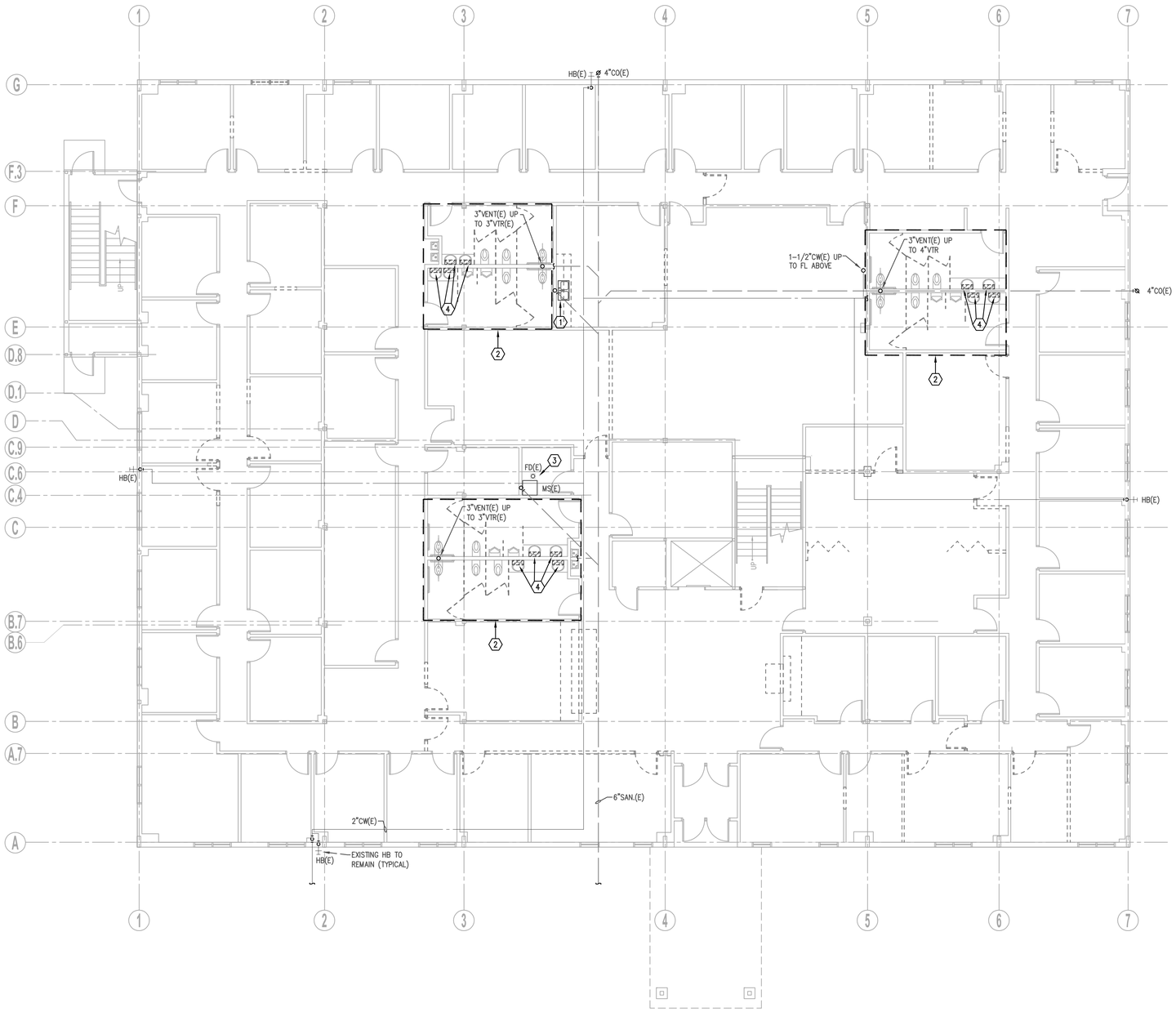
2ND LEVEL DEMO POWER PLAN

SHEET

DEP2.02



1 DP2.01 **1ST LEVEL DEMO PLUMBING PLAN**

1/8"=1'-0"

GENERAL NOTES:

A. ALL FIXTURES, EQUIPMENT AND PLUMBING LINES SHOWN WITH (E) ARE EXISTING TO REMAIN. UNLESS NOTED OTHERWISE.

B. THE CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING ALL WORK UNDER THIS SECTION OF THE PROJECT IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES INCLUDING THOSE PUBLISHED BY OSHA AND EPA.

C. THE EXTENT OF DEMOLITION WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VSIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING. CONTRACTOR SHALL IDENTIFY/VERIFY ALL PLUMBING LINES BEFORE STARTING ANY DEMOLITION WORK.

D. CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW, HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS. PATCH AND SEAL OPENINGS AS REQUIRED. COORDINATE ALL CUTTING AND PATCHING WITH OTHER TRADES.

E. ALL EXISTING PLUMBING FIXTURES AND EQUIPMENT REMOVED DURING CONSTRUCTION THAT ARE NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE AND PROPERLY RETURNED TO THE OWNER, IF DESIRED BY OWNER.

F. PROVIDE ALL WORK REQUIRED FOR THE REMOVAL OF FIXTURES TO BE DEMOLISHED AND INSTALLATION OF NEW FIXTURES AND ASSOCIATED SERVICES TO PROVIDE A COMPLETE AND OPERABLE SYSTEM UPON COMPLETION OF THE PROJECT.

G. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCH'L DOCUMENTS IN ADDITION TO THE MECHANICAL AND ELECTRICAL DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.

H. COORDINATE DEMOLITION OF PLUMBING SYSTEMS AS REQUIRED WITH ALL OTHER TRADES.

PLUMBING DEMO KEYED NOTES:

1. DEMOLISH EXISTING PLUMBING FIXTURE. PREPARE EXISTING PLUMBING PIPING FOR NEW FIXTURE LOCATION. CAP ANY UNUSED PIPING AT CONCEALED LOCATION. PATCH WALL AND FLOOR TO MATCH EXISTING. EXTEND PIPING TO NEW FIXTURE LOCATION AS REQUIRED.
2. EXISTING PLUMBING AND FIXTURES TO REMAIN WITH THE EXCEPTION OF NEW SINK FAUCETS TO BE PROVIDED.
3. EXISTING MOP SINK, FLOOR DRAIN & PIPING TO REMAIN.
4. EXISTING SINK FAUCET TO BE REMOVED AND REPLACED. EXISTING SINK AND COUNTER TOP TO REMAIN. PROTECT SINK AND COUNTERTOP FROM DAMAGE DUE TO FAUCET REMOVAL AND NEW FAUCET INTALLATION. REFER TO P2.01 AND P2.02 FOR NEW FAUCET LOCATIONS AND REFER TO PLUMBING FIXTURE SCHEDULE FOR NEW SINK FAUCET.

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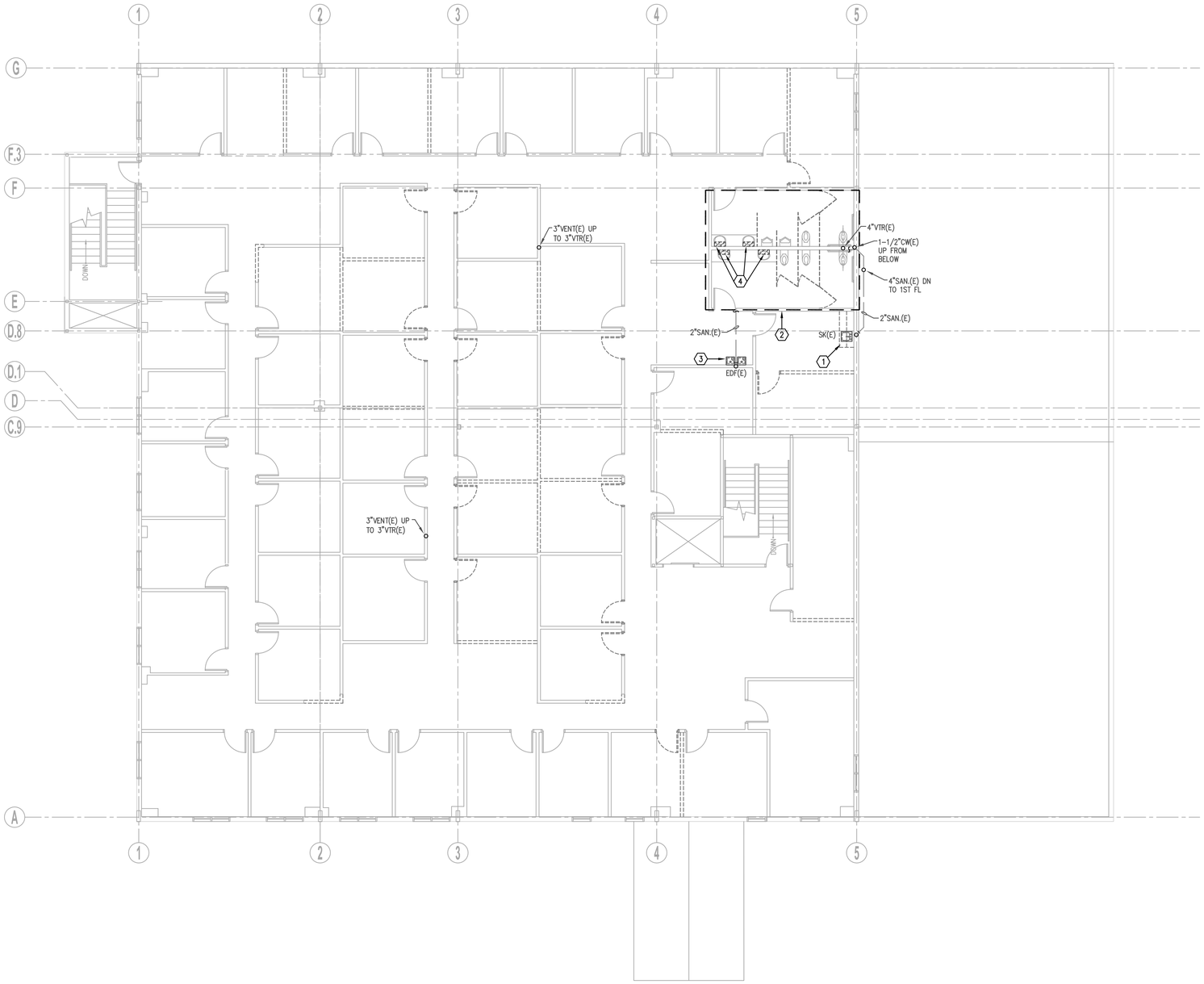
1ST LEVEL DEMO PLUMBING PLAN

SHEET

DP2.01



1 DP2.02 2ND LEVEL DEMO PLUMBING PLAN

1/8"=1'-0"

GENERAL NOTES:

A. ALL FIXTURES, EQUIPMENT AND PLUMBING LINES SHOWN WITH (E) ARE EXISTING TO REMAIN. UNLESS NOTED OTHERWISE.

B. THE CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING ALL WORK UNDER THIS SECTION OF THE PROJECT IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES INCLUDING THOSE PUBLISHED BY OSHA AND EPA.

C. THE EXTENT OF DEMOLITION WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING. CONTRACTOR SHALL IDENTIFY/VERIFY ALL PLUMBING LINES BEFORE STARTING ANY DEMOLITION WORK.

D. CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW, HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS. PATCH AND SEAL OPENINGS AS REQUIRED. COORDINATE ALL CUTTING AND PATCHING WITH OTHER TRADES.

E. ALL EXISTING PLUMBING FIXTURES AND EQUIPMENT REMOVED DURING CONSTRUCTION THAT ARE NOT TO BE REUSED SHALL BE REMOVED FROM THE JOB SITE AND PROPERLY RETURNED TO THE OWNER, IF DESIRED BY OWNER.

F. PROVIDE ALL WORK REQUIRED FOR THE REMOVAL OF FIXTURES TO BE DEMOLISHED AND INSTALLATION OF NEW FIXTURES AND ASSOCIATED SERVICES TO PROVIDE A COMPLETE AND OPERABLE SYSTEM UPON COMPLETION OF THE PROJECT.

G. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCH'L DOCUMENTS IN ADDITION TO THE MECHANICAL AND ELECTRICAL DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.

H. COORDINATE DEMOLITION OF PLUMBING SYSTEMS AS REQUIRED WITH ALL OTHER TRADES.

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2. EXISTING PLUMBING AND FIXTURES TO REMAIN WITH THE EXCEPTION OF NEW SINK FAUCETS TO BE PROVIDED.

3. DEMOLISH EXISTING PLUMBING FIXTURE. CAP ANY UNUSED PIPING AT CONCEALED LOCATION. PATCH WALL AND FLOOR TO MATCH EXISTING.

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2ND LEVEL DEMO PLUMBING PLAN

SHEET

DP2.02

ABBREVIATIONS (NOT ALL ITEMS INDICATED APPLY TO THIS PROJECT)

A

A	AIR (COMPRESSED)
ABV	ABOVE
A/C	AIR CONDITIONING
AC	ALTERNATING CURRENT AIR COMPRESSOR
ACCH	AIR COOLED CHILLER
ACCU	AIR COOLED CONDENSING UNIT
AD	ACCESS DOOR, AREA DRAIN
ADJ	ADJUSTABLE
AF	AIR FILTER
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
AMB	AMBIENT
AP	ACCESS PANEL
APD	AIR PRESSURE DROP
ARI	AMERICAN REFRIGERANT INSTITUTE
ARCH	ARCHITECT, ARCHITECTURAL
AS	AIR SEPARATOR
ASHRAE	AMERICAN SOCIETY OF HEATING AND REFRIGERATION ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
AV	ACID VENT, AIR VENT
AVG	AVERAGE
AWS	AMERICAN WELDING SOCIETY
AUX	AUXILIARY

B

B	BOILER
BC	BELOW COUNTER
B/C	BACK OF CURB
BFV	BUTTERFLY VALVE
BH	BOX HYDRANT
BLDG	BUILDING
BM	BENCHMARK
BOF	BOTTOM OF FOOTING
BOS	BOTTOM OF STRUCTURE
BT	BATH TUB, BREAK TANK
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BWV	BACK WATER VALVE

C

C	CELSIUS
CAB	CABINET
CB	CATCH BASIN
CD	CONDENSATE DRAIN LINE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CH	CHILLER
CHW	CHILLED WATER
CHWP	CHILLED WATER PUMP
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
CI	CAST IRON
CIRC	CIRCULATING
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CPI	CAST IRON PIPE INSTITUTE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CO	CLEAN OUT
COL	COLUMN
COMB	COMBINATION
COMP	COMPRESSOR
CON	CONVERTER
CONC	CONCRETE, CONCENTRIC
COND	CONDENSER, CONDENSATE
CONN	CONNECTION
CONT	CONTINOUS, CONTINUATION
CONTR	CONTROLLER, CONTRACTOR
CRAC	COMPUTER ROOM A/C UNIT
CRT	CATHODE RAY TUBE
CT	COOLING TOWER
CTR	CENTER
CU	COPPER
CW	COLD WATER
CWP	CONDENSER WATER PUMP
CWR	CONDENSER WATER RETURN
CWS	CONDENSER WATER SUPPLY

D

D	DEPTH, DRAIN, DRYER
DB	DRY BULB
DC	DOUBLE DUCT CONSTANT VOLUME, DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DESIG	DESIGNATION
DTL	DETAIL
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIFF	DIFFUSER
DIM	DIMENSION
DISC	DISCONNECT
DN	DOWN
DPR	DAMPER
DS	DOWNSPOUT, DOUBLE SUCTION
DV	DOUBLE DUCT VAV
DW	DISHWASHER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
DWP	DOMESTIC WATER PUMP
DX	DIRECT EXPANSION

E

EA	EACH
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
ECC	ECCENTRIC
EDB	ENTERING DRY BULB
EDF	ELECTRIC DRINKING FOUNTAIN
EDH	ELECTRIC DUCT HEATER
EF	EXHAUST FAN
EFF	EFFICIENCY
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR EMERGENCY ENCLOSURE
EMERG	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
EQ	EQUAL
EQUIP	EQUIPMENT
ES	END SUCTION, EMERGENCY SHOWER
ESP	EXTERNAL STATIC PRESSURE EXPANSION TANK
ET	EXPANSION TANK
ETR	EXISTING TO REMAIN
EVAP	EVAPORATOR
EWB	ENTERING WET BULB
EWT	ENTERING WATER TEMPERATURE
EX	EXPLOSION-PROOF
EXT	EXTERNAL
EXTG	EXISTING

F

F	FAHRENHEIT, FIRE
FBO	FURNISHED BY OTHERS
FCO	FLOOR CLEAN OUT
FCS	FLOOR CONTROL STATION
FCU	FAN COIL UNIT
FD	FLOOR DRAIN, FIRE DAMPER
FDS	FIRE DEPARTMENT SIAMESE
FDV	FIRE DEPARTMENT VALVE
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FL	FLOW LINES
FLR	FLOOR
FP	FIRE PUMP
FPT	FAN POWERED TERMINAL
FRZR	FREEZER
FS	FLOW SWITCH, FIRE SPRINKLER
FSK	FLOOR SINK
FT	FOOT, FEET
FUT	FUTURE

G

G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSH	GRAND SENSIBLE HEAT
GTH	GRAND TOTAL HEAT
GV	GATE VALVE

H

HB	HOSE BIBB
HD	HEAD, HUB DRAIN
HE	HEAT EXCHANGER
HF	HUMIDIFIER
HORIZ	HORIZONTAL
HP	HORSEPOWER, HALON PANEL
HPU	HEAT PUMP UNIT
HKP	HOUSEKEEPING PAD
HSC	HORIZONTAL SPLIT CASE
HSTAT	HUMIDISTAT
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HW	HOT WATER
HWC	HOT WATER CIRCULATOR
HWP	HEATING WATER PUMP
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HZ	HERTZ

I

ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IH	INFRARED HEATER
IN	INCH
INSUL	INSULATION
INT	INTERNAL, INTERIOR
IW	INDIRECT WASTE

J

JB	JUNCTION BOX
JP	JOCKEY PUMP

K

KEC	KITCHEN EQUIPMENT CONTRACTOR
KO	KNOCKOUT
KVA	KILOVOLT- AMPS
KW	KILOWATT

L

L	LENGTH, LAVATORY
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LF	LINEAR FEET
LP	LOW PRESSURE
LRA	LOCKED ROTOR AMPS
LVL	LEVEL
LWB	LEAVING WET BULB
LWCO	LOW WATER CUT OFF
LWT	LEAVING WATER TEMPERATURE

M

MAT	MIXED AIR TEMPERATURE
MAX	MAXIMUM
MBTUH	THOUSAND OF BTU'S
MC	MECHANICAL CONTRACTOR
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MI	MALLEABLE IRON
MIN	MINIMUM
MP	MEDIUM PRESSURE
MS	MOP SINK
MTD	MOUNTED
MU	MAKE-UP
MVD	MANUAL VOLUME DAMPER

N

N.C.	NORMALLY CLOSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO.	NUMBER
NTS	NOT TO SCALE

O

OA	OUTSIDE AIR
OAF	OUTSIDE AIR FAN
OAHU	OUTSIDE AIR HANDLING UNIT
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER, OVERFLOW DRAIN
OFCU	OUTSIDE AIR FAN COIL UNIT
OPG	OPENING
OS&Y	OPEN STEM AND YOLK

P

P	PUMP, PLUMBING EQUIPMENT
PC	PLUMBING CONTRACTOR
PCR	PUMPED CONDENSATE RETURN
PD	PRESSURE DROP, PLANTER DRAIN
PH	PHASE, POST HYDRANT
PIV	POST INDICATOR VALVE
PLBG	PLUMBING
PNEU	PNEUMATIC
PNL	PANEL
PNTH	PENTHOUSE
PP	POLYPROPYLENE
PPM	PART PER MILLION
PRI	PRIMARY
PRS	PRESSURE REDUCING STATION
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PLUMBING TRIM
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE

Q

QTY	QUANTITY

R

RA	RETURN AIR
RAD	REFRIGERATED AIR DRYER
RAF	RETURN AIR FAN
RAG	RETURN AIR GRILL
RAT	RETURN AIR TEMPERATURE
RCP	REFLECTED CEILING PLAN, REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RE	REFERENCE, REFER
RECIRC	RECIRCULATE
RED	REDUCER
REFR	REFRIGERATOR
REG	REGISTER
REINF	REINFORCING
REQD	REQUIRED
REV	REVISION, REVISE
RH	RELATIVE HUMIDITY
RHG	REFRIGERANT HOT GAS
RKVA	RUNNING KILOVOLT-AMPS
RKW	RUNNING KILOWATTS
RL	REFRIGERANT LIQUID
RLA	RUNNING LOAD AMPS
RM	ROOM, REFRIGERATION MACHINE
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
RTU	ROOFTOP UNIT
RV	RELIEF VALVE

S

S	STEAM
SA	SUPPLY AIR
SAF	SUPPLY AIR FAN
SAG	SUPPLY AIR GRILLE
SAN	SANITARY SEWER
SAR	SUPPLY AIR REGISTER
SC	STEAM CONDENSATE
SCHED	SCHEDULED
SCR	SILICON CONTROLLED RECTIFIER
SD	STORM DRAIN
SE	SEWAGE EJECTOR
SEC	SECONDARY
SECT	SECTION
SENS	SENSIBLE
SF	SQUARE FEET
SFCS	SPRINKLER FLOOR CONTROL STATION
SH	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SINK
SKVA	STARTING KILOVOLT-AMPS
SKW	STARTING KILOWATTS
SM	SHEETMETAL
SP	SUMP PUMP, STATIC PRESSURE
SPEC	SPECIFICATION
SPR	SPRINKLER
SQ	SQUARE
SS	SERVICE SINK
SSD	SUBSURFACE DRAIN
SSFU	SANITARY SEWER FIXTURE UNITS
SSSC	SOLID STATE SPEED CONTROL
STD	STANDARD
STL	STEEL
STR	STRAINER
SURF	SURFACE
SUSP	SUSPEND
SV	SANITARY VENT

T

TC	TEMPERATURE CONTROL
TCC	TEMPERATURE CONTROL COMPRESSOR
TD	TRENCH DRAIN
TF	TRANSFER FAN
TDH	TOTAL DYNAMIC HEAD
TH BLK	THRUST BLOCK
TP	TRAP PRIMER
TPD	TRAP PRIMER DEVICE
TSP	TOTAL STATIC PRESSURE
TSTAT	THERMOSTAT
TYP	TYPICAL

U

U	URINAL
UCD	UNDER CUT DOOR
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES, INC.
UNO	UNLESS NOTED OTHERWISE
U/F	UNDERFLOOR
U/S	UNDERSLAB

V

V	VOLT, VENT
VA	VOLT- AMPERE
VAC	VACUUM
VAV	VARIABLE AIR VOLUME
VB	VALVE BOX, VACUUM BREAKER
VCP	VITRIFIED CLAY PIPE
VD	VOLUME DAMPER
VEL	VELOCITY
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VIB	VALVE IN BOX
VOV	VALVE ON VERTICAL
VP	VACUUM PUMP
VR	VARIABLE AIR VOLUME REHEAT
VTR	VENT THRU ROOF

W

W	WATT, WASTE, WIDTH, WASHER
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER CLOSET
WCO	WALL CLEAN OUT
WH	WALL HYDRANT
WM	WATER METER
WP	WEATHERPROOF
WPD	WATER PRESSURE DROP
WWF	WELDED WIRE FABRIC
WT	WATERTIGHT, WEIGHT

Y

Y	YARD HYDRANT

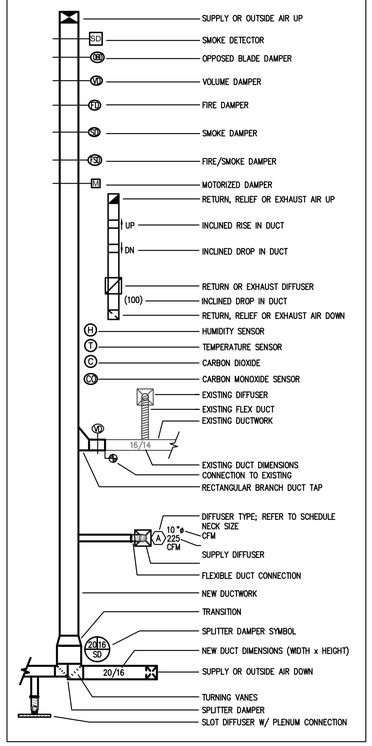
Z

Z	ZONE

MECHANICAL PIPING SYMBOLS

CWS	CONDENSER WATER SUPPLY		STRAINER WITH BLOW DOWN VALVE
CWR	CONDENSER WATER RETURN		GATE VALVE, HVAC BALANCING/STOP VALVE
CHS	CHILLED WATER SUPPLY		GLOBE VALVE
CHR	CHILLED WATER RETURN		BALL VALVE
CD	CONDENSATE DRAIN LINE		BALANCING VALVE WITH DIFFERENTIAL PRESSURE TAPS
	CAP ON END OF PIPE		OS&Y VALVE
	ELBOW UP		CHECK VALVE
	ELBOW DOWN		BUTTERFLY VALVE
	VALVE IN DROP		TWO-WAY MODULATING CONTROL VALVE
	VALVE IN RISE		THREE-WAY MODULATING CONTROL VALVE
	DIRECTION OF FLOW		SOLENOID VALVE
	DIRECTION OF SLOPE DOWN		PRESSURE REDUCING VALVE
	CONCENTRIC REDUCER		GAS REGULATOR
	ECCENTRIC REDUCER		GAS COCK
	TEE OUTLET UP	FCS	SPRINKLER FLOOR CONTROL STATION
	TEE OUTLET DOWN		MANUAL AIR VENT
	UNION		AUTOMATIC AIR VENT
	FLANGE		T&P RELIEF VALVE
	PIPE ANCHOR		PRESSURE GAUGE WITH GAUGE COCK
	EXPANSION JOINT		STEAM TRAP
	PRESSURE AND TEMPERATURE TAP		WATER METER
	FLOW VENTURI		FLEXIBLE CONNECTION
	VACUUM BREAKER		
	VACUUM RELIEF VALVE		
	BACKFLOW PREVENTOR		
	THERMOMETER		
	CIRCULATING PUMP		

DUCTWORK SYMBOLS - NEW



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93852
REGISTERED
PROFESSIONAL ENGINEER
1/13/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

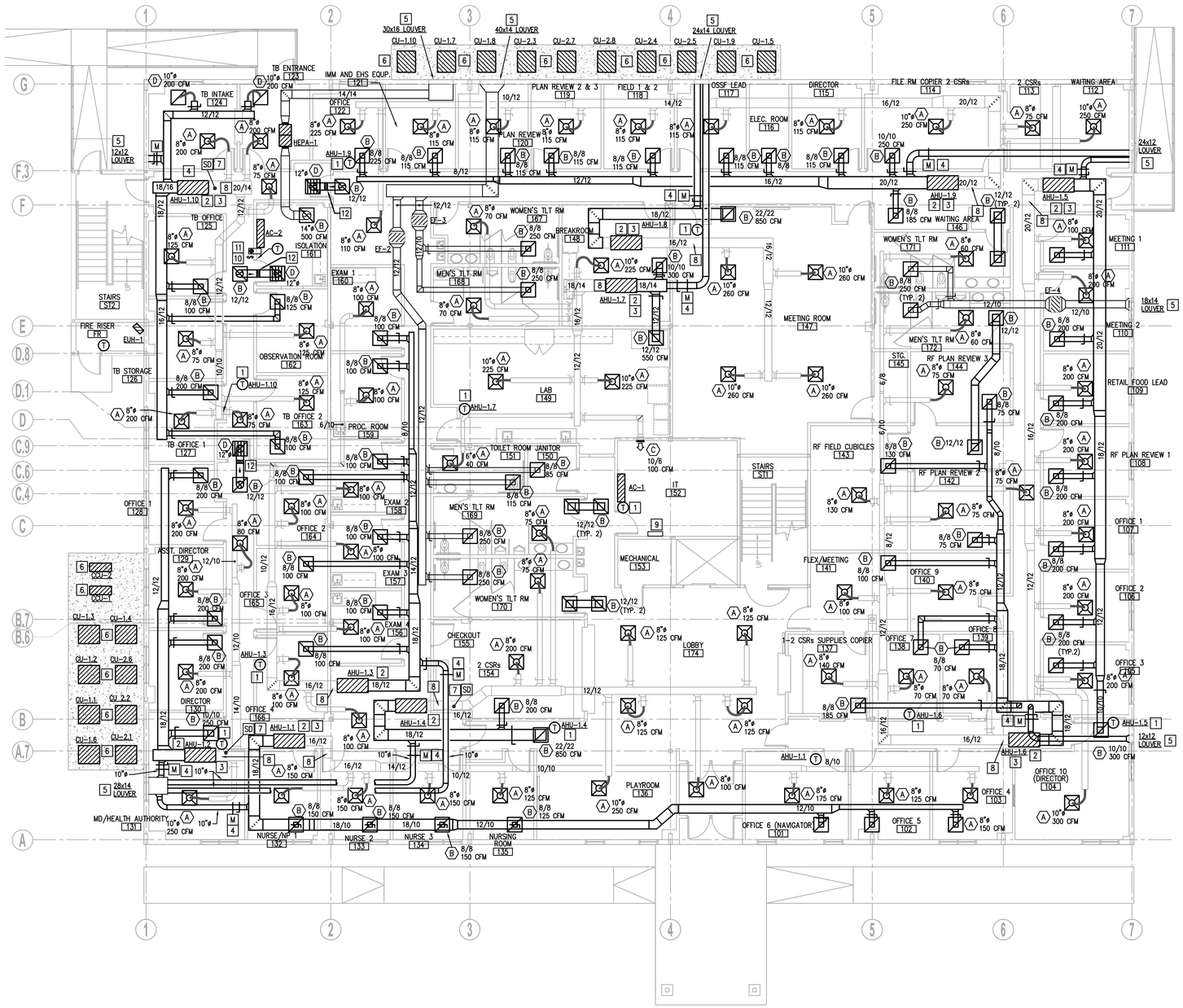
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

MECHANICAL SYMBOLS AND ABBREVIATIONS

SHEET

M0.00



1 M2.01 **1ST LEVEL MECHANICAL PLAN**

1/8"=1'-0"

GENERAL MECHANICAL NOTES:

A. THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL LOCATION OF CONDUIT, LIGHTS, FIRE SPRINKLER PIPING, CONDENSATE PIPING, EQUIPMENT, DUCTS, AND GRILLES, ETC. IT IS THE INTENT OF THESE DRAWINGS AND SPECIFICATIONS THAT UPON PROJECT COMPLETION, THE EXISTING MECHANICAL SYSTEMS, FIRE SPRINKLER PIPING, CONDUIT, DUCTWORK, ETC... BE READY FOR OPERATION WHETHER OR NOT EVERY ITEM OF EQUIPMENT, ACCESSORY, DEVICE, ETC. IS SHOWN. REFERENCE SHALL BE MADE TO THE FULL DRAWING PACKAGE INCLUDING ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR COORDINATION AND POTENTIAL CONFLICTS. THE MECHANICAL SUBCONTRACTOR SHALL, WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICTS WITH OTHER TRADES, OR FOR PROPER EXECUTION OF THE WORK. FIELD VERIFY ALL DIMENSIONS BEFORE FABRICATING DUCTWORK.

B. COORDINATE FLOOR, WALL, ROOF OPENINGS WITH ARCHITECT AND STRUCTURAL ENGINEER.

C. EQUIPMENT SIZES, DIMENSIONS, AND REQUIRED CONNECTIONS SHALL BE VERIFIED WITH THE MANUFACTURER DRAWINGS AND CUT SHEETS BEFORE FABRICATING OF DUCTWORK, PIPING, OR POURING OF HOUSEKEEPING PADS.

D. DUCT SIZES SHOWN ON PLANS ARE CLEAR, INSIDE DIMENSIONS.

E. ALL DUCTWORK AND ASSOCIATED ACCESSORIES SHALL BE CONSTRUCTED TO MEET THE LATEST SMACNA STANDARDS FOR LOW PRESSURE DUCTWORK.

F. EXACT LOCATION OF GRILLES AND DAMPERS SHALL BE FIELD COORDINATED WITH OTHER TRADES TO AVOID CONFLICTS AND ALLOW ADEQUATE CLEARANCES.

G. DIVISION 23 MECHANICAL CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR FOR ALL ELECTRICAL POWER REQUIREMENTS.

H. PROVIDE INSULATION FOR ALL PIPING AND DUCTWORK THAT MEETS LATEST ASHRAE 90.1.

I. PROVIDE AIRFOIL TYPE TURNING VANES IN ALL NEW 90 DEGREE ELBOWS.

J. ALL CEILING MOUNTED AND WALL MOUNTED AIR DEVICES SHALL MATCH ADJACENT ARCHITECTURAL SURFACE. CONTRACTOR SHALL COORDINATE COLOR WITH ARCHITECT.

K. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF ALL OUTSIDE AIR INTAKES AND ANY EXHAUST AIR OUTLET, FLUES, OR PLUMBING VENTS. COORDINATE WITH PLUMBING CONTRACTOR AND OTHER TRADES.

L. ALL SUPPLY AIR TAPS TO DIFFUSERS AND GRILLES SHALL BE SUPPLIED WITH MANUAL VOLUME DAMPERS. PROVIDE YOUNG REGULATORS FOR DAMPERS LOCATED ABOVE INACCESSIBLE CEILINGS.

M. REFER TO ARCHITECTURAL DRAWINGS FOR AIR DIFFUSER FINISHES.

N. ENCLOSED SPACES RECEIVING MORE THAN 2000 CFM SUPPLY AIR FROM MULTIPLE FAN COIL UNITS SHALL HAVE A SMOKE DETECTOR INSTALLED AT THE SUPPLY AIR DISCHARGE OF EACH FAN COIL UNIT FOR AUTOMATIC SHUT-OFF UPON SMOKE DETECTION. ALL DUCT SMOKE DETECTORS SHALL BE TIED TO THE BUILDING FIRE ALARM SYSTEM.

MECHANICAL KEYED NOTES

1. PROVIDE WALL MOUNTED THERMOSTAT. COORDINATE WITH ARCHITECT FOR FINAL LOCATION AND MOUNTING HEIGHT. TYP. ALL.
2. SUSPEND UNIT WITH SECONDARY DRAIN PAN TO STRUCTURE AND BETWEEN JOIST SPACE. ROUTE REFRIGERANT PIPING TO ASSOCIATED OUTDOOR UNIT LOCATED ON ROOF. ALL PIPING ROUTING SHALL BE CONCEALED FROM VIEW AS MUCH AS POSSIBLE. PROVIDE DUCT TRANSITION TO UNIT CONNECTION AS REQUIRED. INSTALL UNIT AND PROVIDE CLEARANCE REQUIREMENT PER MANUFACTURER'S RECOMMENDATIONS.
3. ROUTE AHU 3/4" SCHEDULE 40 GALVANIZED CONDENSATE DRAIN WITH P-TRAP TO MOP SINK IN JANITOR'S CLOSET. PROVIDE LITTLE GIANT VCMA-15ULS CONDENSATE PUMP OR APPROVED EQUAL; 1/50 HP, 65 GPH @ 1 FT, 115V/1PH. REFER TO SPECIFICATION 23 21 13, 3.05 FOR ADDITIONAL INFORMATION.
4. BALANCE OUTSIDE AIR INTAKE CFM AS INDICATED ON THE SPLIT SYSTEM HEAT PUMP SCHEDULE ON M4.01. INTERLOCK MOTORIZED DAMPER WITH ASSOCIATED AIR HANDLING UNIT. DAMPER SHALL BE IN CLOSED POSITION WHEN UNIT IS DE-ENERGIZED.
5. PROVIDE ALUMINUM STATIONARY LOUVER WITH MIN. 50% FREE AREA, BACK DRAFT DAMPER AND BIRD SCREEN. LOUVER SHALL BE RUSKIN ELF575DX OR APPROVED EQUAL. COORDINATE LOUVER COLOR, EXACT LOCATION AND MOUNTING HEIGHT WITH ARCH. MODIFY AND REUSE EXISTING LOUVER OPENING AS MUCH AS POSSIBLE.
6. INSTALL CONDENSING UNIT ON A 4" THICK CONCRETE PAD. ROUTE REFRIGERANT PIPING TO ASSOCIATED INDOOR UNIT. INSTALL UNIT WITH CLEARANCE PER MANUFACTURER'S RECOMMENDATION. REUSE EXISTING CONCRETE PAD AS MUCH AS POSSIBLE.
7. PROVIDE AND INSTALL DUCT SMOKE DETECTOR IN SUPPLY DUCT. CONTRACTOR SHALL VERIFY THAT SMOKE DETECTORS ARE INSTALLED AND FUNCTIONAL IN AIR HANDLING UNITS WHERE INDICATED. AIR HANDLING UNIT SHALL BE TIED TO THE MAIN FIRE ALARM CONTROL PANEL. UNIT SHALL DE-ENERGIZE UPON SMOKE DETECTION. BUILDING FIRE ALARM PANEL MUST INDICATE LOCATION AND STATUS OF ALL SMOKE DETECTORS. MECHANICAL CONTRACTOR SHALL COORDINATE WIRING REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
8. INSTALL IONIZATION UNIT IN SUPPLY DUCT (TYPICAL ALL).
9. AUTOMATED LOGIC HVAC MAIN CONTROL PANEL. COORDINATE WITH ELECTRICAL FOR POWER REQUIRMENTS AND IT VENDOR FOR DATA REQUIREMENTS.
10. ON/OFF SWITCH FOR HEPA-1 EXHAUSTING TB CLINIC ISOLATION ROOM.
11. NEGATIVE PRESSURE VISUAL-ONLY INDICATOR MOUNTED ON WALL OUTSIDE OF ISOLATION ROOM. PROVIDE AND INSTALL "BALL-IN-THE-WALL" TECHNOLOGY SIMILAR TO DEVICE FROM AIRFLOW DIRECTION INCORPORATED (WWW.AIRFLOWDIRECTION.COM).
12. LOW-LEAKAGE MOTORIZED DAMPER TO BE INTERLOCKED WITH ISOLATION ROOM EXHAUST UNIT HEPA-1. WHEN HEPA-1 IS ENERGIZED, DAMPER SHALL OPEN. WHEN HEPA-1 IS DE-ENERGIZED, DAMPER SHALL BE TIGHTLY CLOSED. DAMPER SHALL REQUIRE 24V POWER. MECHANICAL CONTRACTOR TO COORDINATE POWER REQUIREMENTS WITH ELECTRICAL CONTRACTOR.

NOTE TO MECHANICAL CONTRACTOR:

RUN ALL DUCTWORK AND INSTALL ALL INDOOR UNITS AS CLOSE TO STRUCTURE AS POSSIBLE AND COORDINATE WITH ARCHITECT ON FIELD VERIFIED CEILING HEIGHTS PRIOR TO INSTALLATION OF ANY MECHANICAL EQUIPMENT OR DUCTWORK. MECHANICAL CONTRACTOR SHALL PLAN, SIZE, AND SLOPE CONDENSATE PIPING TO JANITOR'S CLOSET ON FIRST FLOOR. MECHANICAL CONTRACTOR SHALL INCLUDE COST OF CONDENSATE PIPING IN HIS BID.

NOTE TO MECHANICAL AND CONTROLS CONTRACTORS:

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DBR Project Number 165026.000

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355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED PROFESSIONAL ENGINEER
1/12/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

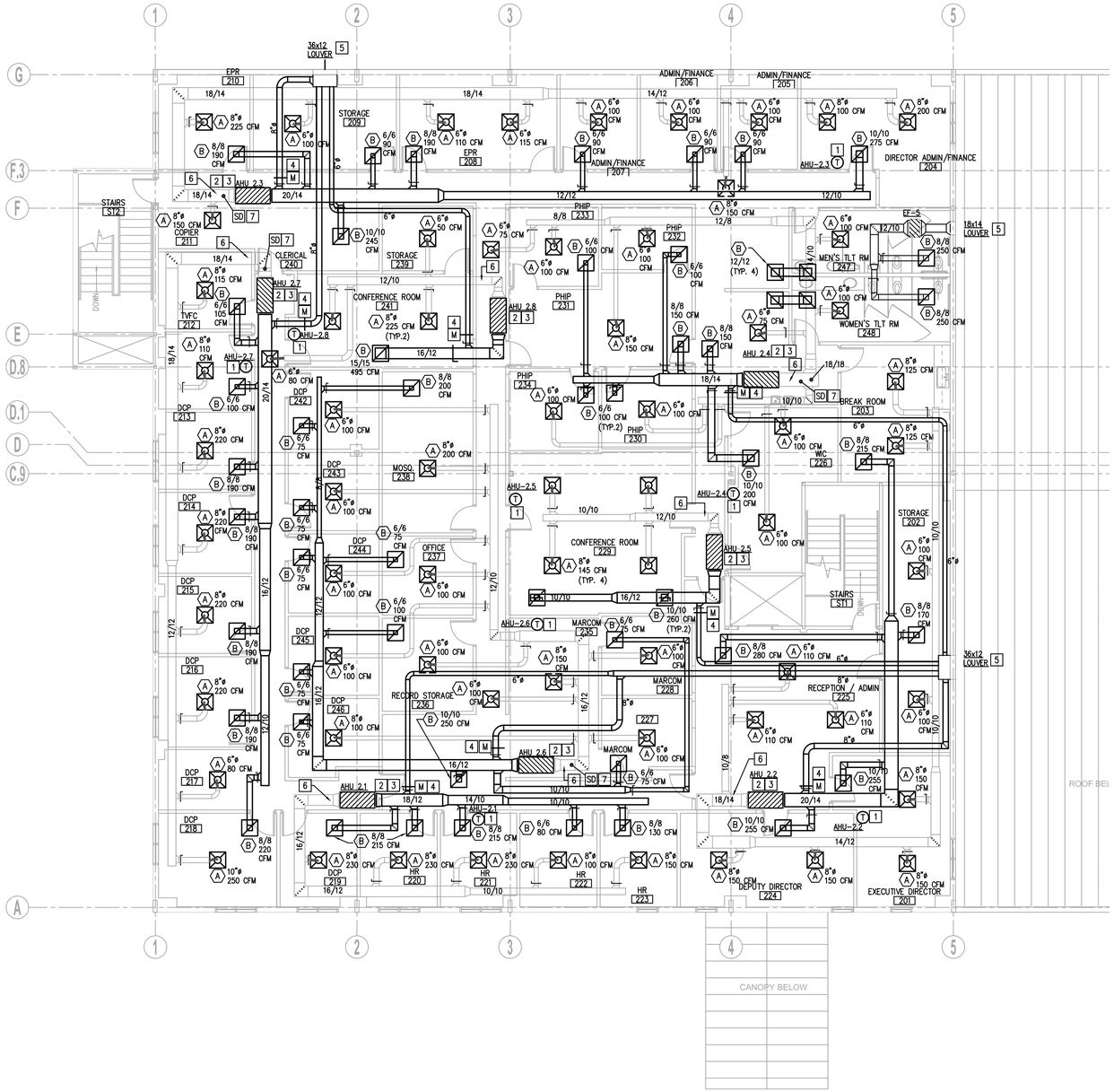
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

1ST LEVEL MECHANICAL PLAN

SHEET

M2.01



1 2ND LEVEL MECHANICAL PLAN

M2.02

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In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED
PROFESSIONAL ENGINEER
7/5/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

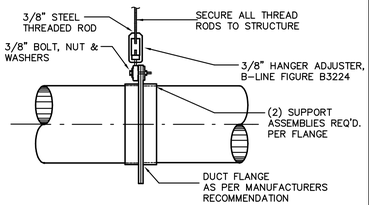
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

2ND LEVEL MECHANICAL PLAN

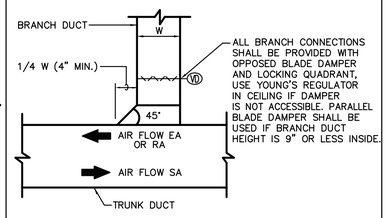
SHEET

M2.02



1 OVAL OR ROUND DUCT HANGER

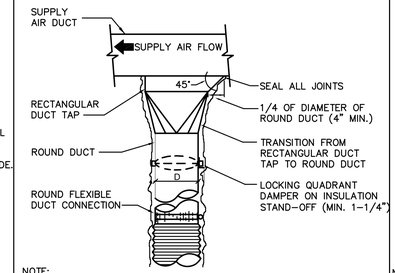
NOT TO SCALE MAGD103.DWG



NOTE: THIS CONNECTION SHALL BE TYPICAL FOR ALL RECTANGULAR BRANCH DUCT CONNECTIONS TO RECTANGULAR TRUNK DUCTS, INCLUDING SUPPLY, RETURN, OUTSIDE AIR AND EXHAUST DUCTS.

2 RECTANGULAR BRANCH DUCT TAP

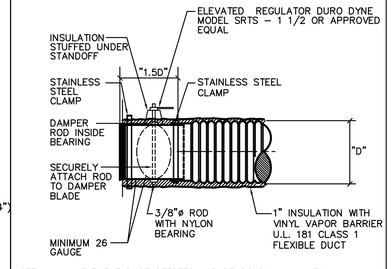
NOT TO SCALE MAGD300.DWG



NOTE:
SEE FLOOR PLAN FOR SIZES

3 RECTANGLUAR TAP TO ROUND TRANSITION

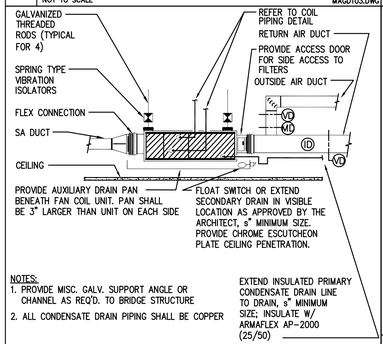
NOT TO SCALE MAGD302.DWG



NOTE: 1. ALL FLEXIBLE DUCT OFFSETS AND BENDS SHALL MAINTAIN A RADIUS OF 1.5 X ("D") MINIMUM 3'–0" AND MAXIMUM 6'–0"
2. TYPICAL OF ROUND DUCT CONNECTIONS TO RECTANGULAR DUCTS
3. ALL JOINTS SHALL BE SEALED WITH MASTIC AND FIBER CLOTH PER SPECIFICATIONS.

4 SPIN-IN DETAIL

NOT TO SCALE

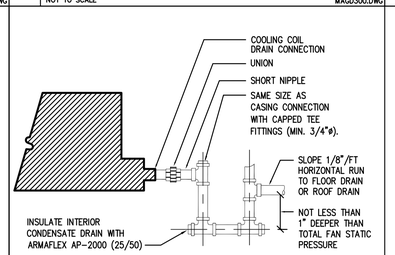


NOTES:
1. PROVIDE MISC. GALV. SUPPORT ANGLE OR CHANNEL AS REQ'D. TO BRIDGE STRUCTURE
2. ALL CONDENSATE DRAIN PIPING SHALL BE COPPER

EXTEND INSULATED PRIMARY CONDENSATE DRAIN LINE TO DRAIN, 8" MINIMUM SIZE; INSULATE W/ ARMAFLEX AP-2000 (25/50)

5 FAN COIL UNIT MOUNTING

NOT TO SCALE



NOTE:
1. MAINTAIN MINIMUM 1" AIR GAP AT FLOOR DRAIN OR ROOF DRAIN.
2. ALL CONDENSATE DRAIN PIPING SHALL BE SCHEDULE 40 GALVANIZED WITH MALLABLE IRON SCREWED FITTINGS.

6 COOLING COIL CONDENSATE DRAIN

NOT TO SCALE

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DBR Project Number 165026.000

MC	SN	NF	AH	--

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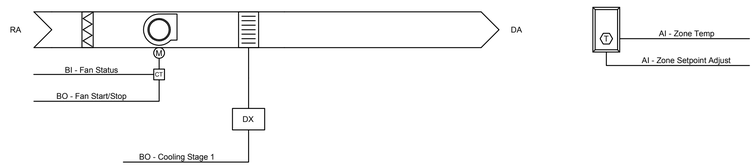
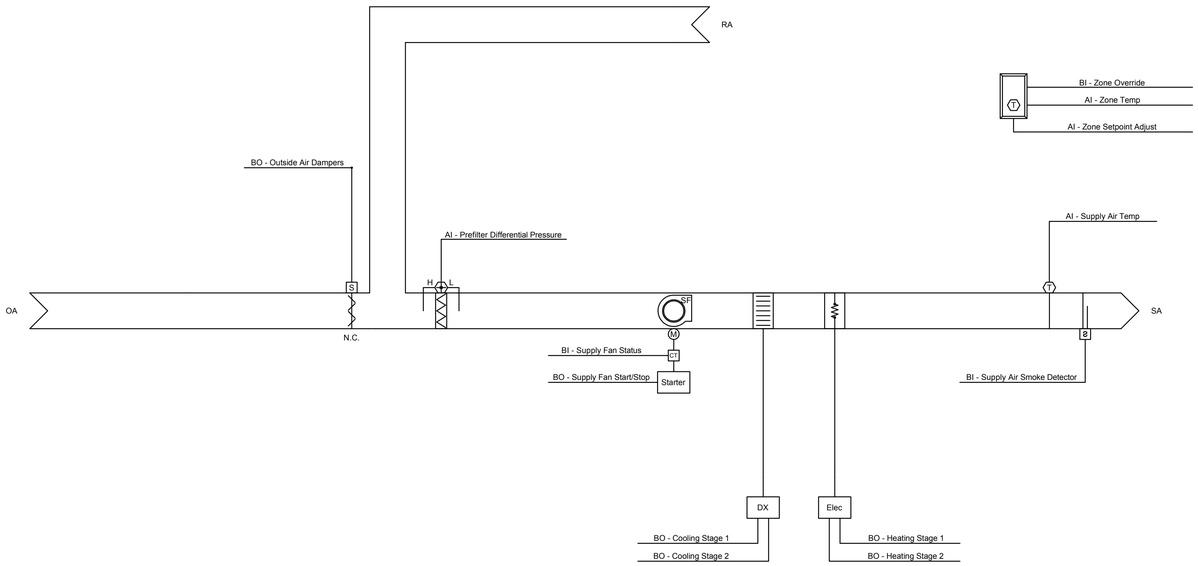
MECHANICAL DETAILS

SHEET

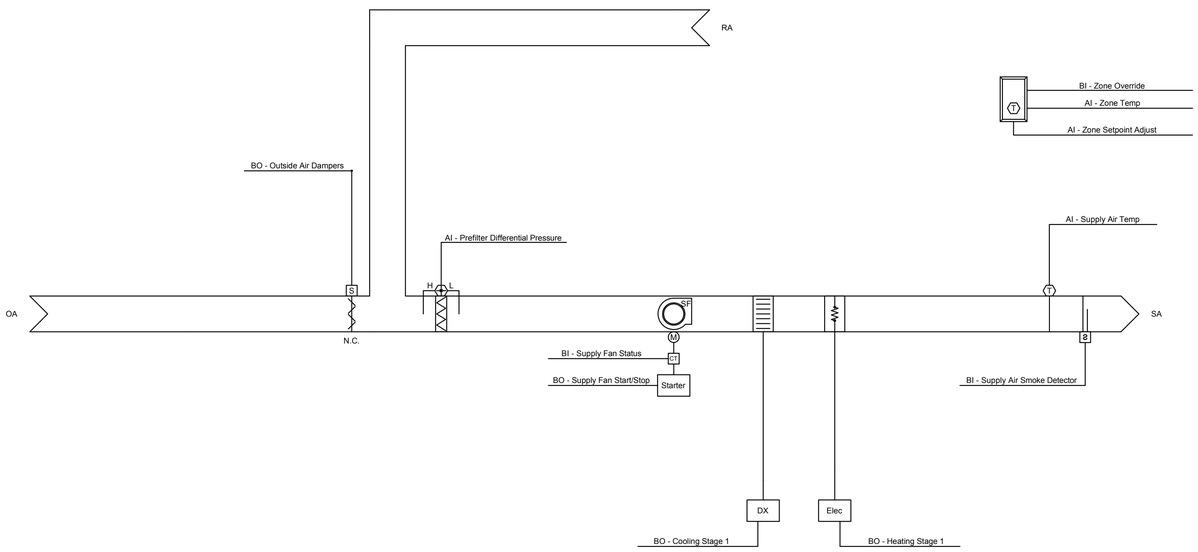
M3.01



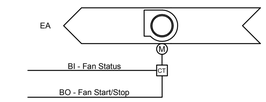
1 DUCTLESS SPLIT SYSTEM
NOT TO SCALE



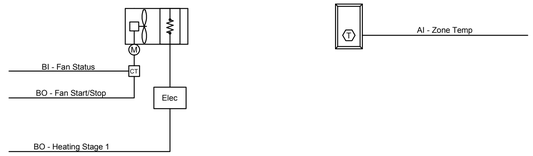
2 DX SPLIT SYSTEM (TWO STAGES COOLING/HEATING)
NOT TO SCALE



3 DX SPLIT SYSTEM (SINGLE STAGES COOLING/HEATING)
NOT TO SCALE



4 EXHAUST FAN
NOT TO SCALE



5 UNIT HEATER
NOT TO SCALE

NOTE TO MECHANICAL AND CONTROLS CONTRACTORS:

AUTOMATED LOGIC CONTROLS SYSTEM TO BE PROVIDED. PROVIDE WEBCTRL SYSTEM AND ALL ASSOCIATED CONTROLLERS, GATEWAYS, ROUTERS, ETC...REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM. MECHANICAL CONTRACTOR AND CONTROLS CONTRACTOR SHALL COORDINATE ALL POINTS REQUIRED FOR ENTIRE BUILDING WITH WILLIAMSON COUNTY HVAC SUPERVISOR, TOBY BONNET, PRIOR TO ORDERING AND INSTALLATION. PLEASE CONTACT TOBY AT 512-943-1599 OR TBONNET@WILCO.ORG. PLEASE NOTE: FOUR ADDITIONAL POINTS SHALL BE PROVIDED TO INTEGRATE EXISTING EXTERIOR SITE LIGHTING CONTROLS.

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MECHANICAL CONTROL SCHEMATICS

SHEET

M3.02

Air Purification Schedule

Zone Tag	S/A Flow	O/A Flow	GPS Model	GPS Quantity	Pressure Drop	Voltage	Watts	Location	Notes
AHU-1.1	1050	200	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.2	930	180	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.3	930	180	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.4	1200	220	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.5	1600	120	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.6	930	180	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.7	930	180	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.8	1050	220	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.9	1600	250	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-1.10	1200	220	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.1	930	100	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.2	1450	250	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.3	1450	250	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.4	930	100	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.5	580	85	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.6	1050	150	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.7	1450	250	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5
AHU-2.8	580	85	GPS-FC-3	1	0.05" W.C.	24	4.8	SA DUCT	1 to 5

NOTE:
1. Basis of Design: Global Plasma Solutions: Approved equals by Airgenics and Bioxgen subject to specification compliance
2. Mount bi-polar ion generator where indicated on schedule
3. If contractor substitutes basis of design with another manufacturer, contractor shall coordinate all electrical and mechanical changes
4. Bi-polar ionization systems requiring perishable glass tubes are not acceptable
5. All manufacturers must pass UL-867-2007 ozone chamber testing by either UL or ETL

DUCTED UVC/HEPA AIR FILTRATION UNIT, FAN POWERED

INDOOR UNIT	MARK	HEPA-1			
	TYPE	ABOVE CEILING INSTALL			
	AIRFLOW (CFM)	500			
	FAN VOLTS/PHASE/HERTZ	120/1/60			
	TOTAL WATTS	560 W			
	MCA	1			
	MOCP	20			
	MANUFACTURER	ISOLATE, CORP.			
	MODEL NUMBER	ISO-HEPA-500HR			
NOTES:		ALL NOTES APPLY			

NOTES:

1. PROVIDE UNIT WITH 99.97% EFFICIENT HIGH EFFICIENCY HEPA AIR FILTER (TO 0.3 MICRON PARTICLE SIZE), UL CLASS 2.
2. PROVIDE UNIT WITH HIGH INTENSITY ULTRAVIOLET (UVC FIXTURE) FROM MANUFACTURER.
3. INSTALL UNIT TO ALLOW FOR SIDE AND/OR BOTTOM ACCESS. SUSPEND UNIT FROM STRUCTURE WITH 5/16" HANGER RODS WITH NYLON LOCK-NUT FASTENERS.
4. UNIT SHALL BE PROVIDED WITH FACTORY WIRED ON-OFF SWITCH TO AN INTERNAL UNIT JUNCTION BOX OR POWER CORD WITH PLUG.
5. PROVIDE WITH MODEL H800 CURRENT SWITCH FOR USE IN REMOTE INDICATION. PROVIDE WITH ONE SPARE UVC/HEPA ELEMENT, MODEL UVC/HEPA-12R.
6. PROVIDE UNIT WITH 12 MONTH WARRANTY FROM DATE OF COMMISSIONING.
7. CONTRACTOR SHALL OBTAIN WIRING DIAGRAM FROM MANUFACTURER FOR INSTALLATION.
8. PROVIDE UNIT WITH ADJUSTABLE SPEED CONTROL FOR UNIT VOLUME CONTROL. INSTALL ON WALL IN ROOM.

AIR DEVICE SCHEDULE

MARK	MFR. & MODEL	TYPE	REMARKS
A	TITUS TMS-AA	LOUVERED FACE SUPPLY AIR DIFFUSER	24"x24" FACE, ALUMINUM CONSTRUCTION.
B	TITUS PAR-AA	PERFORATED FACE RETURN/EXHAUST AIR GRILLE	24"x24" FACE, ALUMINUM CONSTRUCTION. PROVIDE 22"x22" NECK UNLESS OTHERWISE NOTED.
C	TITUS 300FL	SIDEWALL SUPPLY AIR GRILLE	ALUMINUM CONSTRUCTION WITH FRAME FOR SURFACE MOUNT. 3/4" BLADE SPACING, 45 DEG.DOUBLE DEFLECTION, BLADES PARALLEL TO SHORT DIMENSION. SEE PLANS FOR SIZE.
D	TITUS TLFR-AA & HEPA-R	LAMINAR FLOW CEILING DIFFUSER WITH FILTER	24"x24" FACE, ALUMINUM CONSTRUCTION. PROVIDE 99.99%, 4" HEPA FILTER AND FILTER RACK AND HEPA FILTER ALERT LED LIGHT KIT. PROVIDE 24 VAC TRANSFORMER FOR HEPA ALERT KIT.

NOTES:
1. PROVIDE STANDARD WHITE FINISH FOR ALL AIR DEVICES UNLESS NOTED OTHERWISE ON PLAN. COORDINATE FINISH WITH ARCH.
2. UNLESS NOTED OTHERWISE, BRANCH DUCT SIZE SHALL BE SAME SIZE AS NECK OF AIR DEVICE.
3. REFER TO ARCH. CEILING PLAN FOR CEILING TYPE. PROVIDE FRAME AND ACCESSORIES AS REQUIRED FOR LAY IN GRID OR SURFACE MOUNT.

FAN SCHEDULE

MARK	EF-01	EF-02	EF-03	EF-04	EF-05
TYPE/DRIVE	NOT USED	DIRECT	DIRECT	DIRECT	DIRECT
CFM		700	500	500	500
EXT. S.P. (IN. W.G.)		0.5	0.5	0.5	0.500
HORSEPOWER OR WATTS		181 W	192 W	192 W	192 W
RPM (MAX.)		1050	1325	1325	1,325
SONES (MAX.)		1.5	1.5	1.5	1.5
VOLTS/PHASE/HERTZ		115 / 1 / 60	115 / 1 / 60	115 / 1 / 60	115 / 1 / 60
MANUFACTURER		COOK	COOK	COOK	COOK
MODEL NUMBER		GN-842	GN-720	GN-720	GN-720
NOTES		1,2	1,2	1,2	1,2

NOTES:
1. PROVIDE WITH SPEED CONTROL, BACKDRAFT DAMPER, AND
2. UNIT CONTROL BY TIME CLOCK.
3. FAN SHALL RUN CONTINUOUSLY.

OUTSIDE AIR CALCULATION - TABLE 6.1 ASHRAE 62.1 2013

SPACE DESIGNATION	USAGE TYPE	AREA (FT^2)	PEOPLE / 1,000 FT^2	PEOPLE	PEOPLE OVERRIDE	CFM / PERSON	CFM / FT^2	O.A. CFM REQUIRED
FIRST FLOOR								
LOBBY/WAITING AREAS	OFFICE	1,067		15	-	5.0	0.06	139
OFFICES/NURSES	OFFICE	6,329		36		5	0.06	560
LAB	OFFICE	485		4		5	0.06	49
EXAMS/TREATMENTS	EXAM	1,050		10		15	0.00	150
BREAKROOM	OFFICE	250		5		5	0.06	40
STORAGES	STORAGE	750					0.12	90
CORRIDOR	CORRIDOR	2,000					0.06	120
TOILETS		1,040						
MEETING	OFFICE	870		25		5	0.06	177
SECOND FLOOR								
OFFICES/NURSES	OFFICE	7,450		47		5	0.06	682
TOILETS		320						
CORRIDOR	CORRIDOR	1,040					0.06	62
BREAKROOM	OFFICE	250		5		5	0.06	40
CONFERENCES	OFFICE	715		20		5	0.06	143
STORAGES	STORAGE	500					0.12	60
						TOTAL OA CFM REQUIRED:		**2,312**
						TOTAL OA CFM DESIGNED:		**3,220**

TOTAL OA CFM DESIGNED: 3,220

DX SPLIT SYSTEM HEAT PUMP SCHEDULE (ELECTRIC HEAT)

	MARK	AHU-1.1	AHU-1.2	AHU-1.3	AHU-1.4	AHU-1.5	AHU-1.6	AHU-1.7	AHU-1.8	AHU-1.9	AHU-1.10	AHU-2.1	AHU-2.2	AHU-2.3	AHU-2.4	AHU-2.5	AHU-2.6	AHU-2.7	AHU-2.8
INDOOR UNIT	SUPPLY AIR (CFM)	1,050	930	930	1,200	1,600	930	930	1,050	1,600	1,200	930	1,380	1,440	1,100	580	1,350	1,440	580
	OUTSIDE AIR (CFM)	200	180	180	220	120	180	180	220	250	250	100	250	250	200	85	200	250	85
	EXT. SP. (IN W.G.)	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.8	0.6	0.6	0.6	0.8	0.6	0.6	0.6	0.6
	FAN MOTOR HORSEPOWER	1/2	1/3	1/3	1/2	0.75	1/3	1/3	1/2	0.75	0.75	1/3	0.75	0.75	1/2	1/3	0.75	0.75	1/3
	NOMINAL TONS	3 TONS	2.5 TONS	2.5 TONS	3 TONS	4 TONS	2.5 TONS	2.5 TONS	3 TONS	4 TONS	4 TONS	2.5 TONS	4 TONS	4 TONS	3 TONS	1.5 TONS	4 TONS	4 TONS	1.5 TONS
	AHRI COOLING CAPACITY (MBH)	37	29	29	37	47	29	29	37	47	47	29	47	47	37	18	47	47	18
	ELECTRIC HEAT (KW) @ 208 V	7.2	7.2	7.2	7.2	10.8	7.2	7.2	7.2	10.8	10.8	7.2	10.8	10.8	7.2	3.6	10.8	10.8	3.6
	HEAT PUMP CAPACITY (MBH) @ 47°F	32.7	28.1	28.1	32.7	46	28.1	28.1	32.7	46	46	28.1	46	46	32.7	16.7	46	46	16.7
	HEAT PUMP COP	4	4.1	4.1	4	4.3	4.1	4.1	4	4.3	4.3	4.1	4.3	4.3	4	3.8	4.3	4.3	3.8
	VOLTS/PHASE/HERTZ	208 /3 / 60	208 / 3 / 60	208 / 3 / 60	208 /3 / 60	208 / 3 / 60	208 / 3 / 60	208 / 3 / 60	208 /3 / 60	208 / 3 / 60	208 /3 / 60	208 / 3 / 60	208 / 3 / 60	208 / 3 / 60	208 /3 / 60	208 /1 / 60	208 / 3 / 60	208 / 3 / 60	208 /1 / 60
	MCA / MOP	30 / 30	28 / 30	28 / 30	30 / 30	45 / 45	28 / 30	28 / 30	30 / 30	45 / 45	45/45	28 / 30	45 / 45	45 / 45	30 / 30	25 / 25	45 / 45	45 / 45	25 / 25
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
	MODEL	TEM6A0C36	TEM6A0B30	TEM6A0B30	TEM6A0C36	TEM6A0D48	TEM6A0B30	TEM6A0B30	TEM6A0C36	TEM6A0D48	TEM6A0C48	TEM6A0B30	TEM6A0D48	TEM6A0D48	TEM6A0C36	TEM6A0B24	TEM6A0D48	TEM6A0D48	TEM6A0B24
	WEIGHT (LBS)	155	117	117	155	292	117	117	155	292	292	117	292	292	155	126	292	292	126
	NOTES	4,5,6,7	4,5,7	4,5,7	4,5,6,7	4,5,6,7	4,5,7	4,5,7	4,5,6,7	4,5,6,7	4,5,6,7	4,5,7	4,5,6,7	4,5,6,7	4,5,6,7	4,5,7	4,5,6,7	4,5,6,7	4,5,7
CONDENSING UNIT	MARK	CU-1.1	CU-1.2	CU-1.3	CU-1.4	CU-1.5	CU-1.6	CU-1.7	CU-1.8	CU-1.9	CU-1.10	CU-2.1	CU-2.2	CU-2.3	CU-2.4	CU-2.5	CU-2.6	CU-2.7	CU-2.8
	MIN. SEER/EER (ARI)	17.5 / 13	15.25 / 12.5	15.25 / 12.5	17.5 / 13	17.5 / 13	15.25 / 12.5	15.25 / 12.5	17.5 / 13	17.5 / 13	17.5 / 13	15.25 / 12.5	17.5 / 13	17.5 / 13	17.5 / 13	15 / 12.5	17.5 / 13	17.5 / 13	15 / 12.5
	AMBIENT AIR	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
	VOLTS/PHASE/HERTZ	208 / 3 / 60	208 / 1 / 60	208 / 1 / 60	208 / 3 / 60	208 / 3 / 60	208 / 1 / 60	208 / 1 / 60	208 / 3 / 60	208 / 3 / 60	208 / 3 / 60	208 / 1 / 60	208 / 3 / 60	208 / 3 / 60	208 / 3 / 60	208 / 1 / 60	208 / 3 / 60	208 / 3 / 60	208 / 1 / 60
	MCA	15	17	17	15	18	17	17	15	18	18	17	18	18	15	12	18	18	12
	MOCP	25	25	25	25	30	25	25	25	30	30	25	30	30	25	20	30	30	20
	MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
	MODEL	4TWA7036	4TWR5030	4TWR5030	4TWA7036	4TWA7048	4TWR5030	4TWR5030	4TWA7036	4TWA7048	4TWA7048	4TWR5030	4TWA7048	4TWA7048	4TWA7036	4TWR5019	4TWA7048	4TWA7048	4TWR5019
	NOMINAL TONS	3 TONS	2.5 TONS	2.5 TONS	3 TONS	4 TONS	2.5 TONS	2.5 TONS	3 TONS	4 TONS	4 TONS	2.5 TONS	4 TONS	4 TONS	3 TONS	1.5 TONS	4 TONS	4 TONS	1.5 TONS
	WEIGHT (LBS)	257	216	216	257	292	216	216	257	292	292	216	292	292	257	162	292	292	162
	NOTES	1, 2, 3,	1, 2, 3,	1, 2, 3,	1, 2, 3,	1, 2, 3,6, 7	1, 2, 3,	1, 2, 3,	1, 2, 3,	1, 2, 3,6, 7	1, 2, 3,	1, 2, 3,	1, 2, 3,6, 7	1, 2, 3,6, 7	1, 2, 3,	1, 2, 3	1, 2, 3,	1, 2, 3,6, 7	1, 2, 3

NOTES
1. PROVIDE CONDENSER COIL HAIL GUARDS.
2. PROVIDE LOW AMBIENT CONTROL.
3. INSTALL REFRIGERANT PIPING IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
4. PROVIDE SECONDARY DRAIN PAN WITH FLOAT SWITCH UNDER UNIT TO DISENGAGE THE UNIT.
5. PROVIDE UNIT WITH SINGLE POINT POWER CONNECTION AND EXTERNAL FILTER WITH FILTER RACK.
6. PROVIDE UNIT WITH TWO STAGES HEATING AND TWO STAGES COOLING.
7. INSTALL LITTLE GIANT VCMA-15ULS CONDENSATE PUMP ON ALL UNITS. REFER TO M2.01 AND M2.02. KEYED NOTE 3.

ELECTRIC UNIT HEATER SCHEDULE

MARK	EUH-1
CFM	400
KW	3.3
VOLTS/PHASE/HERTZ	208/1/60
AMPS	16
MANUFACTURER	MARKEL
MODEL NO.	F1FUH03003
NOTES	1

NOTES:

1. SHALL INCLUDE FUSED CONTROL CIRCUIT, MANUAL RESET HIGH LIMIT, "FAN ONLY" SWITCH, AND WALL MOUNTING BRACKET/ KIT.

DBR
7800 Shoal Creek Blvd I Suite 100W
Austin, Texas 78757
512.637.4393 p 512.637.4396 f
TBPE Firm Registration No. 2234

DBR Project Number 165026.000

MC	SN	NF	AH	--

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AUSTIN
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Phone : 512-433-2696

In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED
PROFESSIONAL ENGINEER
1/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

MECHANICAL SCHEUDULES

SHEET

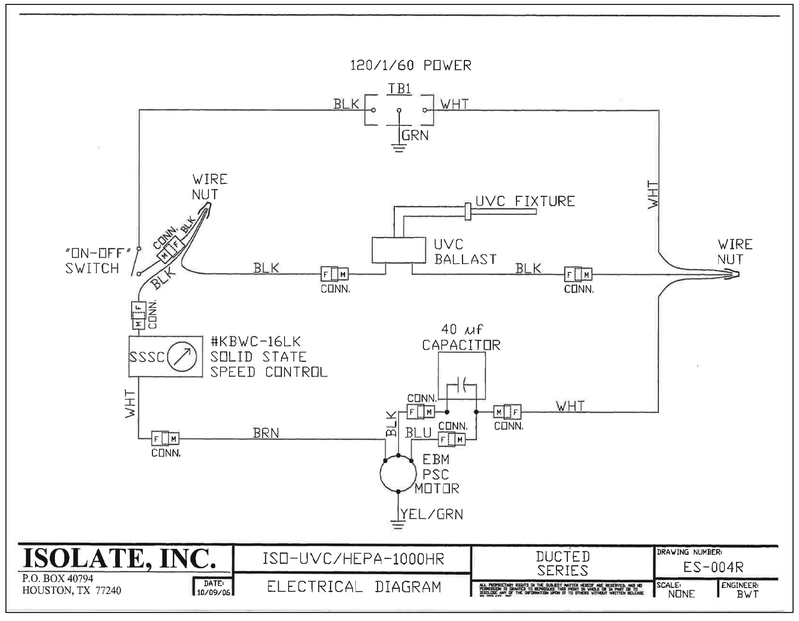
M4.01

DUCTED UVC/HEPA AIR FILTRATION UNIT, FAN POWERED

INDOOR UNIT	MARK	HEPA-1			
	TYPE	ABOVE CEILING INSTALL			
	AIRFLOW (CFM)	500			
	FAN VOLTS/PHASE/HERTZ	120/1/60			
	TOTAL WATTS	560 W			
	MCA	1			
	MOCP	20			
	MANUFACTURER	ISOLATE, CORP.			
	MODEL NUMBER	ISO-HEPA-500HR			
NOTES:		ALL NOTES APPLY			

NOTES:

1. PROVIDE UNIT WITH 99.97% EFFICIENT HIGH EFFICIENCY HEPA AIR FILTER (TO 0.3 MICRON PARTICLE SIZE), UL CLASS 2.
2. PROVIDE UNIT WITH HIGH INTENSITY ULTRAVIOLET (UVC FIXTURE) FROM MANUFACTURER.
3. INSTALL UNIT TO ALLOW FOR SIDE AND/OR BOTTOM ACCESS. SUSPEND UNIT FROM STRUCTURE WITH 5/16" HANGER RODS WITH NYLON LOCK-NUT FASTENERS.
4. UNIT SHALL BE PROVIDED WITH FACTORY WIRED ON-OFF SWITCH TO AN INTERNAL UNIT JUNCTION BOX OR POWER CORD WITH PLUG.
5. PROVIDE WITH MODEL H800 CURRENT SWITCH FOR USE IN REMOTE INDICATION. PROVIDE WITH ONE SPARE UVC/HEPA ELEMENT, MODEL UVC/HEPA-12R.
6. PROVIDE UNIT WITH 12 MONTH WARRANTY FROM DATE OF COMMISSIONING.
7. CONTRACTOR SHALL OBTAIN WIRING DIAGRAM FROM MANUFACTURER FOR INSTALLATION.
8. PROVIDE UNIT WITH ADJUSTABLE SPEED CONTROL FOR UNIT VOLUME CONTROL. INSTALL ON WALL IN ROOM.



ISOLATE, INC.
P.O. BOX 40794
HOUSTON, TX 77240

DATE: 10/09/06

ISO-UVC/HEPA-1000HR
ELECTRICAL DIAGRAM

DUCTED SERIES

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DRAWING NUMBER: ES-004R
SCALE: NONE
ENGINEER: BWT

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In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED PROFESSIONAL ENGINEER
1/13/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

MECHANICAL SCHEDULES

SHEET

M4.02

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512.637.4393 p 512.637.4396 f
TBPE Firm Registration No. 2234

DBR Project Number 165026.000

MC	SN	NF	AH	--

Load / Airflow Summary

By dbr

System	Zone	Room **		Floor Area ft²	People #	Coil Cooling Sensible Btu/h	Coil Cooling Total Btu/h	Space Design Max SA cfm	Air Changes ach/hr	VAV Minimum SA cfm	VAV Minimum %	Main Coil Heating Sensible Btu/h	Heating Fan Max SA cfm	Percent OA Clg	Percent OA Htg
Alternative 1															
		101 OFFICE 6	Rm Peak	172	1.0	3,639	4,209	154	5.97	0	0	-2,501	154	9.9	9.9
		102 OFFICE 5	Rm Peak	130	1.0	1,870	2,437	73	3.74	0	0	-1,450	73	17.5	17.5
		103 OFFICE 4	Rm Peak	130	1.0	3,292	3,801	142	7.27	0	0	-2,241	142	9.0	9.0
		132 NURSE 1	Rm Peak	116	1.0	3,186	3,675	138	7.94	0	0	-2,159	138	8.7	8.7
		133 NURSE 2	Rm Peak	116	1.0	3,186	3,675	138	7.94	0	0	-2,159	138	8.7	8.7
		134 NURSE 3	Rm Peak	116	1.0	3,186	3,675	138	7.94	0	0	-2,159	138	8.7	8.7
		135 NURSING RM	Rm Peak	116	2.0	2,340	3,453	81	4.68	0	0	-2,222	81	33.1	33.1
AHU-01			**Sys Peak**	**896**	**8.0**	**20,700**	**24,924**	**865**				**-14,891**	**865**	**12.0**	**12.0**
AHU-01			**Sys Block**	**896**	**8.0**	**20,680**	**24,586**	**865**				**-14,891**	**865**	**12.0**	**12.0**
		123 TB ENTRANCE	Rm Peak	115	0.0	4,078	4,093	190	11.00	0	0	-2,491	190	3.6	3.6
		124 TB INTAKE	Rm Peak	115	2.0	5,395	6,416	241	13.95	0	0	-4,025	241	11.2	11.2
		125 OFFICE	Rm Peak	115	1.0	1,771	2,323	67	3.89	0	0	-1,332	67	17.7	17.7
		126 TB STORAGE	Rm Peak	115	0.0	1,052	1,488	30	1.76	0	0	-1,005	30	45.6	45.6
		127 TB OFFICE 1	Rm Peak	115	1.0	4,743	5,105	214	12.40	0	0	-3,004	214	5.6	5.6
		161 ISOLATION	Rm Peak	115	1.0	1,991	3,056	58	3.39	0	0	-2,190	58	54.6	54.6
		162 ANTEROOM	Rm Peak	115	1.0	1,991	3,056	58	3.39	0	0	-2,190	58	54.6	54.6
		163 TB OFFICE 2	Rm Peak	115	1.0	1,540	2,082	58	3.39	0	0	-1,234	58	20.4	20.4
AHU-010			**Sys Peak**	**920**	**7.0**	**22,561**	**27,617**	**917**				**-17,470**	**917**	**16.0**	**16.0**
AHU-010			**Sys Block**	**920**	**7.0**	**19,427**	**24,129**	**917**				**-17,470**	**917**	**16.0**	**16.0**
		128 OFFICE 1	Rm Peak	115	1.0	4,744	5,106	214	12.40	0	0	-3,009	214	5.6	5.6
		129 ASST DIR	Rm Peak	115	1.0	4,744	5,106	214	12.40	0	0	-3,009	214	5.6	5.6
		130 DIR	Rm Peak	115	1.0	4,744	5,106	214	12.40	0	0	-3,009	214	5.6	5.6
		131 MD HEALT AUTH	Rm Peak	200	1.0	6,046	6,577	265	8.85	0	0	-3,841	265	6.4	6.4
AHU-02			**Sys Peak**	**545**	**4.0**	**20,277**	**21,894**	**907**				**-12,867**	**907**	**5.8**	**5.8**
AHU-02			**Sys Block**	**545**	**4.0**	**20,236**	**21,757**	**907**				**-12,867**	**907**	**5.8**	**5.8**
		156 EXAM 4	Rm Peak	100	2.0	1,926	2,854	68	4.52	0	0	-1,753	68	31.0	31.0
		157 EXAM 3	Rm Peak	100	2.0	1,926	2,854	68	4.52	0	0	-1,753	68	31.0	31.0
		158 EXAM 2	Rm Peak	100	2.0	1,926	2,854	68	4.52	0	0	-1,753	68	31.0	31.0
		159 PROC RM	Rm Peak	115	2.0	2,012	2,969	71	4.09	0	0	-1,827	71	31.0	31.0
		160 EXAM 1	Rm Peak	115	2.0	2,012	2,969	71	4.09	0	0	-1,827	71	31.0	31.0
		164 OFFICE 2	Rm Peak	115	1.0	1,539	2,081	59	3.39	0	0	-1,213	59	20.3	20.3
		165 OFFICE 3	Rm Peak	115	1.0	1,539	2,081	59	3.39	0	0	-1,213	59	20.3	20.3
		166 OFFICE 4	Rm Peak	115	1.0	1,539	2,081	59	3.39	0	0	-1,213	59	20.3	20.3
		CORRIDOR EXAM AREA	Rm Peak	425	0.0	2,457	3,277	80	1.26	0	0	-2,108	80	31.7	31.7
		CORRIDOR TB AREA	Rm Peak	320	0.0	1,850	2,468	61	1.26	0	0	-1,587	61	31.7	31.7

*** This report does not display heating only systems.**

Project Name:
Dataset Name: 165026 WilliamsonHealthDept.trc

TRACE® 700 v6.3.2 calculated at 11:17 AM on 11/30/2016
Load/Airflow Summary Report Page 1 of 4

System	Zone	Room **		Floor Area ft²	People #	Coil Cooling Sensible Btu/h	Coil Cooling Total Btu/h	Space Design Max SA cfm	Air Changes ach/hr	VAV Minimum SA cfm	VAV Minimum %	Main Coil Heating Sensible Btu/h	Heating Fan Max SA cfm	Percent OA Clg	Percent OA Htg
AHU-03			**Sys Peak**	**1,620**	**13.0**	**18,724**	**26,486**	**661**				**-16,248**	**661**	**28.3**	**28.3**
AHU-03			**Sys Block**	**1,620**	**13.0**	**15,724**	**26,486**	**661**				**-16,247**	**661**	**28.3**	**28.3**
		136 PLAYROOM	Rm Peak	235	4.0	5,155	6,643	207	5.88	0	0	-3,928	207	16.5	16.5
		154 155 CHECKOUT	Rm Peak	285	4.0	5,145	6,995	201	4.70	0	0	-4,005	201	18.5	18.5
		CORRIDOR NURSE ARE	Rm Peak	380	0.0	2,198	2,937	72	1.26	0	0	-1,891	72	31.8	31.8
		WAITING CHECKOUT AREA	Rm Peak	700	15.0	9,995	15,553	338	3.22	0	0	-9,366	338	34.6	34.6
AHU-04			**Sys Peak**	**1,600**	**23.0**	**22,493**	**32,127**	**818**				**-19,190**	**818**	**25.8**	**25.8**
AHU-04			**Sys Block**	**1,600**	**23.0**	**21,962**	**31,882**	**818**				**-19,190**	**818**	**25.8**	**25.8**
		104 OFFICE 10	Rm Peak	220	1.0	7,583	8,250	326	9.87	0	0	-4,548	326	5.6	5.6
		105 OFFICE 3	Rm Peak	116	1.0	5,193	5,671	229	13.17	0	0	-3,159	229	5.2	5.2
		106 OFFICE 2	Rm Peak	116	1.0	5,193	5,671	229	13.17	0	0	-3,159	229	5.2	5.2
		107 OFFICE 1	Rm Peak	116	1.0	5,193	5,671	229	13.17	0	0	-3,159	229	5.2	5.2
		108 RF PLAN REVIEW 1	Rm Peak	116	1.0	5,193	5,671	229	13.17	0	0	-3,159	229	5.2	5.2
		109 RETAIL FOOD LEAD	Rm Peak	116	1.0	5,193	5,671	229	13.17	0	0	-3,159	229	5.2	5.2
		110 MEETING 2	Rm Peak	135	4.0	6,401	7,747	270	13.35	0	0	-4,398	270	10.4	10.4
		111 MEETING 1	Rm Peak	88	2.0	1,961	2,760	78	5.88	0	0	-1,608	78	19.7	19.7
		CORRIDOR OFFICE AREA	Rm Peak	430	0.0	2,496	3,360	81	1.25	0	0	-2,149	81	31.9	31.9
AHU-05			**Sys Peak**	**1,453**	**12.0**	**44,407**	**50,471**	**1,901**				**-28,495**	**1,901**	**7.7**	**7.7**
AHU-05			**Sys Block**	**1,453**	**12.0**	**43,848**	**49,460**	**1,901**				**-28,495**	**1,901**	**7.7**	**7.7**
		137 SUPPLIES	Rm Peak	120	0.0	3,255	3,513	146	8.10	0	0	-1,937	146	4.9	4.9
		138 OFFICE 7	Rm Peak	110	1.0	1,513	2,045	57	3.46	0	0	-1,183	57	20.3	20.3
		139 OFFICE 8	Rm Peak	110	1.0	1,513	2,045	57	3.46	0	0	-1,183	57	20.3	20.3
		140 OFFICE 9	Rm Peak	150	1.0	1,745	2,352	65	2.87	0	0	-1,380	65	21.7	21.7
		141 FLEX MEETING	Rm Peak	150	4.0	2,608	3,848	101	4.48	0	0	-2,016	101	18.9	18.9
		142 RE PLAN REVIEW 2	Rm Peak	110	1.0	1,513	2,045	57	3.46	0	0	-1,183	57	20.3	20.3
		143 RF FIELD CUBICLES	Rm Peak	200	2.0	2,910	3,937	111	3.69	0	0	-2,268	111	19.9	19.9
		144 RF PLAN REVIEW 3	Rm Peak	130	1.0	1,629	2,198	61	3.12	0	0	-1,282	61	21.0	21.0
AHU-06			**Sys Peak**	**1,080**	**11.0**	**16,686**	**21,983**	**654**				**-12,434**	**654**	**16.8**	**16.8**
AHU-06			**Sys Block**	**1,080**	**11.0**	**16,686**	**21,983**	**654**				**-12,434**	**654**	**16.8**	**16.8**
		147 MEETING	Rm Peak	870	25.0	17,559	26,604	626	4.80	0	0	-15,385	626	28.3	28.3
AHU-07			**Sys Peak**	**870**	**25.0**	**17,559**	**26,604**	**626**				**-15,385**	**626**	**28.3**	**28.3**
AHU-07			**Sys Block**	**870**	**25.0**	**17,559**	**26,604**	**626**				**-15,385**	**626**	**28.3**	**28.3**
		148 BREAKROOM	Rm Peak	250	5.0	4,409	5,815	188	5.02	0	0	-2,776	188	8.0	8.0
		149 LAB	Rm Peak	485	4.0	11,103	13,459	466	6.41	0	0	-7,452	466	10.5	10.5
AHU-08			**Sys Peak**	**735**	**9.0**	**15,512**	**19,274**	**654**				**-10,228**	**654**	**9.8**	**9.8**
AHU-08			**Sys Block**	**735**	**9.0**	**15,512**	**19,274**	**654**				**-10,228**	**654**	**9.8**	**9.8**
		112 WAITING	Rm Peak	132	2.0	5,117	5,927	242	12.23	0	0	-3,639	242	7.4	7.4
		113 CSR	Rm Peak	230	1.0	5,467	6,137	258	7.48	0	0	-3,864	258	7.3	7.3
		115 DIRECTOR	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0
		117 OSSF LEAD	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0
		118 FIELD	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0

*** This report does not display heating only systems.**

Project Name:
Dataset Name: 165028 WilliamsonHealthDept.trc

TRACE® 700 v6.3.2 calculated at 11:17 AM on 11/30/2016
Load/Airflow Summary Report Page 2 of 4

System	Zone	Room **		Floor Area ft²	People #	Coil Cooling Sensible Btu/h	Coil Cooling Total Btu/h	Space Design Max SA cfm	Air Changes ach/hr	VAV Minimum SA cfm	VAV Minimum %	Main Coil Heating Sensible Btu/h	Heating Fan Max SA cfm	Percent OA Clg	Percent OA Htg
		119 PLAN REVIEW 2 3	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0
		120 PLAN REVIEW 1	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0
		121 IMM ESH EQUP	Rm Peak	115	1.0	1,977	2,452	74	4.30	0	0	-1,420	74	16.0	16.0
		122 OFFICE	Rm Peak	125	1.0	4,524	5,032	226	12.14	0	0	-3,214	228	5.5	5.5
		CORRIDOR MEETING AREA	Rm Peak	370	0.0	2,137	2,843	72	1.30	0	0	-1,888	72	30.8	30.8
AHU-09			**Sys Peak**	**1,547**	**10.0**	**29,107**	**34,650**	**1,245**				**-21,126**	**1,245**	**11.5**	**11.5**
AHU-09			**Sys Block**	**1,547**	**10.0**	**28,662**	**34,100**	**1,245**				**-21,125**	**1,245**	**11.5**	**11.5**
		219 DCP	Rm Peak	116	1.0	5,375	5,853	231	13.25	0	0	-3,415	231	5.2	5.2
		220 HR	Rm Peak	116	1.0	5,375	5,853	231	13.25	0	0	-3,415	231	5.2	5.2
		221 HR	Rm Peak	116	1.0	5,375	5,853	231	13.25	0	0	-3,415	231	5.2	5.2
		222 HR	Rm Peak	116	1.0	2,129	2,648	77	4.43	0	0	-1,515	77	15.5	15.5
		223 HR	Rm Peak	116	1.0	3,765	4,230	153	8.78	0	0	-2,452	153	7.8	7.8
AHU-21			**Sys Peak**	**580**	**5.0**	**22,020**	**24,438**	**922**				**-14,213**	**922**	**6.5**	**6.5**
AHU-21			**Sys Block**	**580**	**5.0**	**22,046**	**24,387**	**922**				**-14,213**	**922**	**6.5**	**6.5**
		201 EXEC DIR	Rm Peak	235	1.0	7,294	7,992	302	8.56	0	0	-4,878	302	6.3	6.3
		202 STORAGE	Rm Peak	276	0.0	3,184	4,249	93	2.24	0	0	-2,752	93	35.7	35.7
		203 BREAK ROOM	Rm Peak	240	5.0	5,195	6,598	211	5.87	0	0	-3,464	211	6.8	6.8
		224 DEPUTY DIRECTOR	Rm Peak	255	1.0	6,900	7,570	279	7.31	0	0	-4,637	279	7.3	7.3
		225 RECEPTION ADMIN	Rm Peak	470	5.0	8,856	11,427	327	4.64	0	0	-6,778	327	16.3	16.3
AHU-22			**Sys Peak**	**1,476**	**12.0**	**31,430**	**37,835**	**1,213**				**-22,509**	**1,213**	**11.6**	**11.6**
AHU-22			**Sys Block**	**1,476**	**12.0**	**30,376**	**36,580**	**1,213**				**-22,509**	**1,213**	**11.6**	**11.6**
		204 DIR ADMIN	Rm Peak	265	1.0	7,414	8,101	298	7.49	0	0	-4,927	298	7.0	7.0
		205 ADMIN FINANCE	Rm Peak	115	1.0	2,177	2,654	77	4.46	0	0	-1,570	77	15.5	15.5
		206 ADMIN FINANCE	Rm Peak	115	1.0	2,177	2,654	77	4.46	0	0	-1,570	77	15.5	15.5
		207 ADMIN FINANCE	Rm Peak	115	1.0	2,177	2,654	77	4.46	0	0	-1,570	77	15.5	15.5
		208 EPR	Rm Peak	230	4.0	6,080	7,628	227	6.59	0	0	-4,580	227	14.9	14.9
		209 STORAGE	Rm Peak	208	0.0	2,625	3,247	72	2.32	0	0	-2,110	72	34.5	34.5
		210 EPR	Rm Peak	130	1.0	4,981	5,428	223	11.41	0	0	-3,552	223	5.8	5.8
		211 COPIER	Rm Peak	115	0.0	2,830	3,075	116	6.72	0	0	-1,861	116	6.0	6.0
AHU-23			**Sys Peak**	**1,293**	**9.0**	**30,461**	**35,439**	**1,167**				**-21,741**	**1,167**	**11.6**	**11.6**
AHU-23			**Sys Block**	**1,293**	**9.0**	**27,978**	**32,936**	**1,167**				**-21,741**	**1,167**	**11.6**	**11.6**
		226 WIC	Rm Peak	240	3.0	4,616	6,065	173	4.80	0	0	-3,669	173	17.0	17.0
		230 PHIP	Rm Peak	110	1.0	1,715	2,252	62	3.74	0	0	-1,360	62	18.8	18.8
		231 PHIP	Rm Peak	230	2.0	3,309	4,118	126	3.64	0	0	-2,320	126	11.0	11.0
		232 PHIP	Rm Peak	110	1.0	1,715	2,252	62	3.74	0	0	-1,360	62	18.8	18.8
		233 PHIP	Rm Peak	110	1.0	1,715	2,252	62	3.74	0	0	-1,360	62	18.8	18.8
		234 PHIP	Rm Peak	110	1.0	1,715	2,252	62	3.74	0	0	-1,360	62	18.8	18.8
		240 CLERICAL	Rm Peak	110	1.0	1,715	2,252	62	3.74	0	0	-1,360	62	18.8	18.8
		CORRIDOR ADMIN FINANACE	Rm Peak	360	0.0	2,793	3,497	82	1.51	0	0	-2,084	82	26.5	26.5
AHU-24			**Sys Peak**	**1,380**	**10.0**	**19,292**	**24,938**	**689**				**-14,870**	**689**	**17.8**	**17.8**
AHU-24			**Sys Block**	**1,380**	**10.0**	**19,292**	**24,938**	**689**				**-14,870**	**689**	**17.8**	**17.8**

*** This report does not display heating only systems.**

Project Name:
Dataset Name: 165028 WilliamsonHealthDept.trc

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System	Zone	Room **		Floor Area ft²	People #	Coil Cooling Sensible Btu/h	Coil Cooling Total Btu/h	Space Design Max SA cfm	Air Changes ach/hr	VAV Minimum SA cfm	VAV Minimum %	Main Coil Heating Sensible Btu/h	Heating Fan Max SA cfm	Percent OA Clg	Percent OA Htg
		229 CONFERENCE	Rm Peak	460	14.0	8,819	12,269	350	5.07	0	0	-5,764	350	7.9	7.9
AHU-25			**Sys Peak**	**460**	**14.0**	**8,819**	**12,269**	**350**				**-5,764**	**350**	**7.9**	**7.9**
AHU-25			**Sys Block**	**460**	**14.0**	**8,819**	**12,269**	**350**				**-5,764**	**350**	**7.9**	**7.9**
		227 MARCOM	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		228 MARCOM	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		235 MARCOM	Rm Peak	230	2.0	3,299	4,109	127	3.68	0	0	-2,368	127	10.9	10.9
		236 RECORD STORAGE	Rm Peak	130	0.0	1,155	1,637	30	1.55	0	0	-1,123	30	51.7	51.7
		237 OFFICE	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		238 MOSQ	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		239 STORAGE	Rm Peak	130	0.0	1,155	1,637	30	1.55	0	0	-1,123	30	51.7	51.7
		242 DCP	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		243 DCP	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		244 DCP	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		245 DCP	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		246 DCP	Rm Peak	110	1.0	1,708	2,246	62	3.78	0	0	-1,382	62	18.6	18.6
		CORRIDOR DCP AREA	Rm Peak	240	0.0	1,852	2,322	56	1.55	0	0	-1,419	56	25.8	25.8
		CORRIDOR MARCOM	Rm Peak	440	0.0	3,396	4,257	102	1.55	0	0	-2,601	102	25.8	25.8
AHU-26			**Sys Peak**	**2,160**	**11.0**	**26,230**	**34,174**	**906**				**-21,071**	**906**	**21.0**	**21.0**
AHU-26			**Sys Block**	**2,160**	**11.0**	**26,230**	**34,173**	**906**				**-21,070**	**906**	**21.0**	**21.0**
		212 TVFC	Rm Peak	230	4.0	5,969	7,717	223	6.45	0	0	-4,379	223	15.2	15.2
		213 DCP	Rm Peak	125	1.0	4,902	5,272	217	11.56	0	0	-3,312	217	5.8	5.8
		214 DCP	Rm Peak	125	1.0	4,902	5,272	217	11.56	0	0	-3,312	217	5.8	5.8
		215 DCP	Rm Peak	125	1.0	4,902	5,272	217	11.56	0	0	-3,312	217	5.8	5.8
		216 DCP	Rm Peak	125	1.0	4,902	5,272	217	11.56	0	0	-3,312	217	5.8	5.8
		217 DCP	Rm Peak	125	1.0	2,125	2,689	74	3.93	0	0	-1,510	74	17.0	17.0
		218 DCP	Rm Peak	160	1.0	5,946	6,526	253	10.52	0	0	-3,860	253	5.8	5.8
AHU-27			**Sys Peak**	**1,015**	**10.0**	**33,650**	**38,021**	**1,416**				**-22,998**	**1,416**	**7.8**	**7.8**
AHU-27			**Sys Block**	**1,015**	**10.0**	**32,547**	**36,473**	**1,416**				**-22,998**	**1,416**	**7.8**	**7.8**
		241 CONFERENCE	Rm Peak	255	10.0	6,223	8,588	256	6.68	0	0	-3,904	256	6.0	6.0
AHU-28			**Sys Peak**	**255**	**10.0**	**6,223**	**8,588**	**256**				**-3,904**	**256**	**6.0**	**6.0**
AHU-28			**Sys Block**	**255**	**10.0**	**6,223**	**8,588**	**256**				**-3,904**	**256**	**6.0**	**6.0**

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Load/Airflow Summary Report Page 4 of 4

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WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

MECHANICAL LOAD CALCULATIONS

SHEET

M4.03

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DBR Project Number 165026.000

MC	SN	NF	AH	--

ABBREVIATIONS

A

A	AMPERES
ABV	ABOVE
A/C	AIR CONDITIONING
AC	ALTERNATING CURRENT, AIR COMPRESSOR, ABOVE COUNTER
ACC	AIR COOLED CHILLER
ACCU	AIR COOLED CHILLER UNIT
AD	ACCESS DOOR
ADA	AMERICANS WITH DISABILITIES ACT
AF	AMPERE FUSE, AMPERE FRAME
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AIC	AMPERE INTERRUPT CAPACITY
AL	ALUMINUM
AM	AMMETER
AMP	AMPLIFIER
ANN	ANNUNCIATOR
AP	ACCESS PANEL, ALARM PANEL
ARCH	ARCHITECT, ARCHITECTURAL
ASC	AMPERES SHORT CIRCUIT
AT	AMPERE TRIP RATING
ATS	AUTOMATIC TRANSFER SWITCH
AVG	AVERAGE
AUX	AUXILIARY
AWG	AMERICAN WIRE GUAGE

B

BC	BELOW COUNTER
BKR	BREAKER
BLDG	BUILDING

C

C	CONDUIT, CELSIUS
CATV	CABLE TELEVISION SYSTEM
CCTV	CLOSED CIRCUIT TELEVISION
CWP	CONDENSER WATER PUMP
CH	CHILLER
CHP	CHILLED WATER PUMP
CIRC	CIRCULATING
CKT	CIRCUIT
CL	CENTERLINE
CLG	CEILING
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
CONC	CONCRETE
CONN	CONNECTION
CONT	CONTINUOUS, CONTINUATION
CONTR	CONTROLLER, CONTRACTOR
CP	CIRCULATING PUMP
CPUC	CPU CHILLER
CRU	CONDENSATE RETURN UNIT
CT	CURRENT TRANSFORMER, COOLING TOWER
CTR	CENTER
CU	COPPER

D

dB	DECIBEL
DC	DIRECT CURRENT
DDC	DIRECT DIGITAL CONTROL
DTL	DETAIL
DIA	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DN	DOWN
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DR	DROPPED RECEPTACLE
DW	DISHWASHER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
DWP	DOMESTIC WATER PUMP
DXFC	DX FAN COIL UNIT

E

(E)	EXISTING
EA	EACH
EC	ELECTRICAL CONTRACTOR
E.C.	EMPTY CONDUIT
EDF	ELECTRIC DRINKING FOUNTAIN
EF	EXHAUST FAN
EFF	EFFICIENCY
EHC	ELECTRIC HEATING COIL
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMERG	EMERGENCY
EMS	ENERGY MANAGEMENT SYSTEM
ENCL	ENCLOSURE
ENGR	ENGINEER
EPO	EMERGENCY POWER OFF
EQUIP	EQUIPMENT
(ER)	EXISTING TO REMAIN
EUH	ELECTRIC UNIT HEATER
EWH	ELECTRIC WATER HEATER
EXH	EXHAUST

F

F	FAHRENHEIT, FAN, FIRE
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FCU	FAN COIL UNIT
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLEX	FLEXIBLE
FLR	FLOOR
FLUOR	FLUORESCENT
FP	FIRE PUMP, FAN POWERED
FPTB	FAN POWERED TERMINAL BOX
FRZR	FREEZER
FS	FUSED SWITCH, FLOW SWITCH
FSD	MOTORIZED FIRE SMOKE DAMPER
FT	FOOT, FEET
FTL	FEED-THRU LUGS
FUT	FUTURE
FVNR	FULL VOLTAGE, NON-REVERSING

G

GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GND	GROUND
GUH	GAS UNIT HEATER

H

HACR	HEATING, AIR CONDITIONING RATED CIRCUIT BREAKER
HD	ELECTRIC HAND DRYER
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HS	HAND SET
HSC	HAND SCANNER
HTG	HEATING WATER PUMP
HTR	HEATER
GUH	HOT WATER/GAS UNIT HEATER
HVAC	HEATING, VENTILATING, AIR CONDITIONING
HVU	HEATING/VENTILATING UNIT
HWB	HOT WATER BOILER
HWC	HOT WATER CIRCULATOR
HWP	HOT WATER PUMP
HZ	HERTZ

I

ID	INSIDE DIAMETER
IG	ISOLATED GROUND
IN	INCH
INCAND	INCANDESCENT
INT	INTERNAL, INTERIOR

J,K,L

JB	JUNCTION BOX
JP	JOCKEY PUMP
KEC	KITCHEN EQUIPMENT
KO	CONTRACTOR KNOCKOUT
KVA	KILO-VOLT AMPS
KW	KILOWATT
KWH	KILOWATT-HOUR
LF	LINEAR FEET
LRA	LOCKED ROTOR AMPS
LTG	LIGHTING
LV	LOW VOLTAGE TRANSFORMER
LVL	LEVEL

M

M	METER
MAP	MASTER ALARM PANEL
MATV	MASTER ANTENNA TELEVISION SYSTEM
MAX.	MAXIMUM
MBP	MAINTENANCE BYPASS
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MD	MOTORIZED DAMPER
MDP	MAIN DISTRIBUTION PANEL
MECH.	MECHANICAL
MFR	MANUFACTURER
MH	METAL HALIDE
MIC	MICROPHONE
MIN.	MINIMUM
MLO	MAIN LUGS ONLY
MSB	MAIN SWITCHBOARD
MTD	MOUNTED
MV	MERCURY VAPOR

N

N3R	NEMA 3R ENCLOSURE
N4X	NEMA 4X ENCLOSURE
N.C.	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATON
NF	NON-FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NFS	NON FUSED SWITCH
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
N.O.	NORMALLY OPEN
NO.	NUMBER
NTS	NOT TO SCALE

O

OAF	OUTSIDE AIR FAN
OAHU	OUTSIDE AIR HANDLING UNIT
OC	ON CENTER
OD	OUTSIDE DIAMETER
OHE	OVERHEAD ELECTRICAL
OPG	OPENING

P,Q

P	POLE, PUMP
PB	PUSHBUTTON
PC	PLUMBING CONTRACTOR
PH	PHASE
PL	PILOT LIGHT
PLBG	PLUMBING
PNEU	PNEUMATIC
PNL	PANEL
POS	POINT OF SALE
PP	POWER POLE
PR	PAIR
PRI	PRIMARY
PVC	POLYVINYL CHLORIDE
PWR	POWER
QTY	QUANTITY

R

R	EXISTING TO BE REMOVED
RA	RETURN AIR
RAD	REFRIGERATED AIR DRYER
RAF	RETURN AIR FAN
RC	RECONNECT EXISTING DEVICE TO CIRCUIT INDICATED
RCP	REFLECTED CEILING PLAN
RCPT	RECEPTACLE
RE	REFERENCE, REFER
REC	RECEPTACLE
REFR	REFRIDGERATOR
REINF	REINFORCING
REL	EXISTING TO BE RELOCATED
REL/EX	NEW LOCATION OF RELOCATED EQUIPMENT
REQD	REQUIRED
REV	REVISION, REVISE
RGS	RIGID GALV. STEEL CONDUIT
RLA	RUNNING LOAD AMPS
RPM	REVOLUTIONS PER MINUTE
RR	REMOVE AND REPLACE
RTU	ROOFTOP UNIT

S

SA	SUPPLY AIR
SAF	SUPPLY AIR FAN
SCHED	SCHEDULE
SE	SEWAGE EJECTOR
SEC	SECONDARY
SECT	SECTION
SC	SHARED CIRCUIT
SF	SQUARE FEET
SHT	SHEET
SIM	SIMILAR
SKVA	STARTING KILOVOLTOAMPS
SKW	STARTING KILOWATTS
SP	SUMP PUMP
SPEC	SPECIFICATION
SPF	STAIR PRESSURIZATION FAN
SPKR	SPEAKER
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SQ	SQUARE
SRF	SMOKE REMOVAL FAN
SS	START-STOP PUSH BUTTON
SSSC	SOLID STATE SPEED CONTROL
ST	SHUNT TRIP
STB	STEAM BOILER
STD	STANDARD
STL	STEEL
SURF	SURFACE
SW	SWITCH
SWBD	SWITCHBOARD

T

TC	TEMPERATURE CONTROL
TEL	TELEPHONE
TF	TRANSFER FAN
TL	TWIST LOCK
TOC	TOP OF CURB
TOS	TOP OF STEEL
TP	CHILD TAMPER PROOF DEVICE
TSTAT	THERMOSTAT
TTB	TELEPHONE TERMINAL BOARD
TTC	TELEPHONE TERMINAL CABINET
TU	TERMINAL UNIT
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL

U

UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES, INC.
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY

V

V	VOLT
VA	VOLT-AMPERE
VAV	VARIABLE AIR VOLUME
VC	VOLUME CONTROL
VERT	VERTICAL
VFD	VARIABLE FREQUENCY DRIVE
VP	VACUUM PUMP
VM	VOLT METER

W

W	WATT, WIRE, WIDTH
WG	WIREGUARD
W/	WITH
W/O	WITHOUT
WP	WEATHERPROOF
WS	WATER SOFTENER
WT	WATERTIGHT, WEIGHT
WWF	WELDED WIRE FABRIC

X,Z

XFMR	TRANSFORMER
Z	ZONE

ELECTRICAL EQUIPMENT

- DISTRIBUTION PANEL
- SWITCHBOARD, MAIN DISTRIBUTION PANEL, OR MOTOR CONTROL CENTER
- PANELBOARD (FLUSH/SURFACE MOUNT)
- FLOOR MOUNTED DRY-TYPE TRANSFORMER
- SUSPENDED OR WALL MOUNTED TRANSFORMER
- ATS — AUTOMATIC TRANSFER SWITCH
- PLYWOOD TERMINAL BOARD. 4'x8'x3/4" U.N.O
- TERMINAL CABINET (FLUSH/SURFACE MOUNT) 24"x48"x3-1/2" U.N.O.
- BAT — BATTERY/INVERTER UNIT
- LV — LOW VOLTAGE TRANSFORMER.

ELECTRICAL SYMBOLS

MOTORS AND CONTROLS

- (5) — SINGLE/THREE PHASE MOTOR –NUMBER INDICATES HORSE POWER
- DISCONNECT (SAFETY) SWITCH – '200/3/150/N3R' DENOTES 'FRAME-SIZE/POLE/FUSE/NEMA-RATING' 'NF' DENOTES NON-FUSED
- ENCLOSED CIRCUIT BREAKER – '200/3/250/N3R' DENOTES 'FRAME-SIZE/POLE/TRIP-RATING'
- MOTOR STARTER – FURNISHED BY DIV. 23, INSTALLED BY DIV. 26
- COMBINATION STARTER/DISCONNECT (SAFETY) – '30/3/15' DENOTES 'FRAME-SIZE/POLE/FUSE'. 'NF' DENOTES NON-FUSED. PROVIDED BY DIV. 23, INSTALLED BY DIV. 26.
- VFD — VARIABLE FREQUENCY DRIVE. –PROVIDED BY DIV. 23, INSTALLED BY DIV. 26.
- EPO — EMERGENCY POWER OFF BUTTON
- LC — LIGHTING CONTACTOR
- TC — TIME CLOCK
- TS — TIME SWITCH
- PC — PHOTOCELL (AS PART OF OR ADDITION TO TIME-CLOCK)
- R — RELAY – MULTIPLE TYPES (REFER TO PLANS FOR USE)

RECEPTACLES AND OUTLETS

REFER TO SPECIFICATIONS FOR MOUNTING HEIGHT OF ALL DEVICES

- SIMPLEX WALL RECEPTACLE, NEMA 5-20R, 20A, 125V
- DUPLEX WALL RECEPTACLE, NEMA 5-20R, 20A, 125V
  - 'AC': ABOVE COUNTER
  - 'DR': DROPPED RECEPTACLE
  - 'GFI': GROUND FAULT INTERRUPTER
  - 'IG': ISOLATED GROUND
  - 'TP': TAMPER PROOF
  - 'UC': UNDER COUNTER
  - 'WP': WATERPROOF
  - 'USB': UNIVERSAL SERIAL BUS
  - 'C': CEILING
  - 'H': HORIZONTALLY ORIENTED RECEPTACLE REFER TO ARCHITECTURAL DRAWINGS FOR EXACT MOUNTING HEIGHT
- DUPLEX WALL RECEPTACLE ON EMERGENCY CIRCUIT. RED COLOR.
- DUPLEX WALL RECEPTACLE ON A DEDICATED CIRCUIT TO DATA PROCESSING, GRAY COLOR. PROVIDE ISOLATED GROUND WHERE NOTED.
- SPLIT WIRED RECEPTACLE. TOP RECEPTACLE SHALL BE SWITCHED ACCORDING TO PLANS, BOTTOM REMAINS UNSWITCHED
- FOURPLEX (DOUBLE DUPLEX) WALL RECEPTACLE. NEMA 5-20R, 20A, 125V.
- FOURPLEX WALL RECEPACLE ON EMERGENCY CIRCUIT. RED COLOR.
- SPECIAL RECEPTACLE. NEMA CONFIGURATION AS NOTED ON PLAN
- DUPLEX RECEPTACLE, PEDESTAL MOUNT
- FLUSH MOUNTED FLOOR OUTLET.
- MULTI-OUTLET SURFACE RACEWAY OR PLUGMOLD. SEE ARCHITECTURAL DRAWINGS FOR EXACT LENGTH AND MOUNTING HEIGHT.
- JUNCTION BOX
- PULL BOX (OVER 4" SQUARE)
- 2 GANG FLOOR OUTLET
- 3 GANG FLOOR OUTLET
- POWER POLE
- DIRECT CONNECTION TO EQUIPMENT
- CLOCK RECEPTACLE, MOUNTED 12" BELOW FINISHED CEILING. (2) DENOTES DOUBLE SIDED
- CRP — CORD REEL POWER
- FF — FURNITURE FEED
- TV — TELEVISION SET, SEE 'COMMUNICATION' SECTION
- PUSHBUTTON ROUGH-IN. 42" AFF
- H — HAND DRYER CONNECTION

COMMUNICATIONS

THE FOLLOWING NOTATIONS REFER TO ALL COMMUNICATIONS OUTLETS:

- DATA OUTLET, SAME HEIGHT AS RECEPTACLES
- FLUSH DATA FLOOR OUTLET,
- TV — TELEVISION OUTLET: PROVIDE (1) RECESSED BOX WITH (2) SINGLE GANG BOXES. DIV. 26 SHALL PROVIDE (1) DUPLEX RECEPTACLE IN 1 GANG AND (1) SPARE GANG BOX FOR A/V/DATA. 60" U.N.O.
- VC S — CEILING MOUNTED SPEAKER. "VC" INDICATES VOLUME CONTROL ON SPEAKER.
- S — WALL MOUNTED SPEAKER.
- C — SCHOOL INTERCOMMUNICATION CALLBACK.
- VC — VOLUME CONTROL – WALL MOUNTED

SCOPE OR WORK REQUIRED BY DIV. 26:

ALL DATA/AV DEVICES SHALL BE 'ROUGH-IN' ONLY. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH DIV. 27 AND 28 FOR EXACT ROUGH-IN REQUIREMENTS. AT A MINIMUM, ALL ROUGH-INS PROVIDED BY DIV. 26 SHALL HAVE A 3/4" CONDUIT FROM ROUGH-IN TO NEAREST ACCESSIBLE CEILING SPACE. TV ROUGH-INS SHALL BE PROVIDED WITH 1-1/4" CONDUIT FROM THE DATA/AV BOX TO CEILING SPACE ABOVE.

LIGHTING

LETTER(S) DENOTE TYPE – REFER TO LIGHTING FIXTURE SCHEDULE FOR ADDITIONAL INFORMATION.

- 2'x4' FLUORESCENT LIGHTING FIXTURE.
- 2'x2' FLUORESCENT LIGHTING FIXTURE
- 1'x4' FLUORESCENT LIGHTING FIXTURE
- 1'x2' FLUORESCENT LIGHTING FIXTURE
- 1'x1' FLUORESCENT LIGHTING FIXTURE
- FLUORESCENT STRIP FIXTURES
- STAGGERED STRIP FIXTURE
- INCANDESCENT, FLUORESCENT, LED, OR HID DOWNLIGHT
- WALL MOUNTED INCANDESCENT, FLUORESCENT, LED OR HID FIXTURE
- TRACK LIGHTING FIXTURE.
- CEILING MOUNTED EXIT SIGHT. ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S)
- WALL MOUNTED EXIT SIGN. ARROWS AS INDICATED. SHADED AREA DENOTES FACE(S)
- EMERGENCY WALL MOUNTED LIGHTING FIXTURE. BATTERY OPERATED UNLESS NOTED OTHERWISE
- HID SECURITY WALL-PACK
- SITE LIGHTING FIXTURE
- POST-TOP FIXTURE/ACORN FIXTURE. BRACKET ARM INDICATES WALL MOUNT WITH ARM
- LIGHT FIXTURE ON EMERGENCY BRANCH CIRCUIT OR WITH BATTERY PACK.

RACEWAYS AND WIRING

- HASH MARKS INDICATE NUMBER OF CONDUTORS. LEFT TO RIGHT:PHASE/NEUTRAL/GROUND/ISOLATED GROUND. NO HASH MARKS INDICATE (2) #12, PLUS #12 GROUND, UNLESS OTHERWISE
- 1LA-2,4 — HOMERUN TO PANEL WITH CIRCUIT NUMBER(S) INDICATED
- (SC) 1LA-2,4 — PARTIAL (SHARED) CIRCUIT HOMERUN
- CAP AND STAKE CONDUIT
- CONDUIT CONCEALED IN WALL OR CEILING
- CONDUIT UNDERSLAB OR UNDERGROUND
- EXPOSED CONDUIT
- CONDUIT TURNED UP
- CONDUIT TURNED DOWN
- 'X' — CONDUIT OR CABLE, WHERE 'X':
  - 'C' MASTER CLOCK
  - 'D' DATA
  - 'FA' FIRE ALARM
  - 'I' INTERCOM
  - 'PA' PAGING
  - 'S' SECURITY
  - 'T' TELEPHONE
  - 'V' VIDEO
  - 'OHE' OVERHEAD ELECTRIC
  - 'UG' UNDERGROUND ELECTRIC
  - 'DB' CONCRETE ENCASE DUCTBANK
  - 'EM' EMERGENCY CONDUIT

SECURITY/ACCESS CONTROL

- K — CARD KEY ACCESS
- CR — CARD READER
- CAMERA
- CAMERA WITH TILT/PAN
- DC — DOOR CONTACT SWITCH
- KP — KEYPAD
- HSC — HAND SCANNER
- CEILING MOUNTED MOTION DETECTOR
- WALL MOUNTED MOTION DETECTOR
- DC — DOOR CONTACT
- GB — GLASS BREAK SENSOR
- VS — SAFE VIBRATION SENSOR
- H — HOLD UP BUTTON
- ACB — ALARM CONTROL BOX
- A — ALARM AUDIO DEVICE

SCOPE OR WORK REQUIRED BY DIV. 26:

ALL SECURITY DEVICES SHALL BE 'ROUGH-IN' ONLY. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH DIV. 27 AND 28 FOR EXACT ROUGH-IN REQUIREMENTS. AT A MINIMUM, ALL ROUGH-INS PROVIDED BY DIV. 26 SHALL HAVE A 3/4" CONDUIT FROM ROUGH-IN TO NEAREST ACCESSIBLE CEILING SPACE.

ONE LINE AND RISER DIAGRAMS

- TRANSFORMER, TYPE & RATINGS AS NOTED
- 800A/3P — SWITCH, RATINGS AS SHOWN
- 400A — FUSE, RATING AS SHOWN
- CL — CIRCUIT BREAKER, RATING AS SHOWN. 3-POLE U.N.O. 'CL' DENOTES CURRENT LIMITING
- DRAWOUT CIRCUIT BREAKER, RATING AS SHOWN. 3-POLE U.N.O.
- ST — SHUNT TRIP
- GFI — GROUND FAULT RELAY
- K — KIRK KEY INTERLOCK
- M — DIGITAL METER
- 1200/5 — CURRENT TRANSFORMER, RATED AS SHOWN.
- 12.47KV/120V — POTENTIAL TRANSFORMER, RATING AS SHOWN
- GROUND CONNECTION
- LIGHTING ARRESTOR
- G — GENERATOR SET
- AUTOMATIC TRANSFER SWITCH
- BUS DUCT PLUG
- SPD — SURGE PROTECTION DEVICE
- M — ELECTRICAL METER

FIRE ALARM

- W — WATER FLOW SWITCH
- SP — SUPERVISORY SWITCH
- D — SMOKE DETECTOR – "D" INDICATES DUCT TYPE
- HEAT DETECTOR
- BT — BEAM DETECTOR TRANSMITTER, HIGH IN CEILING WALL DIRECT LINE OF SIGHT.
- BR — BEAM DETECTOR RECEIVER, HIGH IN CEILING WALL DIRECT LINE OF SIGHT.
- D — MAGNETIC DOOR HOLDER
- R — AUXILIARY CONTROL RELAY
- F — FIRE ALARM PULL STATION +42" AFF
- FIREMAN'S TELEPHONE JACK +42" AFF
- SPEAKER STROBE/HORN STROBE. (REFER TO SPECIFICATIONS TO DETERMINE IF F.A. WILL CONTAIN VOICE EVAC.) +80" AFF- 15/75cd U.N.O.
- SPEAKER/HORN (REFER TO SPECIFICATIONS TO DETERMINE IF F.A. WILL CONTAIN VOICE EVAC) +80" AFF
- VISUAL FIRE ALARM (STROBE) +80" AFF- 15/75cd U.N.O.
- FACP — FIRE ALARM CONTROL PANEL
- ANN — REMOTE FIRE ALARM ANNUNCIATOR PANEL
- VEP — FIRE ALARM VOICE EVACUATION PANEL
- S — FIRE ALARM SPEAKER
- FH — FIRE FIGHTER HANDSET
- RPS — REMOTE POWER SUPPLY FOR AUDIO/VISUAL FIRE ALARM DEVICES.
- FSD — FIRE SMOKE DAMPER

FIRE ALARM NOTES:

DO NOT PROVIDE SPEAKER AND HORNS IN THE SAME STRUCTURE. IF FIRE ALARM SPECIFIED REQUIRES VOICE EVACUATION, PROVIDE SPEAKER STROBES. IF VOICE EVACUATION IS NOT REQUIRED, PROVIDE SPEAKER STROBES. REFER TO SPECIFICATIONS FOR DETAILS.

ANNOTATIONS AND TAGS

- 1 — KEYED NOTE REFERENCE
- 1 — FEEDER SCHEDULE REFERENCE

DRAWING/DETAIL REFERENCE

REFER TO DRAWING/DETAIL NUMBER 1 E3-2

RE: 1 /E3-2 — SHEET NUMBER

GENERAL NOTES

1. NOT ALL SYMBOLS SHOWN ON THIS SYMBOL LIST ARE USED IN THE CONTRACT DOCUMENTS.
2. REFER TO SPECIFICATIONS FOR ALL MOUNTING HEIGHTS. MOUNTING HEIGHT STATED IN SPECIFICATIONS TAKE PRECEDENCE TO HEIGHTS STATED ON THIS SHEET.

SWITCHES

ALL SWITCHES SHALL BE MOUNTED AT 42" ABOVE FINISHED FLOOR TO CENTER OF DEVICE U.N.O.
ALL SWITCHES SHALL BE RATED FOR 20A, 120/277V U.N.O

- $ — SWITCH, SPST
- $x — SWITCH, WHERE 'X':
  - '2' DENOTES DPST
  - '3' DENOTES THREE-WAY
  - '4' DENOTES FOUR-WAY
  - 'F' FAN SPEED CONTROLLER
  - 'K' DENOTES KEY SWITCH
  - 'P' DENOTES PILOT LIGHT
  - 'R' DENOTES RED
  - 'M' MOTOR RATED SWITCH WITH THERMAL OVERLOADS
  - 'T' TIMER SWITCH
  - 'DM' DIMMER CONTROL SWITCH, 600 WATT U.N.O
  - 'MC' SPDT, CENTER OFF, MOMENTARY CONTACT
  - 'OC' OCCUPANCY SENSOR
  - 'OC2' DUAL RELAY OCCUPANCY SENSOR
  - 'PS' MOTORIZED PROJECTION SCREEN SWITCH
  - 'RS' ROLL-UP DOOR SWITCH OR CONTROLLER MODULE
- OC — CEILING MOUNTED OCCUPANCY SENSOR
- MP — MASTER OCCUPANCY SENSOR POWER PACK
- $D — DIGITAL ADDRESSABLE SWITCH, WHERE:
  - 'D1' 1-BUTTON DIGI-SWITCH
  - 'D2' 2-BUTTON DIGI-SWITCH
  - 'D3' 3-BUTTON DIGI-SWITCH
  - 'D4' 4-BUTTON DIGI-SWITCH
  - 'D5' 5-BUTTON DIGI-SWITCH
  - 'D6' 6-BUTTON DIGI-SWITCH
  - 'DM' SINGLE DIMMER DIGI-SWITCH
  - 'DM2' DOUBLE DIMMER DIGI-SWITCH
  - 'DK' KEYED DIGI-SWITCH

$D1 — SWITCH ADDRESS (IF APPLICABLE)
$D — SWITCH TYPE

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STATE OF TEXAS — NICOLE M. FENSIL — 99123 — REGISTERED PROFESSIONAL ENGINEER — 1/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

ELECTRICAL SYMBOLS AND ABBREVIATIONS

SHEET

E0.00

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TBPE Firm Registration No. 2234

DBR Project Number 165026.000

MC	SN	NF	AH	--

Bid 1701-139

Williamson County, Texas

GENERAL ELECTRICAL SPECIFICATIONS

1. COMPLY WITH THE MOST RECENTLY REVISED VERSIONS OF ALL APPLICABLE RULES, REGULATIONS AND ORDINANCES ADOPTED BY THE AUTHORITY HAVING JURISDICTION AND AS PER 2014 NATIONAL ELECTRICAL CODE, NFPA-70.
2. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH OWNER FOR ALL CONSTRUCTION STANDARDS.
3. THE SCOPE OF THE ELECTRICAL WORK INCLUDES FURNISHING AND INSTALLING ALL ELECTRICAL WORK FOR A COMPLETE INSTALLATION.
4. THIS DRAWING IS FOR FIXTURE AND OUTLET CIRCUITING INFORMATION. REFER TO ARCHITECTURAL DRAWING FOR NOTES, MOUNTING DETAILS AND EXACT LOCATIONS.
5. CONTRACTOR TO PROVIDE PULL STRING ROUTED TO CEILING PLENUM, TYPICAL FOR EACH TELEPHONE OUTLET USING PLENUM RATED CABLE. IF CABLE ROUTING IS RESTRICTED, BY ROUTING HORIZONTALLY OR IN AN INSULATED WALL, PROVIDE 3/4" CONDUIT WITH PULL STRING ROUTED TO ABOVE CEILING. COORDINATE WITH TENANT'S CABLE INSTALLER.
6. VERIFY ELECTRICAL REQUIREMENTS (IF ANY) FOR ANY SPECIAL EQUIPMENT PRIOR TO ANY WORK PERFORMED. PROVIDE ISOLATED GROUND WIRE AND GROUNDING BUS IN PANEL PER MANUFACTURER'S INSTALLATION REQUIREMENTS.
7. ALL RECEPTACLES TO BE MOUNTED A MINIMUM OF 18" A.F.F. AND ALL SWITCHES SHALL BE A MAXIMUM OF 42" A.F.F. UNLESS NOTED OTHERWISE. ALL DIMENSIONS ARE TO THE CENTERLINE. NEW DEVICE TYPES SHALL MATCH ORIGINAL BASE BUILDING STANDARDS WITH COLOR SELECTION BY ARCHITECT, UNLESS OTHERWISE NOTED.
8. CONTRACTOR SHALL PROVIDE ONE SET OF SUBMITTALS VIA EMAIL ON ALL ELECTRICAL EQUIPMENT, INCLUDING, BUT NOT LIMITED TO, SWITCH GEAR, LIGHT FIXTURES, ELECTRICAL DEVICES, DIMMERS, RACEWAYS, FIRE ALARM DEVICES ETC.
9. ALL WIRING SHALL BE COPPER. ALUMINUM WIRING IS NOT ACCEPTABLE. MINIMUM WIRE SIZE IS #12 AWG. CONDUCTORS SIZED SHALL BE STRANDED. INSULATION SHALL BE "UL" TYPE THW OR THHN/THWN. HOSPITAL GRADE METAL CLAD CABLE MAY BE USED FOR BRANCH CIRCUITS IF APPROVED BY THE AUTHORITY HAVING JURISDICTION.
10. MANUFACTURER AND CLASS OF ALL NEW DISCONNECT SWITCHES, ETC. SHALL MATCH ORIGINAL BASE BUILDING ELECTRICAL GEAR. ALL SAFETY SWITCHES ARE TO BE HEAVY DUTY TYPE UNLESS APPROVED BY OWNER.
11. ALL ELECTRICAL MATERIALS USED ON THIS PROJECT MUST BE U.L. LISTED AND LABELED.
12. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES AND SUBCONTRACTORS TO PROVIDE A COMPLETE WORKING SYSTEM.
13. THIS CONTRACTOR SHALL FURNISH AND INSTALL ALL MOTOR STARTERS NOT PROVIDED WITH MECHANICAL OR PLUMBING EQUIPMENT.
14. THIS CONTRACTOR SHALL PROVIDE CONDUIT FOR CONTROL WIRING. COORDINATE WITH MECHANICAL CONTRACTOR.
15. COORDINATE WITH MECHANICAL AND PLUMBING DRAWINGS FOR EXACT EQUIPMENT LOCATIONS.
16. MAINTAIN ALL U.L. FIRE RATED ASSEMBLIES AS NOTED ON ARCHITECTURAL DRAWINGS WHENEVER PENETRATING FLOOR SLABS, FIRE RATED CEILINGS AND FIRE RATED WALLS. ALL FIRE PROOFING MUST BE U.L. LISTED FOR THAT APPLICATION. MAINTAIN THE FIRE RESISTANCE RATING AS REQUIRED PER ARTICLE 300-21 N.E.C.
17. PROVIDE IDENTIFICATION OF ALL NEW PANEL BOARD AND DISTRIBUTION EQUIPMENT WITH ENGRAVED PHENOLIC PLASTIC LABEL SCREWED TO COVER. LABEL MUST IDENTIFY EQUIPMENT NAME, VOLTAGE AND PHASE, AMPACITY, AND SERVICE SOURCE.
18. PROVIDE UPDATED, TYPED DIRECTORY FOR EACH PANEL BOARD, DESIGNATING CIRCUITS BEING SERVED.
19. WHEN A LIFE SAFETY SYSTEM EXISTS, MAINTAIN THIS EXISTING SYSTEM IN ACCORDANCE WITH THE LOCAL CODES AND N.F.P.A., COORDINATING WITH OWNER FOR APPROVED LIFE SAFETY CONTRACTOR. BUILDING CORRIDORS MUST BE PROTECTED WITH SMOKE DETECTORS. AUDIBLE DEVICES MUST BE DISTINCT THROUGHOUT THE BUILDING. VISUAL ALARMS MUST PROVIDE COVERAGE PER AMERICANS WITH DISABILITIES ACT. THIS CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFYING THAT EXISTING SYSTEM IS ADEQUATE FOR ADDITIONS AND MODIFICATIONS REQUIRED IN THESE PLANS. REFER TO SEPARATE FIRE ALARM REMODELING NOTES.
20. IT IS THE RESPONSIBILITY OF THE CONTRACTOR OR CONTRACTORS TO VISIT THE SITE OF THE PROPOSED CONSTRUCTION IN ORDER TO FULLY UNDERSTAND THE FACILITIES, DIFFICULTIES AND RESTRICTION ATTENDING THE EXECUTION OF WTH WORK. NO ADDITIONAL COMPENSATION WILL BE ALLOWED THIS CONTRACTOR FOR WORK OR ITEMS OMITTED FROM HIS ORIGINAL PROPOSAL DUE TO HIS FAILURE TO INFORM HIMSELF REGARDING SUCH MATTERS AFFECTING THE PERFORMANCE OF THE WORK IN THIS CONTRACT OR NECESSARY FOR THE INSTALLATION AND COMPLETION OF THE WORK INCLUDED HEREIN.

FIRE ALARM REMODELING NOTES:

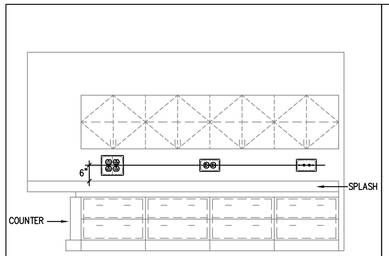
1. REFER TO THE FIRE ALARM PLAN FOR FIRE ALARM DEVICES, NEW OR EXISTING. BEING ADDED, RE-USED OR REMOVED BY THIS REMODEL.
2. THE INTENT OF THIS PLAN IS TO INCORPORATE NEW AND RELOCATED DEVICES WITH THE EXISTING BASE BUILDING FIRE ALARM SYSTEM. WHEN A PULL STATION OR SMOKE DETECTOR IS ACTIVATED THE STROBES WILL FLASH AND SPEAKERS WILL SOUND ON THE FLOOR ABOVE AND THE FLOOR BELOW THE FLOOR OF INCIDENCE.
3. IT IS ASSUMED WITH THIS REMODEL THAT THE EXISTING SYSTEM MEETS REQUIRED CODES FOR THE ORIGINAL DATE OF INSTALLATION, AND BUILDING MANAGEMENT HAS MAINTAINED SYSTEM IN COMPLIANCE WITH LIFE SAFETY 101. FOR SEQUENCE OF OPERATIONS AND SPECIFICATIONS, REFER TO ORIGINAL SYSTEM DOCUMENT. COORDINATE WITH OWNER.
4. THE EQUIPMENT SUPPLIER AND INSTALLING CONTRACTOR SHALL BE LICENSED BY THE STATE FIRE MARSHALL TO SELL, INSTALL, AND SERVICE FIRE ALARM SYSTEMS AS REQUIRED BY ARTICLE 5.49-2 OF THE TEXAS INSURANCE CODE.
5. ALL NEW EQUIPMENT REQUIRED FOR THIS REMODEL SHALL BE COMPATIBLE WITH THE EXISTING BUILDING SYSTEM AND IS TO BE A PART OF THE SUBMITTAL PROCESS AS NOTED IN THE ELECTRICAL SPECIFICATIONS FOR THIS PROJECT. PROVIDE ADDITION SYSTEM POWER BOOSTER WHERE REQUIRED.
6. APPROVED FIRE ALARM CONTRACTOR TO FIELD VERIFY THAT THE EXISTING SYSTEM IS ADEQUATE FOR ADDITIONS AND MODIFICATIONS AND DETERMINE EXACT LOCATIONS OF NEW, RELOCATED AND EXISTING DEVICES. VERIFY QUANTITIES OF NEW DEVICES TO INTERFACE WITH THE EXISTING BUILDING SYSTEM. THE CONTRACTOR SHALL COORDINATE WITH OWNER AND SHALL NOTIFY THE ENGINEER IF ANY CONFLICT EXISTS PREVENTING MODIFICATIONS REQUIRED IN THESE PLANS.
7. THE SYSTEM WHEN MODIFIED, SHALL BE A COMPLETE AND WORKING SYSTEM, AND COMPLY WITH THE MOST RECENT RULES, REGULATIONS, AND ORDINANCES THAT PRESENTLY APPLY TO THIS REMODEL.
8. ALL FIRE ALARM WORK IS TO BE APPROVED BY THE OWNER PRIOR TO START OF CONSTRUCTION.
9. ALL EXISTING SMOKE DETECTORS SUBJECTED TO DUST AND DEBRIS DURING CONSTRUCTION SHALL BE REPLACED WITH HEAT TYPE DETECTORS. REPLACE SMOKE DETECTORS WITH NEW UPON COMPLETIONOF CONSTRUCTION. FIELD VERIFY LOCATIONS OF ALL DEVICES.
10. FIRE ALARM CONTRACTOR SHALL SUBMIT AUDIBILITY TESTING RESULTS TO BUILDING MANAGEMENT UPON COMPLETION.

GENERAL ELECTRICAL REMODELING NOTES:

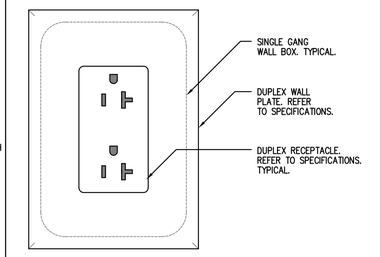
1. WHEN OUTLETS ARE ABANDONED, WIRE MUST BE PULLED OUT OF CONDUIT BACK TO THE NEAREST REMAINING BOX OR CABINET AND EXPOSED CONDUIT, THAT HAS BEEN ABANDONED, MUST BE REMOVED.
2. REESTABLISH SERVICE TO ALL OUTLETS THAT MAY HAVE BEEN INTERRUPTED BECAUSE OF REMODELING WORK.
3. PROVIDE ALL APPURTENANCES REQUIRED TO REROUTE, RELOCATE, REMOVE, OR REINSTALL ALL ITEMS DESCRIBED IN THESE NOTES.
4. VERIFY THE LOADING OF EACH CIRCUIT AFFECTED BY REMODELING WORK. THE MAXIMUM LOAD OF ANY BRANCH CIRCUIT MUST NOT EXCEED 80% OF ITS RATING.
5. REMOVE ALL OUTLETS AND WIRING ASSOCIATED WITH ALL EQUIPMENT BEING REMOVED, INCLUDING MECHANICAL AND PLUMBING EQUIPMENT.

LIGHT FIXTURE SCHEDULE

TYPE	MANUFACTURER	MOUNTING	LAMPS	VOLTS	REMARKS
A/AE	METALUX #22GR-L04-32-F1-UNV-L835-CD1-U	RECESSED	33W LED	120V	RECESSED 2'X2' LED TROFFER.
B/BE	HALO COMMERCIAL #PD6-15-ED010-PDMBA-835	RECESSED	17W LED	120V	6" RECESSED DOWNLIGHT.
C/CE	METALUX #4SWLED-L04-36SLLC-UNV-GTD2L840-CD1-U	SURFACE	35W LED	120V	4" SURFACE MOUNTED LED. WET LISTED.
D/DE	LUMARK #LDWP-FC-4A-DT	SURFACE	40W LED	120V	WET LISTED, FULL CUT OFF LED WALL PACK.
F	NEO-RAY #S23DR-2L35-SR-3-UDD-S1S93	RECESSED	28W LED	120V	RECESSED NARROW DIRECT LED. VERIFY FINISH WITH ARCHITECT.
GE	MCGRAW-EDISON #TT-O6-LED-E1-WQ-TR	SURFACE	108W LED	120V	SURFACE MOUNTED LED CANOPY LIGHT.
X	SURE-LITES #LPX-7	SURFACE	LED	120V	SURFACE MOUNTED POLYCARBONATE LED EXIT SIGN.



1 TYPICAL COUNTERTOP DEVICE ELEVATION
NOT TO SCALE EPR001.DWG



2 TYPICAL RECEPTACLE MOUNTING DETAIL
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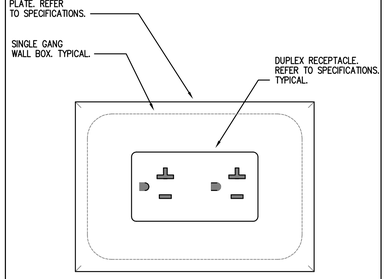
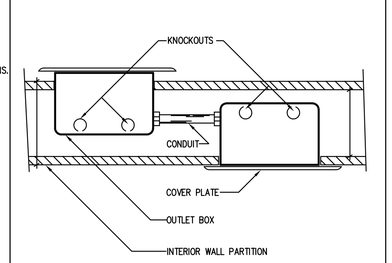
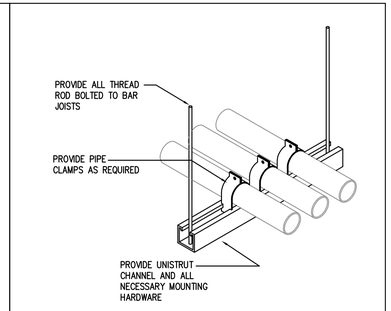


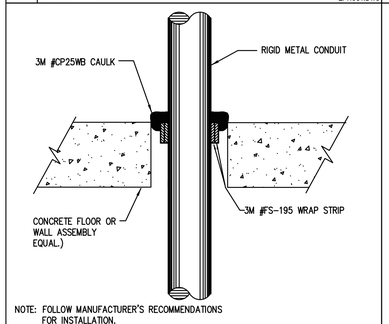
3 HORIZONTAL RECEPTACLE MOUNTING DETAIL
NOT TO SCALE EPR007.DWG



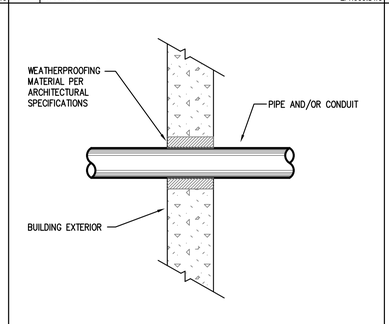
4 BACK-TO-BACK OUTLETS
NOT TO SCALE EPR013.DWG



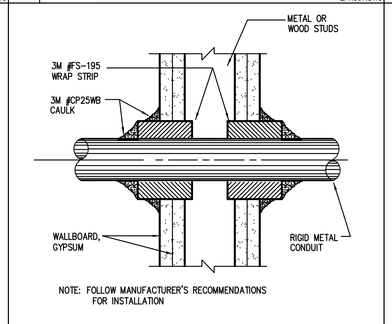
5 UNISTRUT CONDUIT DETAIL
NOT TO SCALE EPC001.DWG



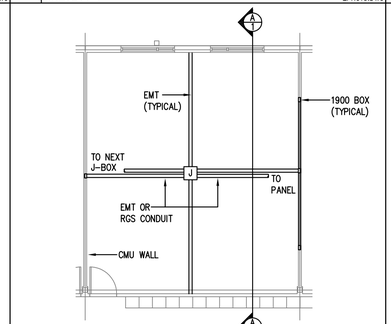
9 2, 3 AND 4 HR. PENETRATIONS FOR CONCRETE FLOOR AND WALL
NOT TO SCALE EPC013.DWG



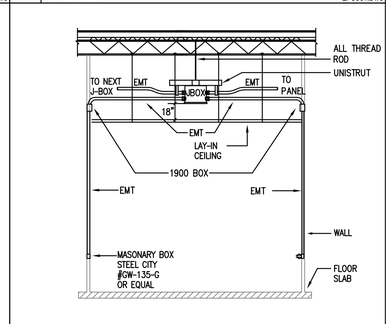
10 PIPE AND/OR CONDUIT PENETRATION
NOT TO SCALE EPC014.DWG



6 1 AND 2 HR. GYPSUM/WALLBOARD PIPE PENETRATION
NOT TO SCALE EPC012.DWG



7 TYP. RACEWAY CONFIGURATION
NOT TO SCALE EPW005.DWG



8 SECTION A-A FOR TYPICAL RACE WAY CONFIGURATION
NOT TO SCALE EPW009.DWG

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Round Rock, Texas

STATE OF TEXAS
NICOLE M. FERSTL
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REGISTERED PROFESSIONAL ENGINEER
11/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

ELECTRICAL NOTES, DETAILS AND LIGHT FIXTURE SCHEDULE

SHEET

E3.01

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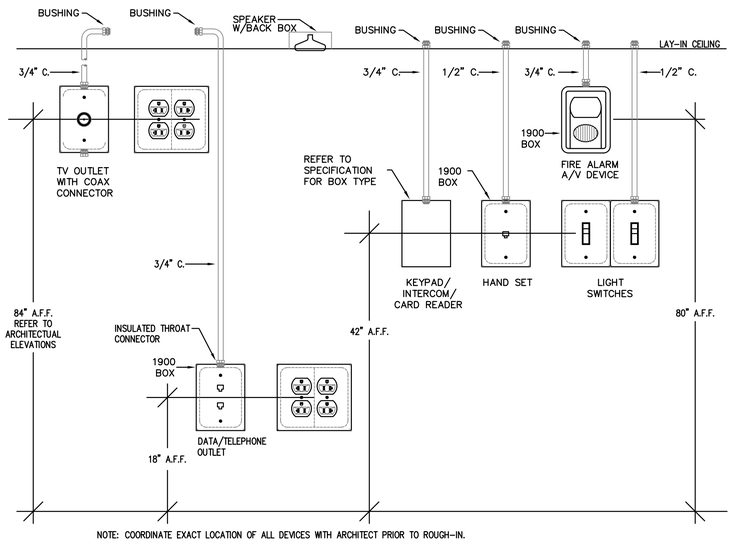
Austin, Texas 78757
512.637.4393 p 512.637.4396 f
TBPE Firm Registration No. 2234

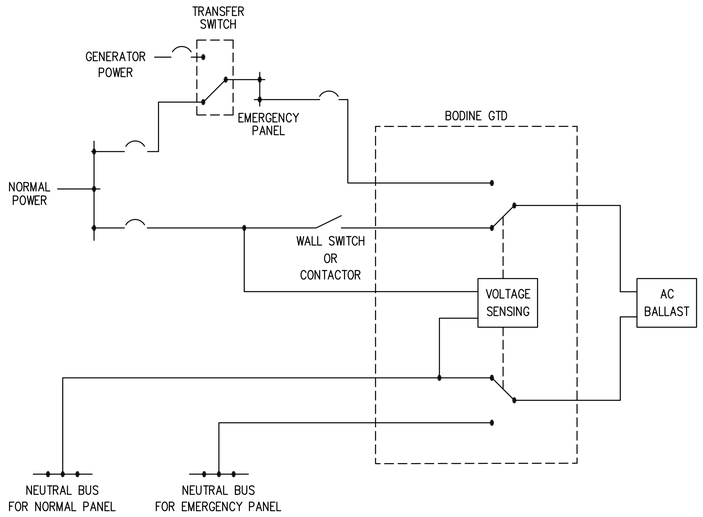
DBR Project Number 165026.000

MC	SN	NF	AH	--

2/2/2017 8:32 AM



1 TYPICAL DEVICE ELEVATIONS
NOT TO SCALE EDo001.DWG



* REFER TO ONE LINE DIAGRAM FOR FEEDER SIZES

2 BODINE GTD GENERATOR TRANSFER DEVICE
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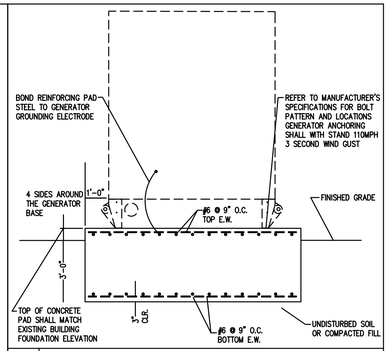
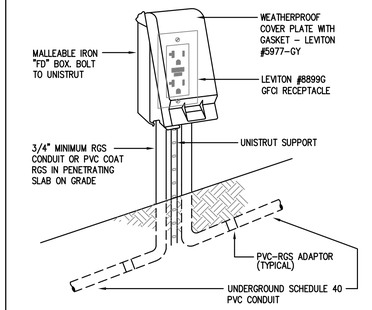
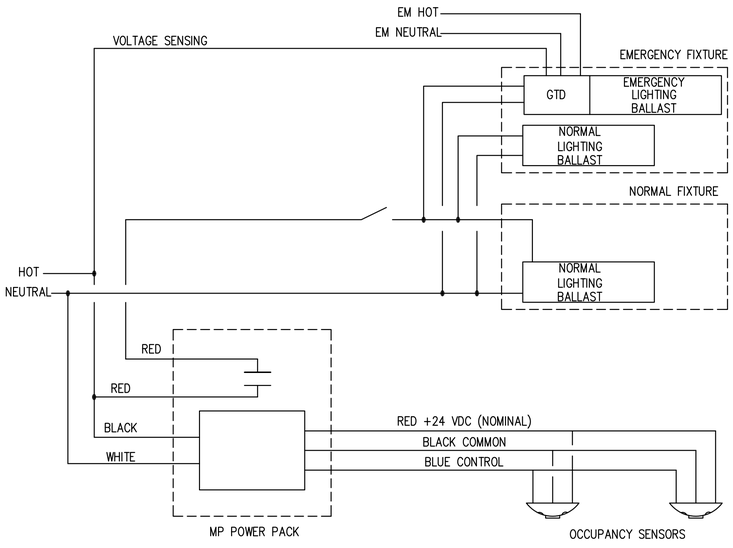


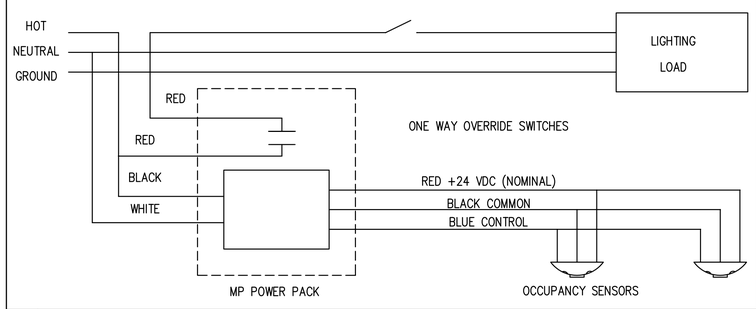
3 GENERATOR PAD DETAIL
NOT TO SCALE



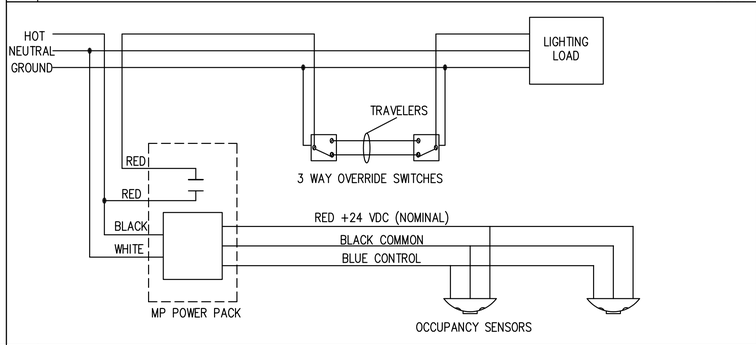
4 RECEPTACLE MOUNTING DETAIL
NOT TO SCALE epr018



5 EMERGENCY GTD WITH OCCUPANCY SENSORS
NOT TO SCALE EPG001.DWG



6 1 WAY OCCUPANCY SENSOR
NOT TO SCALE ELC018.DWG



7 3 WAY OCCUPANCY SENSOR
NOT TO SCALE ELC019.DWG

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Austin, Texas 78746
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In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
NICOLE M. FERSTL
99123
REGISTERED PROFESSIONAL ENGINEER
11/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE
ELECTRICAL DETAILS

SHEET
E3.02

DBR
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Austin, Texas 78757
512.637.4393 p 512.637.4396 f
TBPE Firm Registration No. 2234

DBR Project Number 165026.000

MC	SN	NF	AH	--

Distribution Panelboard M

42,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 1200 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
1	66480	PANEL B	SP	3/0	200/3	1	A	2	150/3	1/0	SP	PANEL G	45200	1
1		-		3/0	-	3	B	4	-	1/0		-		1
1		-		3/0	-	5	C	6	-	1/0		-		1
1	25780	PANEL E	SP	3/0	200/3	7	A	8	100/3	3	SP	PANEL D	23360	1
1		-		3/0	-	9	B	10	-	3		-		1
1		-		3/0	-	11	C	12	-	3		-		1
1	43709	PANEL C	SP	1/0	150/3	13	A	14	100/3	3	SP	PANEL F	20120	1
1		-		1/0	-	15	B	16	-	3		-		1
1		-		1/0	-	17	C	18	-	3		-		1
4	27779	PANEL EM	SP	3	100/3	19	A	20				SPACE		
4		-		3	-	21	B	22				SPACE		
4		-		3	-	23	C	24				SPACE		
		SPACE				25	A	26				SPACE		
		SPACE				27	B	28				SPACE		
		SPACE				29	C	30				SPACE		
		SPACE				31	A	32				SPACE		
		SPACE				33	B	34				SPACE		
		SPACE				35	C	36				SPACE		
1	122375	PANEL A	SP	500	400/3	37	A	38				SPACE		
1		-		500	-	39	B	40				SPACE		
1		-		500	-	41	C	42				SPACE		
	286,123	Subtotal										Subtotal	88,680	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	0		0	210.20(a)	(L) Lighting	0	125%	0
220.56	(K) Kitchen	0	100%	0		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	0	0%	0		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	0	100%	0		(SP) Sub Panel	374,803	100%	374,803

Total Connected Load 374,803 VA = 1041.1 AMPS
Total Load (Diversified 374,803 VA = 1041.1 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard A

42,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 400 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
3,5	2335	AHU-1.1	C	10	30/3	1	A	2	25/2	10	C	CU-1.6	1150	3,5
3,5	2335	-	C	10	-	3	B	4	-	10	C	-	1150	3,5
3,5	2335	-	C	10	-	5	C	6	45/3	8	C	AHU-2.3	3510	3,5
3,5	2185	AHU-1.2	C	10	30/3	7	A	8	-	8	C	-	3510	3,5
3,5	2185	-	C	10	-	9	B	10	-	8	C	-	3510	3,5
3,5	2185	-	C	10	-	11	C	12	45/3	8	C	AHU-2.7	3510	3,5
3,5	2185	AHU-1.3	C	10	30/3	13	A	14	-	8	C	-	3510	3,5
3,5	2185	-	C	10	-	15	B	16	-	8	C	-	3510	3,5
3,5	2185	-	C	10	-	17	C	18	25/2	10	C	CU-2.1	1150	3,5
3,5	2335	AHU-1.4	C	10	30/3	19	A	20	-	10	C	-	1150	3,5
3,5	2335	-	C	10	-	21	B	22	25/3	10	C	CU-1.3	1150	3,5
3,5	2335	-	C	10	-	23	C	24	-	10	C	-	1150	3,5
3,5	3510	AHU-1.5	C	8	45/3	25	A	26	30/3	10	C	AHU-2.4	2335	3,5
3,5	3510	-	C	8	-	27	B	28	-	10	C	-	2335	3,5
3,5	3510	-	C	8	-	29	C	30	-	10	C	-	2335	3,5
3,5	3510	AHU-1.9	C	8	45/3	31	A	32	45/3	8	C	AHU-2.2	3510	3,5
3,5	3510	-	C	8	-	33	B	34	-	8	C	-	3510	3,5
3,5	3510	-	C	8	-	35	C	36	-	8	C	-	3510	3,5
1	500	EXISTING LOAD	M	12	20/1	37	A	38	20/1	12	M	EXISTING LOAD	500	1
4,5	1550	AHU-2.5	C	10	25/2	39	B	40	25/2	10	C	CU-2.4	1150	4,5
4,5	1550	-	C	10	-	41	C	42	-	10	C	-	1150	4,5
	51,780	Subtotal										Subtotal	48,295	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	0		0	210.20(a)	(L) Lighting	0	125%	0
220.56	(K) Kitchen	0	100%	0		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	99,075	100%	99,075	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	0	0%	0		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	1,000	100%	1,000		(SP) Sub Panel	0	100%	0

Total Connected Load 100,075 VA = 278.0 AMPS
Total Load (Diversified 100,075 VA = 278.0 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard B

10,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 225 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
3,5	1170	CU-1.1	C	10	25/3	1	A	2	45/3	8	C	AHU-1.10	3510	3,5
3,5	1170	-	C	10	-	3	B	4	-	8	C	-	3510	3,5
3,5	1170	-	C	10	-	5	C	6	-	8	C	-	3510	3,5
3,5	1150	CU-1.2	C	10	25/2	7	A	8	30/3	10	C	AHU-1.6	2185	3,5
3,5	1150	-	C	10	-	9	B	10	-	10	C	-	2185	3,5
3,5	1170	CU-2.6	C	10	25/3	11	C	12	-	10	C	-	2185	3,5
3,5	1170	-	C	10	-	13	A	14	30/3	10	C	AHU-1.8	2335	3,5
3,5	1170	-		10	-	15	B	16	-	10	C	-	2335	3,5
		SPACE				17	C	18	-	10	C	-	2335	3,5
3,5	1170	CU-1.4	C	10	25/3	19	A	20	25/3	10	C	CU-1.8	1170	3,5
3,5	1170	-	C	10	-	21	B	22	-	10	C	-	1170	3,5
3,5	1170	-	C	10	-	23	C	24	-	10	C	-	1170	3,5
3,5	1405	CU-1.5	C	10	30/3	25	A	26	30/3	10	C	AHU-2.1	2185	4,5
3,5	1405	-	C	10	-	27	B	28	-	10	C	-	2185	4,5
3,5	1405	-	C	10	-	29	C	30	-	10	C	-	2185	4,5
3,5	1405	CU-1.9	C	10	30/3	31	A	32	30/3	10	C	CU-2.3	1405	4,5
3,5	1405	-	C	10	-	33	B	34	-	10	C	-	1405	4,5
3,5	1405	-	C	10	-	35	C	36	-	10	C	-	1405	4,5
4,5	1170	CU-1.10	C	10	25/3	37	A	38	30/3	10	C	CU-2.2	1405	4,5
4,5	1170	-	C	10	-	39	B	40	-	10	C	-	1405	4,5
4,5	1170	-	C	10	-	41	C	42	-	10	C	-	1405	4,5
	24,770	Subtotal										Subtotal	42,585	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	0		0	210.20(a)	(L) Lighting	0	125%	0
220.56	(K) Kitchen	0	100%	0		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	66,185	100%	66,185	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	0	0%	0		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	0	100%	0		(SP) Sub Panel	0	100%	0

Total Connected Load 66,185 VA = 183.8 AMPS
Total Load (Diversified 66,185 VA = 183.8 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard C

10,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 225 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
3,5	3510	AHU-2.6	C	8	45/3	1	A	2	20/2	12	C	CU-2.5	810	2
3,5	3510	-	C	10	-	3	B	4	-	12	C	-	810	2
3,5	3510	-	C	10	-	5	C	6	20/2	12	C	AC-2	104	3
3,5	1405	CU-2.7	C	10	30/3	7	A	8	-	12	C	-	104	3
4,5	1405	-	C	10	-	9	B	10	20/1	12	F	HEPA-1	560	2
4,5	1405	-	C	10	-	11	C	12	20/1	12	F	EXHAUST FANS	1019	4
1	7100	ELEVATOR	MT	3	100/3	13	A	14	20/1	12	L	ELEVATOR CAB LTS	500	1
1	7100	-	MT	3	-	15	B	16	20/1	12	MT	SUMP PUMP	500	1
1	7100	-	MT	3	-	17	C	18	20/1	12	R	ELEV PIT LT/RECEPT	500	1
1	300	F/Q BOOSTER	M	12	20/1	19	A	20	20/1	12	M	FA PANEL	400	1
1	500	EXISTING LOAD	M	12	20/1	21	B	22	20/1	12	M	1ST FL COND PMPS	800	2
1	500	EXISTING LOAD	M	12	20/1	23	C	24	20/1	12	M	SUMP PUMP ALARM	200	1
1	1200	COPIER #122	M	12	20/1	25	A	26	20/1	12	M	IRRIGATION CNTL	400	2
1	500	EXISTING LOAD	M	12	20/1	27	B	28	20/1	12	M	EXISTING LOAD	500	1
		SPACE				29	C	30	20/1	12	M	2ND FL COND PMPS	640	4
	39,045	Subtotal										Subtotal	7,847	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	500		500	210.20(a)	(L) Lighting	500	125%	625
220.56	(K) Kitchen	0	100%	0		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	16,573	100%	16,573	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	0	0%	0		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	1,579	100%	1,579	220.50	(MT) Lrg. Mot.	21,800	125%	27,250
	(M) Misc.	5,940	100%	5,940		(SP) Sub Panel	0	100%	0

Total Connected Load 46,892 VA = 130.3 AMPS
Total Load (Diversified 52,467 VA = 145.7 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard D

10,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 225 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
1	720	REC 113-116,118,133	R	12	20/1	1	A	2	20/1	12	R	REC 110,131,119,120	720	1
1	720	REC 121/2/9,130/1/7	R	12	20/1	3	B	4	20/1	12	R	REC 123/5/6/8,138/9	720	1
1	720	REC 154/5/6/9,165/6	R	12	20/1	5	C	6	20/1	12	R	REC 140-143,149,150	720	1
1	720	REC 169-171,177	R	12	20/1	7	A	8	20/1	12	R	REC 147,152,164,179	720	1
1	720	R152,163,206-209	R	12	20/1	9	B	10	20/1	12	R	REC 210-215	720	1
1	720	R216?,232/3/5,240	R	12	20/1	11	C	12	20/1	12	R	REC 230/1/6/7/8,218	720	1
1	720	219-221,228,239,240	R	12	20/1	13	A	14	20/1	12	R	REC 224-227,241/2	720	1
1	720	REC 243/4,270-273	R	12	20/1	15	B	16	20/1	12	R	246/7,268/9,276/7	720	1
1	720	249/50/66/67/81/82	R	12	20/1	17	C	18	20/1	12	R	203,251,260,263-5	720	1
1	720	RECEPT 204,205	R	12	20/1	19	A	20	50/2	8	M	1ST FLOOR TELE RM	3600	1
1	720	REC 1-FLR TEL RM	R	12	20/1	21	B	22	-	8	M	RECTIFIER	3600	1
1	720	REC 2-FLR TEL RM	R	12	20/1	23	C	24	20/1	12	R	REC 2-FLR TEL RM	720	1
1	720	EXISTING LOAD	R	12	20/1	25	A	26	20/1	12	R	EXISTING LOAD	720	1
1	720	EXISTING LOAD	R	12	20/1	27	B	28	20/1	12	R	EXISTING LOAD	720	1
1	720	EXISTING LOAD	R	12	20/1	29	C	30	20/1	12	R	EXISTING LOAD	720	1
1	720	EXISTING LOAD	R	12	20/1	31	A	32	20/1	12	R	EXISTING LOAD	720	1
1	720	EXISTING LOAD	R	12	20/1	33	B	34	20/2	12	H	EUH-1	1650	4
		SPACE				35	C	36	-	12	H	-	1650	4
4	1667	GENERATOR	H	12	20/3	37	A	38	20/2	12	C	CCU-2	1560	4
4	1667	WATER JACKET	H	12	-	39	B	40	-	12	C	-	1560	4
4	1667	HEATER	H	12	-	41	C	42				SPACE		
	17,241	Subtotal										Subtotal	23,700	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	22,320		16,160	210.20(a)	(L) Lighting	0	125%	0
220.56	(K) Kitchen	0	100%	0		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	3,120	0%	0	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	8,301	100%	8,301		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	7,200	100%	7,200		(SP) Sub Panel	0	100%	0

Total Connected Load 40,941 VA = 113.7 AMPS
Total Load (Diversified 31,661 VA = 87.9 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard E

10,000 AIC Rating
X Existing
New

120/208 Volt,3-Phase,4-Wire, 1 Section, 1 -Nema Rating | X MLO | 225 AMP MCB | AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
2	500	CARD READERS	M	12	20/1	1	A	2	20/1	12	R	EXTERIOR RECEPT	540	2
2	1419	1ST FLOOR LIGHTS	L	12	20/1	3	B	4	20/1	12	R	CHECKOUT RECEPT	540	2
2	964	1ST FLOOR LIGHTS	L	12	20/1	5	C	6	20/1	12	K	REFRIGERATOR	1200	2
2	726	1ST FLOOR LIGHTS	L	12	20/1	7	A	8	20/1	12	R	MEETING 147 RECPT	540	2
2	924	1ST FLOOR LIGHTS	L	12	20/1	9	B	10	20/1	12	R	MEETING 147 RECPT	540	2
2	858	1ST FLOOR LIGHTS	L	12	20/1	11	C	12	20/1	12	R	RECEPTACLES	720	2
2	860	1ST FLOOR LIGHTS	L	12	20/1	13	A	14	20/1	12	R	2CSRS RECEPTS	1080	2
2	1101	1ST FLOOR LIGHTS	L	12	20/1	15	B	16	20/1	12	K	REFRIGERATOR	1200	2
		SPARE		12	20/1	17	C	18	20/1	12	R	CONFER. 229 RECPT	540	2
		SPARE		12	20/1	19	A	20	20/1	12	R	2CSRS RECEPTS	540	2
		SPARE		12	20/1	21	B	22	20/1	12	L	2ND FLOOR LIGHTS	1254	2
		SPARE		12	20/1	23	C	24	20/1	12	L	2ND FLOOR LIGHTS	1254	2
		SPARE		12	20/1	25	A	26	20/1	12	L	2ND FLOOR LIGHTS	1683	2
		SPARE		12	20/1	27	B	28	20/1	12	L	2ND FLOOR LIGHTS	1421	2
1	1200	LIGHT POLES	L	12	20/1	29	C	30	20/1	12	R	HVAC CONT. PANEL	360	2
1	300	CONTACTOR	M	12	20/1	31	A	32	20/1	12	H	GEN COND. HEATER	100	2
		SPARE		12	20/1	33	B	34	20/1	12		SPARE		
		SPARE		12	20/1	35	C	36	20/1	12		SPARE		
		SPARE		12	20/1	37	A	38	20/1	12		SPARE		
		SPACE				39	B	40				SPACE		
		SPACE				41	C	42				SPACE		
	8,852	Subtotal										Subtotal	13,512	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	5,400		5,400	210.20(a)	(L) Lighting	13,664	125%	17,080
220.56	(K) Kitchen	2,400	100%	2,400		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	0	0%	0	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	100	100%	100		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	800	100%	800		(SP) Sub Panel	0	100%	0

Total Connected Load 22,364 VA = 62.1 AMPS
Total Load (Diversified 25,780 VA = 71.6 AMPS
Location of Panel: ELECTRICAL ROOM

Panelboard EM

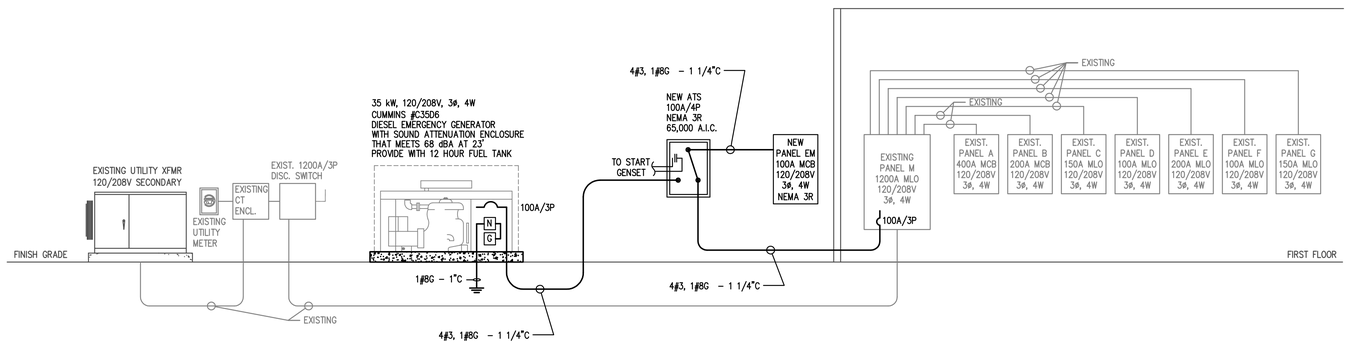
10,000 AIC Rating
Existing
X New

120/208 Volt,3-Phase,4-Wire, 1 Section, 3R -Nema Rating | X MLO | 100 AMP MCB | 100 AMP BUS (Copper) | X Single, Double, Feed - Thru | X Surface, Flush

Notes	Load (VA)	Description	Type	Wire	CB	CKT #	PH	CKT #	CB	Wire	Type	Description	Load (VA)	Notes
	264	LAB LIGHTING	L	12	20/1	1	A	2	30/3	10	C	AHU-1.7	2185	5
	99	CONF LIGHTING	L	12	20/1	3	B	4	-	10	C	-	2185	5
	836	2ND FL EM LIGHTS	L	12	20/1	5	C	6	-	10	C	-	2185	5
	1414	1ST FL EM LIGHTS	L	12	20/1	7	A	8	25/2	10	C	CU-1.7	1150	5
	900	LAB RECEPTS	R	12	20/1	9	B	10	-	10	C	-	1150	5
	1200	LAB FRIDGE	K	12	20/1	11	C	12	25/2	10	C	AHU-2.8	1150	5
	1200	LAB FRIDGE	K	12	20/1	13	A	14	-	10	C	-	1150	5
	1200	LAB FRIDGE	K	12	20/1	15	B	16	20/2	12	C	CU-2.8	810	5
	1200	LAB FRIDGE	K	12	20/1	17	C	18	-	12	C	-	810	5
	900	CONF RECEPTS	R	12	20/1	19	A	20	15/2	12	C	AC-1	104	5
	720	IT RECEPTS	R	12	20/1	21	B	22	-	12	C	-	104	5
	540	STORAGE RECEPT	R	12	20/1	23	C	24	30/3	10	C	CCU-1	1500	5
	360	IT RACK	R	12	20/1	25	A	26	-	10	C	-	1500	5
	360	IT RACK	R	12	20/1	27	B	28	20/1	12		SPARE		
	360	IT RACK	R	12	20/1	29	C	30	20/1	12		SPARE		
	500	ACCESS CNTL PNL	M	12	20/1	31	A	32				SPACE		
		SPARE		12	20/1	33	B	34				SPACE		
		SPARE		12	20/1	35	C	36				SPACE		
		SPACE				37	A	38				SPACE		
		SPACE				39	B	40				SPACE		
		SPACE				41	C	42				SPACE		
	12,053	Subtotal										Subtotal	15,983	

N.E.C.	Load Type	Conn.	Fct.	Diversity	N.E.C.		Conn.	Fct.	Diversity
220.44	(R) Recept.	4,140		4,140	210.20(a)	(L) Lighting	2,613	125%	3,266
220.56	(K) Kitchen	4,800	80%	3,840		(EL) Ext. Ltg.	0	125%	0
220.60	(C) Cooling	15,983	100%	15,983	620.14	(E) Elevators	0	100%	0
220.60	(H) Heating	0	0%	0		(WH) Water Ht.	0	100%	0
220.60	(F) Fans	0	100%	0	220.50	(MT) Lrg. Mot.	0	125%	0
	(M) Misc.	500	100%	500		(SP) Sub Panel	0	100%	0

Total Connected Load 28,036 VA = 77.9 AMPS
Total Load (Diversified 27,729 VA = 77.0 AMPS
Location of Panel: EXTERIOR



ONE-LINE DIAGRAM GENERAL NOTES:

A. ELECTRICAL SERVICE AND ALL PANELBOARDS ARE EXISTING TO REMAIN, UNLESS NOTED OTHERWISE.

ONE-LINE DIAGRAM KEYED NOTES:

(1) PROVIDE NEW 100A/3P CIRCUIT BREAKER IN EXISTING AVAILABLE SPACE TO FEED NEW ATS. NEW CIRCUIT BREAKER SHALL MATCH EXISTING.

PANEL SCHEDULE NOTES:

1. EXISTING LOAD TO REMAIN.
2. CONNECT NEW LOAD TO EXISTING SPARE CIRCUIT BREAKER.
3. DISCONNECT EXISTING CIRCUIT BREAKER AND PROVIDE NEW AS SCHEDULED.
4. PROVIDE NEW CIRCUIT BREAKER IN EXISTING AVAILABLE SPACE.
5. PROVIDE HACR TYPE CIRCUIT BREAKER.

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REVISIONS

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2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

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TITLE

ELECTRICAL ONE-LINE DIAGRAM AND PANEL SCHEDULES

SHEET

E4.01

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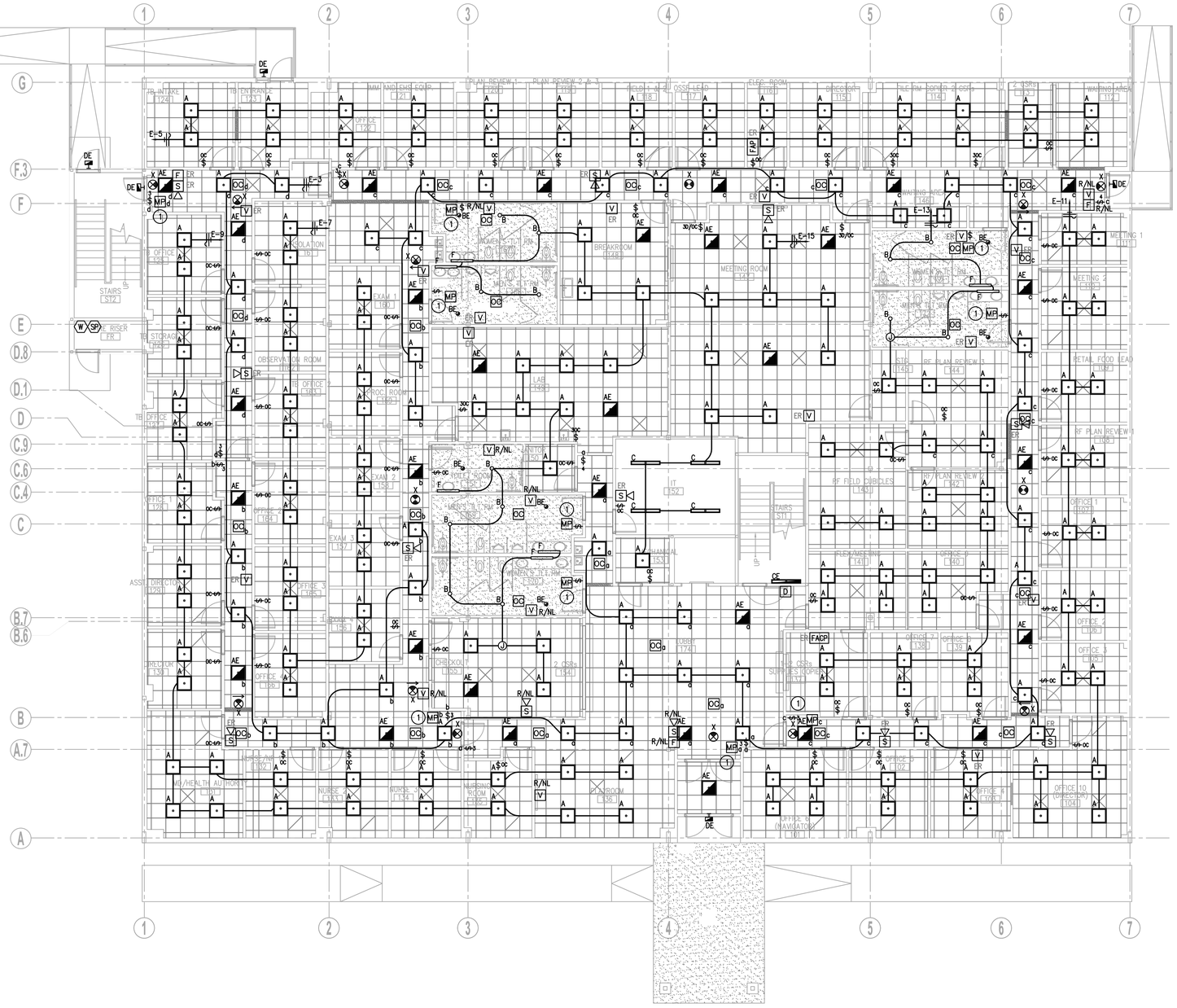
DBR Project Number 165026.000

MC	SN	NF	AH	--



1 1ST LEVEL LIGHTING PLAN
EL2.01
1/8"=1'-0"

GENERAL LIGHTING NOTES:

A. ALL 1ST FLOOR EMERGENCY AND EXIT LIGHTS SHALL BE FED FROM PANEL EM, CIRCUIT #7.

B. ALL 2ND FLOOR EMERGENCY AND EXIT LIGHTS SHALL BE FED FROM PANEL EM, CIRCUIT #5.

C. ALL WALL MOUNTED OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY AND MANUFACTURED BY SENSOR SWITCH #WSX-PDT, UNLESS NOTED OTHERWISE. SWITCHES SHALL BE PROGRAMMED FOR MANUAL ON/AUTOMATIC OFF. CEILING MOUNTED OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY AND MANUFACTURED BY SENSOR SWITCH #CM-PDT-10. VERIFY COLOR WITH ARCHITECT.

D. ALL EMERGENCY LIGHT FIXTURE GENERATOR TRANSFER DEVICES SHALL BE CONNECTED EMERGENCY EGRESS LIGHTING CIRCUIT INDICATED ON DRAWINGS. ALL EMERGENCY WIRING SHALL BE ROUTED IN A SEPARATE CONDUIT. REFER TO DETAILS ON SHEET E3.02 FOR WIRING INFORMATION.

E. ALL CEILING MOUNTED DEVICES LOCATED IN LAY-IN CEILINGS SHALL BE CENTERED IN THE CEILING TILE.

F. MULTIPLE SWITCHES SHOWN TOGETHER SHALL BE GANGED TOGETHER UNDER A COMMON COVER PLATE.

G. PROVIDE UNSWITCHED CIRCUIT TO ALL EXIT SIGNS ORIGINATING FROM CIRCUIT NEAREST EMERGENCY CIRCUIT.

H. REFER TO SHEET E3.02 FOR OCCUPANCY SENSOR WIRING DETAILS.

I. REFER TO SHEET E3.01 FOR LIGHT FIXTURE SCHEDULE.

J. CONTRACTOR SHALL INDICATE LIGHTING CIRCUIT CONTROLLED BY EACH SWITCH BY PROVIDING TYPE WRITTEN LABELING LOCATED ON INSIDE FACE OF EACH SWITCH COVER PLATE.

K. EMERGENCY CIRCUITS SHALL BE ROUTED IN SEPARATE CONDUIT FOR EMERGENCY LIGHTING.

L. PROVIDE ALL EMERGENCY LIGHT FIXTURES WITH UNSWITCHED HOT LEG AS DEFINED IN NEC 700.12

M. ROUTE AN UNSWITCHED HOT LEG TO ALL LIGHT FIXTURES DESIGNATED AS EMERGENCY FIXTURES. HOT LEG SHALL ORIGINATE FROM CIRCUIT SERVING NORMAL LIGHTING FIXTURES IN THAT SPACE. UNSWITCHED HOT LEG SHALL CONNECT TO THE NORMAL POWER SENSING LUG ON THE GTD DEVICE. REFER TO GTD WIRING DIAGRAM ON SHEET E6.01 FOR ADDITIONAL INFORMATION.

N. CONTRACTOR SHALL PROVIDE AND INSTALL ALL RECEPTACLES, CONDUITS, BOXES, CONDUCTORS, ETC. NECESSARY FOR THE PROPER INSTALLATION OF ANY CITY-REQUIRED OR OWNER-SPECIFIED BUILDING LOW-VOLTAGE SYSTEMS. COORDINATE SCOPE OF WORK AND E.C. RESPONSIBILITY WITH OWNER'S REPRESENTATIVE, AND ALL OTHER RELEVANT PARTIES.

O. MINIMUM CIRCUIT SIZE IS 2#12 AND 1#12 GROUND IN 3/4" CONDUIT. ALL CONDUCTORS SHALL BE 75 DEGREE (MINIMUM) COPPER THHN, COLOR CODED AS PER NEC AND LOCAL AMENDMENTS WITH SIZE, TEMPERATURE, AND VOLTAGE PERMANENTLY PRINTED ON THE JACKET. ALL JOINTS SHALL BE MADE UP USING SELF LOCKING, TWIST-ON, COLOR CODED, SQUARE WIRE SPRING GRAB, LONG SKIRT, WIRE CONNECTORS WITH SWEPT WINGS.

P. FIRESTOP ALL CONDUIT PENETRATIONS IN RATED WALLS. SEE ARCHITECTURAL DRAWINGS FOR WALL RATINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO SHEET ROCK AND REPAIR.

Q. WHEN LOCATING SYSTEMS NEXT TO DOORS, LOCATE 8" OFF DOOR JAMB TO CENTER OF DEVICE. WHEN MULTIPLE DEVICES ARE TOGETHER, STACK, BUT NO MORE THAN 42" AFF.

R. DEVICES LABELED 'ER' ARE EXISTING TO REMAIN.

S. DEVICES LABELED 'R/NL' ARE NEW LOCATION OF EXISTING LIGHT FIXTURES BEING RELOCATED. EXTEND EXISTING WIRING AND CONDUIT TO NEW LOCATION AS REQUIRED.

T. NEW LIGHT FIXTURES SHALL BE CONNECTED TO EXISTING LIGHTING CIRCUITRY IN THE AREA LEFT IN PLACE BY DEMOLITION. EXTEND EXISTING WIRING AND CONDUIT TO NEW LIGHT FIXTURES AS REQUIRED. CIRCUIT NUMBERS ARE SHOWN FOR REFERENCE.

U. EXIT SIGNS SHALL BE UNSWITCHED.

V. ALL WALL BOX DIMMERS SHALL BE LUTRON NT SERIES. CONTRACTOR SHALL NOT REMOVE HEAT SINK FINS PRIOR TO INSTALLATION.

GENERAL FIRE ALARM NOTES:

A. ALL CEILING MOUNTED DEVICES SHALL BE CENTERED IN THE CEILING TILE.

B. ALL FIRE ALARM VISUAL AND AUDIO/VISUAL DEVICES SHALL BE CONFIGURED TO PROVIDE CANDELA RATINGS IN ACCORDANCE WITH ADA & NFPA COVERAGES. CONTRACTOR SHALL INCLUDE RATINGS OF ALL DEVICES IN SUBMITTAL.

C. ALL VISUAL FIRE ALARM DEVICES SHALL BE 15 CD UNLESS NOTED OTHERWISE.

D. ALL WIRING FOR DEVICES IN EXPOSED STRUCTURE AREAS SHALL BE ROUTED WITHIN CONDUIT. NO WIRING SHALL BE ROUTED EXPOSED.

E. ELECTRICAL CONTRACTOR SHALL PROVIDE CONTROL WIRING TO SHUT DOWN AIR HANDLING UNIT UPON DETECTION OF SMOKE BY THE DUCT DETECTOR. COORDINATE WITH HVAC CONTRACTOR AND SEE SHEET M2.01 AND M2.02 FOR MORE INFORMATION.

KEYED LIGHTING NOTES:

(1) PROVIDE SENSOR SWITCH POWER PACK, #PP-16, ABOVE CEILING. CONNECT ALL OCCUPANCY SENSORS IN THE AREA TO THE POWER PACK.

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DBR Project Number	165026.000			
MC	SN	NF	AH	--

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Round Rock, Texas

STATE OF TEXAS
NICOLE M. FERSTL
99123
REGISTERED
PROFESSIONAL ENGINEER
11/9/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

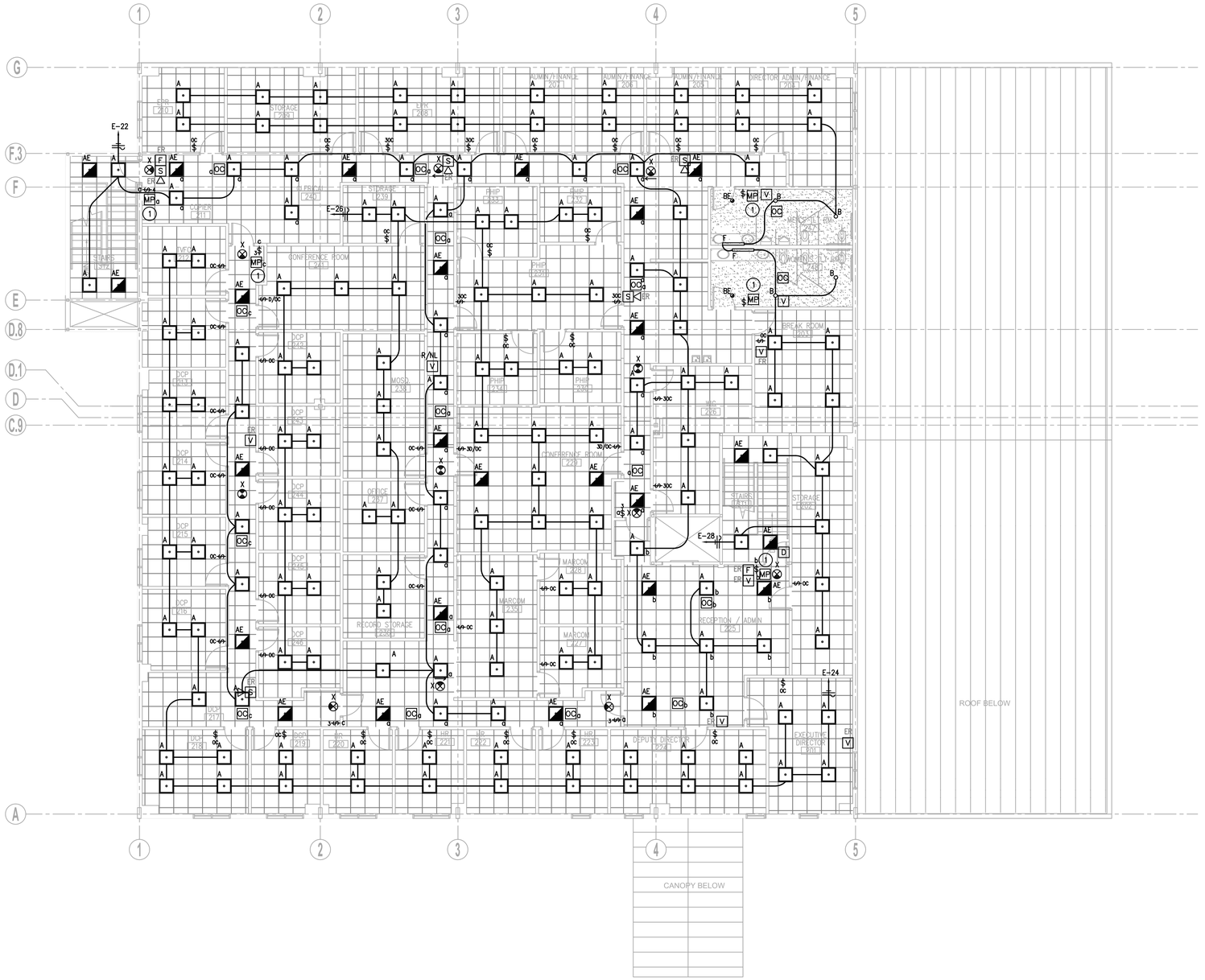
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

1ST LEVEL LIGHTING PLAN

SHEET

EL2.01



1 EL2.02 **2ND LEVEL LIGHTING PLAN**

1/8"=1'-0"

GENERAL LIGHTING NOTES:

A. ALL 1ST FLOOR EMERGENCY AND EXIT LIGHTS SHALL BE FED FROM PANEL EM, CIRCUIT #7.

B. ALL 2ND FLOOR EMERGENCY AND EXIT LIGHTS SHALL BE FED FROM PANEL EM, CIRCUIT #5.

C. ALL WALL MOUNTED OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY AND MANUFACTURED BY SENSOR SWITCH #WSX-PDT, UNLESS NOTED OTHERWISE. SWITCHES SHALL BE PROGRAMMED FOR MANUAL ON/AUTOMATIC OFF. CEILING MOUNTED OCCUPANCY SENSORS SHALL BE DUAL TECHNOLOGY AND MANUFACTURED BY SENSOR SWITCH #nCM-PDT-10. VERIFY COLOR WITH ARCHITECT.

D. ALL EMERGENCY LIGHT FIXTURE GENERATOR TRANSFER DEVICES SHALL BE CONNECTED EMERGENCY EGRESS LIGHTING CIRCUIT INDICATED ON DRAWINGS. ALL EMERGENCY WIRING SHALL BE ROUTED IN A SEPARATE CONDUIT. REFER TO DETAILS ON SHEET E3.02 FOR WIRING INFORMATION.

E. ALL CEILING MOUNTED DEVICES LOCATED IN LAY-IN CEILINGS SHALL BE CENTERED IN THE CEILING TILE.

F. MULTIPLE SWITCHES SHOWN TOGETHER SHALL BE GANGED TOGETHER UNDER A COMMON COVER PLATE.

G. PROVIDE UNSWITCHED CIRCUIT TO ALL EXIT SIGNS ORIGINATING FROM CIRCUIT NEAREST EMERGENCY CIRCUIT.

H. REFER TO SHEET E3.02 FOR OCCUPANCY SENSOR WIRING DETAILS.

I. REFER TO SHEET E3.01 FOR LIGHT FIXTURE SCHEDULE.

J. CONTRACTOR SHALL INDICATE LIGHTING CIRCUIT CONTROLLED BY EACH SWITCH BY PROVIDING TYPE WRITTEN LABELING LOCATED ON INSIDE FACE OF EACH SWITCH COVER PLATE.

K. EMERGENCY CIRCUITS SHALL BE ROUTED IN SEPARATE CONDUIT FOR EMERGENCY LIGHTING.

L. PROVIDE ALL EMERGENCY LIGHT FIXTURES WITH UNSWITCHED HOT LEG AS DEFINED IN NEC 700.12

M. ROUTE AN UNSWITCHED HOT LEG TO ALL LIGHT FIXTURES DESIGNATED AS EMERGENCY FIXTURES. HOT LEG SHALL ORIGINATE FROM CIRCUIT SERVING NORMAL LIGHTING FIXTURES IN THAT SPACE. UNSWITCHED HOT LEG SHALL CONNECT TO THE NORMAL POWER SENSING LUG ON THE GTD DEVICE. REFER TO GTD WIRING DIAGRAM ON SHEET E6.01 FOR ADDITIONAL INFORMATION.

N. CONTRACTOR SHALL PROVIDE AND INSTALL ALL RECEPTACLES, CONDUITS, BOXES, CONDUCTORS, ETC. NECESSARY FOR THE PROPER INSTALLATION OF ANY CITY-REQUIRED OR OWNER-SPECIFIED BUILDING LOW-VOLTAGE SYSTEMS. COORDINATE SCOPE OF WORK AND E.C. RESPONSIBILITY WITH OWNER'S REPRESENTATIVE, AND ALL OTHER RELEVANT PARTIES.

O. MINIMUM CIRCUIT SIZE IS 2#12 AND 1#12 GROUND IN 3/4" CONDUIT. ALL CONDUCTORS SHALL BE 75 DEGREE (MINIMUM) COPPER THHN, COLOR CODED AS PER NEC AND LOCAL AMENDMENTS WITH SIZE, TEMPERATURE, AND VOLTAGE PERMANENTLY PRINTED ON THE JACKET. ALL JOINTS SHALL BE MADE UP USING SELF LOCKING, TWIST-ON, COLOR CODED, SQUARE WIRE SPRING GRAB, LONG SKIRT, WIRE CONNECTORS WITH SWEPT WINGS.

P. FIRESTOP ALL CONDUIT PENETRATIONS IN RATED WALLS. SEE ARCHITECTURAL DRAWINGS FOR WALL RATINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO SHEET ROCK AND REPAIR.

Q. WHEN LOCATING SYSTEMS NEXT TO DOORS, LOCATE 8" OFF DOOR JAMB TO CENTER OF DEVICE. WHEN MULTIPLE DEVICES ARE TOGETHER, STACK, BUT NO MORE THAN 42" AFF.

R. DEVICES LABELED 'ER' ARE EXISTING TO REMAIN.

S. DEVICES LABELED 'R/NL' ARE NEW LOCATION OF EXISTING LIGHT FIXTURES BEING RELOCATED. EXTEND EXISTING WIRING AND CONDUIT TO NEW LOCATION AS REQUIRED.

T. NEW LIGHT FIXTURES SHALL BE CONNECTED TO EXISTING LIGHTING CIRCUITRY IN THE AREA LEFT IN PLACE BY DEMOLITION. EXTEND EXISTING WIRING AND CONDUIT TO NEW LIGHT FIXTURES AS REQUIRED. CIRCUIT NUMBERS ARE SHOWN FOR REFERENCE.

U. EXIT SIGNS SHALL BE UNSWITCHED.

V. ALL WALL BOX DIMMERS SHALL BE LUTRON NT SERIES. CONTRACTOR SHALL NOT REMOVE HEAT SINK FINS PRIOR TO INSTALLATION.

GENERAL FIRE ALARM NOTES:

A. ALL CEILING MOUNTED DEVICES SHALL BE CENTERED IN THE CEILING TILE.

B. ALL FIRE ALARM VISUAL AND AUDIO/VISUAL DEVICES SHALL BE CONFIGURED TO PROVIDE CANDELA RATINGS IN ACCORDANCE WITH ADA & NFPA COVERAGES. CONTRACTOR SHALL INCLUDE RATINGS OF ALL DEVICES IN SUBMITTAL.

C. ALL VISUAL FIRE ALARM DEVICES SHALL BE 15 CD UNLESS NOTED OTHERWISE.

D. ALL WIRING FOR DEVICES IN EXPOSED STRUCTURE AREAS SHALL BE ROUTED WITHIN CONDUIT. NO WIRING SHALL BE ROUTED EXPOSED.

E. ELECTRICAL CONTRACTOR SHALL PROVIDE CONTROL WIRING TO SHUT DOWN AIR HANDLING UNIT UPON DETECTION OF SMOKE BY THE DUCT DETECTOR. COORDINATE WITH HVAC CONTRACTOR AND SEE SHEET M2.01 AND M2.02 FOR MORE INFORMATION.

KEYED LIGHTING NOTES:

(1) PROVIDE SENSOR SWITCH POWER PACK, #nPP-16, ABOVE CEILING. CONNECT ALL OCCUPANCY SENSORS IN THE AREA TO THE POWER PACK.

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DBR Project Number	165026.000

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11/3/17

REVISIONS

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SHEET INFORMATION

Date	January 16, 2017
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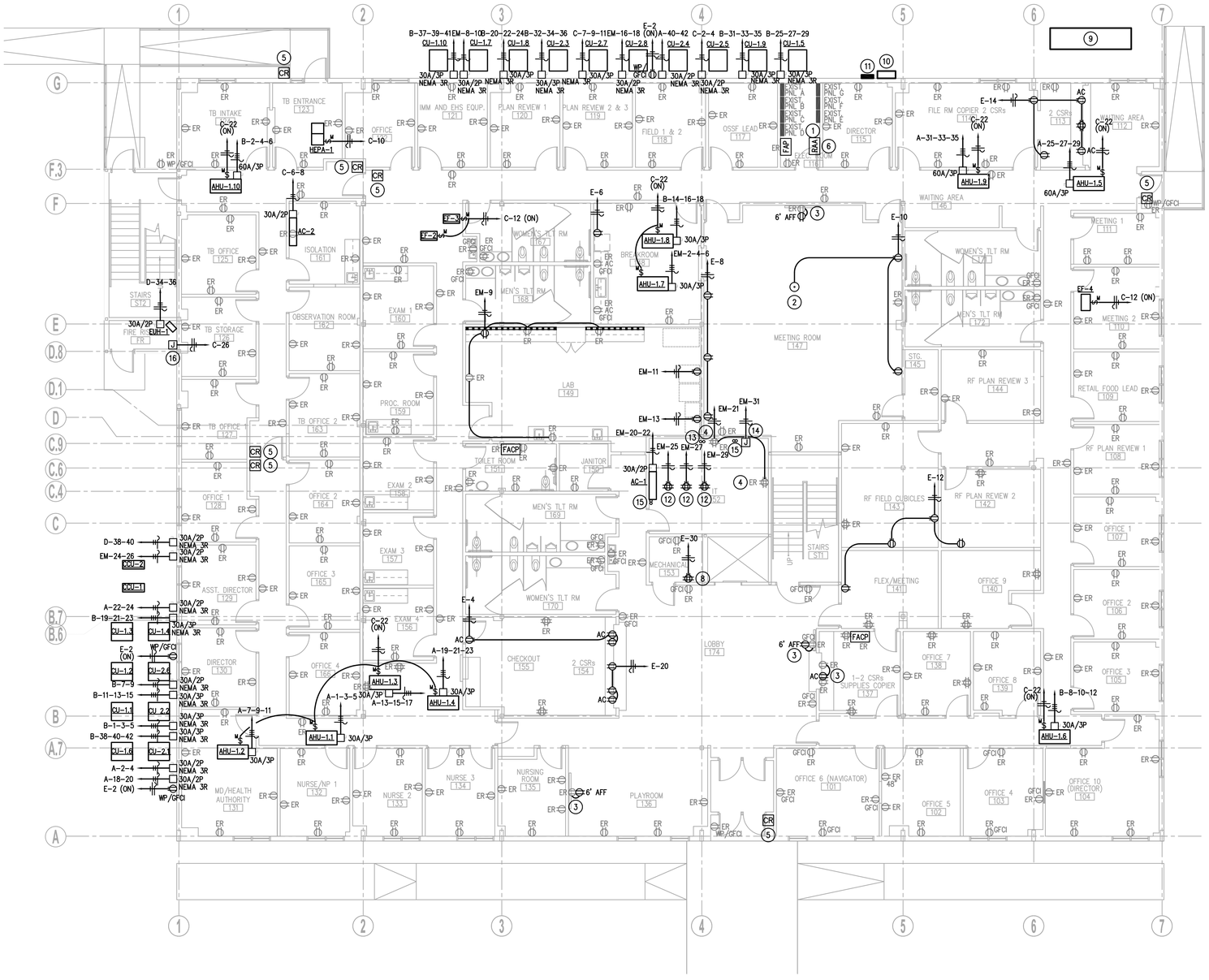
TITLE

2ND LEVEL LIGHTING PLAN

SHEET

EL2.02



1 EP2.01 **1ST LEVEL POWER PLAN**

1/8"=1'-0"

GENERAL POWER NOTES:

A. ELECTRICAL CONTRACTOR SHALL GROUP HOMERUNS WITH THREE HOTS (A,B, AND C PHASE), AND #10 NEUTRAL TO PROVIDE MULTI-WIRE BRANCH CIRCUITS. NO MORE THAN 2 MULTI-WIRE HOMERUNS PER CONDUIT.

B. CONTRACTOR SHALL VERIFY DEVICE LOCATIONS WITH ARCHITECT PRIOR TO ROUGH-IN. REVIEW ARCHITECTURAL CASEWORK AND MILLWORK ELEVATIONS PRIOR TO RECEPTACLE ROUGH-INS. DO NOT LOCATE RECEPTACLES BEHIND DRAWERS OR HIDDEN IN MILLWORK UNLESS SPECIFICALLY DIRECTED BY OWNER/ARCHITECT. SEE ARCHITECTURAL ELEVATIONS IN BREAKROOM FOR APPLIANCES AND RECEPTACLE MOUNTING LOCATIONS.

C. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL RECEPTACLES, CONDUIT, BOXES, CONDUCTORS, ETC. NECESSARY FOR THE PROPER INSTALLATION FOR ANY CITY-REQUIRED OR OWNER-SPECIFIED BUILDING LOW VOLTAGE SYSTEMS. COORDINATE SCOPE OF WORK AND E.C. RESPONSIBILITY WITH OWNER'S REPRESENTATIVE AND ALL OTHER RELEVANT PARTIES. REFER TO DIVISION 26 SPECIFICATIONS AND TECHNOLOGY DRAWINGS FOR ALL WORK REQUIRED.

D. ELECTRICAL CONTRACTOR SHALL PROVIDE BOX WITH PULL STRING FOR ALL TELEPHONE/DATA DEVICES. (TYP)

E. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR ALL EXHAUST FAN CONTROLS. PROVIDE A FAN SWITCH IF INDICATED BY MECHANICAL. ALL EXHAUST FANS SHALL BE PROVIDED WITH BUILT-IN DISCONNECT SWITCH.

F. HVAC AND PLUMBING EQUIPMENT MAY DIFFER FROM LOCATIONS AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE EXACT LOCATIONS WITH MECHANICAL AND PLUMBING CONTRACTOR.

G. ALL RECEPTACLES MOUNTED ABOVE COUNTERS AND WITHIN 6 FEET OF SINKS OR LAVATORIES SHALL BE GFCI TYPE.

H. PROVIDE A DEDICATED HOT, NEUTRAL, AND GROUND FOR ALL COPY MACHINES.

I. CONTRACTOR SHALL PROVIDE HANDLE TIES MANUFACTURED BY THE SWITCH GEAR SUPPLIER ON ALL MULTI-WIRE CIRCUITS TO MEET THE REQUIREMENTS OF NEC ARTICLE 210.4(B). AT THE CONTRACTOR'S OPTION, TWO AND THREE POLE BREAKERS MAY BE USED.

J. CONTRACTOR SHALL INDICATE CIRCUIT SERVING EACH RECEPTACLE BY PROVIDING TYPE WRITTEN LABELING LOCATED ON INSIDE FACE OF EACH RECEPTACLE COVER PLATE.

K. COORDINATE WITH MECHANICAL CONTRACTOR TO FURNISH INTEGRAL DISCONNECT SWITCH FOR ALL MECHANICAL EQUIPMENT. ELECTRICAL CONNECTIONS SHALL BE PROVIDED BY DIVISION 26.

L. ALL RECEPTACLES LOCATED IN RESTROOMS, JANITOR CLOSETS, MECHANICAL ROOMS, ELEVATOR PITS OR SHAFTS, ELEVATOR EQUIPMENT ROOMS, SERVING ELECTRIC DRINKING FOUNTAINS OR VENDING MACHINES, LOCATED WITHIN 6' OF A SINK, LOCATED ABOVE A WET COUNTERTOP OR IN A KITCHEN OR COFFEE BAR SHALL BE GFCI. EACH GFCI PROTECTED RECEPTACLE SHARING THE SAME CIRCUIT SHALL HAVE ITS OWN RE-SET AND TEST BUTTON.

M. WHEN LOCATING SYSTEMS NEXT TO DOORS, LOCATE 8" OFF DOOR JAMB TO CENTER OF DEVICE. WHEN MULTIPLE DEVICES ARE TOGETHER, STACK, BUT NO MORE THAN 42" AFF.

N. MOUNT RECEPTACLES 18" AFF, 6" ABOVE BACKSPLASH AT COUNTERS, 48" IN TOILET ROOMS AND AT EQUIPMENT ROUGH-IN LOCATIONS FOR APPLIANCES. PROVIDE GFCI RECEPTACLES AT ALL SINKS, EXTERIOR RECEPTACLES, AND UNDERCOUNTER EQUIPMENT.

O. MINIMUM CIRCUIT SIZE IS 2 #12 AND 1 #12 GROUND IN 3/4" CONDUIT. ALL CONDUCTORS SHALL BE 75 DEGREE (MINIMUM) COPPER THHN, COLOR CODED AS PER NEC AND LOCAL AMENDMENTS WITH SIZE, TEMPERATURE, AND VOLTAGE PERMANENTLY PRINTED ON THE JACKET. ALL JOINTS SHALL BE MADE UP USING SELF LOCKING, TWIST-ON, COLOR CODED, SQUARE WIRE SPRING GRAB, LONG SKIRT, WIRE CONNECTORS WITH SWEPT WINGS.

P. FIRESTOP ALL CONDUIT PENETRATIONS IN RATED WALLS. SEE ARCHITECTURAL DRAWINGS FOR WALL RATINGS. CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO SHEET ROCK AND REPAIR.

Q. ALL ELECTRICAL EQUIPMENT AND DEVICES ARE FED FROM EXISTING PANELS, UNLESS NOTED OTHERWISE. RECEPTACLES SHALL BE FED FROM EXISTING CIRCUITS MADE AVAILABLE BY DEMOLITION OF EXISTING RECEPTACLES IN THE AREA. CIRCUIT NUMBERS ARE SHOWN FOR REFERENCE ONLY. VERIFY EXACT CIRCUIT NUMBER IN THE FIELD. PROVIDE NEW WIRING AND CONDUIT AS REQUIRED.

KEYED POWER NOTES:

(ALL NOTES MAY NOT APPLY)

1. ALL EQUIPMENT IN THIS ROOM IS EXISTING TO REMAIN UNLESS NOTED OTHERWISE.
2. PROVIDE RECEPTACLE IN CENTER OF CEILING TILE. COORDINATE WITH ARCHITECT AND A/V CONTRACTOR PRIOR TO ROUGH-IN.
3. CONNECT NEW RECEPTACLE TO EXISTING RECEPTACLE CIRCUIT. MAXIMUM LOAD ON CIRCUIT BREAKER SHALL BE 16A.
4. PROVIDE NEW WIRING AND CONDUIT TO FEED EXISTING RECEPTACLE FROM NEW CIRCUIT.
5. PROVIDE ROUGH IN FOR FUTURE CARD READER AND ALL ASSOCIATED REQUIRED EQUIPMENT AND HARDWARE; INCLUDING, BUT NOT LIMITED TO, REQUEST TO EXIT MOTION DETECTOR, MANUAL PUSHBUTTON DOOR RELEASE, AND ELECTRIC STRIKE. PROVIDE 120V POWER FOR ACCESS CONTROL HEAD END UNIT. PROVIDE RELAY TO INTERFACE WITH FIRE ALARM CONTROL PANEL. DOOR STRIKE SHALL DISENGAGE IN ALARM STATE. REFER TO SECURITY DRAWINGS FOR ROUGH-IN REQUIREMENTS. (TYP)
6. COORDINATE EXACT LOCATION OF NEW GENERATOR REMOTE ALARM ANNUNCIATOR IN THE FIELD.
7. EXTEND EXISTING WIRING AND CONDUIT LEFT IN PLACE BY DEMOLITION OF EXISTING RECEPTACLES TO FEED NEW RECEPTACLES.
8. PROVIDE RECEPTACLE FOR HVAC CONTROL PANEL. COORDINATE INSTALLATION LOCATION AND REQUIREMENTS WITH HVAC CONTRACTOR PRIOR TO ROUGH-IN.
9. PROVIDE NEW 35kW DIESEL GENERATOR IN SOUND ATTENUATION ENCLOSURE. CUMMINS #C35D6. SOUND ATTENUATION ENCLOSURE SHALL MEET 68dBA AT 23'. PROVIDE BELLY FUEL TANK FOR 12 HOURS OF OPERATION. COORDINATE EXACT INSTALLATION LOCATION AND REQUIREMENTS PRIOR TO ROUGH-IN.
10. PROVIDE NEW 100A/4P AUTOMATIC TRANSFER SWITCH IN NEMA 3R ENCLOSURE. COORDINATE EXACT INSTALLATION LOCATION AND REQUIREMENTS PRIOR TO ROUGH-IN.
11. PROVIDE NEW 100A, 120/208V, 3ø, 4W EMERGENCY PANEL EM IN NEMA 3R ENCLOSURE. COORDINATE EXACT INSTALLATION LOCATION AND REQUIREMENTS PRIOR TO ROUGH-IN.
12. RECEPTACLES SHALL BE FLUSH MOUNTED TO LADDER RACK.
13. PROVIDE (2) 4" EMT CONDUIT SLEEVES FROM IDF 8311.00 ABOVE. PROVIDE FIRE STOP AS REQUIRED.
14. PROVIDE 20A/120V POWER FOR ACCESS CONTROL PANEL. VERIFY EXACT INSTALLATION LOCATION AND REQUIREMENTS PRIOR TO ROUGH-IN.
15. PROVIDE (2) 4" EMT WALL SLEEVES/CONSUITS WITH BUSHING ON EACH END. PROVIDE FIRESTOP AS REQUIRED. SLEEVES ARE FOR HORIZONTAL DATA/VOICE/SECURITY CABLE ONLY.
16. PROVIDE 20A/120V POWER FOR IRRIGATION CONTROLLER. VERIFY EXACT INSTALLATION LOCATION AND REQUIREMENTS PRIOR TO ROUGH-IN.

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DBR Project Number	165026.000

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REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
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Drawn	
Checked	
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TITLE

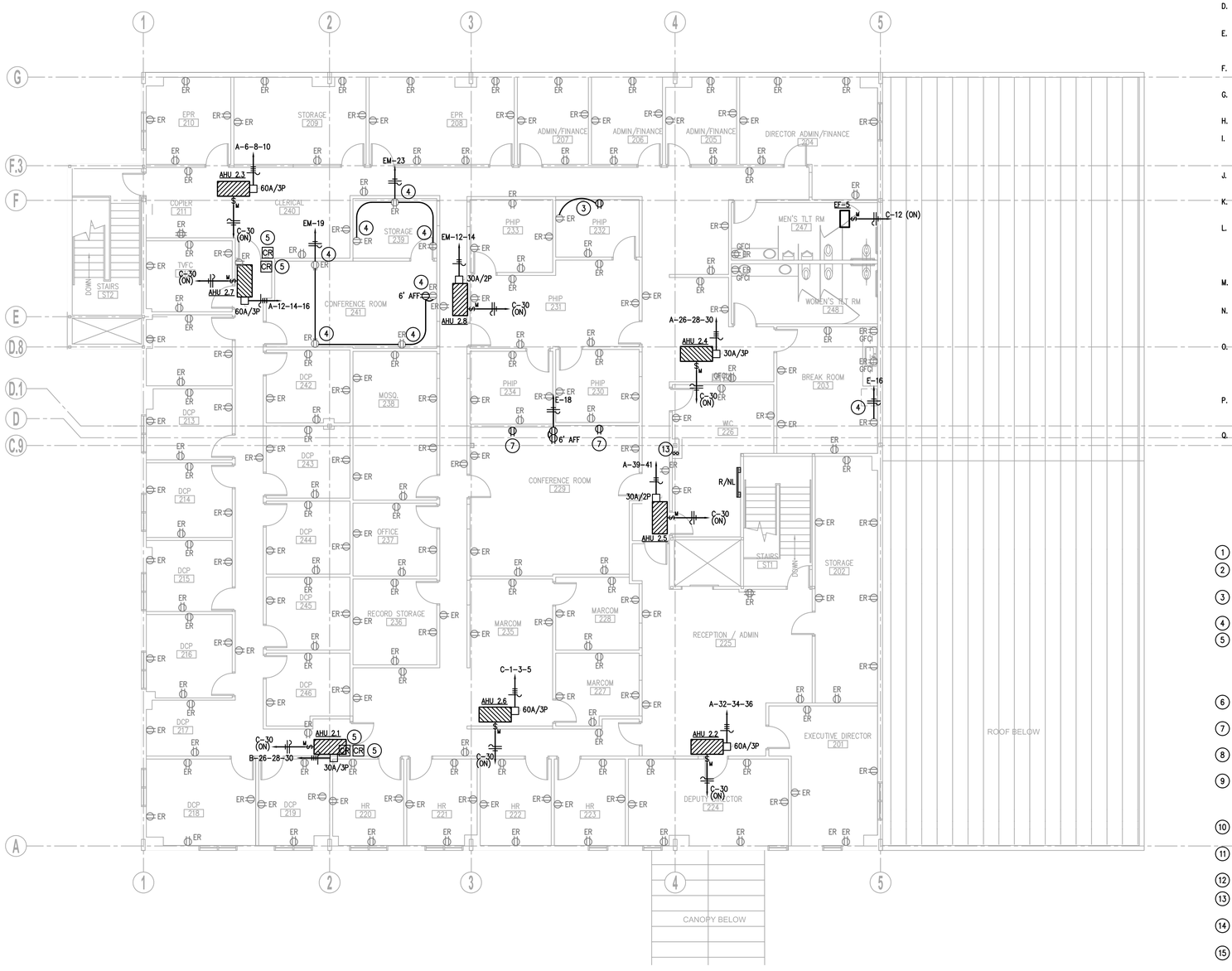
1ST LEVEL POWER PLAN

SHEET

EP2.01

Williamson County, Texas

2/22/2017 8:32 AM



1 EP2.02 **2ND LEVEL POWER PLAN**

1/8"=1'-0"

GENERAL POWER NOTES:

A. ELECTRICAL CONTRACTOR SHALL GROUP HOMERUNS WITH THREE HOTS (A,B, AND C PHASE), AND #10 NEUTRAL TO PROVIDE MULTI-WIRE BRANCH CIRCUITS. NO MORE THAN 2 MULTI-WIRE HOMERUNS PER CONDUIT.

B. CONTRACTOR SHALL VERIFY DEVICE LOCATIONS WITH ARCHITECT PRIOR TO ROUGH-IN. REVIEW ARCHITECTURAL CASEWORK AND MILLWORK ELEVATIONS PRIOR TO RECEPTACLE ROUGH-INS. DO NOT LOCATE RECEPTACLES BEHIND DRAWERS OR HIDDEN IN MILLWORK UNLESS SPECIFICALLY DIRECTED BY OWNER/ARCHITECT. SEE ARCHITECTURAL ELEVATIONS IN BREAKROOM FOR APPLIANCES AND RECEPTACLE MOUNTING LOCATIONS.

C. ELECTRICAL CONTRACTOR SHALL PROVIDE ALL RECEPTACLES, CONDUIT, BOXES, CONDUCTORS, ETC. NECESSARY FOR THE PROPER INSTALLATION FOR ANY CITY-REQUIRED OR OWNER-SPECIFIED BUILDING LOW VOLTAGE SYSTEMS. COORDINATE SCOPE OF WORK AND E.C. RESPONSIBILITY WITH OWNER'S REPRESENTATIVE AND ALL OTHER RELEVANT PARTIES. REFER TO DIVISION 26 SPECIFICATIONS AND TECHNOLOGY DRAWINGS FOR ALL WORK REQUIRED.

D. ELECTRICAL CONTRACTOR SHALL PROVIDE BOX WITH PULL STRING FOR ALL TELEPHONE/DATA DEVICES. (TYP)

E. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR ALL EXHAUST FAN CONTROLS. PROVIDE A FAN SWITCH IF INDICATED BY MECHANICAL. ALL EXHAUST FANS SHALL BE PROVIDED WITH BUILT-IN DISCONNECT SWITCH.

F. HVAC AND PLUMBING EQUIPMENT MAY DIFFER FROM LOCATIONS AS SHOWN ON ELECTRICAL DRAWINGS. COORDINATE EXACT LOCATIONS WITH MECHANICAL AND PLUMBING CONTRACTOR.

G. ALL RECEPTACLES MOUNTED ABOVE COUNTERS AND WITHIN 6 FEET OF SINKS OR LAVATORIES SHALL BE GFCI TYPE.

H. PROVIDE A DEDICATED HOT, NEUTRAL, AND GROUND FOR ALL COPY MACHINES.

I. CONTRACTOR SHALL PROVIDE HANDLE TIES MANUFACTURED BY THE SWITCH GEAR SUPPLIER ON ALL MULTI-WIRE CIRCUITS TO MEET THE REQUIREMENTS OF NEC ARTICLE 210.4(B). AT THE CONTRACTOR'S OPTION, TWO AND THREE POLE BREAKERS MAY BE USED.

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11/3/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

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TITLE

2ND LEVEL POWER PLAN

SHEET

EP2.02

PLUMBING SYMBOLS AND ABBREVIATIONS

(NOT ALL ITEMS INDICATED APPLY TO THIS PROJECT)

ABBREVIATIONS

A

A	AIR (COMPRESSED)
ABV	ABOVE
AC	ABOVE CEILING
AD	ACCESS DOOR, AREA DRAIN
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
AP	ACCESS PANEL
ARCH	ARCHITECT, ARCHITECTURAL
AS	AIR SEPARATOR
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY OF TESTING AND MATERIALS
AV	ACID VENT
AVG	AVERAGE
AW	ACID WASTE
AWS	AMERICAN WELDING SOCIETY
AUX	AUXILIARY

B

B	BOILER
BC	BELOW COUNTER
B/C	BACK OF CURB
BF	BELOW FLOOR
BFV	BUTTERFLY VALVE
BH	BOX HYDRANT
BLDG	BUILDING
BM	BENCHMARK
BOF	BOTTOM OF FOOTING
BOS	BOTTOM OF STRUCTURE
BT	BATH TUB
BTU	BRITISH THERMAL UNIT
BV	BALL VALVE
BWV	BACK WATER VALVE

C

C	CELSIUS
CAB	CABINET
CB	CATCH BASIN
CD	CONDENSATE DRAIN LINE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CH	CHILLER
CP	CIRCULATING PUMP
CI	CAST IRON
CIRC	CIRCULATING
CL	CENTERLINE
CLG	CEILING
CLR	CLEAR
CMU	CONCRETE MASONRY UNIT
CPI	CAST IRON PIPE INSTITUTE
CPVC	CHLORINATED POLYVINYL CHLORIDE
CO	CLEAN OUT
COL	COLUMN
COMB	COMBINATION
COMP	COMPRESSOR
CONC	CONCRETE, CONCENTRIC
CONN	CONNECTION
CONT	CONTINOUS,CONTINUATION
CONTR	CONTROLLER, CONTRACTOR
CRAC	COMPUTER ROOM A/C UNIT
CTR	CENTER
CU	COPPER
CW	COLD WATER

D

D	DEPTH, DRAIN, DRYER
DESIG	DESIGNATION
DTL	DETAIL
DF	DRINKING FOUNTAIN
DIA	DIAMETER
DIM	DIMENSION
DISC	DISCONNECT
DN	DOWN
DS	DOWNSPOUT, DOUBLE SUCTON
DW	DISHWASHER
DWG	DRAWING
DWH	DOMESTIC WATER HEATER
DWP	DOMESTIC WATER PUMP

E

EA	EACH
EC	ELECTRICAL CONTRACTOR
ECC	ECCENTRIC
EDF	ELECTRIC DRINKING FOUNTAIN
EFF	EFFICIENCY
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMERG	EMERGENCY
ENCL	ENCLOSURE
ENGR	ENGINEER
EQ	EQUAL
EQUIP	EQUIPTMENT
ET	EXPANSION TANK
ETR	EXISTING TO REMAIN
EXT	EXTERNAL
EXTG	EXISTING

F

F	FARENHEIT, FIRE
FBO	FURNISHED BY OTHERS
FCO	FLOOR CLEAN OUT
FCS	FLOOR CONTROL STATON
FD	FLOOR DRAIN, FIRE DAMPER
FDSC	FIRE DEPARTMENT SIAMESE CONNECTION
FDV	FIRE DEPARTMENT VALVE
FH	FIRE HYDRANT
FHC	FIRE HOSE CABINET
FHR	FIRE HOSE RACK
FIXT	FIXTURE
FLEX	FLEXIBLE
FL	FLOW LINES
FLR	FLOOR
FP	FIRE PUMP
FRZR	FREEZER
FS	FLOW SWITCH, FIRE SPRINKLER
FSK	FLOOR SINK
FT	FOOT, FEET
FUT	FUTURE

G

G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GLV	GLOBE VALVE
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GV	GATE VALVE

H

HB	HOSE BIBB
HD	HEAD, HUB DRAIN
HORIZ	HORIZONTAL
HP	HORSEPOWER
HKP	HOUSEKEEPING PAD
HSC	HORIZONTAL SPLIT CASE
HT	HEIGHT
HTG	HEATING
HTR	HEATER
HW	HOT WATER
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HZ	HERTZ

I

ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INSUL	INSULATION
INT	INTERNAL, INTERIOR
IW	INDIRECT WASTE

J

JP	JOCKEY PUMP

K

KEC	KITCHEN EQUIPTMENT CONTRACTOR
KO	KNOCKOUT
KVA	KILOVOLT– AMPS
KW	KILOWATT

L

L	LENGTH, LAVATORY
LAV	LAVATORY
LF	LINEAR FEET
LP	LOW PRESSURE
LRA	LOCKED ROTOR AMPS
LVL	LEVEL
LWCO	LOW WATER CUT OFF

M

MAX	MAXIMUM
MBTUH	THOUSAND OF BTU'S
MC	MECHANICAL CONTRACTOR
MECH	MECHANICAL
MFR	MANUFACTURER
MH	MANHOLE
MI	MALLEABLE IRON
MIN	MINIMUM
MP	MEDIUM PRESSURE
MS	MOP SINK
MTD	MOUNTED
MU	MAKE–UP

N

N.C.	NORMALLY CLOSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO.	NUMBER
NTS	NOT TO SCALE

O

OC	ON CENTER
OD	OUTSIDE DIAMETER, OVERFLOW DRAIN
OFCU	OUTSIDE AIR FAN COIL UNIT
OPG	OPENING
OS&Y	OPEN STEM AND YOLK
O	MEDICAL OXYGEN

P

P	PUMP, PLUMBING EQUIPTMENT
PC	PLUMBING CONTRACTOR
PD	PRESSURE DROP, PLANTER DRAIN
PH	PHASE, POST HYDRANT
PIV	POST INDICATOR VALVE
PLBG	PLUMBING
PNEU	PNEUMATIC
PNL	PANEL
PNTH	PENTHOUSE
PP	POLYPROPYLENE
PPM	PART PER MILLION
PRI	PRIMARY
PRG	PRESSURE REDUCING STATION
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	PLUMBING TRIM
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE

Q

QTY	QUANTITY

R

RCP	REFLECTED CEILING PLAN, REINFORCED CONCRETE PIPE
RD	ROOF DRAIN
RE	REFERENCE,REFER
RECIRC	RECIRCULATE
RED	REDUCER
REFR	REFRIGERATOR
REINF	REININGFORCING
REQD	REQUIRED
REV	REVISION, REVISE
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
RV	RELIEF VALVE

S

SCHED	SCHEDULED
SD	STORM DRAIN
SE	SEWAGE EJECTOR
SEC	SECONDARY
SECT	SECTION
SF	SQUARE FEET
SFCS	SPRINKLER FLOOR CONTROL STATION
SH	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SINK
SP	SUMP PUMP, STATIC PRESSURE
SPEC	SPECIFICATION
SPR	SPRINKLER
SQ	SQUARE
SS	SERVICE SINK
SSD	SUBSURFACE DRAIN
SSFU	SANITARY SEWER FIXTURE UNITS
STD	STANDARD
STL	STEEL
STR	STRAINER
SURF	SURFACE
SUSP	SUSPEND
SV	SANITARY VENT
SW	SOFT WATER

T

TD	TRENCH DRAIN
TDH	TOTAL DYNAMIC HEAD
TH BLK	THRUST BLOCK
TP	TRAP PRIMER
TPD	TRAP PRIMER DEVICE
TYP	TYPICAL

U

U	URINAL
UCD	UNDER CUT DOOR
UG	UNDERGROUND
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES, INC.
UNO	UNLESS NOTED OTHERWISE
U/F	UNDERFLOOR
U/S	UNDERSLAB

V

V	VOLT, VENT
VAC	VACUUM(MEDICAL)
VB	VALVE BOX, VACUUM BREAKER
VCP	VITRIFIED CLAY PIPE
VEL	VELOCITY
VERT	VERTICAL
VIB	VALVE IN BOX
VOV	VALVE ON VERTICAL
VP	VACUUM PUMP
VTR	VENT THRU ROOF

W

W	WATT, WASTE, WIDTH, WASHER
W/	WITH
W/O	WITHOUT
WC	WATER CLOSET
WCO	WALL CLEANOUT
WH	WALL HYDRANT
WM	WATER METER
WP	WEATHERPROOF
WPD	WATER PRESSURE DROP
WWF	WELDED WIRE FABRIC
WT	WATERTIGHT, WEIGHT

Y

Y	YARD HYDRANT

Z

Z	ZONE

SYMBOLS

PLUMBING SYSTEMS

- SANITARY DRAIN BELOW FLOOR
- SANITARY DRAIN ABOVE FLOOR
- SANITARY VENT
- GW — GREASE WASTE(ABOVE CEILING)
- GW — GREASE WASTE(BELOW FLOOR)
- SD — STORM DRAIN(ABOVE CEILING)
- SD — STORM DRAIN(BELOW FLOOR)
- OD — OVERFLOW DRAIN(ABOVE CEILING)
- OD — OVERFLOW DRAIN(BELOW FLOOR)
- AW — ACID WASTE(ABOVE CEILING)
- AW — ACID WASTE(BELOW FLOOR)
- AV — ACID VENT(ABOVE CEILING OR BELOW FLOOR)
- COLD WATER
- 110° — HOT WATER(FINAL DELIVERY TEMPERATURE AS NOTED)
- 110° — HOT WATER RECIRCULATION (TEMPERATURE AS NOTED)
- G — NATURAL GAS
- T 110° — TEMPERED WATER(FINAL DELIVERY TEMPERATURE AS NOTED)
- CA — COMPRESSED AIR
- A — MEDICAL AIR
- O — MEDICAL OXYGEN
- V — MEDICAL VACUUM
- F — FIRE STANDPIPE, FIRE LINE
- FS — WET AUTOMATIC FIRE SPRINKLER
- TP — TRAP PRIMER
- D — DRAIN LINE
- SW — SOFT WATER

SYMBOLS

PIPING FITTINGS

- CAP ON END OF PIPE
- ELBOW UP
- ELBOW DOWN
- VALVE IN DROP
- VALVE IN RISE
- DIRECTION OF FLOW
- DIRECTION OF SLOPE DOWN
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER
- TEE OUTLET UP
- TEE OUTLET DOWN
- UNION
- FLANGE
- PIPE ANCHOR
- EXPANSION JOINT
- STRAINER WITH BLOWDOWN VALVE
- GATE VALVE, HVAC BALANCING/STOP VALVE
- GLOBE VALVE
- BALL VALVE
- BALANCING VALVE WITH DIFFERENTIAL PRESSURE TAPS
- OS&Y VALVE
- CHECK VALVE
- BUTTERFLY VALVE
- TWO–WAY MODULATING CONTROL VALVE
- THREE–WAY MODULATING CONTROL VALVE
- SOLENOID VALVE
- PRESSURE REDUCING VALVE
- GAS REGULATOR
- GAS COCK
- SPRINKLER FLOOR CONTROL STATION
- MANUAL AIR VENT
- AUTOMATIC AIR VENT
- T&P RELIEF VALVE
- LINE CLEANOUT/ WALL CLEANOUT
- FLOOR CLEANOUT
- YARD CLEANOUT
- PRESSURE GAUGE WITH GAUGE COCK
- THERMOMETER
- WM — WATER METER
- FLEXIBLE CONNECTION
- PRESSURE AND TEMPERATURE TAP
- FLOW VENTURI
- VACUUM BREAKER
- VACUUM RELIEF VALVE
- BACKFLOW PREVENTOR
- CIRCULATING PUMP
- DRAIN(TYPE AND SIZE AS NOTED ON PLANS)
- ROOF DRAIN OR OVERFLOW DRAIN
- ROOF DRAIN OR OVERFLOW DRAIN(FROM ABOVE)

MISCELLANEOUS

- HOSE BIBB
- WALL HYDRANT
- PLUMBING FIXTURES
- POINT OF NEW CONNECTION TO EXISTING PIPING
- 1 — PLUMBING DRAWING NOTE REFERENCE
- 2 / P2.1 — DETAIL NUMBER OR PLAN SHEET WHERE DETAIL OR PLAN IS SHOWN
- FS — FLOW SWITCH
- TS — TAMPER SWITCH
- FIRE HOSE CABINET
- FIRE DEPARTMENT SIAMESE CONNECTION(WALL MOUNTED)
- FIRE DEPARTMENT SIAMESE CONNECTION(FREE STANDING)
- 2 / P7.1 — PLUMBING RISER DIAGRAM NUMBER SHEET WHERE PLUMBING RISER DIAGRAM IS SHOWN

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TITLE

PLUMBING SYMBOLS AND ABBREVIATIONS

SHEET

P0.00

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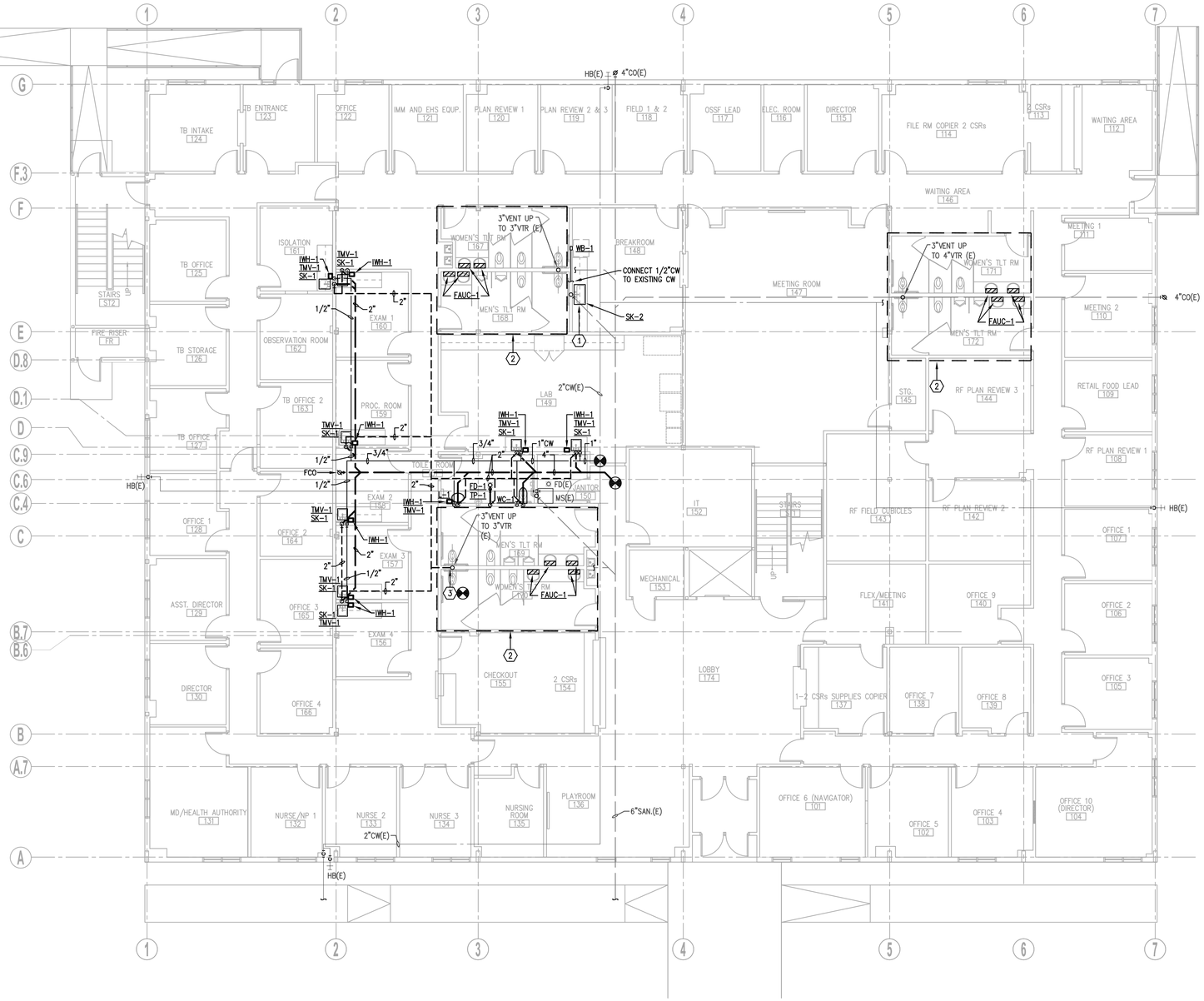

1 P2.01 1ST LEVEL PLUMBING PLAN

1/8"=1'-0"

GENERAL NOTES:

A. SIZES AND LOCATION OF EXISTING PIPINGS SHOWN ARE APPROXIMATE LOCATION. CONTRACTOR NEED TO FIELD VERIFY EXACT SIZES, CONDITIONS AND LOCATIONS OF INDICATED EXISTING UTILITIES.

B. THE CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING ALL WORK UNDER THIS SECTION OF THE PROJECT IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES INCLUDING THOSE PUBLISHED BY OSHA AND EPA.

C. THE EXTENT OF WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING. CONTRACTOR SHALL IDENTIFY/VERIFY ALL PLUMBING LINES BEFORE STARTING ANY DEMOLITION WORK.

D. CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW, HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS. PATCH AND SEAL OPENINGS AS REQUIRED. COORDINATE ALL CUTTING AND PATCHING WITH OTHER TRADES.

E. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCH'L DOCUMENTS IN ADDITION TO THE MECHANICAL AND ELECTRICAL DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.

F. DRAWING IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH BUILDING ELEMENTS AND THE WORK OF OTHER TRADES. REFER TO RISER DIAGRAMS FOR MORE SIZING INFORMATION AND OTHER REQUIREMENTS.

PLUMBING KEYED NOTES

1. CONNECT TO EXISTING UTILITY. CONTRACTOR TO BE RESPONSIBLE FOR VERIFICATION OF EXACT LOCATION AND CONNECTION OF ALL UTILITIES TO EXISTING UTILITY IN THE BUILDING. SITE VISIT IS REQUIRED PRIOR TO BIDDING TO DETERMINE FULL SCOPE OF WORK.
2. EXISTING PLUMBING IN THIS AREA TO REMAIN WITH THE EXCEPTION OF NEW SINK FAUCETS TO BE PROVIDED.
3. CONNECT 2"VENT TO EXISTING 3"VENT RISER.

FIRE PROTECTION NOTES:

CONTRACTOR TO ADJUST/REWORKED LOCATIONS OF ALL AFFECTED SPRINKLER HEADS AND FIRELINES. CONTRACTOR IS RESPONSIBLE FOR TESTING AND INSPECTING EXISTING SYSTEM AND INSURE THAT ALL COMPONENTS ARE FULLY FUNCTIONING. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING TO DETERMINE FULL SCOPE OF WORK.

PROVIDE/MODIFY FIRE ALARM SYSTEM AS REQUIRED BY LOCAL, STATE OR FEDERAL CODES TO RECEIVE CERTIFICATE OF OCCUPANCY FOR THE PROJECT.

A STATE LICENSED FIRE SPRINKLER AND FIRE ALARM CONTRACTOR MUST SUBMIT SHOP DRAWINGS DIRECTLY TO THE CITY FIRE DEPARTMENT FIRE MARSHAL'S OFFICE FOR REVIEW AND APPROVAL OF THE PROPOSED FIRE SPRINKLER AND ALARM SYSTEM WORK. THESE SHOP DRAWINGS MUST BE APPROVED BY THE FIRE DEPARTMENT PRIOR TO THE CONTRACTOR BEGINNING THE WORK. ALL WORK MUST BE IN COMPLIANCE WITH THE APPLICABLE NFPA STANDARDS AND THE INTERNATIONAL FIRE CODE.

PRIOR TO SHUT-DOWN OF ANY EXISTING FIRE PROTECTION SYSTEM, CONTRACTOR SHALL NOTIFY OWNER OR OWNER'S APPOINTED REPRESENTATIVE 24 HOURS PRIOR TO SERVICE INTERRUPTION. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING SYSTEM TO FULL OPERATION.

NOTE:

CONTRACTOR SHALL EVALUATE ALL EXISTING PLUMBING FIXTURES (SINKS, TOILETS, FAUCETS, ETC...) TO REMAIN. CONTRACTOR SHALL REPAIR, REFURBISH, RESEAL, RESEAT, TIGHTEN, CLEAN, CAULK, ETC...EXISTING FIXTURES TO THE FULLEST EXTENT POSSIBLE IN LIEU OF REPLACING THEM.

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1ST LEVEL PLUMBING PLAN

SHEET

P2.01

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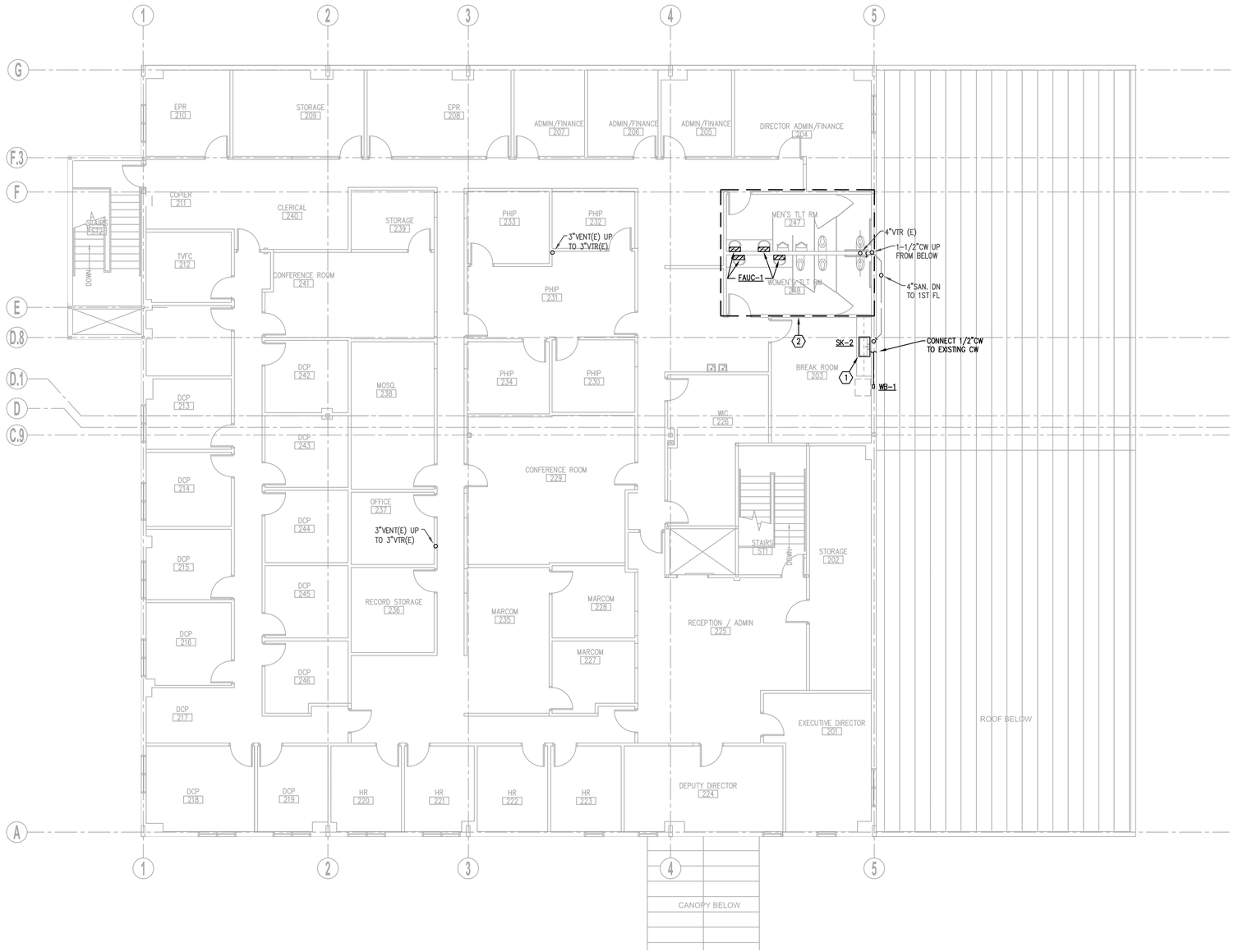

1 P2.02 2ND LEVEL PLUMBING PLAN

1/8"=1'-0"

GENERAL NOTES:

(A) SIZES AND LOCATION OF EXISTING PIPINGS SHOWN ARE APPROXIMATE LOCATION. CONTRACTOR NEED TO FIELD VERIFY EXACT SIZES, CONDITIONS AND LOCATIONS OF INDICATED EXISTING UTILITIES.

(B) THE CONTRACTOR IS FULLY RESPONSIBLE FOR PERFORMING ALL WORK UNDER THIS SECTION OF THE PROJECT IN FULL COMPLIANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES INCLUDING THOSE PUBLISHED BY OSHA AND EPA.

(C) THE EXTENT OF WORK IS INDICATED ON THE ARCHITECTURAL DRAWINGS AND BY THE REQUIREMENTS OF THIS SECTION. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING. CONTRACTOR SHALL IDENTIFY/VERIFY ALL PLUMBING LINES BEFORE STARTING ANY DEMOLITION WORK.

(D) CUTTING OF CONCRETE FLOORS SHALL BE BY MACHINE SAW, HOLES FOR PIPES (WALL OR FLOOR) SHALL BE DONE WITH CORE DRILLING EQUIPMENT WITH PRIOR APPROVAL FROM THE STRUCTURAL ENGINEERS. PATCH AND SEAL OPENINGS AS REQUIRED. COORDINATE ALL CUTTING AND PATCHING WITH OTHER TRADES.

(E) PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO REVIEW THE ARCH'L DOCUMENTS IN ADDITION TO THE MECHANICAL AND ELECTRICAL DOCUMENTS TO DETERMINE THE COMPLETE SCOPE OF WORK.

(F) DRAWING IS DIAGRAMMATIC ONLY. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH BUILDING ELEMENTS AND THE WORK OF OTHER TRADES. REFER TO RISER DIAGRAMS FOR MORE SIZING INFORMATION AND OTHER REQUIREMENTS.

PLUMBING KEYED NOTES

(1) CONNECT TO EXISTING UTILITY. CONTRACTOR TO BE RESPONSIBLE FOR VERIFICATION OF EXACT LOCATION AND CONNECTION OF ALL UTILITIES TO EXISTING UTILITY IN THE BUILDING. SITE VISIT IS REQUIRED PRIOR TO BIDDING TO DETERMINE FULL SCOPE OF WORK.

(2) EXISTING PLUMBING IN THIS AREA TO REMAIN WITH THE EXCEPTION OF NEW SINK FAUCETS TO BE PROVIDED.

FIRE PROTECTION NOTES:

CONTRACTOR TO ADJUST/REWORKED LOCATIONS OF ALL AFFECTED SPRINKLER HEADS AND FIRELINES. CONTRACTOR IS RESPONSIBLE FOR TESTING AND INSPECTING EXISTING SYSTEM AND INSURE THAT ALL COMPONENTS ARE FULLY FUNCTIONING. A VISIT TO THE SITE WILL BE REQUIRED PRIOR TO BIDDING TO DETERMINE FULL SCOPE OF WORK.

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PRIOR TO SHUT-DOWN OF ANY EXISTING FIRE PROTECTION SYSTEM, CONTRACTOR SHALL NOTIFY OWNER OR OWNER'S APPOINTED REPRESENTATIVE 24 HOURS PRIOR TO SERVICE INTERRUPTION. CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING SYSTEM TO FULL OPERATION.

NOTE:

CONTRACTOR SHALL EVALUATE ALL EXISTING PLUMBING FIXTURES (SINKS, TOILETS, FAUCETS, ETC...) TO REMAIN. CONTRACTOR SHALL REPAIR, REFURBISH, RESEAL, RESEAT, TIGHTEN, CLEAN, CAULK, ETC...EXISTING FIXTURES TO THE FULLEST EXTENT POSSIBLE IN LIEU OF REPLACING THEM.

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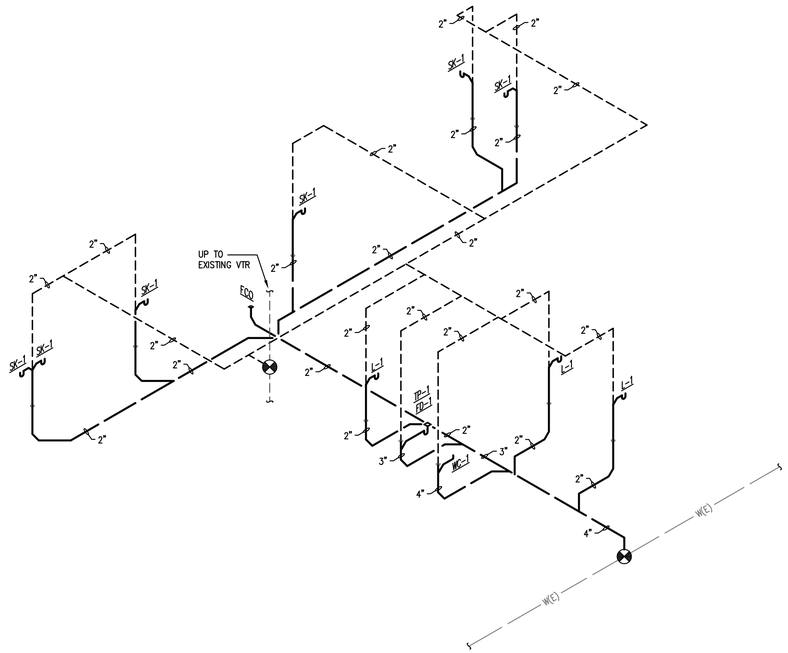
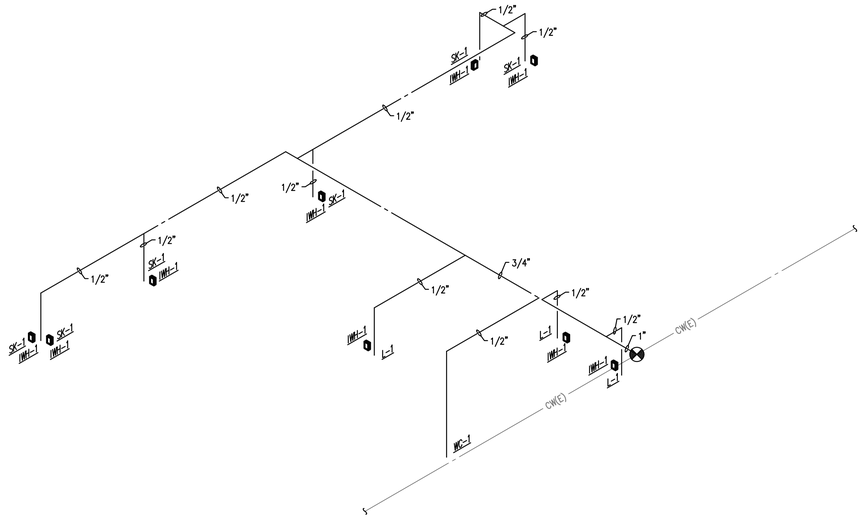
TITLE

2ND LEVEL PLUMBING PLAN

SHEET

P2.02





1 P3.01 PLUMBING RISERS
1/8"=1'-0"

GENERAL NOTES: PLUMBING RISER

WHEN NOT SHOWN ON PLANS, INDIVIDUAL FIXTURE CONNECTIONS SHALL BE SIZE AS SHOWN ON PLUMBING FIXTURE SCHEDULE.

ISOMETRIC DIAGRAMS ARE FOR SIZING PURPOSES ONLY AND SHALL NOT BE USED FOR MATERIAL TAKE-OFFS, OR BE CONSTRUED TO INDICATE ACTUAL SITE INSTALLATION. CONTRACTOR SHALL COORDINATE EXACT LOCATIONS OF PIPING, DEVICES AND EQUIPMENT WITH BUILDING ELEMENTS AND THE WORK OF OTHER TRADES.

PROVIDE WATER HAMMER ARRESTORS FOR EACH GROUP OF FIXTURES WHETHER INDICATED OR NOT ON PLAN. PROVIDE ACCESS PANEL WHERE LOCATED IN INACCESSIBLE CEILING OR WALL.

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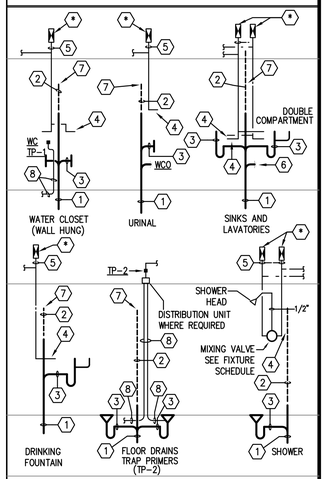
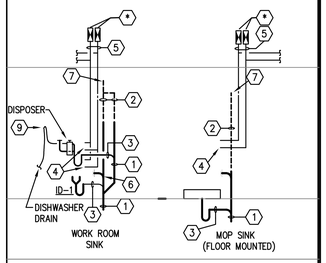
PLUMBING RISERS

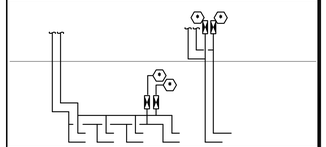
SHEET

P3.01

PLUMBING RISER DETAILS







KEYED NOTES – RISER DIAGRAM DETAILS:

(SEE PLUMBING FIXTURE SCHEDULE ON SHEET P3.01)

1. REFER TO PLUMBING FIXTURE SCHEDULE FOR SOIL OR WASTE ROUGH-IN PIPE SIZE. MINIMUM SOIL OR WASTE DRAIN LINE SIZE (EXCEPT AS NOTED) FOR THIS FIXTURE.
2. REFER TO PLUMBING FIXTURE SCHEDULE FOR SANITARY VENT ROUGH-IN PIPE SIZE. MINIMUM SANITARY VENT BRANCH SIZE (EXCEPT AS NOTED) FOR THIS FIXTURE
3. REFER TO PLUMBING FIXTURE SCHEDULE FOR FIXTURE DRAIN ROUGH-IN PIPE SIZE. MINIMUM FIXTURE DRAIN AND TRAP SIZE (EXCEPT AS NOTED) FOR THIS FIXTURE
4. REFER TO PLUMBING FIXTURE SCHEDULE FOR WATER PIPING ROUGH-IN PIPE SIZE. MINIMUM WATER SUPPLY BRANCH SIZE (EXCEPT AS NOTED) FOR THIS FIXTURE.
5. SHOCK ARRESTOR INLET; REFER TO SHOCK ARRESTOR SCHEDULE FOR SIZE. LOCATION SHOWN HERE FOR INDIVIDUAL FIXTURE WILL VARY WHERE INCLUDED AS PART OF PLUMBING CHASE BATTERY OF PIPING. REFER TO RISER DIAGRAMS FOR BATTERY LOCATIONS. ARRANGE ALL WATER LINES TO GRAVITY DRAIN.
6. WALL CLEANOUTS SHALL BE PROVIDED AT ALL END OF BATTERY OR END OF BRANCH LINE FIXTURES AND WHERE REQUIRED BY PLUMBING CODE OFFICIALS TO ASSURE COMPLETE ACCESS TO ALL PORTIONS OF DRAIN.
7. SANITARY VENT PIPES SHALL CONTINUE TO CEILING OR HEADER TOGETHER AT MINIMUM 42" ABOVE FINISHED FLOOR.
8. TRAP REFULL LINE; SEE PLUMBING DETAILS SHEET. EXTEND AND CONNECT TO FLOOR DRAIN TRAP AS SHOWN.
9. AIR GAP FITTING; PROVIDE WHERE REQUIRED BY CODE.

PLUMBING LEGEND

DISREGARD LEGEND ITEMS NOT INDICATED ON DRAWINGS

SYMBOL	DESCRIPTION	ABBR.
	SOIL OR WASTE PIPING B.G.	WST
	SOIL OR WASTE PIPING A.G.	WST
GW	GREASE WASTE PIPING	GW
	VENT PIPING	V
SD	STORM DRAIN PIPING	SD
OD	OVERFLOW STORM DRAIN PIPING	OD
G	GAS LINE	G
F	FIRE OR SPRINKLER LINE	F
	DOMESTIC COLD WATER	CW
	DOMESTIC HOT WATER	HW
	DOMESTIC HOT WATER RETURN	HWR
TW	TEMPERED DOMESTIC HOT WATER	TW
	GATE VALVE	GV
	GLOBE VALVE	GLV
	BALL VALVE	BV
	CHECK VALVE	CKV
	BALANCING VALVE	BAV
	BUTTERFLY VALVE	BTV
	PLUG VALVE	PLV
	PRESSURE REDUCING VALVE	PRV
	PRESSURE RELIEF VALVE	T&P
	STRAINER	STR
	UNION	UN
	THERMOMETER WELL	TW
	PRESSURE GAUGE	PG
	THERMOMETER	THRM
D	CONDENSATE OR INDIRECT DRAIN	D
	BRANCH CONNECTION, TOP	--
	BRANCH CONNECTION, BOTTOM	--
	ELBOW UP	--
	ELBOW DOWN	--
	FLOOR CLEANOUT (INTERIOR)	FCO
	CLEANOUT AT GRADE (EXTERIOR)	COG
	WALL CLEANOUT	WCO
	FLOOR DRAIN	FD
	FLOOR SINK	FS
	HOSE BIBB	HB
	WALL HYDRANT	WH
	NEW TO EXISTING PIPE CONNECTION	--
P/X	PLUMBING RISER IDENTIFICATION	P/X
DS/X	DOWNSPOUT RISER IDENTIFICATION	DS/X
F/X	FIRE RISER IDENTIFICATION	F/X
	ABBREVIATIONS	ABBR.
--	ABOVE FINISHED FLOOR	AFF
--	ACCESS PANEL	AP
--	BELOW FINISHED FLOOR	BFF
--	BOTTOM OF PIPE	BOP
--	INDIRECT DRAIN	D
--	FINISHED	FIN
--	FLOOR	FLR
--	INVERT ELEVATION	INV. EL.
--	NORMALLY CLOSED	NC
--	SOFT WATER	SW
--	TRAP PRIMER	TP
--	TYPICAL	TYP
--	VENT THRU ROOF	VTR

SHOCK ARRESTOR SCHEDULE

(*) P.D.I. SYMBOL	FIXTURE UNITS	SIZE
A	1–11	1/2" NPT
B	12–32	3/4" NPT
C	33–60	1" NPT
D	61–113	1 1/4" NPT
E	114–154	1 1/2" NPT
F	155–330	2" NPT

PIPING RISER DIAGRAMS ILLUSTRATE SHOCK ARRESTORS FOR FIXTURE WATER PIPE OPENINGS. SHOCK ARRESTORS, WHERE USED, SHALL BE SIZED AS NOTED IN PLUMBING RISER DETAILS ON THIS SHEET OR PER PLUMBING CODE REQUIREMENTS, WHICHEVER PLACES THE MOST STRINGENT REQUIREMENT. PROVIDE WATER HAMMER ARRESTORS FOR EACH GROUP OF FIXTURES WHETHER SHOWN OR NOT ON PLANS.

SHOCK ARRESTORS SHALL HAVE LIFETIME WARRANTY AND SHALL BE CERTIFIED BY THE MANUFACTURER TO BE SUITABLE FOR INSTALLATION WITHOUT REQUIREMENT FOR ACCESS PANELS.

PLUMBING GENERAL PLAN NOTES:

A. ALL PIPE PASSING THROUGH FIRE RATED WALLS OR FLOOR SLABS SHALL BE SUPPORTED AT PENETRATION AND OPENINGS SHALL BE SEALED WITH APPROVED, NON-HARDENING, FIRE STOP MATERIALS AS SPECIFIED OR REQUIRED.

B. CONTRACTOR SHALL COORDINATE WITH THE STRUCTURAL CONDITIONS AT THE SITE AND PROVIDE PROPER ROUGH-IN CONNECTIONS REQUIRED WITHOUT DAMAGE TO STRUCTURE. WHERE STRUCTURAL MODIFICATIONS ARE NECESSARY, CONTRACTOR SHALL FIRST RECEIVE WRITTEN APPROVAL OF THE ARCHITECT AND STRUCTURAL ENGINEER.

C. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD COORDINATING LOCATIONS AND ELEVATIONS OF ALL PLUMBING PIPING WITH OTHER TRADES PRIOR TO INSTALLATION. CORRECTIONS OR RELOCATIONS DUE TO MISALIGNED PIPE SHALL BE PERFORMED IN A TIMELY MANNER AT NO ADDITIONAL COST TO OWNER.

D. DO NOT SCALE THE PLUMBING DRAWINGS FOR ROUGH-IN WORK. CONTRACTOR SHALL REFER TO THE DIMENSIONED ARCHITECTURAL AND STRUCTURAL DRAWINGS TO FIELD DETERMINE EXACT LOCATIONS OF PLUMBING ROUGH-IN WORK.

E. SANITARY DRAINAGE PIPING 2" AND SMALLER SHALL HAVE A UNIFORM MINIMUM CONTINUOUS SLOPE OF 1/4 INCH PER FOOT OF RUN. DRAINAGE PIPING OF 3" SIZE AND LARGER SHALL SLOPE MINIMUM 1/8 INCH PER FOOT OF RUN. SLOPE ALL VENT PIPING MINIMUM 6" PER 100 FEET OF RUN BACK TO DRAIN.

F. PROVIDE AND INSTALL CLEANOUTS AT EACH CHANGE OF DIRECTION OF THE BUILDING SANITARY DRAIN, AT MINIMUM 75' INTERVALS ALONG STRAIGHT RUNS OF MAIN DRAIN AND BRANCHES, AT EACH HORIZONTAL CHANGE OF DIRECTION IN SOIL OR WASTE PIPES GREATER THAN 45 DEGREES, AT END OF INDIVIDUAL BRANCH DRAINS LONGER THAN 5'. PROVIDE CLEANOUTS IN ACCORD WITH INTERNATIONAL PLUMBING CODE.

G. INSTALL EACH WATER HEATER AND ALL PLUMBING EQUIPMENT WITH ADEQUATE CLEARANCES FOR ACCESS BY SERVICE PERSONNEL AND WITH PROPER ORIENTATION FOR ELEMENT REMOVALS/REPLACEMENTS.

H. PROVIDE ISOLATION VALVES FOR ALL BRANCHES OFF DOMESTIC WATER MAINS. ALL PLUMBING SYSTEM VALVES SHALL BE INSTALLED IN ACCESSIBLE CEILING SPACES. WHERE CEILING IS NOT ACCESSIBLE, OR SPACE IS CONFLICTING, VALVES SHALL BE INSTALLED IN PARTITIONS OR PIPE CHASES. PROVIDE APPROVED PAINTED STEEL HINGED ACCESS PANELS IN LOCATIONS PRE-APPROVED BY THE ARCHITECT. PROVIDE STAINLESS STEEL ACCESS DOORS FOR SHOWER, LOCKER AND LOCKER TOILET ROOM PANELS. PROVIDE MARKINGS ON CEILING TILES ON LOCATIONS OF ISOLATION VALVES.

I. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD COORDINATING LOCATIONS OF ALL SANITARY VENTS UP THROUGH ROOF TO MAINTAIN MINIMUM 15' CLEARANCE TO ANY BUILDING OUTDOOR AIR INLET.

GENERAL NOTES – PLUMBING FIXTURES

1. MOUNTING HEIGHT ELEVATION OF ALL WALL HUNG OR COUNTER MOUNTED FIXTURES SHALL BE COORDINATED WITH ARCHITECTURAL DRAWINGS PRIOR TO INSTALLATION OF ROUGH-IN WORK.
2. FOR ALL FIXTURES AND EQUIPMENT WITH ASSOCIATED TRIM OR COMPONENT ACCESSORIES PROVIDED UNDER SEPARATE DIVISIONS AND REQUIRING PLUMBING CONNECTIONS; THIS CONTRACTOR SHALL FIELD COORDINATE EXACT REQUIREMENTS OF, MAKE PROVISIONS FOR, AND SUPPLY ALL MATERIALS AND LABOR FOR MAKING FINAL CONNECTIONS.
4. CONTRACTOR SHALL REFER TO SHOP DRAWINGS OF EQUIPMENT TO BE SUPPLIED FOR FINAL COORDINATION OF ALL ROUGH-IN OPENINGS BEFORE BEGINNING WORK.
5. ALL FIXTURE AND EQUIPMENT STUB-OUTS SHALL BE PROVIDED WITH A STOP VALVE. ALL FIXTURE STOPS SHALL BE SOLID BRASS, LOOSE KEY OPERATED, CHROME PLATED (WHERE EXPOSED), AND FITTED TIGHT TO CHROME PLATED BRASS WALL ESCUTCHEON PLATES. SUPPLY RISERS SHALL BE STAINLESS STEEL FLEXIBLE CONNECTORS.
6. ALL P-TRAPS WITHIN THE BUILDING, ABOVE GRADE AND EXPOSED TO INSPECTION SHALL BE C.P. ADJUSTABLE, CAST BRASS WITH CLEANOUT PLUG. PROVIDE CAST BRASS SLIP NUTS AND WASHERS, 17 GAGE SEAMLESS TUBULAR BRASS DRAIN TO WALL AND WALL FLANGE. PROVIDE McGUIRE No. 8872C, 1-1/4" P-TRAP FOR ALL LAVATORIES AND SIMILAR FIXTURES PROVIDE McGUIRE No. 8912C, 1-1/2" P-TRAP FOR ALL SINKS AND SIMILAR FIXTURES.
7. PROVIDE DEEP SEAL P-TRAP FOR ALL DRAINS OF INFREQUENT USE OR REQUIRING TRAP PRIMER.
8. ALL ROUGH IN OPENINGS SHALL BE FITTED WITH CHROME PLATED, WROUGHT BRASS DEEP BELL OR BOX ESCUTCHEON PLATES FITTED TIGHT TO THE PIPE AND FLUSH TO THE WALL. STEEL ESCUTCHEON PLATES ARE NOT ACCEPTED.
9. ALL EXPOSED BRASS SHALL BE CHROME PLATED.
10. ALL HANDICAPPED ACCESSIBLE FIXTURES INDICATED WITH ♿ SHALL BE PROVIDED OF APPROVED TYPES AND WITH REQUIRED CONTROLS AND INSTALLED TO HEIGHTS AND CLEARANCES, AS PRESCRIBED BY AMERICANS WITH DISABILITIES ACT (ADA). FIXTURES SHALL COMPLY WITH ALL FEDERAL, STATE, AND LOCAL ACCESSIBILITY CODE REQUIREMENTS. REFER TO ARCHITECTURAL DRAWINGS FOR DIMENSIONED MOUNTING HEIGHTS AND SPECIFIED CLEARANCE REQUIREMENTS. PROVIDE FIXTURES WITH DEPTHS AT MAXIMUM PERMITTED AND AVAILABLE FOR INTENDED FIXTURE USE.
11. ALL WHEELCHAIR LAVATORY AND SINK PIPING WHERE EXPOSED SHALL BE INSULATED. PROVIDE OFFSET DRAIN FITTINGS WHERE REQUIRED TO PROVIDE MINIMUM CLEARANCES. REFER TO SPECIFICATIONS SECTION 15440.
12. ALL SINKS FOR HANDICAPPED USE SHALL BE STAMPED WITH DRAIN OUTLET AT REAR OF BOWL.
13. PLUMBING FIXTURES SHALL BE OF WATER CONSERVATION TYPE IN ACCORDANCE WITH PLUMBING CODE REQUIREMENTS FOR WATER SAVING PERFORMANCE. LAVATORY AND SINK FAUCETS SHALL INCLUDE 2.2 GPM FLOW CONTROL.
14. ORIENT ADA WATER CLOSET FLUSH VALVE WITH OPERATOR ON WIDE SIDE OF ENCLOSURE.
15. SEAL ALL SPACES BETWEEN PLUMBING FIXTURES AND MOUNTING SURFACES WITH WHITE LATEX CAULK WIPED SMOOTH AND FLUSH WITH FIXTURE.
16. FLOOR DRAINS SHALL BE INSTALLED AT LOW POINTS OF UNIFORMLY SLOPED FLOOR. CONTRACTOR SHALL FIELD COORDINATE WITH STRUCTURAL TO INSURE FLOORS ARE SLOPED UNIFORMLY ACROSS ENTIRE TOILET ROOMS OR OVER AS WIDE AN AREA AS PRACTICAL FOR OPEN AREA FLOOR DRAINS. CONVEX FLOOR SLOPE IN THE IMMEDIATE VICINITY OF THE FLOOR DRAIN IS NOT ACCEPTABLE.

PLUMBING FIXTURE SCHEDULE

PLAN MARK	MINIMUM ROUGH-IN SIZES WST & VENT	DRAIN	CW	HW	
WATER CLOSET WC-1 ♿	4"	2"	4"	1"	---- AMERICAN STANDARD No.3641.001, 17.125" HEIGHT WHITE V.C. ELONGATED SIPHON JET FLOOR MTD. (1.28 GPF) BOWL WITH TOP SPUD, BOLT CAPS, OLSONITE No.95-SS WHITE OPEN FRONT SEAT, LESS COVER AND SLOAN ROYAL 111-1.28 HET FV. "RIGHT WIDTH FLOWISE ELONGATED, RIGHT HEIGHT"
LAVATORY-WALL HUNG L-1 ♿	2"	1-1/2"	1-1/4"	1/2"	1/2" AMERICAN STANDARD NO.0355.012 WHITE VC LAVATORY WITH FRONT OVERFLOW AND 4" CENTER FAUCET HOLE FOR CHICAGO 802-VE2805-665ABCP METERING FAUCET W/ 0.5 GPM NON-AERATING SPRAY. MOUNTING HEIGHT FOR ADULT ADA. PROVIDE TMV-1 WHERE INDICATED. PROVIDE WADE OR EQUAL FLOOR MOUNTED CONCEALED ARM CARRIER.
SINK SK-1 ♿	2"	1-1/2"	1-1/2"	1/2"	1/2" ELKAY No. LRAD-1918-55 "LUSTERTONE" THREE HOLE PUNCH STAINLESS STEEL SINK. PROVIDE CHICAGO 895-317GN2AE35ABCP (1.5 GPM) GOOSE-NECK FAUCET WITH WRISTBLADE HANDLES, AND SWING SPOUT, ELKAY No. LK-18 GRID DRAIN STRAINER, TAILPIECE. CAST BRASS P-TRAP WITH CO. STOPS AND SUPPLIES. PROVIDE OFFSET TAILPIECE AND INSULATION KIT WHERE FIXTURE TRIM IS EXPOSED. WITH REAR CENTER DRAIN.
SINK SK-2 ♿	2"	1-1/2"	1-1/2"	1/2"	1/2" ELKAY No. ECTSRS33229BG CROSSTOWN STAINLESS STEEL SINK, SINGLE BOWL DUAL MOUNT KIT. PROVIDE CHICAGO 895-317GN2AE35ABCP (1.5 GPM) GOOSE-NECK FAUCET WITH WRISTBLADE HANDLES, AND SWING SPOUT, ELKAY No. LK-18 GRID DRAIN STRAINER, TAILPIECE. CAST BRASS P-TRAP WITH CO. STOPS AND SUPPLIES. PROVIDE OFFSET TAILPIECE AND INSULATION KIT WHERE FIXTURE TRIM IS EXPOSED. WITH REAR CENTER DRAIN.
FLOOR DRAIN FD-1	3"	2"	----	----	---- ZURN No.ZN-415 CAST IRON DRAIN WITH 6" DIAMETER TYPE 'B' STRAINER AND 1/2" IPS TRAP PRIMER CONNECTION. (PLUGGED WHERE NOT REQUIRED)
TRAP PRIMER TP-1	----	----	1/2"	----	---- PROVIDE SLOAN No. VBF-72-A1 FLUSH VALVE VACUUM BREAKER TRAP REFILL SUPPLY. AFFIX TO WATER CLOSET NEAREST TO AND IN SAME ROOM AS DRAIN SUPPLIED. ALL EXPOSED TO BE CHROME PLATED AND RUN SHORT AS POSSIBLE WALL CONCEALED DRAIN TUBING SHALL BE 1/2" TYPE 'K' SOFT COPPER SLOPING UNIFORMLY TO DRAIN.
WALL CLEAN-OUT WCO	----	----	----	----	---- WADE 8550 & 8480S DURO-COATED CAST IRON CLEANOUT TEE WITH COUNTER-SUNK GASKET, WATERTIGHT THREADED PLUG AND SQUARE SMOOTH ACCESS COVER WITH VANDAL PROOF SCREWS.
FLOOR CLEAN-OUT FCO, YCO	----	----	----	----	---- WADE 6000 SERIES CAST IRON CLEANOUT WITH COUNTER-SUNK PLUG AND SUITED FOR THE INSTALLATION REQUIRED. VERIFY TOP FINISHES WITH ARCHITECT.
INSTANTANEOUS WATER HEATER IWH-1	----	----	----	1/2"	1/2 SINGLE POINT INSTANTANEOUS WATER HEATER EQUAL TO EEMAX EX82208T, 208V/1PH, 8.3 KW, 40 AMPS, 57°F RISE AT 1 GPM. THERMOSTATIC MIXING VALVE SET AT 105°F.
ICE MAKER WALL BOX WB-1	----	----	----	1/2"	---- GUY GRAY NO. BIM-875 WITH 1/2 X 1/4 O.D. TUBE, CHROME PLATED FIXTURE SUPPLY STOP. INSTALL BOX 54" AFF BEHIND FREE STANDING REFRIGERATOR WITH ICE MAKER AND 18" AFF FOR UNDER COUNTER REFRIGERATOR OR ICE MAKER LEAVE 48" COIL OF 1/4" O.D. TYPE 'K' SOFT COPPER FOR EQUIP. CONNECTION AND PROVIDE CUNO ICEASSURE1 FILTER BRACKETED TO WALL.
THERMOSTATIC MIXING VALVE TMV-1				1/2"	1/2" LEONARD 170BP, ADJUSTABLE THERMOSTATIC MV ASSE 1070, POINT-OF-USE MIXING VALVE WITH INLET CHECK STOPS TO LIMIT HOT WATER TEMP. TO MAXIMUM 110° F. AT FAUCET OUTLET. INSTALL AS PER MANUFACTURER'S DETAILS AND RECOMMENDATIONS.
SINK FAUCET FAUC-1				1/2"	1/2" PROVIDE CHICAGO FAUCET (OR APPROVED EQUAL) DECK MOUNTED, 4" FIXED CENTER, SINGLE LEVER HOT AND COLD WATER MIXING SINK FAUCET, MODEL 2200-4E2805ABCP, 0.5 GPM. CHROME PLATED (VERIFY WITH ARCHITECT PRIOR TO ORDERING), ECONO-FLO, NON-AERATING SPRAY, LOW LEAD CONTENT.

NOTE:

CONTRACTOR SHALL EVALUATE ALL EXISTING PLUMBING FIXTURES (SINKS, TOILETS, FAUCETS, ETC...) TO REMAIN. CONTRACTOR SHALL REPAIR, REFURBISH, RESEAL, RESEAT, TIGHTEN, CLEAN, CAULK, ETC...EXISTING FIXTURES TO THE FULLEST EXTENT POSSIBLE IN LIEU OF REPLACING THEM.

PLUMBING PIPE MATERIALS SCHEDULE

PIPING SYSTEM	PIPING MATERIAL
SANITARY DRAINS AND VENTS INSIDE BUILDING AND BELOW GROUND	SCHEDULE 40 PVC DWV
SANITARY DRAINS AND VENTS INSIDE BUILDING AND ABOVE GROUND	SCHEDULE 40 PVC DWV
SANITARY DRAINS AND VENTS INSIDE BUILDING AT PLENUM CEILING	SCHEDULE 40 PVC DWV
DOMESTIC HOT & COLD WATER INSIDE BUILDING AND ABOVE GROUND	COPPER, TYPE "L" HARD DRAWN
DOMESTIC HOT & COLD WATER INSIDE BUILDING AND BELOW GROUND	COPPER, TYPE "K" SOFT ANNEALED
FIRE SPRINKLER ABOVE GROUND – 2" AND SMALLER	BLACK STEEL SCHEDULE 40
FIRE SPRINKLER ABOVE GROUND – 2-1/2" AND LARGER	BLACK STEEL SCHEDULE 10

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DBR Project Number 165026.000

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Phone : 512-433-2696

In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED
PROFESSIONAL ENGINEER
7/5/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

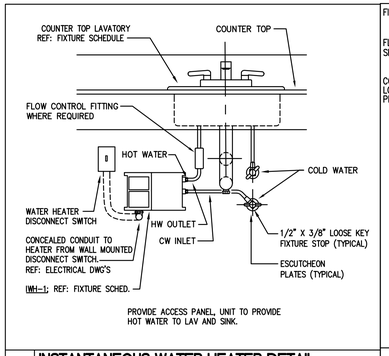
Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

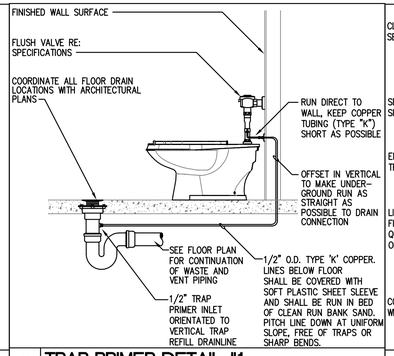
PLUMBING SCHEDULES

SHEET

P5.01



1 INSTANTANEOUS WATER HEATER DETAIL
NOT TO SCALE



2 TRAP PRIMER DETAIL #1
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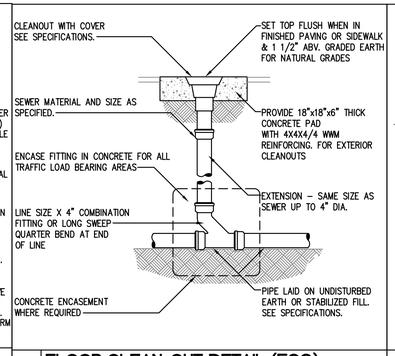
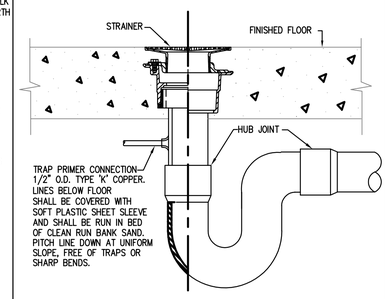


3 FLOOR CLEAN-OUT DETAIL (FCO)
NOT TO SCALE



4 FLOOR DRAIN DETAIL (FD-1)
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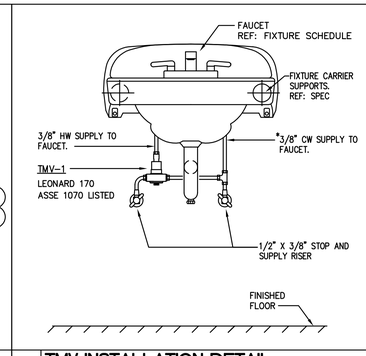

5 TMV INSTALLATION DETAIL
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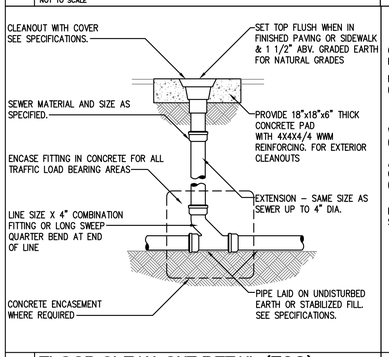

6 FLOOR CLEAN-OUT DETAIL (FCO)
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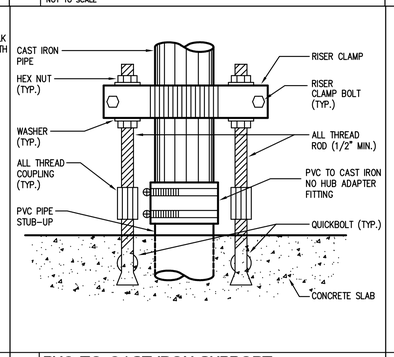
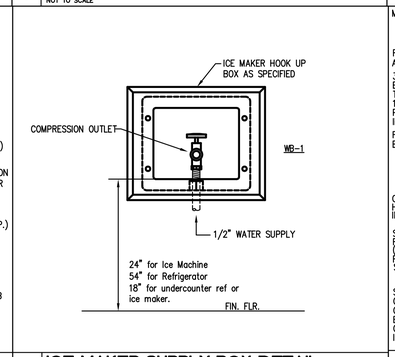


7 PVC TO CAST IRON SUPPORT
NOT TO SCALE



8 ICE MAKER SUPPLY BOX DETAIL
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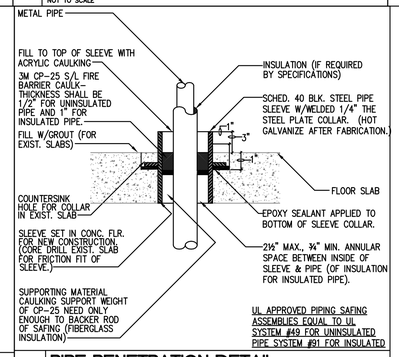

9 PIPE PENETRATION DETAIL
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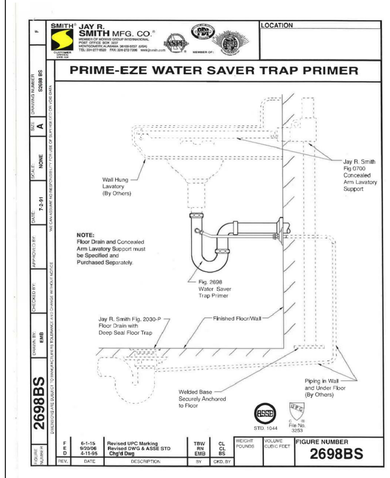

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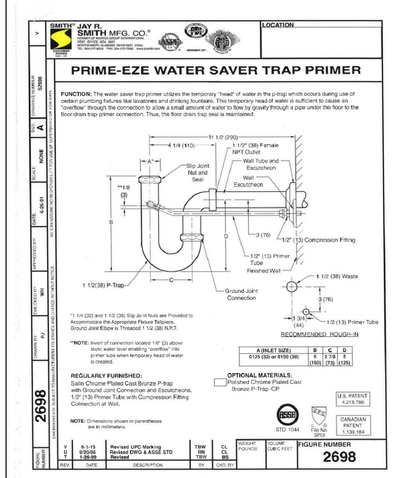

11 TRAP PRIMER DETAIL #3
NOT TO SCALE

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In Association w/

WCCHD Office Renovations

355 Texas Avenue
Round Rock, Texas

STATE OF TEXAS
MELISSA B. COAD
93852
REGISTERED
PROFESSIONAL ENGINEER
1/13/17

REVISIONS

No.	Issue	Date
1	100% Construction Documents	12/05/2016
2	100% CD Issue for Bid	01/16/2017

SHEET INFORMATION

Date	January 16, 2017
Job Number	16-1010
Scale	
Drawn	
Checked	
Approved	

TITLE

PLUMBING DETAILS

SHEET

P6.01

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DBR Project Number 165026.000

MC	SN	NF	AH	--

Evaluation of Respondents and Selection Criteria

for

Texas Avenue Facility

Located at 355 Texas Avenue, Round Rock, TX

RFP 1701-139

Evaluation of Respondents

Pursuant to Chapter 2269 of the Texas Government Code, Williamson County shall receive, publicly open and read aloud the names of the Respondents and any monetary proposals made by the Respondents. Not later than the 45th day after the date on which the proposals are opened, Williamson County shall evaluate and rank each proposal submitted in relation to the published selection criteria below.

Williamson County shall thereafter select the Respondent that submits the proposal that offers the best value for Williamson County based on:

(1) the selection criteria set out below and the weighted value for those criteria; and

(2) the selection criteria's ranking evaluation.

Williamson County will first attempt to negotiate a contract with the selected Respondent. Williamson County and its architect or engineer may discuss with the selected Respondent options for a scope or time modification and any price change associated with the modification. If Williamson County is unable to negotiate a satisfactory contract with the selected Respondent, Williamson County shall, formally and in writing, end negotiations with that Respondent and proceed to the next Respondent in the order of the selection ranking until a contract is reached or all proposals are rejected.

All Proposals will be evaluated by a Williamson County appointed Evaluation Committee. The Evaluation Committee may be composed of County Staff that may have expertise, knowledge or experience with the services and/or goods being procured hereunder. As may be noted in this RFP, Respondents may receive further

evaluation via telephone or in-person interviews with members of the Evaluation Committee.

Selection Criteria

1. **The price (40% of score – 40 points max)**

Price project out based on Architectural plans and any addendums.

2. **The Respondent's proposed personnel for the project (20% of score – 15 points max)**

Respondent to provide list of proposed staff to be used on the project. Provide names of Company Owner, Project Manager, Superintendent, etc. and or equivalents.

3. **Respondent's experience and reputation (20% of score – 15 points max)**

Respondent to provide a list of 3 similar (or larger) projects performed in Texas. Please include project name, owner contact name & contact information, brief project description with size/square footage and contracted dollar amount.

4. **Respondent's office location as it relates to distance from the project site (20% of score – 15 point max)**

Provide verifiable physical address of Respondent's closest permanent location to project and length of time at that location.

Each Selection Criteria will be scored as set out in the chart below. Maximum score points on evaluation is 85.

	Evaluation Criteria for Texas Avenue Facility Remodel RFP 1701-139						
	Buyer Teri Jeffries 512-943-1553						
	Criteria	Maximum Points	Please select a Whole Number from the list provided for each question. (Decimal scoringnot permitted)				
1.1	Proposal pricing- based upon all architectural plans, specifications and instructions per the RFP	40	The Respondent with the lowest price proposal will receive the maximum points for proposal pricing. Each particular remaining Respondent's points for pricing will be determined by multiplying the maximum points for pricing by a fraction, the numerator of which is the lowest price proposal amount and the denominator of which is each particular Respondent's price proposal amount. The product of the calculation shall be the particular Respondent's points for proposal pricing. For example, the pricing points for the Respondent with the next to lowest pricing proposal ("Respondent #2") shall be calculated as follows: 40 Maximum Points for Pricing x (Lowest Respondent's Price Proposal Amount ÷ Respondent No. 2's Price Proposal Amount = Respondent No. 2's Pricing Points.				
1.2	Personnel for the project	15	15 = Significantly Exceeds Requirements 12 = Exceed Requirements 9 = Meets ALL Requirements 6 = Marginally Meets Requirements 1 = Does Not Meet Requirements				
1.3	Respondent's experience	15	15 = Significantly Exceeds Requirements 12 = Exceed Requirements 9 = Meets ALL Requirements 6 = Marginally Meets Requirements 1 = Does Not Meet Requirements				
1.4	Respondent's physical address	15	15 = Significantly Exceeds Requirements 12 = Exceed Requirements 9 = Meets ALL Requirements 6 = Marginally Meets Requirements 1 = Does Not Meet Requirements				
	Total Evaluation Points	85	TOTAL	0	0	0	0

Williamson County – Request for Proposal (RFP)

SECTION 1 - DEFINITIONS

Addendum/Addenda – means any written or graphic instruments issued by the County prior to the consideration of Proposals which modify or interpret the Proposal Documents by additions, deletions, clarifications, or corrections.

Agreement/Ensuing Agreement(s) – means the Successful Respondent may be required by the County to sign an additional Agreement containing terms necessary to ensure compliance with the RFP and the Respondent's Proposal. Such Ensuing Agreement(s) shall contain the Proposal specifications, terms and conditions that are derived from the RFP.

Contract – means this RFP and the Proposal of the Successful Respondent shall become a Contract between the Successful Respondent and the County once the Successful Respondent's Proposal is properly accepted by the Williamson County Commissioners Court (sometimes referred to herein as the Commissioner's Court").

Commissioner's Court – means the Williamson County Commissioners Court.

County – means Williamson County, a political subdivision of the State of Texas.

Executive Summary – means the document submitted by Respondent that represents a concise summary of the contents of the Proposal. It does not include any information concerning costs.

Proposal Documents – means the Legal Notice, RFP including attachments, and any Addenda issued by the County prior to the consideration of any Proposals.

Proposal – means the complete, properly signed document, and ALL required forms and documentation listed in the proposal package which have been submitted in accordance with this RFP package. A Proposal submitted in accordance with this RFP is irrevocable during the specified time period for evaluation and acceptance of Proposals, unless a waiver is obtained from the Williamson County Purchasing Agent.

Respondent – means a person or entity who submits a Proposal in response to this RFP.

Request for Proposals (RFP) – means this document, together with the attachments thereto and any future Addenda issued by the County.

Successful Respondent– means the responsible Respondent who, in the County's sole opinion, submits the Proposal which is in the best interest of the County, taking into account factors identified

herein, and to whom the County intends to award the Contract.

SECTION 2 - RESPONSE FORMAT AND SUBMISSION

2.1 INTRODUCTION

Each Proposal submitted in response to this RFP should clearly reference the numbered sections of this RFP that require a response. Failure to arrange the Proposal as requested may result in the disqualification of the Proposal.

Though there is not a page limit for Proposals, to save natural resources including paper, and to allow the County staff to efficiently evaluate all submitted Proposals, the County requests that Proposals be orderly, concise, but comprehensive in providing the requested information. Conciseness and clarity of content are emphasized and encouraged. If mailed or delivered in person, please limit additional, non requested information.

Please provide your Proposal response using:

A. 8 ½" x 11" pages, inclusive of any cover letter or supporting materials.

B. The least amount of plastic/laminate or other non-recyclable binding materials.

C. Single-sided printing.

Vague and general Proposals will be considered non-responsive, and may, at the County's sole discretion, result in disqualification. Proposals must be legible and complete. Failure to provide the required information may result in the disqualification of the Proposal. All pages of the Proposal should be numbered and the Proposal should contain an organized, paginated table of contents corresponding to the sections and pages of the Proposal.

2.2 ORGANIZATION OF PROPOSAL CONTENTS AND TABLE OF CONTENTS

Each Proposal should be submitted with a table of contents that clearly identifies and denotes the location of all enclosures of the Proposal. The table of contents should follow the RFP's structure as much as is practical.

Each Proposal should be organized in the manner described below:

A. Transmittal Letter. Please see Section 2.3, Transmittal Letter, for more information.

B. Table of Contents.

C. Executive Summary. Please see Section 2.4, Executive Summary.

D. Proposal Response to Criteria. (Please see the sections in this RFP package that list the Specifications & Cost Proposal, Experience and Qualifications, References, and Implementation Strategy to respond to our criteria in a clear and concise manner)

E. Price Sheet.

F. References: Identification of three (3) references within the last four (4) years, for which the Respondent is providing, or has provided, the goods and/or services (public sector) of the type requested in this RFP. Include the name, position/title, and telephone number of a contact person at each entity.

G. Conflict of Interest Questionnaire.

H. Proposal Affidavit (Signature Page).

I. Attach your entities sample Contract, if applicable, for the County's review and consideration. This should include any additional terms or conditions. The County is not required to use the sample Contract submitted.

2.3 TRANSMITTAL LETTER

The Respondent should submit a Transmittal Letter that provides the following information:

A. Name and address of individual or business entity submitting the Proposal.

B. Respondent's type of business entity (i.e., Corporation, General Partnership, Limited Partnership, LLC, etc.). See Section 3.5, Signature of Respondent, for more information.

C. Place of incorporation or organization, if applicable.

D. Name and location of major offices and other facilities that relate to the Respondent performance under the terms of this RFP.

E. Name, physical address, email address, business and fax number of the Respondent's principal contact person regarding all contractual matters relating to this RFP.

F. The Respondent's Federal Employer Identification Number.

G. A commitment by the Respondent to provide the services required by the County;

H. A statement that the Proposal is valid for the time specified on page three (3), under the section named *Prices Good for*, of this Proposal packet. Any Proposal containing a term of less than the required amount, may at the County's sole discretion, be rejected as non-responsive.

I. If the Proposal being submitted will have an effect on air quality for the County (as it relates to any state, federal, or voluntary air quality standard), then the Respondent is encouraged to provide information in narrative indicating the anticipated air quality impact. See Section 4.40, Air Quality for more information.

The Transmittal Letter should be signed by a person legally authorized to bind the Respondent to its representations in the Transmittal Letter and the Proposal. In the case of a joint Proposal, each party must sign the Transmittal Letter.

2.4 EXECUTIVE SUMMARY

The Respondent should provide an Executive Summary of its Proposal that asserts that the Respondent is providing in its response all of the requirements of this RFP. The Executive Summary should not include any information concerning the cost of the Proposal, but instead must represent a full and concise summary of the contents of the Proposal. It is recommended the Executive Summary include the following information:

A. Identify any goods and/or services that are provided beyond those specifically requested. If the Respondent is providing services and/or goods that do not meet the specific requirements of this RFP, but in the opinion of the Respondent are equivalent or superior to those specifically requested, any such differences should be noted in the Executive Summary. However, the Respondent must realize that failure to provide the goods and/or services specifically required, at the County's sole discretion, may result in disqualification of the Proposal.

B. Indicate why the Respondent believes that it is the most qualified Respondent to provide the services described in this RFP. The Successful Respondent must demonstrate extensive experience and understanding of the intent of this project. The Respondent should describe in detail the current and historical experience the Respondent and its subcontractors have that would be relevant to completing the project. References must contain the name of key personnel and telephone numbers for each contact, as described in Section 3.14, References.

C. Briefly state why the Respondent believes its proposed goods and/or services best meet the County's needs and RFP requirements, and the Respondent also should concisely describe any additional features, aspects, or advantages of its goods and/or services in any relevant area not covered elsewhere in its Proposal.

2.5 CONFLICT OF INTEREST

No public official shall have interest in a contract, in accordance with Vernon's Texas Codes Annotated, Local Government Code, Title 5, Subtitle C, Chapter 171, as amended.

As of January 1, 2006, all Respondents are responsible for complying with Local Government Code, Title 5, Subtitle C, Chapter 176. Additional information may be obtained from the County's website at the following link:

http://www.wilco.org/CountyDepartments/Purchasing/ConflictofInterestDisclosure/tabid/689/language/en-US/Default.aspx

Each Respondent must disclose any existing or potential conflict of interest relative to the performance of the requirements of this RFP. **Examples of potential conflicts of interest may include an existing business or personal relationship between the Respondent, its principal, or any affiliate or subcontractor with the County or any other entity or person involved in any way with the project that is subject to this RFP**. Similarly, any personal or business relationship between the Respondent, the principals, or any affiliate or subcontractor with any employee, or official of the County or its suppliers must be disclosed. Any such relationship that might be perceived or represented as a conflict must be disclosed. Failure to disclose any such relationship or reveal personal relationships with the County employees or officials may be cause for termination.

The County will decide if an actual or perceived conflict should result in Proposal disqualification.

By submitting a Proposal in response to this RFP, all Respondents affirm they have not given, nor intend to give, at any time hereafter, any economic opportunity, future employment, gift, loan, gratuity, special discount, trip, favor, or service to a the County public servant or any employee, official or representative of same, in connection with this procurement.

Each Respondent must provide a Conflict of Interest Statement with their Proposal Package. Package may be deemed incomplete without this form.

2.6 CERTIFICATE OF INTERESTED PARTIES – FORM 1295

As of January 1, 2016, all Respondents are responsible for complying with the Texas Government Code, Section 2252.908. The law states that the County may not enter into certain contracts with a Respondent unless the Respondent submits a disclosure of interested parties to the County at the time the Respondent submits the signed contract. The law applies only to a contract of the County on or after January 1, 2016 that either:

A. Requires an action or vote by the Commissioners Court before the contract may be signed (all contracts that fall under the jurisdiction of the Commissioners Court approval, such as contracts resulting from an Initiation for Bid (IFB), RFP, Request for Qualifications (RFQ), etc., excluding,

but not limited to, certain Juvenile Service contracts, contracts funded with Sheriff's seized fun monies, etc.); or

B. Has a value of at least $1,000,000.

By January 1, 2016, the Texas Ethics Commission will make available on its website, a new filing application that must be used to file Form 1295. Information regarding how to use the filing application is available on the Texas Ethics Commission website at the following link:

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

A Respondent must:

A. Use the online application to process the required information on Form 1295.

B. Print a copy of the form which will contain a unique certification number.

C. An authorized agent of the Respondent must sign the printed copy of the form.

D. Have the form notarized.

E. File the completed Form 1295 and certification of filing (scanning and emailing form is sufficient) with Williamson County Purchasing Agent at the time the signed Contract is submitted for approval.

After the Commissioners Court award of the contract, the County shall notify the Texas Ethics Commission, using the Texas Ethics Commission's filing application, of the receipt of the filed Form 1295 and certification of filing not later than the 30th day after the date the contract binds all parties to the contract. The Texas Ethics Commission will post the completed Form 1295 to its website within seven business days after receiving notice from the County.

2.7 PROPOSAL SUBMITTAL DEADLINE

The Proposal is due no later than the submittal date and time set forth in the Public Announcement and General Information listed in this RFP package. Contents of each Proposal shall be submitted in accordance with this RFP.

2.8 ETHICS

The Respondent shall not accept or offer gifts or anything of value, nor enter into any business arrangement with any employee, official or agent of the County.

2.9 DELIVERY OF PROPOSALS

The County uses BidSync to distribute and receive bids and Proposals. It is preferred that Proposals be submitted electronically through BidSync; however, Respondents can submit a hard copy.

Refer to www.bidsync.com for further information on how to submit electronically.

If mailed or delivered in person, Proposal and Proposal Addenda are to be delivered in sealed envelope on or before the submittal deadline, as noted in the Public Announcement and General Information listed in this RFP package, to:

Williamson County Purchasing Department

Attn: **Proposal Name and Number**
901 South Austin Avenue
Georgetown, Texas 78626

Also, all Respondents should list their Name and Address, and the Date of the Proposal opening on the outside of the box or envelope and note "Sealed Proposal Enclosed." Williamson County will not accept any Proposals after the submittal deadline, and shall return such Proposals unopened to the Respondent. The County will not accept any responsibility for Proposals being delivered by third party carriers.

Proposals will be opened publicly; however, in a manner to avoid public disclosure of contents, only names of Respondents will be read aloud: no pricing will be announced at the opening.

SECTION 3 - INSTRUCTIONS AND GENERAL REQUIREMENTS

3.1 INSTRUCTIONS

Read this document carefully, and follow all instructions and requirements. All Respondents are responsible for fulfilling all requirements and specifications. Be sure to have a clear understanding of this RFP.

General requirements apply to all advertised RFPs; however, these may be superseded, in whole or in part, by the proposal specifications, Addenda and modifications issued as a part of this RFP. Be sure your Proposal package is complete.

3.2 AMBIGUITY, CONFLICT, OR OTHER ERRORS IN THIS RFP

If a Respondent discovers any ambiguity, conflict, discrepancy, omission or other error in this RFP, the Respondent shall immediately notify the County Purchasing Department of such error in writing and request modification or clarification of the document.

Modifications will be made by issuing Addenda. If the Respondent fails to notify the County prior to the date and time fixed for submission of Proposals of an error or ambiguity in the RFP known to the Respondent, or an error or ambiguity that reasonably should have been known to the Respondent, then the Respondent shall be deemed to have waived the error or ambiguity or its later resolution.

The County may also modify the RFP, no later than forty-eight (48) hours prior to the date and time fixed for submission of Proposals, by issuance of an Addendum. All Addenda will be numbered consecutively, beginning with one (1).

3.3 NOTIFICATION OF MOST CURRENT ADDRESS

All Respondents in receipt of this RFP shall notify the Williamson County Purchasing Department of any address changes, contact person changes, and/or telephone number changes no later than forty-eight (48) hours prior to the date and time fixed for submission of Proposals.

3.4 SIGNATURE OF RESPONDENT

A Transmittal Letter, which shall be considered an integral part of the Proposal as stated in Section 2.3, Transmittal Letter, shall be signed by an individual who is authorized to bind the Respondent contractually.

A. If the Respondent is a Corporation or Limited Liability Company, the legal name of the Corporation or Limited Liability Company shall be provided together with the signature of the officer or officers authorized to sign on behalf of such entity.

B. If the Respondent is a General Partnership, the true name of the firm shall be provided with the signature of each partner authorized to sign.

C. If the Respondent is a Limited Partnership, the name of the Limited Partner's General Partner shall be provided with the signature of the officer authorized to sign on behalf of the General Partner.

D. If the Respondent is a Sole Proprietor(s) (individual), each Sole Proprietor(s) shall sign.

E. If signature is by an agent, other than the Sole Proprietor(s) or an officer of a Corporation, Limited

Liability Company, General Partner or a member of a General Partnership, a power of attorney equivalent document must be submitted to the Williamson County Purchasing Department.

3.5 ASSUMED BUSINESS NAME

If the Respondent operates business under an Assumed Business Name, the Respondent must have file with the Williamson County Clerk a current Assumed Name Certificate and provide a file marked copy of same prior to contract award.

3.6 ECONOMY OF PRESENTATION

Proposals should not contain promotional or display materials, except as they may directly answer in whole or in part questions contained in the RFP. Such exhibits shall be clearly marked with the applicable reference number of the question in the RFP. Proposals must address the technical requirements as specified in the RFP. All questions posed by the RFP must be answered concisely and clearly. Proposals that do not address each criterion may be, at the sole discretion of the County, rejected and not considered.

3.7 PROPOSAL OBLIGATION

The contents of the RFP, Proposal, and any clarification thereof submitted by the Successful Respondent shall become part of the contractual obligation and incorporated by reference into the Contract and any Ensuing Agreement(s).

3.8 COMPLIANCE WITH RFP SPECIFICATIONS

It is intended that this RFP describe the requirements and the Proposal format in sufficient detail to secure comparable Proposal. Failure to comply with all provisions of the RFP may, at the sole discretion of the County, result in disqualification.

3.9 EVALUATION

The County reserves the right to use all pertinent information (also learned from sources other than disclosed in the RFP process) that might affect the County's judgment as to the appropriateness of award to the best evaluated Respondent. This information may be appended to the Proposal evaluation process results. Information on a Respondent from reliable sources, and not within the Respondent Proposal, may also be noted and made part of the evaluation file. The County shall have sole discretion for determining the reliability of the source. The County reserves the right to conduct written and/or oral discussions/interviews after the Proposal opening. The purpose of such discussions/interviews is to provide clarification and/or additional information to make an award that is in the best interest of the County.

3.10 WITHDRAWAL OF PROPOSAL

The Respondent may withdraw its Proposal by submitting a written request with the company letterhead and the signature of an authorized individual, as described in Section 3.4, Signature of Respondent, to the Williamson County Purchasing Department any time prior to the submission deadline.

The Respondent may submit a new Proposal prior to the deadline. Alterations of the Proposal in any manner will not be considered if submitted after the deadline. Withdrawal of a Proposal after the deadline will be subject to written approval of the Williamson County Purchasing Agent.

3.11 RESPONSIBILITY

It is expected that a Respondent will be able to affirmatively demonstrate responsibility. A prospective Respondent should be able to meet the following requirements:

A. Have adequate financial resources, or the ability to obtain such resources as required;
B. Be able to comply with the required or proposed delivery schedule;
C. Have a satisfactory record of performance that can be determined thru references provided; and
D. Be otherwise qualified and eligible to receive an award.

The County may request representation and other information sufficient to determine the Respondent ability to meet these minimum standards listed above.

3.12 PURCHASE ORDERS

If required by the Williamson County Purchasing Department, a purchase order(s) may be generated to the Successful Respondent for goods and/or services. If a purchase order is issued, the purchase order number must appear on all itemized invoices and/or requests for payment.

3.13 SILENCE OF SPECIFICATIONS

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

3.14 REFERENCES

Respondents shall furnish a list of contracts where similar responsibilities and goods and/or services have been required and/or performed for the past five (5) years, to include names, titles, phone numbers and email addresses of reference contacts, contract numbers and dates of performance.

Also, Respondents shall include a list of any contracts that have been cancelled or terminated within the last five (5) years, along with an explanation of the cancellation and the names, email address and phone number of a reference person with that institution.

The County may contact some or all of the references in order to determine the Respondent performance record on work similar to that described in this RFP. The County reserves the right to contact references other than those provided in the response and to use the information gained from them in the evaluation process.

References should be provided in accordance with this RFP. Proposal may not be deemed complete without the inclusion of requested references.

SECTION 4 - TERMS AND CONDITIONS

4.1 VENUE AND GOVERNING LAW

The Respondent hereby agrees and acknowledges that venue and jurisdiction of any suit, right, or cause of action arising out of or in connection with this RFP, the Contract and any Ensuing Agreement(s), shall lie exclusively in either Williamson County, Texas or in the Austin Division of the Western Federal District of Texas, and the parties hereto expressly consent and submit to such jurisdiction. Furthermore, except to the extent that this RFP, the Contract and any Ensuing Agreement(s) is governed by the laws of the United States, this RFP, the Contract and any Ensuing Agreement(s) shall be governed by and construed in accordance with the laws of the State of Texas, excluding, however, its choice of law rules.

4.2 INCORPORATION BY REFERENCE AND PRECEDENCE

A. The Contract shall be derived from the RFP and its Addenda (if applicable), and the Respondent Proposal. In the event of a dispute under the Contract, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence:

   1. The RFP and its Addenda (if applicable); and

   2. The Respondent's Proposal.

B. In the event the County requires that an Ensuing Agreement be executed following award and a dispute arises between the terms and conditions of the Ensuing Agreement, the RFP and its Addenda (if applicable), and the Respondent's Proposal, applicable documents will be referred to for the purpose of clarification or for additional detail in the following order of precedence:

   1. The terms and conditions of the Ensuing Agreement;

   2. The RFP and its Addenda; and

   3. The Respondent's Proposal.

4.3 OWNERSHIP OF PROPOSAL

Each Proposal shall become the property of the County upon submittal and will not be returned to Respondents unless received after the submittal deadline.

4.4 DISQUALIFICATION OF RESPONDENT

Upon signing and submittal of the Proposal, a Respondent offering to sell supplies, materials, services, or equipment to the County, certifies that the Respondent has not violated the antitrust laws of the State of Texas codified in Business & Commerce Code, Section 15.01, or the Federal Antitrust Laws, and has not communicated directly or indirectly the offer made to any competitor or any other person engaged such line of business. Any or all Proposals may be rejected if the County believes that collusion exists among the Respondents.

4.5 FUNDING

The County intends to budget and make sufficient funds available and authorize funds for expenditure to finance the costs of the Contract. All Respondents understand and agree that the County's payment of

amounts under the Contract shall be contingent on the County receiving appropriations or other expenditure authority sufficient to allow the County, in the exercise of reasonable administrative discretion, to make payments under this Contract.

4.6 ASSIGNMENT, SUCCESSORS AND ASSIGNS

The Successful Respondent may not assign, sell, or otherwise transfer the Contract or any other rights or interests obtained under the Contract without written permission of the Williamson County the Commissioners Court. The Contract and any Ensuing Agreement(s) shall be binding upon and inure to the benefit of the contracting parties hereto and their respective successors and permitted assigns.

4.7 IMPLIED REQUIREMENTS

Products or services not specifically described or required in the RFP, but are necessary to provide the functional capabilities described by the Respondent, shall be implied and deemed to be included in the Proposal.

4.8 TERMINATION

A. **Termination for Cause:** The County reserves the right to terminate the Contract and/or any Ensuing Agreement(s) for default if the Successful Respondent breaches any of the Proposal specifications, terms and conditions, including warranties of the Respondent, if any, or if the Successful Respondent becomes insolvent or commits acts of bankruptcy. Such right of termination is in addition to and not in lieu of any other remedies the County may have at law or equity or as may otherwise be provided hereunder. Default may be construed as, but not limited to, failure to deliver the proper goods and/or services within the proper amount of time, and/or to properly perform any and all other requirements to the County's satisfaction, and/or to meet all other obligations and requirements.

B. **Termination for Convenience:** The County may terminate the Contract and/or any Ensuing Agreement(s) for convenience and without cause or further liability, upon no less than thirty (30) calendar days written notice to the Successful Respondent. The County reserves the right to extend this period if it is in the best interest of the County. In the event the County exercises its right to terminate without cause, it is understood and agreed that only the amounts due to the Successful Respondent for goods, commodities and/or services provided and expenses incurred to and including the date of termination, will be due and payable. No penalty will be assessed for the County's termination for convenience.

4.9 NON-PERFORMANCE

It is the objective of the County to obtain complete and satisfactory performance of the requirements set forth herein. In addition to any other remedies available at law, in equity or that may be set out herein, failure to perform may result in a deduction of payment equal to the amount of the goods and/or services that were not provided and/or performed to the County's satisfaction.

In the event of such non-performance, the County shall have the right, but shall not be obligated, to complete the services itself or by others and/or purchase the goods from other sources. If the County elects to acquire the goods or perform the services itself or by others, pursuant to the foregoing, the Successful Respondent shall reimburse the County, within ten (10) calendar days of demand, for all costs incurred by the County (including, without limitation, applicable, general, and administrative expenses, and field overhead, and the cost of necessary equipment, materials, and field labor) in correcting the nonperformance which the Successful Respondent fails to meet pursuant to the requirements set out herein. In the event the Successful Respondent refuses to reimburse the County as set out in this provision, the County shall have the right to deduct such reimbursement amounts from any amounts that may be then owing or that may become owing in the future to the Successful Respondent.

4.10 PROPRIETARY INFORMATION AND THE TEXAS PUBLIC INFORMATION ACT

All material submitted to the County shall become public property and subject to the Texas Public Information Act upon receipt. If a Respondent does not desire proprietary information in the Proposal to be disclosed, each page must be clearly identified and marked proprietary at time of submittal or, more preferably, all proprietary information may be placed in a folder or appendix and be clearly identified and marked as being proprietary. Failure to clearly identify and mark information as being proprietary as set forth under this provision will result in all unmarked information being deemed non-proprietary and available to the public. For all information that has not been clearly identified and marked as proprietary by the Respondent, the County may choose to place such information on the County's website and/or a similar public database without obtaining any type of prior consent from the Respondent.

The County will, to the extent allowed by law, endeavor to protect from public disclosure the information that has been identified and marked as proprietary. The final decision as to what information must be disclosed, however, lies with the Texas Attorney General.

To the extent, if any, that any provision in this RFP or in the Respondent's Proposal is in conflict with Texas Government Code, Chapter 552, as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood, and agreed, that the County, and its officers and employees, may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any items or data furnished to the County as to whether or not the same are available to the public. It is further understood that that the County, and its officers and employees, shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that the County, its officers and employees shall have no liability or obligation to any party hereto for the disclosure to the public, or to any person or persons, of any items or data furnished to the County by a party hereto, in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

4.11 RIGHT TO AUDIT

The Successful Respondent agrees that the County or its duly authorized representatives shall, until the expiration of three (3) years after termination or expiration of the services to be performed, have access to and the right to examine and photocopy any and all books, documents, papers and records of the Successful Respondent, which are directly pertinent to the services to be performed or goods to delivered for the purposes of making audits, examinations, excerpts and transcriptions. The Successful Respondent agrees that the County shall have access during normal working hours to all necessary facilities and shall be provided adequate and appropriate work space in order to conduct audits in compliance with the provisions of this section. The County shall give the Successful Respondent reasonable advance notice of intended audits.

4.12 TESTING AND INSPECTIONS

The County reserves the right to inspect and test equipment, supplies, materials and goods for quality and compliance with this RFP, and ability to meet the needs of the user. Demonstration units must be available for review. Should the goods or services fail to meet requirements and/or be unavailable for evaluation, the County can deem the Respondent to be in breach and terminate the Contract and/or any Ensuing Agreement(s).

4.13 PROPOSAL PREPARATION COSTS

The cost of developing Proposals is the sole responsibility of the Respondents and shall not be charged to the County. There is no expressed or implied obligation for the County to reimburse the Respondents for any expense incurred in preparing a Proposal in response to this RFP and the County will not reimburse the Respondents for such expenses.

4.14 INDEMNIFICATION

The Successful Respondent shall indemnify, defend and save harmless, the County, its officials, employees, agents and agent's employees from, and against, all claims, liability, and expenses including reasonable attorneys' fees, arising from activities of the Respondent, its agents, servants or employees, performed hereunder that result from the negligent act, error, or omission of the Respondent or any of the Respondent's agents, servants or employees, as well as all claims of loss or damage to the Respondent's and the County's property, equipment, and/or supplies.

Furthermore, the County, its officials, employees, agents and agents' employees shall not be liable for damages to the Successful Respondent arising from any act of any third party, including, but not limited to, theft. The Successful Respondent further agrees to indemnify, defend and save harmless, the County from its officials, employee, agents and agents' employees against all claims of whatever nature arising from any accident, injury, or damage whatsoever, caused to any person, or the property of any person, occurring in relation to the Successful Respondent's performance of any services requested hereunder during the term of the Contract and/or any Ensuing Agreement(s).

The Successful Respondent shall timely report all claims, demands, suits, actions, proceedings, liens or judgements to the County and shall, upon the receipt of any claim, demand, suit, action, proceeding, lien or judgement, not later than the fifteenth (15^{th}) day of each month; provide the County with a written report on each such matter, setting forth the status of each matter, the schedule or planned proceedings with respect to each matter and the cooperation or assistance, if any, of the County required by the Successful Respondent in the defense of each matter. The Successful Respondent's duty to defend, indemnify and hold the County harmless shall be absolute. It shall not abate or end by reason of the expiration or termination of the Contract and/or any Ensuing Agreement(s), unless otherwise agreed by the County in writing. The provisions of this section shall survive the termination of the Contract and shall remain in full force and effect with respect to all such matters no matter when they arise.

In the event of any dispute between the parties, as to whether a claim, demand, suit, action, proceeding, lien or judgement, that appears to have been caused by or appears to have arisen out of or in connection with acts or omissions of the County, the Respondent shall nevertheless fully defend such claim, demand, suit or action, proceeding, lien or judgement, until and unless there is a determination by a court of competent jurisdiction that the acts and omissions of the Respondent are not an issue in the matter.

The Successful Respondent's indemnification shall cover, and the Successful Respondent agrees to, indemnify the County, in the event the County is found to have been negligent for having selected the Successful Respondent to perform the work described in this request. The provision by the Successful Respondent of insurance shall not limit the liability of the Successful Respondent under the Contract and/or any Ensuing Agreement(s).

4.15 WAIVER OF SUBROGATION

The Successful Respondent and the Successful Respondent's insurance carrier waive any and all rights whatsoever with regard to subrogation against the County as an indirect party to any suit arising out of personal or property damages resulting from the Respondent's performance under this Contract and any Ensuing Agreement(s).

4.16 RELATIONSHIP OF THE PARTIES

The Successful Respondent shall be an independent contractor and shall assume all of the rights, obligations, liabilities, applicable to it as such independent contractor hereunder and any provisions herein which may appear to give the County the right to direct the Successful Respondent as to details of doing work herein covered, or to exercise a measure of control over the work, shall be deemed to mean that the Successful Respondent shall follow the desires of the County in the results of the work only. The County shall not retain or have the right to control the Successful Respondent's means, methods or

details pertaining to the Successful Respondent's performance of the work. The County and the Successful Respondent hereby agree and declare that the Successful Respondent is an independent contractor and as such meets the qualifications of an "Independent Contractor" under Texas Workers Compensation Act, Texas Labor Code, Section 406.141, that the Successful Respondent is not an employee of the County, and that the Successful Respondent and its employees, agents and subcontractors shall not be entitled to workers compensation coverage or any other type of insurance coverage held by the County.

4.17 SOLE PROVIDER

The Successful Respondent agrees and acknowledges that it shall not be considered a sole provider of the goods and/or services described herein and that the County may contract with other providers of such goods and/or services if the County deems, at its sole discretion, that multiple providers of the same goods and/or services will serve the best interest of the County.

4.18 FORCE MAJEURE

If the party obligated to perform is prevented from performance by an act of war, order of legal authority, act of God, or other unavoidable cause not attributable to the fault or negligence of said party, the other party shall grant such party relief from the performance. The burden of proof for the need of such relief shall rest upon the party obligated to perform. To obtain release based on force majeure, the party obligated to perform shall file a written request with the other party.

4.19 SEVERABILITY

If any provision of this RFP, the Contract or any Ensuing Agreement(s) shall be held invalid or unenforceable by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision thereof, but rather the entire RFP, Contract or any Ensuing Agreement (s) will be construed as if not containing the particular invalid or unenforceable provision or provisions, and the rights and obligation of the parties shall be construed and enforced in accordance therewith. The parties acknowledge that if any provision of this RFP, the Contract or any Ensuing Agreement(s) is determined to be invalid or unenforceable, it is the desire and intention of each that such provision be reformed and construed in such a manner that it will, to the maximum extent practicable, give effect to the intent of this RFP, the Contract or any Ensuing Agreement(s) and be deemed to be validated and enforceable.

4.20 EQUAL OPPORTUNITY

Neither party shall discriminate against any employee or applicant for employment because of race, color, sex, religion or national origin.

4.21 NOTICE

Any notice to be given shall be in writing and may be distributed by personal delivery, or by registered or certified mail, return receipt requested, addressed to the proper party, at the following address:

The County: Williamson County Purchasing Department
Attn: Purchasing Agent
901 South Austin Avenue
Georgetown, Texas 78626

The Respondent: Address set out in Respondent's Transmittal Letter

Notices given in accordance with this provision shall be effective upon (1) receipt by the party to which notice is given, or (2) on the third (3rd) calendar day following mailing, whichever occurs first.

4.22 SALES AND USE TAX EXEMPTION

The County is a body, corporate and politic, under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code, Section 151.309, as amended, and the services and/or goods subject hereof are being secured for use by the County.

4.23 COMPLIANCE WITH LAWS

The County and the Successful Respondent shall comply with all federal, state, and local laws, statutes, ordinances, rules and regulations, and the orders and decrees of any courts or administrative bodies or tribunals in any matter affecting the performance of the Contract and any Ensuing Agreement(s), including, without limitation, Workers' Compensation laws, salary and wage statutes and regulations, licensing laws and regulations. When required, the Successful Respondent shall furnish the County with certification of compliance with said laws, statues, ordinances, rules, regulations, orders, and decrees above specified.

4.24 INCORPORATION OF EXHIBITS, APPENDICES AND ATTACHMENTS

All of the Exhibits, Appendices and Attachments referred to herein are incorporated by reference as if set forth verbatim herein. Any conflicting terms in the Contract documents will be resolved at the sole discretion of the Commissioners Court.

4.25 NO WAIVER OF IMMUNITIES

Nothing herein shall be deemed to waive, modify or amend any legal defense available at law or in equity to the County, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. The County does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

4.26 NO WAIVER

The failure or delay of any party to enforce at any time or any period of time any of the provisions of this RFP, the Contract or any Ensuing Agreement(s) shall not constitute a present or future waiver of such provisions nor the right of either party to enforce each and every provision. Furthermore, no term or provision hereof shall be deemed waived and no breach excused unless such waiver or consent shall be in writing and signed by the party claimed to have waived or consented. Any consent by any party to, or waiver of, a breach by the other, whether expressed or implied, shall not constitute a consent to, waiver of or excuse for any other, different or subsequent breach.

4.27 CURRENT REVENUES

The obligations of the parties under the Contract and any Ensuing Agreement(s) do not constitute a general obligation or indebtedness of the County for which the County is obligated to levy, pledge, or collect any of taxation. It is understood and agreed that the County shall have the right to terminate the Contract and any Ensuing Agreement(s) at the end of any the County fiscal year if the governing body of the County does not appropriate sufficient funds as determined by the County's budget for the fiscal year in question. The County may effect such termination by giving written notice of termination to t Successful Respondent at the end of its then-current fiscal year.

4.28 BINDING EFFECT

This Contract and any Ensuing Agreement(s) shall be binding upon and inure to the benefit of the parties and their respective permitted assigns and successors.

4.29 ASSIGNMENT

The Successful Respondent's interest and duties hereunder may not be assigned or delegated to a third party without the express written consent of the County.

4.30 SAFETY

The Successful Respondent is responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with any services to be provided hereunder. The safety program shall comply with all applicable requirements of the current federal Occupational Safety and Health Act and all other applicable federal, state and local laws and regulations.

4.31 GENERAL OBLIGATIONS AND RELIANCE

The Successful Respondent shall perform all services and/or provide all goods, as well as those reasonably inferable and necessary for completion and provision of services and/or goods required hereunder. The Successful Respondent shall keep the County informed of the progress and quality the services. The Successful Respondent agrees and acknowledges that the County is relying on the Successful Respondent's represented expertise and ability to provide the goods and/or services described herein. The Successful Respondent agrees to use its best efforts, skill, judgment, and abilities to perform its obligations in accordance with the highest standards used in the profession and to further the interests of the County in accordance with the County's requirements and procedures. The Successful Respondent's duties, as set forth herein, shall at no time be in any way diminished by reason of any approval by the County, nor shall the Successful Respondent be released from any liability reason of such approval by the County, it being understood that the County at all times is ultimately relying upon the Successful Respondent's skill and knowledge in performing the services and providing any goods required hereunder.

4.32 CONTRACTUAL DEVELOPMENT

The Commissioners Court may award the Contract on the basis of the initial Proposals received, without any further or additional discussions. Therefore, each initial Proposal should contain the Respondent best terms and offer. The contents of the RFP and the selected Proposal will become an integral part of the Contract, but may be modified, at Williamson County's sole discretion, by provisions of an Ensuing Agreement. Therefore, the Respondent must agree to inclusion in an Ensuing Agreement of t Proposal specifications, terms and conditions of this RFP. Williamson County may, at its discretion, opt to conduct further discussions with responsible offerors and request the highest ranked firm's Best and Final Offer (BAFO).

4.33 ENTIRE AGREEMENT

The Contract and any Ensuing Agreement(s) shall supersede all prior Agreements, written or oral between the Successful Respondent and the County and shall constitute the entire Agreement and understanding between the parties with respect to the services and/or goods to be provided. Each of the provisions herein shall be binding upon the parties and may not be waived, modified, amended or altered, except by writing signed by the Successful Respondent and the County.

4.34 SURVIVABILITY

All applicable agreements that were entered into between the Successful Respondent and the County, under the terms and conditions of the Contract and/or any Ensuing Agreement(s), shall survive the expiration or termination thereof for ninety (90) days unless a new contract has been awarded.

The County may exercise, by written notice to the Successful Respondent no later than ten (10) calendar days of the Contract expiration, this clause for emergency cases only.

4.35 PAYMENT

The County's payment for goods and services shall be governed by the Texas Government Code, Chapter 2251. An invoice shall be deemed overdue the thirty-first (31st) day after the later of the following:

A. The date the County receives the goods under the Contract;
B. The date the performance of the service under the Contract is completed; or
C. The date the Williamson County Auditor receives an invoice for the goods or services.

Interest charges for any overdue payments shall be paid by the County in accordance with Texas Government Code, Section 2251.025. More specifically, the rate of interest that shall accrue on a late payment is the rate in effect on September 1 of the County's fiscal year in which the payment becomes due. The said rate in effect on September 1 shall be equal to the sum of one (1) percent and the prime rate published in the Wall Street Journal on the first (1st) day of July of the preceding fiscal year that does not fall on a Saturday or Sunday.

In the event that an error appears in an invoice submitted by the Successful Respondent, the County shall notify the Successful Respondent of the error not later than the twenty-first (21st) day after the date the County receives the invoice. If the error is resolved in favor of the Successful Respondent, the Successful Respondent shall be entitled to receive interest on the unpaid balance of the invoice submitted by the Successful Respondent beginning on the date that the payment for the invoice became overdue. If the error is resolved in favor of the County, the Successful Respondent shall submit a corrected invoice that must be paid in accordance within the time set forth above. The unpaid balance accrues interest as provided by the Texas Government Code, Chapter 2251, if the corrected invoice is not paid by the appropriate date.

As a minimum, invoices shall include:

A. Name, address, and telephone number of the Successful Respondent and similar information in the event the payment is to be made to a different address.

B. The County Contract, Purchase Order.

C. Identification of items or service as outlined in the Contract.

D. Quantity or quantities, applicable unit prices, total prices and total amount.

E. Any additional payment information which may be called for by the Contract.

Payment inquiries should be directed to the following address:

Williamson County Auditor's Office, Accounts Payable Department
Email: accountspayable@wilco.org
Phone: 512-943-1500

4.36 CONTRACTUAL FORMATION AND ENSUING AGREEMENT

The RFP and the Respondent's Proposal, when properly accepted by the Commissioners Court, shall constitute a Contract equally binding between the Successful Respondent and the County. The Successful Respondent may be required by Williamson County to sign an additional Agreement containing terms necessary to ensure compliance with the RFP and Respondent's Proposal.

4.37 LEGAL LIABILITY INFORMATION

The Successful Respondent shall disclose all legal liability information by listing any pending litigation anticipated litigation that your firm is involved in including, but not limited to, potential or actual legal matters with private parties and any local, state, federal or international governmental entities. The County reserves the right to consider legal liability information in the recommendation of any proposed contract to the Commissioners Court.

4.38 CONFIDENTIALITY

Respondent expressly agrees that it will not use any direct or incidental confidential information that may be obtained while working in a governmental setting for its own benefit, and agrees that it will not access unauthorized areas or confidential information and it will not disclose any information to unauthorized third parties, and will take care to guard the security of the information at all times.

4.39 INCLEMENT WEATHER

In case of inclement weather or any other unforeseen event causing the County to close for business on the date of a Proposal submission deadline, the Proposal closing will automatically be postponed until the next business day the County is open. If inclement weather conditions or any other unforeseen event causes delays in carrier service operations, the County may issue an Addendum to all known Respondents interested in the project to extend the deadline. It will be the responsibility of the Respondent to notify the County of their interest in the project if these conditions are impacting their ability to turn in a submission within the stated deadline. The County reserves the right to make the final judgement call to extend any deadline.

4.40 AIR QUALITY

In determining the overall best Proposal, the County may, to the extent applicable, exercise the option granted to local governments under the Texas Local Government Code, Section 271.907.

This option allows the County to evaluate Proposals and give preference to goods and/or services of Respondent that demonstrates that the Respondent meets or exceeds any and all state or federal environmental standards, including voluntary standards, relating to air quality. If the Proposal being submitted will have an effect on air quality for the County (as it relates to any state, federal, or voluntary air quality standard), then the Respondent is encouraged to provide information in narrative indicating the anticipated air quality impact. All Respondents are expected to meet all mandated state and federal air quality standards.

4.41 COOPERATIVE PURCHASING PROGRAM

During the term of the Contract resulting from this RFP, the County would like to afford the same prices, terms and conditions to other political subdivisions or public entities. Another entity's participation in the Contract resulting from this RFP is subject to a properly authorized Purchasing Cooperative Inter-local Agreement (ILA) with the County. Any liability created by purchase orders issued against the Contract shall be the sole responsibility of the governmental agency placing the order.

4.42 PREVAILING WAGE RATES

To the extent this procurement is for the construction of a public work, including a building, highway, road, excavation, and repair work or other project development or improvement, paid for in whole or in part from public funds, without regard to whether the work is done under public supervision or direction, Texas Government Code, Chapter 2258, shall apply and the contractor shall pay not less than the wage scale of the various classes of labor as shown on the "Prevailing Wage Schedule" provided by the County. Pursuant to Texas Government Code, Section 2258.022(a)(2), the County has determined the general prevailing rate of the "Prevailing Wage Schedule" in the locality in which the public work is to be performed for each craft or type of worker needed to execute the contract and the prevailing rate for legal holiday and overtime work by using the prevailing wage rate as determined by the United States

Department of Labor in accordance with the United States Code, Section 276a (Davis-Bacon Act).

The specified wage rates are minimum rates only, and are not representations that qualified labor adequate to perform the work is available locally at the prevailing wage rates. The County is not bound to pay—and will not consider—any claims for additional compensation made by any contractor because the contractor pays wages in excess of the applicable minimum rate contained in the Contract Documents. The "Prevailing Wage Schedule" is not a representation that quantities of qualified labor adequate to perform the work may be found locally at the specified wage rates.

For classifications not shown, workers shall not be paid less than the wage indicated for laborers. The contractor shall notify each worker commencing work on the project the worker's job classification and the established minimum wage rate required to be paid, as well as the actual amount being paid. The notice must be delivered to and signed in acknowledgement of receipt by the employee and must list both the monetary wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by the County, competent evidence of compliance with the Texas Prevailing Wage Law shall be furnished by contractor. A copy of each worker wage rate notification shall be submitted to the County with the Application for Payment for the period during which the worker began on-site activities.

Should the contractor at any time become aware that a particular skill or trade not reflected on the County's "Prevailing Wage Schedule" will be or is being employed in the work, whether by the contractor or by a subcontractor, the contractor shall promptly inform the County and shall specify a wage rate for that skill or trade, which shall bind the contractor.

The contractor and any subcontractor shall pay to the County a penalty of sixty dollars ($60.00) for each worker employed for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the "Prevailing Wage Schedule" or any supplement thereto. The contractor and each subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all workers employed in connection with the work, and showing the actual per diem wages paid to each worker, which records shall be open at all reasonable hours for the inspection by the County.

Within thirty-one (31) days of receipt of information concerning a violation of the Texas Government Code Chapter 2258, the County shall make an initial determination as to whether good cause exists to believe a violation occurred. The County's decision on the initial determination shall be reduced to writing and sent to the contractor or subcontractor against whom the violation was alleged, and to the affected worker. When a good cause finding is made, the County shall retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the "Prevailing Wage Schedule" and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

After the County makes its initial determination, the affected contractor or subcontractor and worker have fourteen (14) calendar days in which to resolve the issue of whether a violation occurred, including the amount that should be retained by the County or paid to the affected worker. If the contractor or subcontractor and affected worker reach an agreement concerning the worker's claim, the contractor shall promptly notify the County in a written document signed by the worker. It the contractor or Subcontractor and affected worker do not agree before the fifteenth (15th) calendar day after the County determination, the contractor or subcontractor and affected worker must participate in binding arbitration in accordance with the Texas General Arbitration Act, Chapter 171, (Texas Civil Practice and Remedies Code). The parties to the arbitration have ten (10) calendar days after the expiration of the fifteen (15) calendar days referred to above, to agree on an arbitrator; if by the eleventh (11th) calendar day there is no agreement to an arbitrator, a district court shall appoint an arbitrator on the petition of any of the parties to the arbitration.

If an arbitrator determines that a violation has occurred, the arbitrator shall assess and award against the contractor or subcontractor the amount of penalty as provided above and the amount owed the worker. The County may use any amounts retained hereunder to pay the worker the amount as designated in the

arbitration award. If the County has not retained enough from the contractor or subcontractor to pay the worker in accordance with the arbitration award, the worker has a right of action against the contractor and subcontractor as appropriate, and the surety of either to receive the amount owed, attorneys' fees and court costs. The contractor shall promptly furnish a copy of the arbitration award to the County.

Money retained pursuant to the provisions above shall be used to pay the claimant or claimants the difference between the amount the worker received in wages for labor on the project at the rate paid by the contractor or subcontractor and the amount the worker would have received at the general prevailing wage rate as provided by the agreement of the claimant and the contractor or subcontractor affected, or in the arbitrator's award. The full statutory penalty of sixty dollars ($60.00) per calendar day of violation per worker shall be retained by Williamson County to offset its administrative costs, pursuant to Texas Government Code, Section, 2258.023. Any retained funds in excess of these amounts shall be paid to the contractor on the earlier of the next progress payment or final payment. Provided, however, that the County shall have no duty to release any funds to either the claimant or the contractor until it has received the notices of agreement or the arbitration award as provided under the provision herein-above.

4.43 CONFIDENTALITY

The Respondent expressly agrees that it will not use any direct or incidental confidential information that may be obtained while working in a governmental setting for its own benefit, and agrees that it will not access unauthorized areas or confidential information and it will not disclose any information to unauthorized third parties, and will take care to guard the security of the information at all times.

AGREEMENT
BETWEEN OWNER AND CONTRACTOR

The **Owner**: Williamson County
710 Main Street, Ste. 101
Georgetown, Texas 78626

and **Contractor** _____
_____
_____ _____

for the **Project**: _____
_____
_____ _____

Engineer: _____
_____
_____ _____

AGREEMENT, this Agreement Between Owner and Contractor (hereinafter called "Agreement") is entered into effective as of the date indicated herein below and all attachments (the "Effective Date"), by and between Williamson County a political subdivision of the State of Texas (hereinafter called the "Owner") and _____ (hereinafter called "Contractor").

WHEREAS, the Owner desires to retain a Contractor for the _____ (hereinafter called the "Project"),

WHEREAS, the Owner desires a Contractor who will render, diligently and competently in accordance with the highest standards used in the profession, all Contractor services which shall be necessary or advisable for the expeditious, economical and satisfactory completion of the Project, and

NOW, THEREFORE, in consideration of the mutual undertakings herein contained, the parties hereto agree as follows:

ARTICLE 1 SCOPE OF WORK

The Contractor has overall responsibility for and shall provide complete construction services and furnish all materials, equipment, tools and labor as necessary or reasonably inferable to complete the Work, or any phase of the Work, in accordance with the Specifications and Drawings for the Project and the Owner's requirements. The Specifications and Drawings were prepared for Williamson County by the Engineer. The Contractor shall do everything required by the Contract Documents.

ARTICLE 2 CONTRACT DOCUMENTS

2.1 The Contract Documents consist of the following, which are incorporated by reference for all purposes:

a. This Agreement and all exhibits and attachments listed, contained or referenced in this Agreement;
b. The Uniform General Conditions for Williamson County ("General Conditions");
c. The Supplementary Conditions, if any;
d. All Addenda issued prior to the Effective Date of this Agreement;
e. The Bid/Proposal Documents as defined by the Invitation for Bidders/Request for Proposals;
f. All Change Orders issued after the Effective Date of this Agreement; and
g. The Drawings, Specifications, details and other documents developed by Engineer to describe the Project and accepted by Owner, which are attached hereto **EXHIBIT 1**.

2.2 The Contract Documents form the entire and integrated Contract and Agreement between Owner and Contractor and supersede all prior negotiations, representations or agreements, written or oral. Contractor acknowledges receipt of all Contract Documents as of the date of its execution hereof.

2.3 The term "Contractor" shall be interchangeable with the terms "Proposer," "Bidder," Respondent" and "General Contractor" or other similar terms as appropriate in the Contract Documents.

ARTICLE 3 CONTRACT TIME

The Owner shall provide a Notice to Proceed in which a date for commencement of the work shall be started. The Contractor shall achieve Substantial Completion of the Work within _____ (_____) calendar days after such commencement date, as such completion date may be extended by approved Change Orders. Unless otherwise specified in writing, Contractor shall achieve Final Completion

within _____ (_____) calendar days of Substantial Completion. The time set forth for completion of the work is an essential element of the Contract.

ARTICLE 4 CONTRACTOR REPRESENTATIONS

4.1 In order to induce Owner to enter into this Agreement, Contractor makes the following representations:

A. Contractor has examined and carefully studied the Contract Documents and the other related data identified in the Bid/Proposal Documents.

B. Contractor has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Contractor is familiar with and is satisfied as to all federal, state, and local laws and regulations that may affect cost, progress, and performance of the Work.

D. Contractor has considered the information known to Contractor; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, including any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Contract Documents; and (3) Contractor's safety precautions and programs.

E. Based on the information and observations referred to in Paragraph 4.1.D above, Contractor does not consider that further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.

F. Contractor is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

G. Contractor has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Contractor has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Contractor.

H. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 5 THE CONTRACT PRICE

5.1 Contract Price. Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.1.A and 5.1.B, below:

A. For all Work other than Unit Price Work, a lump sum of: $_____

B. For all Unit Price Work, an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the actual quantity of that item.

The Bid/Proposal prices for Unit Price Work set forth as of the Effective Date of the Agreement are based on estimated quantities. As provided in the General and Supplementary Conditions, estimated quantities are not guaranteed, and determinations of actual quantities and classifications are to be made by Engineer as provided in the Contract Documents.

5.2 Contract Payments. Method and terms of payment of the Contract Price shall be in accordance with the Contract Documents.

ARTICLE 6 TIME

6.1 TIME LIMITS STATED IN THE CONTRACT DOCUMENTS ARE OF THE ESSENCE OF THIS AGREEMENT.

6.2 Unless otherwise approved in writing, the Owner and the Contractor shall perform their respective obligations under the Contract Documents as expeditiously as is consistent with reasonable skill and care and the orderly progress of the Work.

6.3 Liquidated Damages. Contractor and Owner recognize that time is of the essence and that Owner will suffer financial loss if the Work is not completed within the times specified in Article 3 above, plus any extensions thereof allowed in accordance with the General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal proceeding the actual loss suffered by Owner if the Work is

not completed on time. Accordingly, instead of requiring any such proof, for each consecutive calendar day after the date of Substantial Completion that the Work is not substantially completed, the Owner may deduct the amount of:

Five Hundred Dollars per calendar day ($500.00/calendar day)

from any money due or that becomes due the Contractor, not as a penalty but as liquidated damages representing the parties' estimate at the time of contract execution of the damages that the Owner will sustain for late completion. The parties stipulate and agree that calculating Owner's actual damages for late completion of the Project would be impractical, unduly burdensome, and cause unnecessary delay and that the amounts of daily liquidated damages set forth are reasonable. Contractor expressly agrees that the amounts of daily liquidated damages are a reasonable forecast of the actual damages Owner will incur due to any such delay.

ARTICLE 7 NOTICES

Notices of claims, disputes or other legal notices shall be in writing and shall be deemed to have been given when delivered in person to the representative of the Contractor or Owner for whom it is intended, as set out below or sent by U. S. Mail to the representative of the Contractor or Owner for whom it is intended, as set out below. Mail notices are deemed effective upon receipt or on the third business day after the date of mailing, whichever is sooner.

If to Owner:
Williamson County Judge
710 Main Street, Ste. 101
Georgetown, Texas 78626

with copy to:
Hal C. Hawes
General Counsel to the
Williamson County Commissioners Court
710 Main Street, Suite 102
Georgetown, Texas 78626

If to Contractor: _____
_____
_____ _____

The parties may make reasonable changes in the person or place designated for receipt of notices upon advance written notice to the other party.

ARTICLE 8 PARTY REPRESENTATIVES

The Owner's Designated Representative (sometimes referred to as the "ODR") authorized to act in the Owner's behalf with respect to the Project is:

_____
_____
_____ _____
Phone (512) _____
Fax (512) _____

The Contractor's designated representative authorized to act on the Contractor's behalf and bind the Contractor with respect to the Project is:

_____
_____
_____ _____
Phone (512) _____
Fax (512) _____

The parties may make reasonable changes in their designated representatives upon advance written notice to the other party.

ARTICLE 9 ENTIRE AGREEMENT

This Agreement supersedes all prior agreements, written or oral, between Contractor and Owner and shall constitute the entire agreement and understanding between the parties with respect to the Project. This Agreement and the terms of the Contact Documents shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by Contractor and Owner.

BY SIGNING BELOW, the Parties have executed and bound themselves to this Agreement to be effective as of _____ _____, 20____ (the "Effective Date").

WILLIAMSON COUNTY Williamson County, Texas,	_____, a Texas _____,
By: _____	By: _____
Printed Name: _____	Printed Name: _____
Title: _____	Title: _____

EXHIBIT 1 –DRAWINGS AND SPECIFICATIONS

FOR

LIST OF DRAWINGS

DWG	DRAWING TITLE	ISSUE DATE

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

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

§ 1.1.2 THE CONTRACT

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

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

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

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

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

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

§ 1.1.8 KNOWLEDGE: The terms "knowledge," "recognize," and "discover," their respective derivatives, and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize), and discovers (or should discover) in exercising the care, skill, and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably inferable by a contractor familiar with the Project and exercising the care, skill, and diligence required of the Contractor by the Contract Documents.§1.1.10 PRODUCT: Materials, systems, and equipment incorporated or to be incorporated in the Work.

§1.1.9 PROVIDE: Furnish and install and shall include, without limitation, labor, materials, equipment, transportation, services and other items required to complete the referenced tasks.

§1.1.02 FURNISH: Pay for, deliver (or receive), unload, inspect, and store products, materials, equipment, and accessories as specified while retaining care, custody and control until received for installation based on a signed receipt.

§ 1.1.11 INSTALL: Receive, unload, inspect, and store as specified while retaining care, custody and control; set or place in position, make required connections; and adjust and test as specified in the Contract Documents for satisfactory performance and operation.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS
§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the intended results. In the event of inconsistencies within or between parts of the Contract Documents, or between the Contract Documents and applicable standards, codes, and ordinances, the Contractor shall (i) provide the better quality or greater quantity of Work or (ii) comply with the more stringent requirement; either or both in accordance with the Owner or the Architect’s

interpretation. The terms and conditions of this Section 1.2.1, however, shall not relieve the Contractor of any of the obligations set forth in the Contract Documents.

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

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

§ 1.2.3.1 Whenever a product is specified in accordance with a Federal Specification, an ASTM Standard, an American National Standards Institute Specification, or other Association Standard, the Contractor, if required by the Specifications or if requested by the Owner, shall present evidence from the manufacture, certifying the product complies with the particular Standard or Specification. When required by the Contract Documents, supporting data shall be submitted to substantiate compliance.

§ 1.2.3.2 Whenever a product is specified or shown by describing proprietary items, model numbers, catalog numbers, manufacturer, trade names, or similar reference, no substitutions may be made unless accepted in strict accordance with the Substitution requirements stated in the Specifications or, if no Substitution requirements are stated in the Specifications, in accordance with the requirements stated elsewhere in the Contract Documents. Where two or more products are shown or specified, the Contractor has the option to use either of those shown or specified.

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

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

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

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

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM
If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall establish the necessary protocols governing such transmissions in writing, unless otherwise already provided in the Agreement or the Contract Documents.

ARTICLE 2 OWNER

§ 2.1 GENERAL

The Owner means Williamson County acting through any duly authorized representative as provided in the Agreement, and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization ("Owner's Designated Representative"). The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.2 OWNER

§ 2.2.1 Appropriation of Funds by Owner. Owner believes it has sufficient funds currently available and authorized for expenditure to finance the costs of the Agreement between Owner and Contractor. Contractor understands and agrees that the Owner's payment of amounts under the Agreement between Owner and Contractor is contingent on the Owner receiving appropriations or other expenditure authority sufficient to allow the Owner, in the exercise of reasonable administrative discretion, to continue to make payments under the Agreement.

§ 2.2.2 Unless specifically stated otherwise in the Contract Documents, Contractor shall secure and pay for necessary permits, approvals, assessments, and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. Except for surveys or grade information, the Contractor shall compare the information furnished by the Owner, including, but not limited to, soil tests, with visibly observable physical conditions and the Contract Documents and, on the basis of such review, promptly report to the Owner and the Architect any known conflicts, errors or omissions. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

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

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

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

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

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

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

§2.5 EXTENT OF OWNER RIGHTS

§ 2.5.1 The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner (i) granted in the Contract Documents, (ii) at law, or (iii) in equity.

§ 2.5.2 In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.

§ 2.6 OWNER'S RIGHT TO RECORDS

§ 2.6.1 The Contractor's records, which shall include but not be limited to accounting records, written policies and procedures, subcontractor files (including proposals of successful bidders), original estimates, estimating work sheets, correspondence, schedules, change order files (including documentation covering negotiated settlements), and any other supporting evidence necessary to substantiate charges related to this contract (all foregoing hereinafter referred to as "records") and shall be open to inspection and subject to audit and/or reproduction, during normal working hours, by Owner's agent or its authorized representative to the extent necessary to adequately permit evaluation and verification of any invoices, payments or claims submitted by the Contractor or any of his payees. Such records subject to examination shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs (including overhead allocations) as they may apply to costs associated with this Contract.

§ 2.6.2 For the purpose of such audits, inspections, examinations and evaluations, the Owner's agent, or authorized representatives shall have access to said records from the effective date of this Contract for the duration of Work and until three (3) years (or longer if required by law) after the date of final payment by Owner to Contractor.

§ 2.6.3 Owner's agent or its authorized representative shall have access during normal business hours to the Contractor's facilities, shall have access to all necessary records and shall be provided adequate and appropriate work space, in order to conduct audits in compliance with this Article 2.6. Owner's agent or authorized representative shall give auditees reasonable advance notice of intended audits.

§ 2.6.4 Contractor shall require all subcontractors, insurance agents, and material suppliers (payees) with cost plus contracts, if permitted, and not fixed price contracts to comply with the provisions of this Article by insertion of the requirements hereof in a written contract agreement between Contractor and payee. Failure to obtain such written contracts which include such provisions shall be reason to exclude some or all of the related payee's costs from amounts payable to the Contractor pursuant to this contract.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative, and if these General Conditions are used in conjunction with the Agreement between Owner and Construction Manager-At-Risk, the term "Contractor" shall mean the Construction Manager.

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

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

§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents. Prior to execution of the Agreement, the Contractor and each Subcontractor shall have evaluated and satisfied themselves as to the observable conditions and limitations under which the Work is to be performed, including, without limitation, (i) the location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, (iv) availability and cost of materials, tools, and equipment, and (v) other similar issues. The Owner assumes no responsibility or liability for the physical condition or safety of the Project site or any improvements located on the Project site. Except as set forth in Section 10.3, the Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or the Contract Time in connection with any failure by the Contractor or any Subcontractor to have complied with the requirements of this Section 3.2.1.

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Owner and Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner. The Contractor shall verify the accuracy of elevations, dimensions, locations, and field measurements. In all cases of the interconnection of its Work with existing or other Work, the Contractor shall verify at the site all dimensions relating to such existing or other Work.

.1 All of Contractor's work shall conform to the Contract Documents. Contractor shall be responsible for the details of the Work necessary to carry out the intent of the drawings and specifications, or which are customarily performed. When more detailed information is required for performance of the Work or when an interpretation of the Contract Documents is requested, the Contractor shall submit a written request for information to the Architect or Owner (as required), and the Owner or Architect shall furnish such information or interpretation. Where only part of the Work is indicated, similar parts shall be considered repetitive. Where any detail is shown and components thereof are fully described, similar details not fully described shall be considered to incorporate the fully described details and components.

.2 The Contractor has had an opportunity to examine, and has carefully examined, all of the Contract Documents and Project site, and has fully acquainted itself with the scope of work, design, availability of materials, existing facilities, access, general topography, soil structure, subsurface conditions, obstructions, and all other conditions pertaining to the Work, the site of the Work, and its surrounding; that it has made necessary investigations to a full understanding of the difficulties which may be encountered in performing the Work; and that anything in any Contract Documents, or in any representations, statements, or information made or furnished by Owner or its representatives notwithstanding, Contractor will complete the Work for the compensation stated in the Agreement. In addition thereto, Contractor represents that it is fully qualified to do the Work in accordance with the terms of this Agreement in the time specified.

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

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

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

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

§ 3.3.4 Inspection of the progress, quantity, or quality of the Work done by the Owner, any Owner's representative, any governmental agency, or the Architect, or any inspector, shall not relieve the Contractor of any responsibility for the compliance of the Work with the Contract Documents. The Owner or its approved representative (heretofore referred to as Owner's representative) shall have access to the worksite and all Work. No supervision or inspection by the Owner's representative, nor the authority to act nor any other actions taken by the Owner's representative shall relieve the Contractor of any of its obligations under the Contract Documents nor give rise to any duty on the part of the Owner.

§ 3.4 LABOR AND MATERIALS

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

§ 3.4.1.1 Duty to Pay Prevailing Wage Rates. The Contractor shall pay not less than the wage scale of the various classes of labor as shown on the "Prevailing Wage Schedule" provided by the Owner. The specified wage rates are minimum rates only, and are not representations that qualified labor adequate to perform the Work is available locally at the prevailing wage rates. The Owner is not bound to pay—and will not consider—any claims for additional compensation made by any Contractor because the Contractor pays wages in excess of the applicable minimum rate contained in the Contract Documents. The "Prevailing Wage Schedule" is not a representation that quantities of qualified labor adequate to perform the Work may be found locally at the specified wage rates.

.1 For classifications not shown, workers shall not be paid less than the wage indicated for Laborers. The Contractor shall notify each worker commencing work on the Project the worker's job classification and the established minimum wage rate required to be paid, as well as the actual amount being paid. The notice must be delivered to and signed in acknowledgement of receipt by the employee and must list both the monetary wages and fringe benefits to be paid or furnished for each classification in which the worker is assigned duties. When requested by Owner, competent evidence of compliance with the Texas Prevailing Wage Law shall be furnished by Contractor.

.2 A copy of each worker wage rate notification shall be submitted to the Owner with the Application for Payment for the period during which the worker began on-site activities.

§ 3.4.1.2 Prevailing Wage Schedule. The "Prevailing Wage Schedule" shall be determined by the Owner in compliance with Chapter 2258, Texas Government Code. Should the Contractor at any time become aware that a particular skill or trade not reflected on the Owner's Prevailing Wage Schedule will be or is being employed in the Work, whether by the Contractor or by a subcontractor, the Contractor shall promptly inform the Owner and shall specify a wage rate for that skill or trade, which shall bind the Contractor.

§ 3.4.1.3 Penalty for Violation. The Contractor and any Subcontractor shall pay to the Owner a penalty of sixty dollars ($60.00) for each worker employed for each calendar day, or portion thereof, that the worker is paid less than the wage rates stipulated in the Prevailing Wage Schedule or any supplement thereto pursuant to §3.4.1.2. The Contractor and each Subcontractor shall keep, or cause to be kept, an accurate record showing the names and occupations of all workers employed in connection with the Work, and showing the actual per diem wages paid to each worker, which records shall be open at all reasonable hours for the inspection by the Owner.

§ 3.4.1.4 Complaints of Violations of Prevailing Wage Rates. Within 31 days of receipt of information concerning a violation of Chapter 2258 of the Texas Government Code, the Owner shall make an initial determination as to whether good cause exists to believe a violation occurred. The Owner's decision on the initial determination shall be reduced to writing and sent to the Contractor or Subcontractor against whom the violation was alleged, and to the affected worker. When a good cause finding is made, the Owner shall retain the full amounts claimed by the claimant or claimants as the difference between wages paid and wages due under the Prevailing Wage Schedule and any supplements thereto, together with the applicable penalties, such amounts being subtracted from successive progress payments pending a final decision on the violation.

§ 3.4.1.5 Arbitration Required if Violation not Resolved. After the Owner makes its initial determination, the affected Contractor or Subcontractor and worker have 14 days in which to resolve the issue of whether a violation occurred, including the amount that should be retained by Owner or paid to the affected worker. If the Contractor or Subcontractor and affected worker reach an agreement concerning the worker's claim, the Contractor shall promptly notify the Owner in a written document signed by the worker. It the Contractor or Subcontractor and affected worker do not agree before the 15th day after the Owner's determination, the Contractor or Subcontractor and affected worker must participate in binding arbitration in accordance with the Texas General Arbitration Act, Chapter 171, Tex. Civ. Prac. & Rem. Code. The parties to the arbitration have 10 days after the expiration of the 15 days referred to above, to agree on an arbitrator; if by the 11th day there is no agreement to an arbitrator, a district court shall appoint an arbitrator on the petition of any of the parties to the arbitration.

§ 3.4.1.6 Arbitration Award. If an arbitrator determines that a violation has occurred, the arbitrator shall assess and award against the Contractor or Subcontractor the amount of penalty as provided in this Article 3.4 and the amount owed the worker. The Owner may use any amounts retained hereunder to pay the worker the amount as designated in the arbitration award. If the Owner has not retained enough from the Contractor or Subcontractor to pay the worker in accordance with the arbitration award, the worker has a right of action against the Contractor and Subcontractor as appropriate, and the surety of

either to receive the amount owed, attorneys' fees and court costs. The Contractor shall promptly furnish a copy of the arbitration award to the Owner.

§ 3.4.1.7 Prevailing Wage Retainage. Money retained pursuant to this Article 3.4 shall be used to pay the claimant or claimants the difference between the amount the worker received in wages for labor on the Project at the rate paid by the Contractor or Subcontractor and the amount the worker would have received at the general prevailing wage rate as provided by the agreement of the claimant and the Contractor or Subcontractor affected, or in the arbitrator's award. The full statutory penalty of $60.00 per day of violation per worker shall be retained by the Owner to offset its administrative costs, pursuant to Texas Government Code §2258.023. Any retained funds in excess of these amounts shall be paid to the Contractor on the earlier of the next progress payment or final payment. Provided, however, that the Owner shall have no duty to release any funds to either the claimant or the Contractor until it has received the notices of agreement or the arbitration award as provided under §§3.4.2 and 3.4.3.

§ 3.4.1.8 No Extension of Time. If the Owner determines that good cause exists to believe a violation has occurred, the Contractor shall not be entitled to an extension of time for any delay arising directly or indirectly from of the procedures set forth in this Article 3.4.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Owner or Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive. If the Contractor desires to submit an alternate product or method in lieu of what has been specified or shown in the Contract Documents, the Contractor shall comply with the Substitution requirements listed in the Specifications, or if there are no Substitution requirements listed in the Specifications, then the following provisions apply:

§ 3.4.2.1 The Contractor must submit to the Architect and the Owner (i) a full explanation of the proposed substitution and submittal of all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures, and other like information necessary for a complete evaluation of the substitution; (ii) the adjustment, if any, in the Contract Sum, in the event the substitution is acceptable; (iii) the adjustment, if any, in the time of completion of the Contract and the construction schedule in the event the substitution is acceptable; and (v) a statement indicating Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by the Architect. Proposals for substitutions shall be to the Architect in sufficient time to allow the Architect no less than ten (10) working days for review. No substitutions will be considered or allowed without the Contractor's submittal of complete substantiating data and information as stated hereinbefore.

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

§ 3.4.4 The Contractor shall only employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts, and any other individuals associated with the Project.

§ 3.4.5. In case the progress of the Work is affected by any undue delay in furnishing or installing any items or materials or equipment required under the Contract Documents because of such conflict involving any such labor agreement or regulation, the Owner may require that other material or equipment of equal kind and quality be provided pursuant to a Change Order or Construction Change Directive.

§ 3.5 WARRANTY

§ 3.5.1 The Contractor warrants to the Owner: (1) that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise; (2) that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit; (3) that the Work will be done strictly in accordance with the Contract Documents; (4) that all products are installed

per the manufacturer's instructions, and in such a way that the manufacturer's warranties are preserved, including the use of a manufacturer-certified installer, if required by the manufacturer; (5) and that the Work, when finally completed, will provide a complete Project that meets the intent of the Contract Documents. The Contractor represents and warrants to the Owner that its materials and workmanship, including without limitation, construction means, methods, procedures and techniques necessary to perform the Work, use of materials, selection of equipment and requirements of product manufacturers are and shall be consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to the Work; (3) requirements of any warranties applicable to the Work subject to Paragraph 3.2.3. Work, materials, or equipment not conforming to these requirements shall be considered defective, and promptly after written notification of non-conformance shall be repaired or replaced by Contractor with Work conforming to this warranty. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Owner or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.1.1 Contractor further warrants that all materials or equipment of a category or classification will be a product of the same manufacturer and such materials or equipment shall be of the same lot, batch or type and that such materials and equipment will be as specified.

§ 3.5.2 The Contractor agrees to assign to the Owner at the time of final completion of the Work any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties.

§ 3.6 TAXES

State Sales and Use Taxes. Sales, use or similar taxes imposed by a governmental authority that are related to the Work and for which the Contractor is liable; provided, however, Owner is a body corporate and politic under the laws of the State of Texas and claims exemption from sales and use taxes under Texas Tax Code Ann. § 151.309, as amended, and the services and materials subject of the Agreement are being secured for use by Owner. Exemption certificates will be provided to Contractor upon request. As a precondition to the Owner reimbursing Contractor for allowable sales and use taxes, Contractor must, on its own, first attempt to use such tax exemption certificates in order to assert the exemption. In the event Contractor's efforts to use the tax exemption certificate is unsuccessful and provided that under the laws of the State of Texas an exemption from sales and use taxes is allowed, Owner will reimburse Contractor for such sales and use taxes upon Contractor providing sufficient and satisfactory documentation to the Williamson County Auditor.

§ 3.7 PERMITS, FEES, NOTICES, AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided, the Contractor shall secure, pay for, and, as soon as practicable, furnish the Owner with copies or certificates of all permits and fees, licenses, and inspections necessary for the proper execution and completion of the Work, including, without limitation, all building permits. All connection charges, assessments, or inspection fees as may be imposed by any municipal agency or utility company are included in the Contract Sum and shall be the Contractor's responsibility.

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

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

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from

those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Owner will promptly investigate such conditions and, if the Owner determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will authorize an equitable adjustment in the Contract Sum or Contract Time, or both. If the Owner determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Owner shall promptly notify the Contractor in writing, stating the reasons. If the Contractor disputes the Owner's determination, the Contractor party may assert a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 ALLOWANCES

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

.3 whenever costs are more than or less than allowances, the Contractor shall, prior to purchasing any such materials, notify the Owner in writing of the cost and whether such cost will exceed the amount of the allowance. If Owner authorizes Contractor to proceed, after receiving the Contractor's estimate of the total cost, then the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent or Contractor's project manager shall be as binding as if given to the Contractor. Important oral communications shall be immediately confirmed in writing.

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

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

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

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

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

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

§ 3.10.4 The construction schedule shall be a detailed precedence-style critical path management ("CPM") schedule in a format satisfactory to the Owner that shall (i) provide a graphic representation of all activities and events that will occur during performance of the Work; (ii) identify each phase of construction and occupancy; and (iii) set forth dates that are critical in ensuring the timely and orderly completion of the Work in accordance with the requirements of the Contract Documents (hereinafter referred to as the "Milestone Date"). Upon review and acceptance by the Owner of the Milestone Dates, the construction schedule shall be deemed part of the Contract Documents. If not accepted, the construction schedule shall be promptly revised by the Contractor in accordance with the recommendations of the Owner and resubmitted for acceptance. The Contractor shall monitor the progress of the Work for conformance with the requirements of the construction schedule and shall promptly advise the Owner of any delays or potential delays. The accepted construction schedule shall be updated to reflect actual conditions as set forth in section 3.10.1 or if requested by the Owner. In the event any progress report indicates any delays, the Contractor shall propose an affirmative plan to correct the delay, including overtime and/or additional labor, if necessary. In no event shall any progress report constitute an adjustment in the Contract Time, any Milestone date, or the Contract Sum unless any such adjustment is agreed to by the Owner and authorize pursuant to a Change Order.

§ 3.10.5 In the event the Owner determines that the performance of the Work, as of a Milestone Date, has not progressed or reach the level of completion required by the Contract Documents, the Owner shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including without limitation, (i) working additional shifts or overtime, (ii) supplying additional manpower, equipment, and facilities, and (iii) other similar measures. Such measures so continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require such measures is solely for the purpose of ensuring the Contractors compliance with the construction schedule.

§ 3.11 DOCUMENTS AT THE SITE

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

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

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

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

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

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

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

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

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

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

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

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

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

§ 3.13 USE OF SITE

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

§ 3.14 CUTTING AND PATCHING

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

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

§ 3.15 CLEANING UP

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

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

§ 3.16 ACCESS TO WORK

The Owner and Architect shall, at all times, have access to the Work in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

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

§ 3.18 INDEMNIFICATION

§ 3.18.1 INDEMNITY – OTHER THAN EMPLOYEE PERSONAL INJURY CLAIMS. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS OWNER, ITS EMPLOYEES, AND ASSIGNS (THE "INDEMNIFIED PARTIES" OR "INDEMNITEES") FROM AND AGAINST CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEYS' FEES, ARISING OUT OF OR ALLEGED TO BE RESULTING FROM THE PERFORMANCE OF THIS AGREEMENT, TO THE EXTENT CAUSED BY THE NEGLIGENT OR WILLFUL ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTORS, SUB-SUBCONTRACTORS, OR ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THEM OR ANYONE FOR WHOSE ACTS THEY MAY BE LIABLE. CONTRACTOR SHALL NOT BE REQUIRED TO INDEMNIFY, HOLD HARMLESS OR DEFEND THE INDEMNIFIED PARTIES AGAINST A CLAIM CAUSED BY THE NEGLIGENCE OR FAULT, OR THE BREACH OR VIOLATION OF A STATUTE, ORDINANCE, GOVERNMENTAL REGULATION, STANDARD, OR RULE OF THE INDEMNITEE, OR OTHER PARTY OTHER THAN CONTRACTOR OR ITS AGENT, EMPLOYEE, OR SUBCONTRACTOR OF ANY TIER, EXCEPT THAT CONTRACTOR SHALL INDEMNIFY, HOLD HARMLESS AND DEFEND THE INDEMNIFIED PARTIES AGAINST ANY CLAIMS FOR THE BODILY INJURY OR DEATH OF AN EMPLOYEE OF CONTRACTOR, ITS AGENTS, OR IT SUBCONTRACTORS OF ANY TIER.

§3.18.2 INDEMNITY – EMPLOYEE <u>PERSONAL INJURY CLAIMS</u>. TO THE FULLEST EXTENT PERMITTED BY LAW, CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE INDEMNIFIED PARTIES AND SHALL ASSUME ENTIRE RESPONSIBILITY AND LIABILITY (OTHER THAN AS A RESULT OF AN INDEMNIFIED PARTY'S GROSS NEGLIGENCE) FOR ANY CLAIM OR ACTION BASED ON OR ARISING OUT OF THE PERSONAL INJURY, INCLUDING THE DEATH, OF ANY EMPLOYEE OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY SUB-SUBCONTRACTOR, OR OF ANY OTHER ENTITY FOR WHOSE ACTS THEY MAY BE LIABLE, WHICH OCCURRED OR WAS ALLEGED TO HAVE OCCURRED ON THE PROJECT SITE OR IN CONNECTION WITH THE PERFORMANCE OF THE WORK OF THIS AGREEMENT. CONTRACTOR HEREBY INDEMNIFIES THE INDEMNIFIED PARTIES EVEN TO THE EXTENT THAT SUCH PERSONAL INJURY WAS CAUSED OR ALLEGED TO HAVE BEEN CAUSED BY THE COMPARATIVE OR CONCURRENT NEGLIGENCE OF THE STRICT LIABILITY OF ANY INDEMNIFIED PARTY. THIS INDEMNIFICATION SHALL NOT BE LIMITED TO DAMAGES, COMPENSATION, OR BENEFITS PAYABLE UNDER INSURANCE POLICIES, WORKERS COMPENSATION ACTS, DISABILITY BENEFITS ACTS, OR OTHER EMPLOYEES BENEFIT ACTS.

§3.18.3 THE CONTRACTOR'S INDEMNITY OBLIGATIONS UNDER THIS SECTION 3.18 SHALL ALSO SPECIFICALLY INCLUDE, WITHOUT LIMITATION, ALL FINES, PENALTIES, DAMAGES, LIABILITY, COSTS, EXPENSES (INCLUDING, WITHOUT LIMITATION, REASONABLE ATTORNEYS' FEES) ARISING OUT OF, OR IN CONNECTION WITH, ANY (I) VIOLATION OF OR FAILURE TO COMPLY WITH ANY LAW, STATUTE, ORDINANCE, RULE, REGULATION, CODE OR REQUIREMENT OF A PUBLIC AUTHORITY THAT BEARS UPON THE PERFORMANCE OF THE WORK BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE, (II) MEANS, METHODS, PROCEDURES, TECHNIQUES, OR SEQUENCES OF EXECUTION OR PERFORMANCE OF THE WORK, AND (III) FAILURE TO SECURE AND PAY FOR PERMITS, FEES, APPROVALS, LICENSES, AND INSPECTIONS AS REQUIRED UNDER THE CONTRACT DOCUMENTS, OR ANY VIOLATION OF ANY PERMIT OR OTHER APPROVAL OF A PUBLIC AUTHORITY APPLICABLE TO THE WORK, BY THE CONTRACTOR, A SUBCONTRACTOR, OR ANY PERSON OR ENTITY FOR WHOM EITHER IS RESPONSIBLE.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

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

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

§ 4.2 ADMINISTRATION OF THE CONTRACT
§ 4.2.1 The Architect will provide administration of the Contract as described in the Owner-Architect Agreement. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

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

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

§ 4.2.4 COMMUNICATIONS AND CONTRACT ADMINISTRATION
Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to relate relevant communications between Owner and Architect to the Architect. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 If included in Architect's scope of work, the agreement between Owner and Architect, or if requested by the Owner, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts based on the Architect's evaluations of the Contractor's Applications for Payment.

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

§ 4.2.7 To the extent provided in the agreement between Owner and Architect, the Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Owner and Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the

purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 If requested by Owner, the Architect will prepare Change Orders and Construction Change Directives with the Owner's prior written consent, but the Architect may authorize minor changes in the Work as provided in the agreement between Owner and Architect, or in Section 7.4 of these General Conditions. If requested by Owner, the Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

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

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

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

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings.

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

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

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

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

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

§ 5.2 AWARD OF SUBCONTRACTS

§ 5.2.1 For Construction Manager-At-Risk Agreements. The Construction Manager shall publicly advertise for bids or proposals and receive bids or proposals from trade contractors or Subcontractors for the performance of all major elements of the work other than the minor work that may be included in the general conditions. The Construction Manager may seek to perform portions of the work itself if:

(A) the Construction Manager submits its bid or proposal for those portions of the Work in the same manner as all other trade contractors or Subcontractors; and

(B) the Owner determines that the Construction Manager's bid or proposal provides the best value for the Owner.

§ 5.2.1.1 REVIEW OF BIDS OR PROPOSALS. Construction Manager shall review all trade contractor or Subcontractor bids or proposals in a manner that does not disclose the contents of the bid or proposal during the selection process to a person not employed by the Construction Manger, Architect, Engineer, or Owner. All bids or proposals shall be made available to the Owner on request and to the public after the later of the award of the contract or the seventh day after the date of final selection of bids or proposals. If the Construction Manager reviews, evaluates, and recommends to the Owner a bid or proposal from a trade contractor or subcontractor but the Owner requires another bid or proposal to be accepted, the Owner shall compensate the Construction Manager by a change in the Contract Sum, Contract Time, or Cost of the Work for any additional cost and risk that the Construction manager incurs because of the Owner's requirement that another bid or proposal be accepted.

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

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

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

§ 5.3 SUBCONTRACTUAL RELATIONS

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

§ 5.3.2 All subcontracts shall be in writing and, if requested, Contractor shall provide Owner with copies of executed subcontracts.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS
§ 5.4.1 This Contract is for Owner's benefit, its successors and assigns who, as well as Contractor, may directly enforce all rights and warranties, express or implied herein, but Subcontractors shall have recourse only against Contractor and not against Owner. Owner may rely solely upon Contractor for enforcement of all Subcontracts. To effect such purpose, Contractor assigns to Owner all right to bring any actions against subcontractors and material vendors without waiver by Owner of his right against Contractor because of defaults, delays and effects for which a subcontractor or material vendor may also be liable, said assignment being effective only if:

.1 Contractor is in default under the Contract Documents; or

.2 Owner has terminated the Contract in accordance with the Contract Documents; and

.3 Only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and

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

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

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

§5.4.4 The Architect and the Owner shall have the right to request from any Subcontractor at any time during the course of construction, a notarized affidavit stating the amount of monies which have been paid to the Subcontractor as of any certain stipulated date.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS
§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

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

§ 6.1.3 The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.2 MUTUAL RESPONSIBILITY
§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall

connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect and the Owner apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

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

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

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

§ 6.3 OWNER'S RIGHT TO CLEAN UP

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

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

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

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

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work. Except as permitted in Section 7.3 and Section 9.7.2, a change in the Contract Sum or the Contract Time shall be accomplished only by Change Order. Accordingly, no course of conduct or dealings between the parties, nor express or implied acceptance of alterations or additions to the Work, and no claim that Owner has been unjustly enriched by any alteration of or addition to the Work, whether or not there is, in fact, any unjust enrichment to the Work, shall be the basis of any Claim to an increase in any amounts due under the Contract Documents or a change in any time period provided for in the Contract Documents.

§ 7.2 CHANGE ORDERS

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

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

§ 7.2.2 Contractor's Change Order shall set forth in clear and precise detail breakdowns of labor and materials for all trades involved and the estimated impact on the dates of Substantial Completion. Contractor shall furnish supporting data as reasonably requested by Owner.

§ 7.2.3 Agreement on any Change Order shall constitute a final settlement of all matters relating to the change in the Work that is the subject of the Change Order, including, but not limited to, all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the construction schedule.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

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

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

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

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.7.

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

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

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

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

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

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

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

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

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

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

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

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

§ 7.4 MINOR CHANGES IN THE WORK

If permitted in the agreement between Owner and Architect, the Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents.

ARTICLE 8 TIME

§ 8.1 DEFINITIONS

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

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

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

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

§ 8.2 PROGRESS AND COMPLETION

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

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

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

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect and Owner determines may justify delay, then the Contract Time shall be extended by Change Order to the extent such delay will prevent the Contractor from achieving Substantial Completion within the Contract Time and if the performance of the Work is not, was not, or would not have been delayed by any other cause for which the Contractor is not entitled to an extension in the Contract Time under the Contract Documents. The Contractor further acknowledges and agrees that adjustments in the Contract Time will be permitted for a delay only to the extent such delay (i) is not caused, or could not have been anticipated, by the Contractor, and (ii) could not be limited or avoided by the Contractor's timely notice to the Owner of the delay or reasonable likelihood that a delay will occur.

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

§ 8.3.3 Notwithstanding anything contained in the Contract Documents to the contrary, the Contractor's sole remedy for any (1) delay in the commencement, prosecution or completion of the Work, (2) hindrance or obstruction in the performance of the Work, (3) loss of productivity, or (4) other similar claims (collectively referred in this Subparagraph 8.3.3 as "Delay or Delays"), whether or not such Delays are foreseeable, shall be an extension of time in which to complete the Work. In no event shall the Contractor be entitled to any other compensation or recovery of any damages, costs, or attorneys' fees, caused by any Delays, unknown site conditions, errors, inconsistencies, or omissions in the Drawings and Specifications, or concealed or unknown conditions, including, without limitation, consequential damages, lost opportunity costs, impact damages or other similar damages; provided however that Contractor may be entitled to additional time as provided under Section 8.3.1.

§ 8.3.4 If the Contractor submits a progress report indicating, or otherwise expresses an intention to achieve, completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

§ 8.3.5 Owner shall have the right to occupy, without prejudice to rights of either party, any completed or substantially completed portions of the Work, notwithstanding the fact that time for completion of entire Work, or portions thereof, may not be expired. Occupancy and use by Owner shall not constitute, in itself, acceptance of the Work.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

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

§ 9.2 SCHEDULE OF VALUES

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

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 As provided in the Agreement and in the Contract Documents, the Contractor shall submit to the Owner and Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2., for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the

Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.

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

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

§ 9.3.1.3 If requested by Owner or required elsewhere in the Contract Documents, Each Application for Payment shall be accompanied by the following, all in a form and substance satisfactory to the Owner:

(i) With each Application for Payment: a current Sworn Statement from the Contractor setting forth all Subcontractors and all material suppliers with whom the Contractor has subcontracted, the amount of each such subcontract, the amount requested for any Subcontractor or material supplier in the Application for Payment, and the amount to be paid to the Contractor from such progress payment;

(ii) With each Application for Payment: a duly executed Conditional Waiver and Release on Progress Payment from the Contractor and Subcontractors establishing receipt of payment or satisfaction of the payment requested by the Contractor in the current Application for Payment;

(iii) Commencing with the second Application for Payment submitted by the Contractor, a duly executed Unconditional Waiver and Release on Progress Payment from Contractor and all Subcontractors, material suppliers and, where appropriate, lower tier subcontractors that have billed more than $5,000 on a single application of payment, establishing receipt of payment or satisfaction of payment of all amounts requested on behalf of such entities and disbursed prior to submittal by the Contractor of the current Application for Payment;

(iv) With the Final Application for Payment: Contractor shall submit a Conditional Waiver and Release on Final Payment as required by Texas Property Code 53.284. Upon receipt of final payment, Contractor shall submit an Unconditional Waiver and Release on Final Payment as required by Texas Property Code 53.284; and

(v) Such other information, documentation, and materials as the Owner, or the title insurer may require in order to ensure that Owner's property is free of lien claims. Such other documents may include, without limitation, original copies of lien or bond claim releases suitable for filing with the County Clerk in Williamson County, Texas.

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

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

§ 9.3.3.1 The Contractor further expressly undertakes to defend Owner, at the Contractor's sole expense, against any actions, lawsuits, or proceedings brought against Owner as a result of liens filed against the Work, the site of any of the Work, the Project site and any improvements thereon, or any portion of the property of any of Owner (referred to collectively as "liens" in this Section 9.3.3), provide the Owner has paid Contractor pursuant to the requirements of the Contract Documents. The Contractor hereby agrees to indemnify and hold Owner harmless against any such liens or claims of lien and agrees to pay any judgment or lien resulting from any such actions, lawsuits, or proceedings.

§ 9.3.3.2 The Owner shall release any payments withheld due to a lien or bond claims if the Contractor obtains security acceptable to the Owner, however, the Contractor shall not be relieved of any responsibilities or obligations under this Section 9.3.3, including, without limitation, the duty to defend and indemnify Owner.

§ 9.3.3.3 Retainage. The Owner shall withhold from each progress payment, as retainage, five percent (5%) of the total earned amount. Retainage so withheld shall be managed in conformance with Subchapter B, Chapter 2252 of the Texas Government Code. Any request for reduction or release of retainage shall be accompanied by written consent of the Contractor's Surety. No such request shall be made until the Contractor has earned at least sixty-five percent (65%) of the total Contract Price.

§ 9.3.3.4 For purposes of Texas Government Code § 2251.021 (a)(2), the date the performance of service is completed is the date when the Owner's representative approves the Application for Payment.

§ 9.4 CERTIFICATES FOR PAYMENT

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

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

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

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

.1 defective Work not remedied;
.2 third party claims filed or reasonable evidence indicating probable filing of such claims;
.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
.5 damage to the Owner or a separate contractor;
.6 failure to maintain the scheduled progress, or reasonable evidence that the Work will not be completed within the Contract Time;
.7 failure to comply with the requirements of Texas Government Code Chapter 2258 (Prevailing Wage Law);
.8 failure to include sufficient documentation to support the amount of payment requested for the Project;
.9 failure to obtain, maintain, or renew insurance coverage for payment/performance bonds required by the Contract Documents; or
.10 repeated failure to carry out the Work in accordance with the Contract Documents.

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

§ 9.6 PROGRESS PAYMENTS
§ 9.6.1 The Owner shall make payment in the manner and within the time provided in the Contract Documents and in accordance with Chapter 2251 of the Texas Government Code.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than 10 days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

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

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

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

§ 9.7 FAILURE OF PAYMENT
§ 9.7.1 If the Architect is required to issue Certificates for Payment and, through no fault of the Contractor, the Architect fails to timely issue Certificates for Payment in the time permitted in the Contract Documents, or if the Owner does not pay the Contractor by the date established in the Contract Documents, then the Contractor may, upon twenty-one days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received.

§ 9.7.2 If the Owner is entitled to reimbursement or payment from the Contractor under or pursuant to the Contract Documents, such payment shall be made promptly upon demand by the Owner. Notwithstanding anything contained in the Contract Documents to the contrary, if the Contractor fails to promptly make any payment due the Owner, or if the Owner incurs any costs and expenses to cure any default of the Contractor or to correct defective work, the Owner shall have an absolute right to offset such amount against the Contract Sum and may, in the Owner's sole discretion, elect either to (i) deduct

an amount equal to that which the Owner is entitled from any payment then or thereafter due the Contractor from the Owner, or (ii) issue a written notice to the Contractor reducing the Contract Sum by an amount equal to that which the Owner is entitled.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy and any other permits, approvals, licenses, and other documents from any governmental authority having jurisdiction thereof necessary for the beneficial occupancy of the Project.

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

§ 9.8.3 Upon receipt of the Contractor's punch list, the Owner and Architect will examine the Work to determine whether the Work or designated portion thereof is substantially complete. If the Owner and/or Architect's examination discloses any item, whether or not included on the Contractor's punch list, that is not sufficiently complete in accordance with the Contract Documents, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Owner or Architect. In such case, the Contractor shall then submit a request for another examination by the Owner or Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect, if required by the Contract Documents, or Owner will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Unless otherwise provided, Contractor shall complete all items on the punch list within 30 days of Substantial Completion. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5, the surety, and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld.

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

§ 9.9.3 Partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Owner and Architect will make such inspection and, when the Owner and Architect find the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled. All warranties and guarantees required under or pursuant to the Contract Documents shall be assembled and delivered by the Contractor to the Architect as part of the final Application for Payment. The final Certificate for Payment will not be issued by the Architect until all warranties and guarantees have been received and accepted by the Owner.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Owner and Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work have been paid or otherwise satisfied, within the period of time required by Chapter 2251 of the Texas Government Code, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety to final payment and (5) other data establishing payment or satisfaction of obligations, such as receipts, unconditional full and final releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner.

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

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

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

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

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

§ 10.2 SAFETY OF PERSONS AND PROPERTY

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

.1 employees on the Work and other persons who may be affected thereby;
.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss. Notwithstanding any language to the contrary, the Owner shall not have any responsibility for job site inspections or safety recommendations. Any inspections or observations by the Owner or the Architect are solely for the benefit of the Owner and shall not create any duties or obligations to anyone else.

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

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

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

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

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

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

§ 10.2.9 When all or a portion of the Work is suspended for any reason, the Contractor shall securely fasten down all covering and fully protect the Work, as necessary, from injury or damage by any cause.

§ 10.2.10 The Contractor shall promptly report in writing to the Owner and Architect all accidents arising out of or in connection with the Work that cause death, personal injury, or property damage.

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

Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written notice from the Owner.

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

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

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

ARTICLE 11 INSURANCE AND BONDS
§ 11.1 CONTRACTOR'S LIABILITY INSURANCE
§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
.4 Claims for damages insured by usual personal injury liability coverage;
.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
.7 Claims for bodily injury or property damage arising out of completed operations, which coverage shall be maintained for no less than four (4) years following final payment; and
.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

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

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

§ 11.1.3 Unless otherwise provided, copies of the insurance policies, in form acceptable to the Owner, shall provided to Owner within 30 days of Owner's request. Except as otherwise provided, all of the policies provided shall name Owner as an additional insured, and such policies shall immediately deliver to Owner copies of all such insurance policies, together with certificates by the insurer evidencing Owner's coverage there under. Each policy of insurance obtained by Contractor pursuant to the Contract Documents shall provide, by endorsement or otherwise (i) that such policy shall not be canceled, endorsed, altered or reissued to effect a change in coverage for any reason or to any extent whatsoever unless the insurer shall have first given Owner and Lender at least thirty (30) days prior written notice thereof, and (ii) that Owner may, but shall not be obligated to, make premium payments to prevent the cancellation, endorsement, alteration or reissuance of such policy and such payments shall be accepted by the insurer to prevent the same. Such policies shall provide, by endorsement or otherwise, that Contractor shall be solely responsible for the payment of all premiums under the policies, and that Owner shall have no obligation for the payment thereof, notwithstanding that Owner is named as additional insured under the policy. Any insured loss or claim of loss shall be adjusted to the Owner, and any settlement payments shall be made payable to the Owner as a trustee for the insureds, as their interests may appear. Upon the occurrence of an insured loss or claim of loss, monies received will be held by Owner who shall make distribution in accordance with an agreement to be reached in such event between Owner and Contractor. If the parties are unable to agree between themselves on the settlement of the loss, such dispute shall be resolved in accordance with section 15, below, but the Work of the Project shall nevertheless progress during any such period of dispute without prejudice to the rights of any party to the dispute. The Contractor shall be responsible for any loss within the deductible area of the policy. If Owner is damaged by the failure of Contractor to purchase or maintain such insurance, then Contractor shall bear all costs properly attributable thereto. The Contractor shall affect and maintain similar property insurance on portions of the Work stored off the site or in transit when such portions of the Work are to be included. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until Final Completion of the Project.

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

§ 11.2 OWNER'S LIABILITY INSURANCE
The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE
§ 11.3.1 Unless otherwise provided in the Contract Documents, the Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake,

flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss as well as coverage for building materials while in transit or building materials suitably stored at a temporary location. Property insurance provided by the Contractor shall not cover any tools, apparatus, machinery, scaffolding, hoists, forms, staging, shoring, and other similar items commonly referred to as construction equipment that may be on the site and the capital value of which is not included in the Work. The Contractor shall make its own arrangements for any insurance it may require on such construction equipment. Any such policy obtained by the Contractor under this Section 11.3.1 shall include a waiver of subrogation in accordance with the requirements of Section 11.3.4.

§ 11.3.1.2 If the Contractor does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Contractor shall so inform the Owner in writing prior to commencement of the Work. If the Owner is damaged by the failure or neglect of the Contractor to purchase or maintain insurance as described above, without so notifying the Owner in writing, then the Contractor shall bear all reasonable costs properly attributable thereto.

§ 11.3.1.3 Contractor shall be responsible for any deductibles to the extent that the loss arose out of or was cause by Contractor's negligence or breach of the Agreement.

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

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

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

§ 11.3.5 A loss insured under the property insurance shall be adjusted in good faith and made payable to the Owner in good faith for the insureds, as their interests may appear. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND
§ 11.4.1 The Contractor is required to tender to Owner, prior to commencing the Work, performance and payment bonds, as required by law. In the event Contractor fails to provide such bonds within the time

provided by the Agreement, Owner may immediately, upon notice of such failure, or within a reasonable time thereafter, at its sole option and discretion: (1) void this Agreement in its entirety; or (2) procure such bonds on behalf of the Contractor, deducting such amounts from the Contract Price. In the event Owner voids the Agreement under this section, Contractor may forfeit its bid bond.

§ 11.4.2 A Performance Bond is required if the Contract Price is in excess of $50,000. The performance bond is solely for the protection of the Owner, in the full amount of the Contract Price and conditioned on the faithful performance of the Work in accordance with the Contract Documents. The form of the bond shall be approved by the Owner.

§ 11.4.3 A Payment Bond is required if the Contract Price is in excess of $25,000. A payment bond is payable to the Owner, in the full amount of the Contract Price and solely for the protection and use of payment bond beneficiaries who have a direct contractual relationship with the Contractor or a supplier of required materials or labor. The form of bond shall be approved by the Owner.

§ 11.4.5 Corporate sureties authorized to issue bonds shall be qualified and comply with relevant provisions of the Texas Insurance Code.

§ 11.4.6 Each bond shall be executed by a corporate surety or sureties authorized to do business in the State of Texas and acceptable to the Owner. If any bond is for more than 10 percent of the surety's capital and surplus, the Owner may require certification that the company has reinsured the excess portion with one or more reinsurers authorized, accredited, or trusteed to do business in the State. A reinsurer may not reinsure for more than 10 percent of its capital and surplus. If a surety upon a bond loses its authority to do business in the State, the Contractor shall within thirty (30) days after such loss furnish a replacement bond at no added cost to the Owner.

§ 11.4.7 Each bond shall be accompanied by a valid Power-of-Attorney (issued by the surety company and attached, signed and sealed with the corporate embosses seal, to the bond) authorizing the attorney in fact who signs the bond to commit the company to the terms of the bond, and stating any limit in the amount for which the attorney can issue a single bond.

§ 11.4.8 The process of requiring and accepting bonds and making claims thereunder shall be conducted in compliance with Chapter 2253, Texas Government Code. If for any reason a statutory payment or performance bond is not honored by the surety, the Contractor shall fully indemnify and hold the Owner harmless of and from any costs, losses, obligations or liabilities it incurs as a result.

§ 11.4.9 Owner shall furnish certified copies of a payment bond and the related Agreement between Owner and Contractor to any qualified person seeking copies who complies with §2253.026, Texas Government Code.

§ 11.4.10 Claims on Payment Bonds. Claims on payment bonds must be sent directly to the Contractor and its surety in accordance with § 2253.041, Texas Government Code. All Payment Bond claimants are cautioned that no lien exists on the funds unpaid to the Contractor on such contract, and that reliance on notices sent to the Owner may result in loss of their rights against the Contractor and/or its surety. The Owner is not responsible in any manner to a claimant for collection of unpaid bills, and accepts no such responsibility because of any representation by any agent or employee.

§ 11.4.11 Payment Claims when Payment Bond not Required. When the value of the Agreement between Owner and the Contractor is less than $25,000.00, claimants and their rights are governed by Texas Property Code, §§ 53.231 – 53.239. These provisions set out the requirements for filing a valid lien on funds unpaid to the Contractor as of the time of filing the claim, actions necessary to release the lien and satisfaction of such claims.

§11.4.12 Sureties shall be listed on the Department of the Treasury's Listing of Approved Sureties stating companies holding Certificates of Authority as acceptable sureties on Federal Bonds and acceptable reinsuring companies (Department Circular 570).

§ 11.5 GENERAL REQUIREMENTS

§ 11.5.1 Unless otherwise provided in the Contract Documents, all insurance coverage procured by the Contractor shall be provided by insurance companies having policy holder ratings no lower than "A" and financial ratings not lower than "XII" in the Best's Insurance Guide, the latest edition in effect as of the date of the Contract, and subsequently in effect at the time of renewal of any policies required by the Contract Documents.

§ 11.5.2 If the Owner is damaged by failure of the Contractor to purchase or maintain insurance required under Article 11, then the Contractor shall bear all reasonable costs (including attorneys' fees and court and settlement expenses) properly attributable thereto.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Owner or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Owner or Architect, be uncovered for examination and be replaced at the Contractor's expense without change in the Contract Time. If prior to the date of Substantial Completion the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work (other than start-up), including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment, or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

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

§ 12.2 CORRECTION OF WORK

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

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

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

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

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

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

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

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

ARTICLE 13 MISCELLANEOUS PROVISIONS
§ 13.1 GOVERNING LAW
The Contract shall be governed by the law of Williamson County, Texas.

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

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

§ 13.4 RIGHTS AND REMEDIES
§ 13.4.1 Except as expressly provided in the Contract Documents, duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

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

§ 13.5 TESTS AND INSPECTIONS
§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority. The Contractor shall give the Owner and Architect timely notice of when and where tests and inspections are to be made so that the Owner and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

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

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

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

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

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

§ 13.6 INTEREST
The rate of interest that accrues on an overdue payment is the rate in effect on September 1 of the fiscal year in which the payment becomes overdue. The rate in effect on September 1 is equal to the sum of:
(1) one percent; and
(2) the prime rate as published in the Wall Street Journal on the first day of July of the preceding fiscal year that does not fall on a Saturday or Sunday pursuant to §2251.025 of the Texas Government Code.

§ 13.7 TIME LIMITS ON CLAIMS
The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the time limits provided by law. Nothing herein shall be construed as shortening the period of time Owner has for commencing claims to less than what is required by law.

§ 13.8 Application To Subcontracts
Any specific requirement in this Contract that the responsibilities or obligations of Contractor also apply to a Subcontractor is added for emphasis and are also hereby deemed to include a Subcontractor of any tier. The omission of a reference to a Subcontractor in connection with any of Contractor's responsibilities or obligations shall not be construed to diminish, abrogate or limit any responsibilities or obligations of a Subcontractor of any tier under the Contract Documents or the applicable subcontract.

§ 13.10 GENERAL PROVISIONS
§ 13.10.1 All personal pronouns used in this Contract, whether used in the masculine, feminine, or neuter gender, shall include all other genders; and the singular shall included the plural and vice versa. Titles of articles, sections, and subsections are for convenience only and neither limit nor amplify the provisions of this Contract. The use herein of the word "including," when following any general statement, term, or matter, shall not be construed to limit such statement, term, or matter to the specific items or matters set forth immediately following such word or to similar items or matters, whether or not non-limiting language (such words as "without limitation," or "but not limited to," or words of similar import) is used with reference thereto, but rather shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement, term, or matter.

§ 13.10.2 Wherever possible, each provision of this Agreement shall be interpreted in a manner as to be effective and valid under applicable law. If, however, any provision of this Agreement, or portion thereof,

is prohibited by law or found invalid under any law, only such provision or portion thereof shall be ineffective, without in any manner invalidating or affecting the remaining provisions of this Agreement or valid portions of such provision, which are hereby deemed servable.

§ 13.11 NO ORAL WAIVER
The Provisions of the Contract Documents shall not be changed, amended, waived, or otherwise modified in any respect except by a writing signed by Owner. No person is authorized on behalf of Owner to orally change, amend, waive, or otherwise modify the terms of the Contract Documents or any of the Contractor's duties or obligations under or arising out of the Contract Documents. Any change, waiver, approval, or consent granted to the Contractor shall be limited to the specific matters stated in the writing signed by Owner, and shall not relieve Contractor of any other of the duties and obligations under the Contract Documents. No "constructive" changes shall be allowed.

§ 13.12 Texas Public Information Act. To the extent, if any, that any provision in the Contract Documents is in conflict with Tex. Gov't Code 552.001 et seq., as amended (the "Public Information Act"), the same shall be of no force or effect. Furthermore, it is expressly understood and agreed that Owner, its officers and employees may request advice, decisions and opinions of the Attorney General of the State of Texas in regard to the application of the Public Information Act to any information or data furnished to Owner whether or not the same are available to the public. It is further understood that Owner, its officers and employees shall have the right to rely on the advice, decisions and opinions of the Attorney General, and that Owner, its officers and employees shall have no liability or obligation to Contractor for the disclosure to the public, or to any person or persons, of any software or a part thereof, or other items or data furnished to Owner by Contractor in reliance of any advice, decision or opinion of the Attorney General of the State of Texas.

§ 13.13 Equal Opportunity in Employment. The Contractor agrees that during the performance of the Agreement it will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Parties will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; termination; rates of pay or other forms of compensation, and selection for training, including apprenticeship.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT
§ 14.1 TERMINATION BY THE CONTRACTOR
§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 90 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

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

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

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

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

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon 30 days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

.1 fails to commence the Work in accordance with the provisions of this Contract,

.2 fails to prosecute the Work to completion thereof in a diligent, efficient, timely, workmanlike, skillful and careful manner and in strict accordance with the provisions of the Contract,

.3 fails to use an adequate amount or quality of personnel or equipment to complete the Work without undue delay,

.4 fails to perform any of its obligations under the Contract,

.5 fails to make prompt payments when due to its Subcontractors and Suppliers, or as required by Texas Government Code 2251,

.6 files any petition or other pleading seeking any relief under any provisions of the Federal Bankruptcy Act, as amended, or any other federal or state statute or law providing for reorganization of debts or other relief from creditors, permits a receiver or other person to be appointed on account of its insolvency or financial condition, or becomes insolvent,

.7 creates any situation or state of facts which would authorize or permit an involuntary petition in bankruptcy to be filed against Contractor, or

.8 has not met or in Owner's opinion will not meet the dates of Substantial Completion set forth in the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, in its sole and absolute discretion, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, 30 days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

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

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

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

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished. In the event that a final decision under section 15, below, is rendered that sufficient cause did not exist for termination under this section 14.2, then the termination shall be considered a termination for convenience, under section 14.4, below.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages and costs incurred by the Owner in finishing the Work and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

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

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

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE
§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall
.1 cease operations as directed by the Owner in the notice;
.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 Upon such termination, the Contractor shall recover the amounts provided in Section 10.1.3 of the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES
§ 15.1 CLAIMS
§ 15.1.1 DEFINITION
A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS
Claims for events arising during the performance of the Work by Contractor must be initiated by written notice to the other party with a copy sent to the Architect; provided, however, that the claimant shall use its best efforts to furnish the other party, as expeditiously as possible, with notice of any Claim including, without limitation, those in connection with concealed or unknown conditions, once such claim is recognized, and shall take steps to mitigate the alleged or potential damages, delay, or other adverse consequences arising out of the condition that is the cause of such a Claim. Claims by Contractor must be initiated within 10 business days after occurrence of the event giving rise to such Claim or within 10 business days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims may also be reserved in writing within the time limits set forth in this Section 15.1.2. Any notice of Claim or reservation of Claim must clearly identify the alleged cause and the nature of the Claim and include data and information available to the claimant that will facilitate prompt verification and evaluation of the Claim.

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

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

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

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

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

§ 15.3 MEDIATION
§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived shall be subject to mediation as a condition precedent to seeking redress in a court of competent jurisdiction.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation, which shall consist of a single mediator who is knowledgeable about the subject matter of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in Williamson County, Texas. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§15.3.4 All disputes not resolved through mediation shall be decided in litigation in Williamson County, Texas.

§ 15.3.5 No waiver of Immunity. Nothing in the Contract Documents shall be deemed to waive, modify or amend any legal defense available at law or in equity to Owner, its past or present officers, employees, or agents, nor to create any legal rights or claim on behalf of any third party. Owner does not waive, modify, or alter to any extent whatsoever the availability of the defense of governmental immunity under the laws of the State of Texas and of the United States.

Proposal References

List the last three (3) companies or governmental agencies, where the same or similar goods and/or services as contained in this RFP package, were recently provided by Respondent.

Reference 1

Client Name: Location:

Contact Name: Title:

Phone: E-mail

Contract Date To: Contract Date From: Contract Value: $

Scope of Work:

Reference 2

Client Name: Location:

Contact Name: Title:

Phone: E-mail

Contract Date To: Contract Date From: Contract Value: $

Scope of Work:

Reference 3

Client Name: Location:

Contact Name: Title:

Phone: E-mail

Contract Date To: Contract Date From: Contract Value: $

Scope of Work:

DEBARMENT AND LICENSING CERTIFICATION

STATE OF TEXAS §
§
COUNTY OF WILLIAMSON §

I, the undersigned, being duly sworn or under penalty of perjury under the laws of the United States and the State of Texas, certifies that Firm named herein below and its principals:

(a) Are not presently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any federal department or agency:
(b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state or local) transaction or contract under a public transaction; violation of federal or state antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
(c) Are not presently indicted for or otherwise criminally or civilly charged by a federal, state or local governmental entity with commission of any of the offenses enumerated in paragraph (1)(b) of this certification;
(d) Have not within a three-year period preceding this application/proposal had one or more public (federal, state or local) transactions terminated for cause or default;
(e) Are registered and licensed in the State of Texas to perform the professional services which are necessary for the project; and
(f) Have not been disciplined or issued a formal reprimand by any State agency for professional accreditation within the past three years.

Name of Firm

Signature of Certifying Official | Title of Certifying Official

Printed Name of Certifying Official | Date

Where the Firm is unable to certify to any of the statements in this certification, such Firm shall attach an explanation to this certification.

SUBSCRIBED and sworn to before me the undersigned authority by

on this the day of , 20 , on behalf of said Firm.

Notary Public in and for the State of Texas

My commission expires:

SIGNATURE AND NOTARY NOT REQUIRED IF COMPLETING IN BIDSYNC ELECTRONICALLY.

PROPOSAL AFFIDAVIT

This form must be completed, signed, notarized and returned with Proposal package

The undersigned certifies that the RFP and the Respondent's Proposal have been carefully reviewed and are submitted as correct and final. Respondent further certifies and agrees to furnish any and/or all goods and/or services upon which prices are extended at the price Proposal, and upon the conditions contained in the RFP.

I hereby certify that the foregoing Proposal has not been prepared in collusion with any other Respondent or other person or persons engaged in the same line of business prior to the official opening of this Proposal. Further, I certify that the Respondent is not now, nor has been for the past six (6) months, directly or indirectly concerned in any pool or agreement or combination, to control the price of services/commodities Proposal on, or to influence any person or persons to submit a Proposal or not to submit a Proposal thereon."

Name of Respondent:	
Address of Respondent:	
Email:	
Telephone:	
Printed Name of Person Submitting Affidavit:	
Signature of Person Submitting Affidavit:	

Cooperative Purchasing Program

Check one of the following options below. A non-affirmative Proposal will in no way have a negative impact on the County's evaluation of the Proposal.

☐	I will offer the quoted prices to all authorized entities during the term of the County's Contract.
☐	I will not offer the quoted prices to all authorized entities.

If no box is checked, the Respondent agrees to make best efforts in good faith to offer the quoted prices to all authorized entities.

BEFORE ME, the undersigned authority, a Notary Public, personally appeared _____ (*Name of Signer*), who after being by me duly sworn, did depose and say: "I, _____, (*Name of Signer*) am a duly authorized officer of/agent for _____ (*Name of Respondent*) and have been duly authorized to execute the foregoing on behalf of the said _____ (*Name of Respondent*).

SUBSCRIBED AND SWORN to before me by the above-named _____

on this the _____ day of _____, 20_____.

_____

Notary Public in and for

The State of _____

The County of _____

SIGNATURE AND NOTARY NOT REQUIRED IF COMPLETING IN BIDSYNC ELECTRONICALLY.

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity

Form CIQ

This questionnaire is being filed in accordance with chapter 176 of the Local Government Code by a person doing business with the governmental entity.

By law this questionnaire must be filed with the records administrator of the local government not later than the 7th business day after the date the person becomes aware of facts that require the statement to be filed. See Section 176.006, Local Government Code.

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

OFFICE USE ONLY

Date Received

1 **Name of person doing business with local governmental entity.**

2 ☐ **Check this box if you are filing an update to a previously filed questionnaire.**

(The law requires that you file an updated completed questionnaire with the appropriate filing authority not later than September 1 of the year for which an activity described in Section 176.006(a), Local Government Code, is pending and not later than the 7th business day after the date the originally filed questionnaire becomes incomplete or inaccurate.)

3 **Describe each affiliation or business relationship with an employee or contractor of the local governmental entity who makes recommendations to a local government officer of the local governmental entity with respect to expenditure of money.**

4 **Describe each affiliation or business relationship with a person who is a local government officer and who appoints or employs a local government officer of the local governmental entity that is the subject of this questionnaire.**

CONFLICT OF INTEREST QUESTIONNAIRE

For vendor or other person doing business with local governmental entity

Form CIQ
Page 2

5 **Name of local government officer with whom filer has affiliation or business relationship.**
(Complete this section only if the answer to A, B, or C is YES.)

This section, item 5 including subparts A, B, C & D, must be completed for each officer with whom the filer has affiliation or other relationship. Attach additional pages to this Form CIQ as necessary.

A. Is the local government officer named in this section receiving or likely to receive taxable income from the filer of the questionnaire?

☐ Yes ☐ No

B. Is the filer of the questionnaire receiving or likely to receive taxable income from or at the direction of the local government officer named in this section AND the taxable income is not from the local governmental entity?

☐ Yes ☐ No

C. Is the filer of this questionnaire affiliated with a corporation or other business entity that the local government officer serves as an officer or director, or holds an ownership of 10 percent or more?

☐ Yes ☐ No

D. Describe each affiliation or business relationship.

6. Describe any other affiliation or business relationship that might cause conflict of interest:

7

Signature of person doing business with the governmental entity	Date

Signature not required if completing in BIDSYNC electronically.

Question and Answers for Bid #1701-139 - Renovations to 355 Texas Avenue Facility in Round Rock, TX

Overall Bid Questions
There are no questions associated with this bid.