TEXAS MILITARY DEPARTMENT
STAR CAMPAIGN – WESLACO READINESS CENTER MAJOR MAINTENANCE
ADG17589A
ADDENDUM NO. 1
August 1, 2018

The following additions, deletions, modifications, or clarifications shall be made to the appropriate sections of the Contract Documents. Contractor shall acknowledge receipt of this Addendum in their proposal.

08/01/2018

FREESE AND NICHOLS, INC.
TEXAS REGISTERED
ENGINEERING FIRM
F-2144

08/01/2018

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TECHNICAL SPECIFICATIONS:

A1-1 Section 01 11 00 "Summary of Work"

A. Replace existing specification with attached updated specification.

A1-2 Section 01 22 00 "Unit Prices"

A. Replace existing specification with attached updated specification.

A1-3 Section 01 55 00 "Temporary Facilities and Controls"

A. Replace existing specification with attached updated specification.

A1-4 Section 01 57 00 "Temporary Controls"

A. Add attached specification.

A1-5 Section 13 34 23 "Modular Restroom and Shower Building"

A. Replace existing specification with attached updated specification.

A1-6 Section 22 00 01 "Plumbing Systems"

A. Replace existing specification with attached updated specification.

A1-7 Section 23 09 23 "BACNET Direct Digital Control Systems for HVAC"

A. Replace existing specification with attached updated specification.

A1-8 Section 32 31 13.53 "High-Security Chain Link Fence and Gates"

A. Replace existing specification with attached updated specification.

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DRAWINGS:

A1-9 CIVIL

A. Remove the following drawings and replace with attached:

1. SHEET C-1 DEMOLITION PLAN
2. SHEET C-2 PAVING PLAN
3. SHEET C-3 GRADING PLAN

A1-10 ARCHITECTURE

B. Remove the following drawings and replace with attached:

1. SHEET A-3 SITE PLAN
2. SHEET A-4 SITE DETAILS – BID OPTION 9
3. SHEET A-5 SECURITY FENCING DETAILS – BID OPTION 9
4. SHEET A-6 OVERALL DEMOLITION FLOOR PLAN
5. SHEET A-10 DEMOLITION FLOOR PLAN – AREA 'D'
6. SHEET A-16 OVERALL FLOOR PLAN
7. SHEET A-26 ROOM FINISH SCHEDULE
8. SHEET A-32 EXTERIOR ELEVATIONS

A1-11 MECHANICAL

A. Remove the following drawings and replace with attached:

1. SHEET M-3 DEMOLITION PLAN – C
2. SHEET M-4 DEMOLITION PLAN – D
3. SHEET M-5 FLOOR PLAN – A
4. SHEET M-6 FLOOR PLAN – B
5. SHEET M-7 FLOOR PLAN – C
6. SHEET M-10 NETWORK ARCHITECTURE DIAGRAM

A1-12 PLUMBING

A. Remove the following drawings and replace with attached:

1. SHEET P-7 FLOOR PLAN – C
2. SHEET P-9 ENLARGED FLOOR PLAN
3. SHEET P-11 DOMESTIC WATER RISER DIAGRAMS

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A1-13 ELECTRICAL

B. Remove the following drawings and replace with attached:

1. SHEET E-1 ELECTRICAL SITE PLAN
2. SHEET E-2 LIGHTING DEMOLITION PLAN – AREA 'A'
3. SHEET E-10 LIGHTING PLAN – AREA 'A'

A1-14 FIRE ALARM

A. Remove the following drawings and replace with attached:

1. SHEET FA-7 PLAN – AREA 'B'

ADDITIONAL ITEMS:

A1-15 IFB Documents

A. On the cover page, change "ATTN: Jennifer Escamilla" to "ATTN: Lanette Thaler".
B. All instances of "Jennifer Escamilla" shall be replaced with "Lanette Thaler"

A1-16 HAZMAT Reports

A. Incorporate the attached contractor Indoor Mold Assessment Report.
B. Incorporate the attached Comprehensive Asbestos and Lead Survey Report.

A1-17 Contractor Questions

C. Incorporate the attached contractor questions answered by the Owner & AE.

A1-18 Pre-Bid Meeting Sign-In Sheets

A. Incorporate the attached pre-bid meeting sign-in sheets.

END OF ADDENDUM NO. 1

01 11 00 SUMMARY OF WORK

1.00 GENERAL

1.01 WORK INCLUDED

A. Construct Work as described in the Contract Documents.

1. Provide the materials, equipment, and incidentals required to make the Project completely and fully operable.

2. Provide the labor, equipment, tools, and consumable supplies required for a complete Project.

3. Provide the civil, architectural, structural, mechanical, electrical, instrumentation and all other Work required for a complete and operable Project.

4. Test and place the completed Project in operation.

5. Provide the special tools, spare parts, lubricants, supplies, or other materials as indicated in Contract Documents for the operation and maintenance of the Project.

6. Install Owner provided products and place in operation.

7. The Contract Documents do not indicate or describe all of the Work required to complete the Project. Additional details required for the correct installation of selected products are to be provided by the Contractor and coordinated with the Engineer.

1.02 JOB CONDITIONS

A. The General Conditions, the Supplementary Conditions, and General Requirements apply to each Section of the Specifications.

B. Comply with all applicable state and local codes and regulations pertaining to the nature and character of the Work being performed.

1.03 DESCRIPTION OF WORK

A. Work is described in general, non-inclusive terms as:

1. Modernization of the Texas Army National Guard's Weslaco Readiness Center facility in order to mitigate life safety and code related deficiencies currently experienced at the project site. Interior building improvements include architectural, mechanical, electrical, plumbing, structural and IT/telecom trades. Exterior Building Improvements include site civil and utility modifications.

1.04 CONSTRUCTION OF UTILITIES

1. Contractor may provide temporary power, water, natural gas, telecomm and internet service if required for the project site through the governing utility.

2. Cost for providing temporary power, water, natural gas, telecomm and internet will be paid for by the Contractor.

3. Utilities will remain in Owner's name and contractor may judiciously use owner's utilities (electric, sewer, water, and gas) for constructions. Contractor may not use owner's data, telephone, internet, or other electronic medium connections/utilities.

1.05 OCCUPANCY

A. As soon as any portion of the structure and equipment are ready for use, the Owner shall have the right to occupy or operate that portion upon written notice to the Contractor.

B. The facility shall be unoccupied during the course of this project.

C. Testing of equipment and appurtenances including specified test periods, training, and startup does not constitute acceptance for operation.

D. Owner may accept the new work for continued use after startup and testing at the option of the Owner.

E. The execution of bonds is understood to indicate the consent of the surety to the technical provisions and design drawings provided for this project.

F. Provide an endorsement from the insurance carrier permitting owner partial occupancy of the structures in accordance with the provisions set forth by the Uniform General Conditions (UGCs) during the remaining period of construction.

G. Conduct operations to insure the least inconvenience to the Owner and general public.

1.06 WORK BY OWNER

A. Telecomm and IT System Components:

1. PRODUCTS Owner will perform or award separate contract for the installation of routers, switches, servers, and other accessories in all Telephone Equipment Rooms, upon Substantial Completion of the work in all telecom rooms.

B. Intrusion Detection Systems (IDS) Components:

1. There is no IDS work in this project.

C. Fire Extinguishers

1. Owner will provide all fire extinguishers for fire extinguisher cabinets upon substantial completion of all fire extinguisher cabinet work.

D. Emergency Generator

1. Owner will provide temporary generator for emergency power upon substantial completion of all emergency electrical system work.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials and products per the individual Sections of the Specifications.

3.00 EXECUTION (NOT APPLICABLE)

END OF SECTION

01 22 00 UNIT PRICES

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Uniform General Conditions (UGCs)

2. Section 012100 "Allowances" for procedures for using unit prices to adjust quantity allowances.

3. Section 014000 "Quality Requirements" for field testing by an independent testing agency.

1.03 DEFINITIONS

A. Unit price a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.04 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

2.00 PRODUCTS (NOT USED)

3.00 EXECUTION

3.01 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Repair of concrete cracking and concrete spalling in building.

1. Description: infill of cracked or spalled concrete, as required, according to design drawings and specification section 030130 “Maintenance of Cast-In-Place Concrete”.

2. Unit of Measurement: Cubic feet of spalled concrete repaired, based on in-place surveys of volume before and after filling. Linear feet of concrete cracks repaired, based on in-place surveys of crack length before and after filling.

3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012310 "Bid Options and Allowances."

END OF SECTION

01 50 00 TEMPORARY FACILITIES AND CONTROLS

1.00 GENERAL

1.01 WORK INCLUDED

A. Furnish temporary facilities, including the Contractor's field offices, storage sheds, and temporary utilities needed to complete the work. Refer to specification 011100 "Summary of Work" for more information on temporary utilities.

B. Utilities will remain in Owner's name and contractor may judiciously use owner's utilities (electric, sewer, water, and gas) for constructions. Contractor may not use owner's data, telephone, internet, or other electronic medium connections/utilities.

C. Furnish temporary heating and cooling system for the buildings once finishes begin being applied if the permanent system is not operational. Contractor is responsible for locating and installing this system.

D. Furnish, install, and maintain temporary project identification signs. Provide temporary on-site informational signs to identify key elements of the construction facilities. Do not allow other signs to be displayed.

E. Cost for Temporary Facilities and Controls as described in this section and provided by Suppliers and Subcontractors as described in this section are to be included in the Cost of Work. Contractor efforts are included in the Contractor's fee for Construction Phase Services.

1.02 QUALITY ASSURANCE

A. Testing: Inspect and test each service before placing temporary utilities in use. Arrange for all required inspections and tests by regulatory agencies, and obtain required certifications and permits for use.

1.03 DELIVERY AND STORAGE

A. Arrange transportation, loading, and handling of temporary buildings and sheds.

1.04 JOB CONDITIONS

A. Locate buildings and sheds at the Site as indicated or as approved by the Owner.

B. Prepare the Site by removing debris and performing demolition needed to clear a space adequate for the structures.

C. Contractor is responsible for temporary restrooms facilities. If contractor chooses to have a temporary facility, contractor shall pay for the utilities used by temporary facilities during construction.

D. Provide each temporary service and facility ready for use at each location when the service or facility is first needed to avoid delay in the performance of the Work.

E. Maintain, expand as required, and modify temporary services and facilities as needed throughout the progress of the Work.

F. Operate temporary facilities in a safe and efficient manner.

1. Restrict loads on temporary services or facilities to within their designed or designated capacities.
2. Provide sanitary conditions. Prevent public nuisance, or hazardous conditions from developing or existing at the Site.
3. Prevent freezing of pipes, flooding, or the contamination of water.
4. Maintain site security and protection of the facilities.

1.05 OPTIONS

A. Construction offices may be prefabricated buildings on skids or mobile trailers.

B. Storage sheds may be prefabricated buildings on skids or truck trailers.

2.00 PRODUCTS

2.01 SIGN MATERIALS

A. Provide new or used signs, wood or metal with structure and framing in sound condition. Materials are to be structurally adequate and suitable for the indicated finish.

B. Temporary sign

2.02 TEMPORARY STORAGE BUILDINGS

A. Furnish storage buildings of adequate size to store any materials or equipment delivered to the Site that might be affected by weather.

2.03 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities at the Site from the commencement of the Project until project conclusion. Maintain these facilities in a clean and sanitary condition at all times, and comply with the requirements of the local health authority.

B. Use these sanitary facilities. Do not use rest rooms within existing or Owner - occupied buildings.

3.00 EXECUTION

3.01 LOCATION AND DESIGN OF CONSTRUCTION SIGNAGE

A. Locate construction signage in location shown on architectural site plan. Construction signage shall be as shown in Figure 1 below.

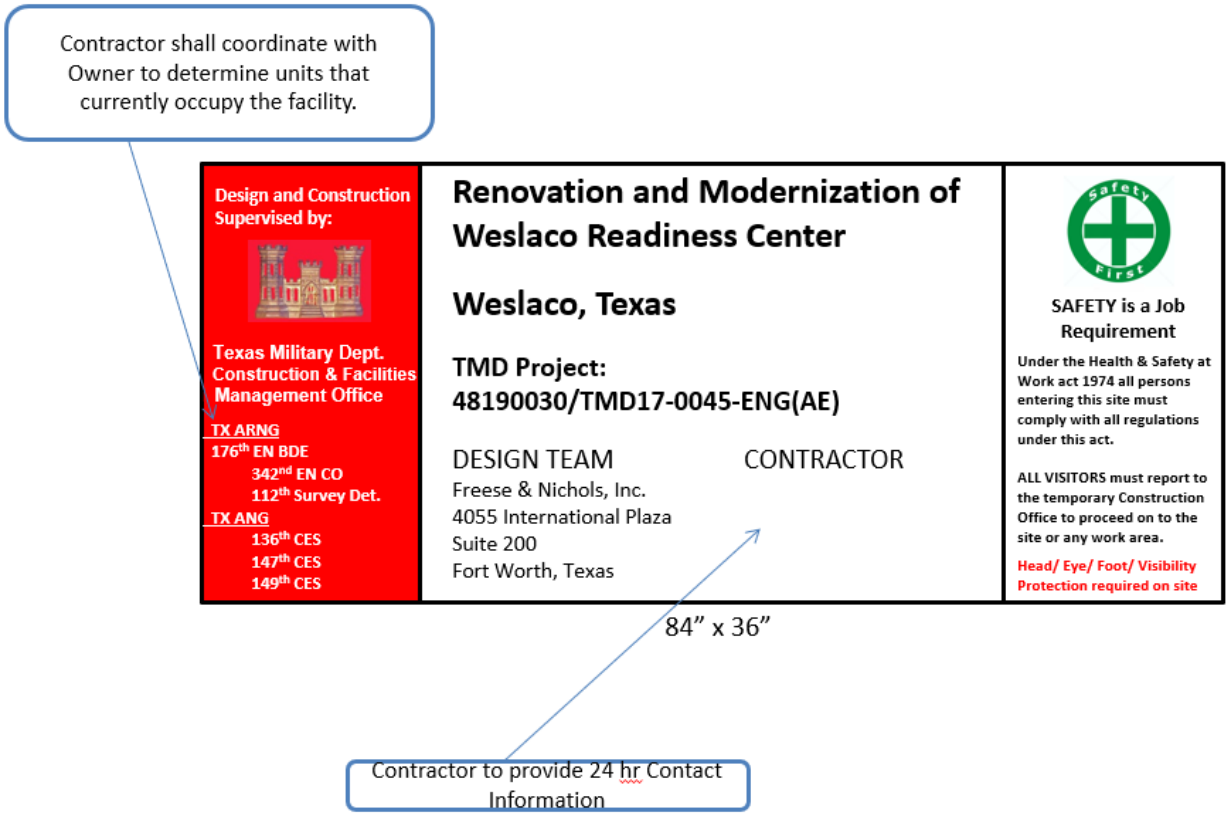


Figure 1. Temporary Construction Signage Example

3.02 LOCATION OF TEMPORARY FACILITIES

A. Locate all temporary facilities in areas approved by the Owner. Construct and install signs at locations approved by the Owner. Install informational signs so they are clearly visible.

3.03 TEMPORARY LIGHTING

A. Provide portable flood lights at any time that Work will be performed outside the structure at night. Provide adequate lighting to provide sufficient light at any location Work is being performed.

B. Work outside the hours or 7:00 a.m. to 6:00 p.m. will not normally be permitted. Obtain prior authorization from the Owner and Engineer for any night Work.

C. Provide Security light for the building entrance and secure parking areas at night.

3.04 CONSTRUCTION FENCE

A. Install and maintain a construction fence around the construction site and/or around the storage yard as indicated. Fence must be a minimum 6 feet high and may be wood picket or chain link construction. Provide gates with padlocks.

3.05 REMOVAL OF TEMPORARY FACILITIES

A. Remove temporary buildings, sheds, and utilities at the conclusion of the Project and restore the Site to original condition or finished in accordance with the Drawings.

B. Remove informational signs upon completion of construction.

C. Remove project identification signs, framing, supports, and foundations upon completion of the Project.

END OF SECTION

01 57 00 TEMPORARY CONTROLS

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide labor, materials, equipment and incidentals necessary to construct temporary facilities to provide and maintain control over environmental conditions at the Site. Remove temporary facilities when no longer needed.

B. Construct temporary impounding works, channels, diversions, furnishing and operation of pumps, installing piping and fittings, and other construction for control of conditions at the Site. Remove temporary controls at the end of the Project.

C. Provide a Storm Water Pollution Prevention Plan in accordance with TCEQ General Permit TXR150000, file required legal notices and obtain required permits prior to beginning any construction activity.

D. Provide labor, materials, equipment, and incidentals necessary to prevent storm water pollution for the duration of the Project. Provide and maintain erosion and sediment control structures as required to preventive sediment and other pollutants from the Site from entering any storm water system, including open channels. Remove pollution control structures when no longer required to prevent storm water pollution.

E. Cost for Temporary Controls as described in this section and provided by Suppliers and Subcontractors as described in this section are to be included in the Cost of Work.

1.02 QUALITY ASSURANCE

A. Construct and maintain temporary controls with adequate workmanship using durable materials to provide effective environmental management systems meeting the requirements of the Contract Documents and requiring minimal maintenance that will disrupt construction activities while providing adequate protection of the environment.

B. Periodically inspect systems to determine that they are meeting the requirements of the Contract Documents.

1.03 SUBMITTALS

A. Provide copies of notices, records and reports required by the Contract Document or regulations as Record Data in accordance with Section 01 33 00 “Submittal Procedures.”

B. Provide documents requiring approval by the Owner or Engineer as Shop Drawings in accordance with Section 01 33 00 “Submittal Procedures.”

1.04 STANDARDS

A. Provide a storm water pollution prevention plan that complies with Local, State, and Federal requirements. Comply with all requirements of the Texas Commission on Environmental Quality General Permit (TXR150000) for storm water discharges from construction activities under the Texas Pollutant Discharge Elimination System (TPDES) program.

B. Perform Work to comply with “Best Practice” as established by the North Central Texas Council Of Governments (NCTCOG) integrated Storm Water Management (iSWM) Design Manual for Construction or the local agency of jurisdiction.

1.05 PERMIT EXCEPTION

A. In regards to the sections below: if less than 1 acre is disturbed, TMD does not require any permits be obtained. All other requirements must still be met, but an actual permit does not need to be obtained.

1.06 PERMITS

A. Submit the following to the TCEQ and the Operator of any Municipal Separate Storm Sewer System (MS4) receiving construction site discharge from the Site:

1. Notice of Intent (NOI) at least 48 hours prior to beginning construction activity. Construction activity may commence 24 hours after the submittal of an electronic NOI.
2. Notice of Change (NOC) letter when relevant facts or incorrect information was submitted in the NOI, or if relevant information in the NOI changes during the course of construction activity.
3. Notice of Termination (NOT) when the construction project has been completed and stabilized.

B. Post a copy of the NOI at the construction site in a location where it is readily available for viewing by the general public and Local, State, and Federal authorities prior to starting construction activities and maintain the posting until completion of the construction activities.

C. Maintain copies of a schedule of major construction activities, inspection reports, and revision documentation with the storm water pollution prevention plan (SWPPP) required under the TPDES General Permit (TXR150000) for Storm Water Discharges from Construction Activities for all projects.

1.07 STORM WATER POLLUTION CONTROL

A. Comply with the current requirements of TPDES General Permit No. TXR15000 (General Storm Water Permit) set forth by the Texas Commission on Environmental Quality for the duration of the Project:

1. Develop a Storm Water Pollution Prevention Plan meeting all requirements of the General Storm Water Permit.
2. Submit of a Notice of Intent to the Texas Commission on Environmental Quality.
3. Develop and implement appropriate Best Management Practices as established by local agencies of jurisdiction.
4. Provide all monitoring and/or sampling required for reporting to the Texas Commission on Environmental Quality.
5. Submit reports to the Texas Commission on Environmental Quality as required as a condition of the permit.

6. Submit copies of the reports to the Engineer as Record Data in accordance with Section 01 33 00 “Submittal Procedures.”

7. Retain copies of these documents on-site at all times for review and inspection by the Owner or regulatory agencies. Post a copy of the permit as required by regulations.

8. Pay all costs associated with complying with the provisions of the General Storm Water Permit. Assume solely responsible for implementing, updating, and modifying the General Storm Water Permit per regulatory requirements the Storm Water Pollution Prevention Plan and Best Management Practices.

B. Use forms required by the Texas Commission on Environmental Quality to file the Notice of Intent. Submit the Notice of Intent at least 2 days prior to the start of construction. Develop the Storm Water Pollution Prevention Plan prior to submitting the Notice of Intent. Provide draft copies of the Notice of Intent, Storm Water Pollution Prevention Plan, and any other pertinent Texas Commission on Environmental Quality submittal documents to Owner for review prior to submittal to the Texas Commission on Environmental Quality.

C. Return any property disturbed by construction activities to either specified conditions or pre-construction conditions as set forth in the Contract Documents. Provide an overall erosion and sedimentation control system that will protect all undisturbed areas and soil stockpiles/spoil areas. Implement appropriate Best Management Practices and techniques to control erosion and sedimentation and maintain these practices and techniques in effective operating condition during construction. Permanently stabilize exposed soil and fill as soon as practical during the Work.

D. Assume sole responsibility for the means, methods, techniques, sequences, and procedures for furnishing, installing, and maintaining erosion and sedimentation control structures and procedures and overall compliance with the General Storm Water Permit. Modify the system as required to effectively control erosion and sediment.

E. Retain copies of reports required by the General Storm Water Permit for 3 years from date of final completion.

1.08 POLLUTION CONTROL

A. Prevent the contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations. Provide adequate measures to prevent the creation of noxious air-borne pollutants. Prevent dispersal of pollutants into the atmosphere. Do not dump or otherwise discharge noxious or harmful fluids into drains or sewers, nor allow noxious liquids to contaminate public waterways in any manner.

B. Provide equipment and personnel and perform emergency measures necessary to contain any spillage.

1. Contain chemicals in protective areas and do not dump on soil. Dispose of such materials at off-site locations in an acceptable manner.

2. Excavate contaminated soil and dispose at an off-site location if contamination of the soil does occur. Fill resulting excavations with suitable backfill and compact to the density of the surrounding undisturbed soil.

3. Provide documentation to the Owner which states the nature and strength of the contaminant, method of disposal, and the location of the disposal site.

4. Comply with local, State and Federal regulations regarding the disposal of pollutants.

C. Groundwater or run-off water which has come into contact with noxious chemicals, sludge, or sludge-contaminated soil is considered contaminated. Contaminated water must not be allowed to enter streams or water courses, leave the Site in a non-contained form or enter non-contaminated areas of the Site.

1. Pump contaminated water to holding ponds constructed by the Contractor for this purpose, or discharge to areas on the interior of the Site, as designated by the Engineer.

2. Construct temporary earthen dikes or take other precautions and measures as required to contain the contaminated water and pump to a designated storage area.

3. Wash any equipment used for handling contaminated water or soil within contaminated areas three times with uncontaminated water prior to using such equipment in an uncontaminated area. Dispose of wash water used to wash such equipment as contaminated water.

1.09 EARTH CONTROL

A. Remove excess soil, spoil materials and other earth not required for backfill at the time of generation. Control stockpiled materials to eliminate interference with Contractor and Owner's operations.

B. Dispose of excess earth off the Site. Pay cost for disposal unless otherwise noted. Provide written approval by the property owner for all disposal on private property, and approval by the Owner if such disposal affects the use of Site or other easements.

1.10 MANAGEMENT OF WATER

A. Manage water resulting from rains or ground water at the Site. Maintain trenches and excavations free of water at all times.

B. Lower the water table in the construction area by acceptable means if necessary to maintain a dry and workable condition at all times. Provide drains, sumps, casings, well points, and other water control devices as necessary to remove excess water.

C. Provide continuous operation of water management actions. Maintain standby equipment to provide proper and continuous operation for water management.

D. Ensure that water drainage does not damage adjacent property. Divert water into the same natural watercourse in which its headwaters are located, or other natural stream or waterway as approved by the Owner. Assume responsibility for the discharge of water from the Site.

E. Remove the temporary construction and restore the Site in a manner acceptable to the Engineer and to match surrounding material at the conclusion of the Work.

2.00 PRODUCTS

2.01 MATERIALS

A. Provide materials meeting regulatory requirements.

3.00 EXECUTION

3.01 CONSTRUCTING, MAINTAINING AND REMOVING TEMPORARY CONTROLS

A. Construct temporary controls in accordance with regulatory requirements.

B. Maintain controls in accordance with regulatory requirements where applicable, or in accordance with the requirements of the Contract Documents.

C. Remove temporary control when no longer required, but before the Project is complete. Correct any damage or pollution that occurs as the result of removing controls before the point where they are no longer required.

END OF SECTION

13 34 23 MODULAR RESTROOM AND SHOWER BUILDING

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide work as described hereinafter.

1. Provide the labor, materials, equipment, and incidentals required to make the modular building completely operable.

2. Test and place the completed modular building in operation.

3. Drawings and specifications do not indicate or describe all of the work required to complete the project. Additional details required for the correct installation of selected products are to be provided by the Manufacturer and coordinated with the Owner.

B. Furnish equipment, manpower, products, and other items necessary to complete the modular building with an acceptable industry standard of quality and within the contract time.

C. Provide modular buildings complete with structural frame, axles, tires, floors**,** ADA compliant ramps, stairs, landings (at ADA restroom/shower trailer), ceilings, exterior walls, interior fixtures and finishes, lighting, plumbing, heating – ventilation and air conditioning, and all necessary appurtenances required for complete functionality of the building.

1. One Restroom Portable Modular Unit to include separate facilities for Men and Women. Modular building to include a total of at least 10 Water Closets. Basis of Design – Premium Comfort Station as provided by A Clean Portoco, or approved equal.

2. One Shower Modular Unit to include separate facilities for Men and Women. Modular building to include a total of at least 8 Showers. Basis of Design – Eight Stall Mobile Shower Trailer as provided by A Clean Portoco, or approved equal.

3. One ADA-Compliant Restroom/Shower Portable Modular Unit to include at least one ADA-compliant restroom, shower and lavatory with an ADA-compliant ramp and landing. Basis of Design - ADA accessible restroom/shower mobile trailer as provided by A Clean Portoco, or approved equal.

D. Deliver the building to the designated site in operational condition, requiring only the extension of utilities, electrical, plumbing and sanitary sewer to a single point of connection.

1.02 QUALITY ASSURANCE

A. Employ competent workmen, skilled in the occupation for which they are employed. Provide only first quality workmanship. Owner's Representative shall determine if the quality of work is acceptable.

B. A defective product is any product that has been found not to be up to manufacturer's standards or is damaged prior to final completion. Defective products shall be removed from the site immediately and replaced, or may remain at the site if arrangements have been made with the Owner's Representative to allow repair of the product at the site. Clearly mark the defective product as "defective" until removed or allowable repairs have been completed.

C. Assume responsibility for the design of the products to include structural stability and operational capability.

D. Provide products suitable for the intended service.

E. Do not use products for any purpose other than that for which it is designed.

F. Materials shall be suitable for service conditions.

1.03 SUBMITTALS

A. Submittals shall include:

1. Dimensioned layout showing sizes and locations of all utility single point connections.

2. Copies of Manufacturer's printed instructions to all parties involved in the installation of the product prior to beginning the work.

1.04 JOB CONDITIONS

A. Comply with all applicable state and local codes and regulations pertaining to the nature and character of the work being performed. The City of Weslaco currently requires compliance with the 2015 International Building Codes, including Plumbing, Mechanical, Energy, and Fire Codes.

B. Comply with the provisions of, and submit drawings to the Texas Department of Licensing and Regulations, for Texas Accessibility Standards Compliance where required by State law.

1.05 MODULAR BUILDING UTILITIES

A. The contractor is responsible for extending all utilities to modular buildings.

B. The modular building manufacturer shall provide a single point of connection for each utility, including:

1. Power

2. Plumbing

3. Sanitary Sewer

1.06 OWNER FURNISHED PRODUCTS

A. Products furnished and paid for by Owner:

1. Lock cores and keys.

1.07 MANUFACTURERS USE OF PROJECT SITE

A. Security Provisions comply with the Homeland Security Act. Comply with Federal, State, County and Local Laws and Ordinances. Persons entering this site by virtue thereof give consent to a search of their vehicles, property and persons without recourse.

B. Limit the use of project site for work and storage to the areas at the site approved by the Owner's Representative.

C. Coordinate the use of the premises with the Owner's Representative.

D. Assume full responsibility for the protection and safekeeping of products stored at the site until accepted by the owner.

E. Store products to allow Owner access for maintenance and operations.

F. Any damage to existing facilities, including contamination, caused by the Manufacturers personnel, visitors, materials, or equipment, shall be repaired or corrected at the Manufacturers expense.

G. Alcoholic beverages or illegal substances are prohibited on the site at any time, nor will persons under the influence of same be permitted to remain on the premises. Persons on site under the influence of alcoholic beverages or illegal substances will be permanently removed from the site in addition to possible criminal and civil penalties.

H. Park equipment and employees' vehicles in designated areas only.

I. The use of loud radios, obnoxious vulgar or abusive language, or sexual harassment in any form will not be tolerated and will be cause for immediate removal of the offender from the premises permanently, in addition to possible criminal or civil penalties.

J. Workers attire shall be professional and commensurate to the trade. Sleeveless shirts, shorts, exceedingly torn, ripped or soiled clothing shall not be permitted.

K. Firearms, concealed or illegal weapons are not permitted on the site under any conditions, including persons with concealed handgun permits.

1.08 HAZARDOUS MATERIALS

A. Contractor shall furnish Material Safety Data sheets for any material provided under this contract in accordance with Federal Standard 313 including but not limited to Paint, Varnish, adhesives and Sealers.

B. Asbestos Certification:

1. Prior to final payment, submit the following notarized certification on contractor's company letterhead: "To the best of my information, knowledge and belief, asbestos or asbestos containing materials have not been incorporated in the work."

1.09 PERFORMANCE REQUIREMENTS

A. Provide modular buildings capable of withstanding the effects of gravity loads and stresses; Seismic performance and thermal movements in accordance with the International Building Codes.

B. The exterior walls shall be framed braced and secured in accordance with the requirements of the International Building Code, based on wind loads applicable to the installation site.

2.00 PRODUCTS

2.01 MODULAR BUILDING CONSTRUCTION

A. Refer to section 1.01 C.

3.00 EXECUTION

3.01 SITE PREPARATION

A. The G.C. will prepare the sites to receive the modular buildings. Specific instructions will be provided to the Owner prior to delivery of each unit, a minimum of 10 days notice shall be provided to the Owner prior to delivery.

3.02 INSTALLATION

A. Set and level modular buildings on prepared sites.

B. Install exposed plumbing pipe, or pipe subject to freezing in such a manner and with adequate protection to prevent breakage caused by freezing temperatures. Provide freeze protection tape only on metallic pipe, provide copper or cast iron pipe on water and drain pipes subject to freezing to allow the installation of freeze protection tape.

END OF SECTION

22 00 01 PLUMBING SYSTEMS

1.00 GENERAL

1.01 WORK INCLUDED

A. Provide labor, materials, equipment and incidentals for complete, operable plumbing systems. Provide appurtenances for every pipe, valve, and fixture or equipment item for a complete operable system.

1.02 QUALITY ASSURANCE

A. Verify location, size, depth and pressure of each utility prior to beginning Work. If conditions are found that will adversely affect the installation, notify the Owners Representative in writing before proceeding with Work.

B. Plumbing fixtures and trim of like kind shall be of the same manufacturer throughout the Project, in the following categories:

1. Water closets, lavatories, urinals.
2. Showers.
3. Countertop sinks.
4. Service sinks.
5. Electric water coolers.
6. Faucets, mixing valves (other than thermostatic mixing valves).
7. Tailpiece, fixture traps, escutcheons, arm extensions, strainers.
8. Fixture carriers.

1.03 SUBMITTALS

A. Provide Submittals in accordance with Section 01 33 00 “Submittal Procedures” and include manufacturer’s Product Data sheets for the following:

1. Plumbing fixtures and trim.
2. Piping materials and valves.
3. Equipment and accessories.

B. Operation and Maintenance Data: Submit operation and maintenance data in accordance with Division 01.

1.04 STANDARDS

A. Authority Having Jurisdiction: Perform all Work in accordance with the regulations and ordinances of federal, state, and local agencies, who have lawful jurisdiction over the Place of Record. Notify proper authorities for inspections as Work progresses.

B. Codes and Ordinances: The design and installation shall be in accordance with the applicable provisions of the latest edition of the following codes and ordinances. These codes and ordinances shall apply as if written here in their entirety:

1. International Building Codes 2015 with local amendments.

2. International Plumbing Code (IPC) 2015, with local amendments.

3. International Fuel Gas Code (IFGC) 2015, with local amendments.

4. International Energy Conservation Code (IECC) 2015, with local amendments.

5. Occupational Safety and Health Standards (OSHA).

6. Architectural Barriers Act (ABA) Standards 2015.

7. UFC-3-420-01 Plumbing Systems.

8. UFC 4-010-01 DOD Minimum Antiterrorism Standards for Buildings.

9. UFC 1-200-02 High Performance and Sustainable Building Requirements.

10. Army National Guard DG 415-5 General Facilities Information Design Guide.

C. Standards:

1. The design and installation shall be in accordance with the applicable provisions of the following standards. These standards shall apply as if written here in their entirety:

a. American National Standards Institute (ANSI)/ American Society of Mechanical Engineers (ASME).

b. American National Standards Institute (ANSI)/ American Society for Testing Materials (ASTM).

c. American National Standards Institute (ANSI)/ American Welding Society (AWS).

d. American National Standards Institute (ANSI)/ American Water Works Association (AWWA).

e. American National Standards Institute (ANSI)/ National Fire Protection Association (NFPA).

f. American Society of Testing and Materials (ASTM) Publications.

g. American Welding Society (AWS) Specifications.

h. American Water Works Administration (AWWA) Publications.

i. American Society of Sanitary Engineering (ASSE).

j. Cast Iron Soil Pipe Institute (CIPE) Standards.

k. Texas Commission on Environmental Quality (TCEQ).

2. Comply with the provisions of the Buy American Act 41 U.S.C. §§ 8301–8305.

1.05 DELIVERY AND STORAGE

A. Deliver and store equipment and materials in accordance with Division 01. Handle pipe in a manner which prevents damage. Store on raised platforms or wood runners in neat piles. Prevent debris or dirt from entering open ends of pipe.

1.06 JOB CONDITIONS

A. Drawings are schematic and intended to show the general arrangement and extent of the Work. Follow dimensions without regard to scale. Determine the exact location and arrangement of piping regarding the actual equipment furnished, the surrounding conditions and the work installed by other trades.

B. Review the Drawings and each Section of the Specifications. Install Work indicated, regardless of which Drawing or Section of the Specifications it occurs. No allowances shall be made for the Contractor's failure to review complete Contract Documents.

C. Locate by field measurement the exact rough-in and final connection location of all fixtures, drains and plumbing. Center pipe between walls and chases.

D. Conform to the manufacturer's rough-in and installation requirements for each fixture equipment and appliance.

E. This project is a renovation to an existing building. Work of this discipline consists of additions and alterations to existing systems. Existing conditions depicted on the drawings are from record drawings, 'as built' drawings provided by the Owner and cursory field observations of unconcealed conditions. The exact location, size and type of existing fixtures, equipment, pipe valves fittings and other appurtenances may vary from what is indicated. Before proceeding with construction verify the exact location, size, type, and condition of each item and modify the new construction to coordinate with existing.

F. Perform cutting and patching required to install the Work under the requirements of the individual trade. Patching shall restore the area to the original condition. No structural member shall be cut without the written approval of the Engineer.

G. Schedule Work to avoid conflicts with other trades.

H. Materials within plenums, rated spaces above ceilings and as required by Code shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke developed index of not more than 50 when tested in accordance with ASTM E84. PVC Piping installed in plenums shall be wrapped in an approved fire blanket or protective enclosure.

I. Installation of Liquid Propane gas to equipment and appliances; comply with the requirements and recommendations of the equipment manufacturer including engineering manuals and O & M/installation guides. Where the design of gas regulators, pipe sizes, and any other appurtenance conflicts with the manufacturers requirements and recommendation's, provide for the greater of the two – design or manufacturers recommendations in the bid.

J. Pipe penetrations through concrete walls shall be core drilled smooth with a maximum of ½" annular space around the pipe, or a sleeve is required. Where an existing pipe penetration has more than a 2" annular space around the pipe, a sleeve will be required. Where a sleeve is used, provide a sleeve with a maximum of ½" annular space between the pipe and sleeve. Load bearing walls shall be sleeved with schedule 40 steel pipe. Seal existing and new annular space between the opening and pipe. Seal pipe with approved rated materials for rated walls. Exposed pipe penetrations shall have escutcheons on the exposed side(s) of the wall.

1.07 GUARANTEES

A. In addition to the Contractor's standard 1 year guarantee, provide the manufacturer's warranty for all equipment installed. Include warranties in the O & M Manual, in accordance with Division 01.

2.00 PRODUCTS

2.01 PIPE AND FITTINGS

A. Water Piping Buried Within 5 Feet of Building:

1. Copper Tubing: For 2-inch diameter and less, (ASTM B88), Type L or K or annealed. Fittings: ANSI/ASME B16.18, cast copper or ANSI/ASME B16.22, wrought copper. Joints: AWS A5.8 BCuP silver braze.

2. Copper Tube for 2-1/2-inch Diameter and Greater: (ASTM B88) Type L or K hard drawn. Fittings ANSI/ASME B16.8 cast copper or ANSI/ASME B16.22 wrought copper. Joints: AWS A5.8 BCuP silver braze.

3. Ductile Iron Piping for 3-inch Diameter and Greater: Pipe: ANSI/AWWA C151, Class 50. Fittings: ANSI/AWWA C110, ductile iron, standard thickness. Joints: ANSI/AWWA C111, rubber gasket, mechanical joint. Pipe and fittings shall have tar coated outside and cement mortar lined inside in accordance with ANSI A21.4.

4. PVC, AWWA Pipe: AWWA C900, Class 150 with bell end with gasket, and with spigot end.

    a. Comply with UL 1285 for fire-service mains if indicated.

    b. PVC Fabricated Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

    c. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

    d. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

        1). Gaskets: AWWA C111, rubber.

    e. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

        1). Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Water Piping Above Grade:

1. Copper Tubing: For 4-inch diameter and less, (ASTM B88), Type L or K, hard drawn. Fittings: ANSI/ASME B16.18, cast brass, or ANSI/ASME B16.22, wrought copper. Joints: (ANSI/ASTM B32), solder, (Grade 95TA) or Copper Pipe 2 through 6 inches may be installed using mechanical type couplings on roll-grooved pipe; coupling housing, ductile iron (ASTM A536) grade 65-45-12, with factory coat copper alkyd enamel paint. Gaskets, flanges, shall be rated for the system by the manufacturer.

C. Sanitary Drain, Sanitary Waste and Vent Piping (DWV) Buried:

1. PVC DWV Pipe: Polyvinyl Chloride, Schedule 40 (ASTM D2665) pipe, and fittings (ASTM D2466).

2. PVC Sewer Pipe (beyond 5 feet of building): Polyvinyl Chloride Gravity Sewer Pipe (ASTM 3034) SDR 35, or (ASTM F789) PS 46 and Fittings, with elastomeric Joints. (Uni-Bell B-4-82, ASTM D3212).

3. Cast Iron Pipe: (ASTM A74) service weight. Fittings: Cast iron. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International. Joints: Hub-and-spigot, CISPI HSN compression type with (ASTM C564) neoprene gaskets.

D. Sanitary Drain, Sanitary Waste and Vent Piping (DWV) Above Grade:

1. Cast Iron Pipe: For pipe below the first floor concrete slab - (ASTM A74), service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with (ASTM C564) neoprene gaskets. For pipe beyond the building foundation - PVC DWV Pipe: Polyvinyl Chloride, Schedule 40 (ASTM D2665) pipe, and fittings (ASTM D2466).

2. Cast Iron Pipe: (CISPI 301), hubless (no-hub), service weight. Fittings: Cast iron. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and shall be listed by NSF International. Joints: Cast-iron couplings (ASTM A48, Class 30-A) with neoprene gaskets (ASTM C1277, ASTM D412 18-8 and CISPI 310) stainless steel bolts and nuts; manufactured by MG Piping Products Co. or equal.

3. PVC Pipe: (ASTM F1760 and ASTM D2665), Schedule 40. Fittings: PVC DWV Type, Schedule 40, (ASTM D2665). Joints: (ASTM D2885) and (ASTM D2564), solvent cemented. PVC pipe installed in plenums and above ceilings shall be wrapped or coated with an approved fire retardant to comply with requirements.

E. Roof and Storm Drainage Piping Below Grade:

1. PVC Pipe (ASTM F1760 and ASTM D2665). Joints: (ASTM D2885) and (ASTM D2564), solvent cemented.

2. Cast Iron Pipe: (ASTM A74) service weight. Fittings: Cast iron. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and be listed by NSF International. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.

F. Roof and Storm Drainage Piping Above Grade:

1. PVC Pipe (ASTM F1760 and ASTM D2665). Joints: (ASTM D2885) and (ASTM D2564), solvent cemented. PVC pipe installed in plenums and above ceilings shall be wrapped or coated with an approved fire retardant to comply with requirements.

2. Cast Iron Pipe: CISPI 301, hubless, service weight. Fittings: Cast iron. All cast iron pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe

Institute and be listed by NSF International. Joints: Cast-iron coupling (ASTM A48 Class 30-A) with neoprene gasket (ASTM D412) 18-8 stainless steel bolts and nuts.

G. Condensate Drain Piping, Above Grade:

1. Copper Tubing: For 4-inch diameter and less, (ASTM B88), Type L, hard drawn. Fittings: ANSI/ASME B16.18, cast brass, or ANSI/ASME B16.22, wrought copper. Joints: (ANSI/ASTM B32), solder, (Grade 95TA) or Copper Pipe 2 through 6 inches may be installed using mechanical type couplings on roll-grooved pipe; coupling housing, ductile iron (ASTM A536) grade 65-45-12, with factory coat copper alkyd enamel paint. Gaskets, flanges, shall be rated for the system by the manufacturer.

2. PVC, Schedule 40 Pipe: ASTM D 1785. or PVC, Schedule 40 Socket Fittings: ASTM D 2466. (Where installed above the ceiling in return air plenum space, PVC shall comply with 25/250 ASTM E84, and shall include insulation and pipe hangars at a maximum 5'–0").

H. Natural Gas Piping:

1. Natural Gas Piping, Buried:

a. Polyethylene Piping (for below ground use only): Pipe: ASTM D1248 and ASTM D2513, 75 psi rated working pressure. Fittings: PE fittings, ASTM D1248 and ASTM D2513, SDR 11, 50 psi rated working pressure. Joints: Butt fusion, in accordance with manufacturer's recommendations and the Department of Transportation Title 49 of Federal Specifications, as it applies to heat fusion.

2. Natural Gas Piping, Above Grade:

a. Steel Pipe: ASTM A53, Schedule 40 black. Fittings: ANSI/ASME B16.3, malleable iron, or ASTM A234, forged steel welding type. Joints: Screwed for pipe 2 inches and under; ANSI/AWS D1.1, welded, for pipe over 2 inches.

b. Interior and Exterior Steel Piping Above Ground: Field apply two coats of exterior grade enamel paint. Color: Safety Yellow or as directed by Owner or authority having jurisdiction. The paint shall be the manufacturer's best quality product. Certification of paint grades shall be submitted. Paints which contain lead in excess of 0.06 percent by weight of the total non-volatile content shall not be used. Paints containing zinc chromate or strontium chromate pigments shall not be used. Exterior painting shall not be performed in rainy, damp or frosty weather, or until surface is thoroughly dry. Prepare surface by removing loose rust, loose mill scale and loose paint to firm surface by hand chipping, scraping, sanding or wire brushing. Follow with solvent wash to remove any remaining residue.

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, solder joints.

B. Pipe size over 2 inches: 150 psig forged steel slip-on flanges for ferrous piping; bronze flanges for copper piping.

C. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

D. Gas Service Line Risers: PE pipe with coated, anodeless, steel pipe casing on riser section. Include inlet for heat-fusion connection to PE pipe and outlet for connection to shutoff valve.

2.03 NATURAL GAS REGULATORS

A. Service Regulators: AGA/IAS-listed for service regulators, single stage, steel jacketed, and corrosion resistant. Include atmospheric vent, elevation compensator, with threaded ends for NPS 2 and smaller, and flanged ends for NPS 2-1/2 and larger. Acceptable manufacturers: American Meter Co.; Equimeter, Inc.; Fisher Controls International, Inc.; National Meter; Schlumberger Industries, Gas Div.; or approved equal.

1. Regulator Vents: Factory-installed or field-installed, corrosion-resistant screen in opening.

2.04 VALVES (WITHIN 5 FEET OF BUILDING)

A. Ball Valves (For Water Shut-Off and Throttling):

1. Ball Valves 2 inches and Less: Full-port, rated 175-lb. minimum water, oil, air and gas pressure, brass or bronze construction, seat material as recommended by manufacturer for material conveying, lever handle, threaded or soldered connections. Throttling valves shall be provided with memory stops. Acceptable manufacturers and models: Crane, 9302, 9322; ITT Grinnell, 3500, 3500SJ; Milwaukee, BA-200, BA-250; Watts, B-6000, B-6001 and Nibco, T-580, S-580.

2. Ball Valves 2-1/2 inches and Greater: Full-port, rated 150-lb. minimum water, oil, air and gas pressure, bronze or carbon steel construction, seat material as recommended by manufacturer for material conveying, lever handle, flanged connections. Throttling valves shall be provided with memory stops. Acceptable manufacturers and models: Watts, G-4000M1; Crane, 941-TF; Apollo, 88-100 and Jamesbury, D150F.

B. Valves (For Gas Piping Only):

1. Non-lubricated, Tapered Plug Valves (for 2 inches and Smaller): Brass or cast-iron body, with brass tapered plug; lever operation; and complying with ASME B16.33, MSS SP-78, UL 842, or AGA/IAS listing. Include lever. Include locking device. Acceptable

manufacturers: Essex Brass Corp.; Grinnell Corp.-Mueller Co.-Gas Products Div.; Lyall, R.W. & Co., Inc.; McDonald, A.Y. Mfg. Co.

C. Check Valves (Swing Check Valves):

1. Check valves 2 inches and Less: MSS SP-80 rated 175-lb. minimum water and air pressure, brass or bronze construction, bronze disc, threaded or soldered connections. Acceptable manufacturers and models: Watts, B-5000 & B-5001; Nibco, T-413-B & S-413-B; Milwaukee, 509-1509; Crane, 37/1707 & 1707S.

2.05 DOMESTIC WATER HEATERS

A. Natural Gas Water Heaters (Direct Fired).

1. Domestic Water Heater (GWH1-GWH5): ASHRAE 90.1-2013 energy efficient, natural gas-fired, tankless, condensing, wall mounted. Water heater air intake and exhaust gas vent shall be Schedule 40 PVC. Water heater shall be controlled by an internal circuit board that monitors the inlet and outlet temperatures with installed thermistors, sensing and controlling flow rate to set point temperature with air-fuel ratio controls in order to maintain thermal combustion efficiency. Units shall include safety features such as flame sensor system, high limit sensors, overheat prevention device, freeze protection mode, and fan rotation detector. Manifolded units shall be installed by connecting the units using cable-only connections. Set outlet temperature to 127°F maximum. The Contractor shall extend vent piping to the outside of the building in accordance with manufacturer's instructions.

a. Acceptable Manufacturers and Models:

1). Navien NPE-240S-NG, or owner approved equal.

2.06 WATER HEATING SYSTEM ACCESSORIES

A. Circulation Pumps: Inline type, flanged connections, rated for 125 psi at 220 F, single stage, vertical split case, all bronze or stainless steel and provided with oil cups, 1/12 HP, 115V, 1 phase, 6 gpm at 10 ft hd. Acceptable manufacturer and Model: Bell & Gossett Ecocirc XL 20-35, or approved equal.

B. Thermostatic Control for Circulation Pumps: Heavy-duty snap-acting SPDT switch, copper constructed liquid filled capillary and bulb sensing element, 100 to 210°F setpoint adjustment range, 5 to 15°F adjustable differential, 120 VAC, UL listed. One 0-10V (Analog): Speed Control by external controller. One 4-20mA (Analog): Connection with an external pressure sensor for the pressure control mode (two different pressure sensor ranges: 0-15 PSI and 0-30 PSI) l One external temperature sensor input for Differential Temp operating mode. Sensor Type KTY38 PN:104502 l One built-in temperature sensor for Set Point Temp and Differential-Temp operating mode. REMOTE BUILDING MANAGEMENT SYSTEM, The

pump monitored or controlled by a signal from BMS (Building Management System). With built in BACnet protocols.

C. Expansion Tank for Water Heaters: Bladder type, factory pre-charged, fabricated steel shell, heavy duty butyl FDA approved bladder, 150 psig working pressure, 200°F operating temperature. Tank head shall be galvanized or polypropylene lined. Pre-charge tank to static pressure of system. Acceptable manufacturers and models: Taco, CAX Series and Amtrol, ST Series, WHTS, DET. Series.

2.07 PLUMBING FIXTURES AND TRIM

A. Water Closets:

1. Water Closet (WC1): Accessible floor-mounted, flush-valve type bottom outlet, white vitreous china, siphon-jet action, elongated bowl, 1 1/2 inch top inlet spud and designed to operate on 1.28 gallons per flush maximum. Mounting height to be 17 inches from finished floor to rim. Acceptable manufacturers and models: American Standard, 3461.001; Kohler K-4405; Zurn, Z5665-BWL.

2. Water Closet (WC2): Floor-mounted, flush-valve type bottom outlet, white vitreous china, siphon-jet action, elongated bowl, 1-1/2-inch top inlet spud and designed to operate on 1.28 gallons per flush maximum. Acceptable manufacturers and models: American Standard, 3451.001; Kohler, K-4406; Zurn, Z5655-BWL-AM.

B. Flush-Valves for Water Closets:

1. Flush-Valve for Water Closets (WC1 & WC2): Exposed type, chrome-plated, 1-inch supply inlet, screw driver back-check angle stop, vacuum breaker, lever activating handle, solid ring pipe support 1-1/2-inch top outlet spud with wall and spud flanges. Flush valve flow to be 1.8 gpf maximum. Inlet of flush-valve shall be 11-1/2 inches maximum, above rim of water closet, coordinate flush valve location with grab bars for accessible installations. Acceptable manufacturers and models: Sloan, Royal III-1.28; Delany, U402-1.28 and Zurn, Z-6000-AV-HET.WS-1.

C. Seats for Water Closets:

1. Seat for Water Closets (WC1 & WC2): White, posture molded, elongated type, open front, extra heavy construction, concealed check stainless steel hinges, and rubber bumpers. Provide with antimicrobial agent option. Acceptable manufacturers and models: Olsonite, 10CC; Church/Bemis, 1955C; Beneke, 527 or 533 and Kohler, K-4680-CA series.

D. Urinals:

1. Urinal (UR1): Accessible wall-mounted, white vitreous china, 14-inch minimum elongate rim type, siphon-jet action, flushing rim, integral trap, 3/4-inch top inlet spud and designed to operate on .125 gallon per flush maximum. Mounting height to be 17 inches from finished floor to rim. Acceptable manufacturers and models: American Standard, 6042.001EC; Kohler, K-4991-ET; Zurn, Z5738.207.00 Series.

2. Urinal (UR2): Wall-mounted, white vitreous china, 14-inch minimum elongate rim type, siphon-jet action, flushing rim, integral trap, 3/4-inch top inlet spud and designed to operate on .125 gallon per flush maximum. Standard mounting height. Acceptable manufacturers and models: American Standard, 6042.001EC; Kohler, K-4991-ET Zurn, Z5738.207.00 Series.

E. Flush Valves for Urinals:

1. Flush-Valve for Urinals (UR1 & UR2): Exposed type, chrome-plated, 3/4-inch supply inlet, screw driver back-check angle stop, vacuum breaker, lever activating handle, 3/4-inch top outlet spud with wall and spud flanges. Flush valve flow to be 0.125 gpf maximum. Acceptable manufacturers and models: Sloan Regal, 186-0125; Delany, 451-0125 and Zurn, Z-6003AV-ULF.

F. Urinal Carriers:

1. Carriers for Urinals: Mounted on concrete block walls or walls other than concrete block, wall and floor supported type, compatible with specified urinal, complete with chrome-plated finished exposed trim, adjustable through the wall frame including top and bottom hanger plates, steel uprights, block foot supports, and accessories. Acceptable manufacturers and models: Josam, 17810 Series; Jay R. Smith, 637 Series; Tyler/Wade, W-400-AM11 Watts Drainage CA-321 and Zurn, Z-1222 Series.

G. Lavatories:

1. Lavatory (L1): Under-countertop mounted, white vitreous china, nominal size including rim 21 by 17 by 5-1/2 inches deep (bowl size: 19” x 15-3/8” x 5-1/2” deep), oval, unglazed rim, template and sealant, rear overflow. Acceptable manufacturers and models: American Standard, 0497.221; Toto, LT587.

H. Faucets for Lavatories:

1. Faucet for Lavatories (L1): Chrome-plated brass, soft flow, vandal proof spout, proximity sensoring with vandal proof 24-VAC solenoid sensor unit. All metal construction, 0.5 gpm vandal resistant spray outlet, soft flow spout, serviceable filter screen upstream of the valve, 4-inch centers for hot and cold water supplies. Provide with thermal mixing valve. Equipped with infra-red sensor activated with vandal proof 24-VAC solenoid sensor unit. Acceptable manufacturers and models: American Standard, 6059.205; Delta, 591TP0250 and Zurn Z6950-XL-S-CP4-CWB.

I. Supplies and Stops for Lavatories:

1. Supply and Stop for Lavatories (L1): Supplied through the wall, chrome-plated cast brass stop, 1/2-inch female standard pipe thread inlet by 3/8-inch O.D. compression type outlet angle stop, wheel or four-armed handle, 3/8-inch O.D. chrome-plated copper flexible riser, and wall escutcheon. Acceptable manufacturers and models: McGuire, 2165LK; Eljer, American Standard, Cambridge/Delta, Zurn and Engineered Brass (Just), Specified trim.

J. Strainer and Tailpiece for Lavatories:

1. Offset Strainer for Lavatories (L1): Heavy Duty 17-gauge chrome plated wheelchair strainer and tailpiece, cast grid drain plug with strainer. Acceptable manufacturers and models: McGuire, 155WC; Eljer, American Standard, Crane, Cambridge/Delta, Specified Trim ST155WC, Zurn and Engineered Brass (Just).

K. P-Trap for Lavatories:

1. P-Trap for Lavatories (L1): 17-gauge chrome-plated brass size 1-1/4 inches, integral cleanout, and wall escutcheon. Acceptable manufacturers: McGuire, B8872**;** Eljer, American Standard, Crane, Cambridge/Delta, Zurn and Engineered Brass (Just).

L. Lavatory Insulation Kits: Fully molded closed cell vinyl insulation 3/16-inch thick with nylon fasteners. K factor of 1.17 (ASTM C177) self-extinguishing burn characteristics (ASTM D635). Insulation kit for p-trap, tailpiece, trap arm, hot and cold water supplies, white. Acceptable manufacturers and models**;** Truebro Inc., #102 with accessory #105**;** Brocar Products Inc., Plumberex, and TCI Products.

M. Sinks

1. Sink (S1): Countertop mounted, double compartment, 18-gauge stainless steel, self-rimming, faucet deck, with four 1-1/2-inch diameter holes, 4-inch centers, with undercoated underside. Size 21 by 33 by 5-1/2 inches deep. Acceptable manufacturers and models: Elkay, LRAD-3321 and Just, DL-ADA-3321-A-GR -L or R.

N. Faucets for sinks

1. Faucets for Sinks (S1): Chrome-plated brass, deck mount, 8” centers, swing gooseneck soft flow spout with 8”-9” reach (centerline of spout inlet to centerline of spout outlet), vinyl hose with deck mounted automatic spray diverter, and chrome-plated brass lever or wing handles. Faucet shall automatically divert water to spray when spray handle is used. Hose connection to faucet shall be provided with backflow preventer under counter. Maximum flow is 2.20 GPM. Acceptable manufacturer and models: Chicago Faucet, 1102, E3, 1000; T & S Brass, B-1172, B-970; Royal Brass, 5269.3-BH-136;

Speakman, SC-5773; American Standard, 7231.000 with .342H lever or .352H Cross handles, Cambridge/Delta, 2276LHP and Zurn, Z-87163-HS.

O. Supplies and stops for sinks

1. Supply and Stop for Sinks: Supplied through the wall, chrome-plated cast brass stop, 1/2" female standard pipe thread inlet by 3/8" O.D. compression type outlet angle stop, wheel or four-armed handle, 3/8" O.D. chrome-plated copper flexible riser, and wall escutcheon. Acceptable manufacturers: McGuire, Eljer, American Standard, Cambridge/Delta, Zurn and Engineered Brass (Just).

P. Strainer and tailpiece for sinks

1. Offset Strainer for Sinks (S1): 17-gauge chrome plated wheelchair strainer and tailpiece, cast grid drain plug with strainer. Acceptable manufacturers: McGuire, Eljer, American Standard, Crane, Cambridge/Delta, Zurn and Engineered Brass (Just).

Q. P-traps for sinks

1. P-Trap for Sinks (S1): Chrome-plated, 17-gauge cast brass, size 1-1/2", with integral cleanout, and wall escutcheon. Acceptable manufacturers: McGuire, Eljer, American Standard, Crane, Cambridge/Delta, Zurn and Engineered Brass (Just).

R. Insulation kit for accessible sinks

1. Sink Insulation Kits: Fully molded closed cell vinyl insulation 3/16" thick with nylon fasteners. K factor of 1.17 (ASTM C-177) self-extinguishing burn characteristics (ASTM D635). Insulation kit for p-trap, tailpiece, trap arm, hot and cold water supplies, white. Acceptable manufacturers: Truebro Inc., Brocar Products Inc., Plumberex, TCI Products. Insulation kit is not required if a trap/supplies enclosure is provided under another division.

S. Electric Water Coolers:

1. Electric Water Cooler (EWC1): Wall-mounted, dual unit, bi-level, wheelchair type, complete water station including laminar flow 1.1 gpm flow rate bottle filling station on high unit and dual water coolers, a hermetically sealed compressor with built-in overload protection, large capacity dryer-strainer, condenser and self-lubricated fan. Refrigeration system to use R-134A refrigerant. Unit shall meet NSF/ANSI 61/372, UL 399 and ASHRAE requirements. Minimum energy-efficiency performance per CSA 815-99. Front and sides push bars with raised lettering, stainless steel top, stainless steel cabinet with flexible hooded two-stream bubblers, inlet strainer and NSF/ANSI 42 certified carbon activated class 1 chlorine and particulate 3,000-gallon capacity filter with NSF/ANSI 53 certified lead reduction media. Bottle filling station to include electronic no-touch sensor activated laminar flow spout with 20 second shut off timer

and green, yellow and red LED light visual filter maintenance monitor. Provide optional stainless steel apron on high unit as required by TAS/ADA for each installation. Wheelchair unit shall be mounted in accordance with TAS/ADA requirements. Water cooler shall deliver a 7.5 gph minimum of 50 F water, based upon 80 F inlet water temperature and 90 F ambient air temperature. Acceptable manufacturers and models: Halsey Taylor HTHB-HACG8BLSS-WF, or approved equal.

T. Supplies and Stops for Electric Water Coolers:

1. Supply and Stop for Electric Water Coolers: Supplied through the wall, chrome-plated brass, 1/2-inch female standard pipe thread inlet by 3/8-inch O.D. compression type outlet angle stop, wheel or four-armed handle, with flexible riser and wall escutcheon. Acceptable manufacturers and models: McGuire, 2166LK; Eljer, American Standard, Cambridge/Delta, Specified Trim, Zurn and Engineered Brass (Just).

U. P-Trap for Electric Water Coolers:

1. P-Trap for Electrical Water Coolers: 17-gauge chrome-plated brass, size 1-1/4 inches, integral cleanout, and wall escutcheons. Acceptable manufacturers and models: McGuire, B8912; Eljer, American Standard, Cambridge/Delta, Zurn and Engineered Brass (Just).

V. Electric Water Cooler Carriers:

1. Carriers for Electric Water Coolers Mounted on Concrete Block Walls or Walls other than Concrete Block: Wall and floor supported type, compatible with specified electric water cooler, complete with adjustable through the wall frame including top and bottom hanger plates, steel uprights, and block foot supports, and accessories. Acceptable manufacturers and models: Josam, 17900; Jay R. Smith, 830; Tyler/Wade, W400-AM11; HAWS, 6800; MC-33 (Bi-Level type); Watts Drainage CA-321 and Zurn, Z-1225.

W. Service Sinks:

1. Service Sink (SSK1): Floor-mounted, corner type, terrazzo material, five-sided, nominal size 28 by 28 by 12 inches, 6-inch drop front corner, 3-inch drain, with mop hanger, hose and hose bracket, stainless steel curb caps, removable stainless steel strainer, cast integral stainless steel drain body, provide for a caulked lead connection of not less than 1 inch deep to a 3-inch drain pipe. One piece basin constructed of black and white marble chips cast in gray Portland cement, to produce a compressive strength of 3000 psi, 7 days after casting, ground smooth, grouted and sealed to resist stains and moisture. Acceptable manufacturers and models: Florestone, (Basin) 96; Florestone, (Hose & Bracket), MR-370; Florestone (Mop Hanger), MR-372; Florestone (Wall Guard), MR-377 (24-inch).

X. Faucets for Service Sinks:

1. Faucets for Service Sinks: Chrome-plated, 3/4-inch hose thread outlet, wall-mounted for concealed supply pipe, wall brace, integral stops, pail hook, and vacuum breaker. Maximum flow is 2.20 gpm. Acceptable manufacturers and models: Chicago Faucet, 897; T & S Brass, B-665-BSTR; Royal Brass, 552-49; Speakman, SC-5811-RCP; American Standard, 8344.111; Fiat, 830AA; Moen 8124, Cambridge/Delta 28T2263, Stern Williams, T-15-VB and Zurn, Z-841MI.

Y. Traps for Service Sinks:

1. Trap for Floor-Mounted Service Sinks: 3-inch cast iron, under floor.

Z. Showers:

1. Accessible Shower (SH1): 36” x 36” (nominal) Accessible Shower enclosure is a built-up type. Refer to the architecture drawings and specifications.

2. Accessible Wide Shower (SH2): 36” x 60” (nominal) Accessible Wide Shower enclosure is a built-up type. Refer to the architecture drawings and specifications.

AA. Mixing Valve Assembly for Showers:

1. Mixing Valve Assembly for Shower (SH1): Pressure balancing type mixing valve with integral volume control, adjustable temperature limit stop, single lever handle, and integral service and check stops. Maximum flow for shower head is 2.75 gpm. Acceptable manufacturers and models: Leonard, 5500 w/accessories; Powers, 902 w/accessories; Speakman, SM-1422 w/accessories; Symmons, S-86 w/accessories; Bradley, IC-EF w/accessories; American Standard, 1312 SS.014, Cambridge/Delta 11T5113 and Zurn, TEMPGARD 7120 with accessories.

2. Mixing valve assembly for showers (SH2): Pressure balancing mixing valve with integral volume control, adjustable temperature limit stop, integral service and check stops, lever handles, separate lever handle diverter and volume control with shower arm, hand held sprayer, escutcheon, flexible 5-foot hose, wall connection, flange, in-line vacuum breaker, 30-inch polished chrome finish slide bar. Acceptable manufacturers: Symmons, Powers, Leonard, Bradley, American Standard, Cambridge/Delta, Speakman, Acorn, and Zurn –Tempgard.

BB. Shower Heads for Showers:

1. Shower SH1 Shower Heads: Provided with shower enclosure. Chrome plated brass, 1.5 gpm, ball joint fitting, two mode. Acceptable manufacturer and model: Symmons model 4-231-1.5, or approved equal.

2. Shower SH2 Accessible Hand Held Sprayer: Polished chrome, 1.5 gpm, integral service stops, integral check stops. Acceptable manufacturer and model: Symmons Temptrol C-96-500B30-V–1.5, or approved equal.

CC. Shower Pans and Drain Flashings:

1. Shower pans shall be copper or nonplasticized chlorinated polyethylene sheet.

a. Sheet copper shall be 16 ounce weight.

b. Sheet nonplasticized chlorinated polyethylene shall be 40 mils thickness. Acceptable manufacturer and model: The Noble Co., “Chloraloy”.

2.08 PLUMBING SPECIALTIES

A. Floor Drains:

1. Floor Drain (FD1) (for use in finished floor areas and showers): ANSI A112.21.1; cast iron body, double drainage flange, weepholes, bottom outlet, vandal proof secured 6-inch diameter nickel bronze adjustable flat strainer, and non-puncturing flashing collar.

a. Acceptable Manufacturers and Models:

1). Josam: Series 30000-6A.

2). Jay R. Smith: Series 2005 or 2010.

3). Wade: Series W-1100.

4). Zurn: Series Z-415.

5). Mifab: Series F-1100.

A. Floor Sink Drains:

1. Floor Sink Drain (FS1): ANSI A112.21.1; square cast iron body, double drainage flange, weepholes, bottom outlet aluminum dome strainer, non-puncturing flashing collar, porcelain enamel or epoxy coated interior and 1/2 grate. Size 8 by 8 by 6 inches. Provide with trap primer connection adapter.

a. Acceptable Manufacturers and Models:

1). Josam: Series 4900.

2). Jay R. Smith: Series 3100.

3). Wade: Series W-9110-24.

4). Zurn: Series ZN-1815.

5). Mifab: Series FS-1520.

B. Cleanouts:

1. Floor Cleanout (FCO) (for Use in Finished Floors): Cast iron body, adjustable type, inside caulk connection, vandal proof secured, standard round nickel bronze top, threaded brass plug.

a. Acceptable Manufacturers and Models:

1). Josam: Series 56000.

2). Jay R. Smith: Series 4128-NB.

3). Wade: Series W-6000.

4). Zurn: Series Z-1405-2.

5). Mifab: Series C-1100.

6). Watts Drainage: Series CO-200.

2. Wall Cleanout (WCO): Recessed wall type, cast iron body with threaded brass plug, flush mounted stainless steel access cover with countersunk center screw and vandal proof secured.

a. Acceptable Manufacturers and Models:

1). Josam: Series 58710.

2). Jay R. Smith: Series 4402.

3). Wade: Series W-8450-R.

4). Zurn: Series ZN-1440-1.

5). Mifab: Series C-1400.

6). Watts Drainage: Series CO-380.

3. Plug Cleanout (PCO): Cast iron body with threaded brass plug, specify with no access cover.

a. Acceptable Manufacturers and Models:

1). Josam: Series 58710, Less cover.

2). Jay R. Smith: Series 4402, Less cover.

3). Wade: Series W-8450-R, Less cover.

4). Zurn: Series ZN-1440, Less cover.

5). Watts Drainage: Series CO-380, less cover.

4. Grade Cleanout (GCO & DGCO): Cast iron body, with straight body for caulking into soil pipe hub with countersunk tapered threaded bronze plug. Provide "T" handle wrench. Double Grade Cleanouts (DGCO) will require two GCO's as described above, along with the proper two-way cleanout pipe fitting.

a. Acceptable Manufacturers and Models:

1). Josam: Series 58850-22.

2). Jay R. Smith: Series 4338.

3). Wade: Series W-8530.

4). Zurn: Series Z-1450.

5). Mifab: Series C-1300.

6). Watts Drainage: Series CO-260.

C. Roof Drainage Downspouts:

1. Downspout Nozzle (DSN): Bronze, wall flange and threaded inlet. Coordinate height and location with Architecture and also with all other discipline's equipment or devices on exterior wall.

a. Acceptable Manufacturers and Models:

1). Josam: Series 25010.

2). Jay R. Smith: Series 1770.

3). Wade: Series W-3940.

4). Zurn: Series Z-199.

5). Mifab: Series R-1940.

6). Watts Drainage: Series RD-940.

D. Backflow Preventers:

a. All fixtures and hose bibbs or hydrants shall be provided with approved individual backflow devices in accordance with the Authority Having Jurisdiction. Provide RPZ or DCV building backflow preventers where required by the AHJ.

E. Water Hammer Arrestors:

1. Water Hammer Arrestors (WHA): ANSI A112.26.1, ASSE 1010, and PDI WH-201; permanently sealed bellows or expanding chamber. Sizing designations indicated on the Drawings are standard classifications established by Plumbing and Drainage Institute "Standard PDI-WH201." Verify that system pressure meets minimum required for water hammer arrestor provided.

a. Acceptable Manufacturers and Models:

1). Josam: 75000.

2). Jay R. Smith: 5000.

3). Wade: "SHOKSTOP" Series.

4). Zurn: Z-1700.

5). Sioux Chief: "Hydra-Rester" Series.

6). Watts: No. 15M2 Series.

7). PPP: SC & SWA Series.

8). Mifab: WHB Series.

F. Trap Seals:

1. Trap Seals (TS): Flexible elastomeric or neoprene trap seal device utilizes a normally closed seal to prevent evaporation of the liquid trap seal and also protects against sewer gases from backing up into the building or surrounding areas. The device opens when liquid enters to allow drainage to flow through into the building drainage piping, and closes when there is no drainage flow entering the drain. Provide in all floor drains, floor sinks, area drains and hub drains connected to the sanitary sewer system or to other systems that may have sewer gases present in the drainage system.

a. Acceptable Manufacturers and Models:

1). ProVent Systems, Inc.: ProSet Trap Guard Series.

2). Mifab: Mi-Gard Series.

3). SureSeal.

4). Jay R. Smith Mfg. Co.: Quad Close Series.

2. Thermostatic Tempering Valves:

a. Thermostatic Tempering Valve (TTV): The valve shall be constructed of solid brass/bronze. The valve shall feature union connection, integral checks, locking temperature adjustment. All internal components shall be lead-free, stainless steel, Teflon, or other corrosion resistant materials. The valve shall be CSA B125 certified and meet ASSE 1017 requirements. Temperature adjustment shall be vandal resistant. In the event of interruption of the cold water supply, the control mechanism shall close off the hot water port, stopping all flow. In the event of interruption of the hot water supply, the control mechanism shall allow cold flow only. In the event that the thermostatic tempering mechanism fails, the control mechanism shall close off the hot water port and allow cold water flow only. Valve assembly shall be equipped with spring loaded in-line check valves and ball valve shut-offs.

b. Capacity of the valve at a 45 psi differential shall be as follows and must be able to control down to 0.5 gpm: 1/2 inch = 17 gpm, 3/4 inch = 20 gpm, 1 inch = 23 gpm.

1). Acceptable Manufacturers and Models:

a). Powers: LFLM490 Series.

b). Watts: USG-B or MMV-M1.

c). Leonard: Eco-Mix LF Series.

d). Symmons.

e). Lawler.

f). Armstrong.

G. Hose Bibbs:

1. Hose Bibb (HB): Chrome plated brass, provided with wall flange, 1/2-inch female NPT inlet by 3/4-inch male N.H.T. outlet, with chrome plated vacuum breaker in conformance with ANSI/ASSE 1011.

a. Acceptable Manufacturers and Models:

1). Chicago Faucet: 15-E27 or 7-E27.

2). T&S Brass: B-702-B-972.

3). Royal Brass: 5115-136-G.

4). Woodford: 24P.

5). Watts: SC8-1.

H. Wall Hydrants:

1. Non-Freeze Wall Hydrant (NFWH1): ANSI/ASSE 1019; exposed flush mount, wall hydrant type, with chrome plated brass or nickel bronze finish on brass castings, freezeless, 3/4-inch hose thread nozzle, integral vacuum breaker, and loose key handle.

a. Acceptable Manufacturers and Models:

1). Woodford: 65.

2). Josam: 71050.

3). Jay R. Smith: 5609.

4). Wade: W-8620.

5). Zurn: Z-1310.

6). Watts: HY-420.

I. Ice Maker Outlet Boxes:

1. Ice Maker Outlet Box (IMOB): Recessed 16-gauge steel cabinet with white powder coated finish, 1/2-inch domestic water ball valve meeting lead-free requirements.

a. Acceptable Manufacturers and Models:

1). Guy Gray: MIB1DAB, or approved equal.

J. Pipe Hangers and Supports:

1. Hangers for pipe sizes 1/2 to 1-1/2 inches: Malleable iron, adjustable swivel, split ring.

2. Hangers for pipe sizes 2 to 4 inches and cold pipe sizes 6 inches and over: Carbon steel, adjustable, clevis.

3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods; cast iron roll and stand for hot pipe sizes 6 inches and over.

4. Vertical Support: Steel riser clamp.

5. Floor Support for pipe sizes to 4 inches and all cold pipe sizes: Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

7. Shields for insulated piping 2 inches and smaller: 18 gage galvanized steel shield over insulation in 180 degree segments, minimum 12-foot long at pipe support.

8. Shields for insulated piping 2-1/2 inches and larger (Except Cold Water Piping): Pipe covering protective saddles.

9. Shields for insulated cold water piping 2-1/2 inches and larger: Hard block non-conducting saddles in 90 degree segments, 12-inch minimum length, block thickness same as insulation thickness.

10. Shields for Vertical Copper Pipe Risers: Sheet lead.

11. Adjustable rooftop pipe supports:

    a. Adjustable rooftop supports for piping shall be provided for installation without requiring roof penetrations, flashing, or damage to the roofing material. Support Bases shall be made of a UV-stabilized, EPDM rubber sized to fit the diameter of the pipe or conduit being supported. The support shall contain appropriate additives for UV protection.

    b. The support shall allow for tool-free pipe installation and integrally-connected height adjustability of up to 4", 6" or 7" in ½" increments.

    c. The support shall have a continuous bottom surface to minimize point loading of the roof membrane. The support shall not have discontinuities, cutouts, or pockets on the surface contacting the roof. The placement of slip sheets or mats between the support and the roof surface shall not satisfy the continuous bottom surface requirement.

    d. Acceptable Manufacturers and Models: Erico, Caddy Pyramid or approved equal.

12. Support horizontal piping as follows:

Pipe Size	Max. Hanger Spacing	Hanger Diameter
1/2" to 1-1/4"	6'-6"	3/8"
1-1/2" to 2"	10'-0"	3/8"
2-1/2" to 3"	10'-0"	1/2"
4" to 6"	10'-0"	5/8"
PVC (All Sizes)	5'-0"	3/8"
C.I. Bell and Spigot (or No-Hub)	5'-0" and at Joints	

13. Hanger Notes:

a. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent Work.

b. Place a hanger within 12 inches of each horizontal elbow.

c. Use hangers with 1-1/2-inch maximum vertical adjustment.

d. Support horizontal cast iron pipe adjacent to each hub, with 5-inch maximum spacing between hangers.

e. Support vertical piping at every floor. Support vertical cast iron pipe at each floor at hub.

f. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers. Consult with project structural engineer for approval.

g. Support riser piping independently of connected horizontal piping.

h. For below floor hanger installations, place one hanger at each pipe penetration thru a concrete grade beam, at either side, a minimum of 12 inches from the face of the grade beam.

K. Hanger Rods:

1. Steel Hanger Rods: Threaded both ends.

L. Inserts:

1. 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.

M. Insulation:

1. Pipe insulation for domestic hot and cold water pipe.

a. Heavy duty preformed fiberglass (ASTM C547, type 1, 2 or 3). Schuller, Knauf or Certainteed.

b. Preformed flexible elastomeric insulation (ASTM C534) Armstrong “Armaflex”, or Schuller “Rubatex.”

c. Preformed unicellular polyolefin foam (ASTM C534) tubular preslit with adhesive. IMCOA.

Insulation Schedule

Insulation Schedule	
Cold Water	1” thick up to 2” pipe size 1-1/2” thick over 2” pipe size
Hot Water	1” thick up to 2” pipe size 1-1/2” thick over 2” pipe size
Condensate Drainage	1” thick
Roof Drainage	2” thick up to and including 4” pipe size and body, 1” thick for pipe sizes over 4”

d. Provide all purpose jacket, high density white kraft bonded to aluminum foil, reinforced with fiberglass yarn lap and butt, self-sealing, pressure sensitive. Schuller “Micro-Lok”, Certainteed “Snap-On.”

e. PVC fitting covers, one piece pre molded high impact PVC white gloss insulating fitting covers and jackets. Schuller “Zeston 2000PVC.”

2. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

a. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

b. Insulation Installed Outdoors: Flame-spread rating of 75 or less, and smoke-developed rating of 150 or less.

N. Piping Identification:

1. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.

a. Pipes with OD, Including Insulation, Less than 6 inches: Pre-tensioned pipe markers. Use size to match pipe and ensure a tight fit.

b. Pipes with OD, Including Insulation, 6 inches and Larger: Shaped pipe markers. Use size to match pipe and secure with fasteners.

c. Locate pipe markers and color bands on piping as follows: Near each valve and control device; Near each branch connection, excluding short takeoffs; Where flow pattern is not obvious, mark each pipe at branch; At other points of origination and termination; Spaced at maximum intervals of 50 feet along each run; Reduce intervals to 25 feet in areas of congested piping and equipment.

3.00 EXECUTION

3.01 PREPARATION

A. Establish invert elevations for drainage piping within 5 feet of building. Minimum slopes for drainage pipe is 1/4 inch per foot for 2 1/2-inch diameter and less and 1/8 inch per foot for 3-inch diameter pipe and greater.

B. Close equipment shutoff valves before turning off gas to premises or piping section.

C. Inspect liquid propane gas piping according to NFPA 54 to determine that liquid propane gas utilization devices are turned off in piping section affected.

D. Comply with NFPA 54, Part 1, “Prevention of Accidental Ignition” Paragraph.

3.02 INSTALLATION

A. Pipe, Valves and Fittings:

1. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

2. Provide clearance for installation of insulation, and access to valves and fittings.

3. Provide access doors where valves and equipment are not accessible. Coordinate size and location of access doors with applicable Section.

4. Install sanitary piping and storm drainage piping true to line with proper grading. Connect horizontal branches to one another with 45 degrees “Y” fittings, combination “Y” and 1/8 bend fittings. Connect horizontal lines to vertical stacks using 45 degrees “Y” branches, 60 degree “Y” branches, or combination “Y” and 1/8 bend fittings. Horizontal branches turning down to vertical stacks may use a short sweep or 1/2 bend. Branches connecting to mains or to other branches shall enter the branch line at a 45 degree angle, tilted 45 degrees upward, so that the entry is from the side and top.

5. Materials exposed within ducts or plenums (ceiling spaces used as supply or return air plenums) shall have a flame-spread index of not more than 25 and a smoke-developed rating of not more than 50 when tested in accordance with the test for Surface Burning Characteristics of Materials, UBC Standard (ASTM E84). Wrap or enclose with rated materials, any CPVC, PVC or PEX piping installed in rated spaces, including return air plenums.

6. Piping hangers shall be sized large enough to allow insulation to pass through. Hangers for piping 2-1/2 inches and greater shall be provided with pipe covering protection saddle, or high compressive strength insulation saddle. Hangers for piping 2 inches and

less shall be provided with pipe covering shields. On cold water piping provide vapor barrier through hanger.

7. Anchor piping with regard to the transmission of vibration and noise. Securely anchor copper piping to studs or wood blocking with "C" clamp of proper size for piping. At each fixture location where the piping penetrates the partition, back the elbow inside the partition, or chase, with wood blocking. Anchor with "C" clamps or cast brass drop ear elbows to prevent movement. Do not use wire as an anchoring device.

8. Piping shall not come into direct contact with metal studs, beams, or other construction elements. Provide a non-metallic separation between dissimilar metals when copper piping is installed in direct contact with steel.

9. Install unions in piping 2 inches and smaller and flanges in piping 2-1/2 inches and larger, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.

10. Install piping adjacent to equipment and specialties to allow service and maintenance.

11. Install piping free of sags and bends.

12. Install strainers on inlet side of service regulators.

13. Install metal shutoff valves on aboveground, gas distribution piping.

14. Install aboveground, shutoff valves in accessible locations, protected from physical damage. Include metal tag, attached to valve with metal chain, indicating piping systems supplied.

15. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on or near each service regulator and meter.

    a. Text: Distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to name of identified unit.

16. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tape during backfilling of trenches for piping.

B. Plumbing Specialties and Equipment:

1. Pipe relief valves and drains to nearest floor drain. Minimum slope 1/16 inch per foot. Provide 2-inch air gap.

2. Install equipment plumb and square to wall on a 4-inch thick (minimum) reinforced concrete housekeeping pad.

3. Provide all interconnecting electrical power and control wiring from control panels to equipment and accessories for a complete operable systems. All exposed wiring shall be in conduit. Comply with Division 26.

4. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

5. Encase grade cleanouts in concrete flush with grade when not located in concrete, pavement, sidewalk, etc.

6. Grade cleanouts located in pavement or sidewalks shall have a brass or cast iron cover that extends to grade and a brass cap shall be installed.

7. Trap all drains connected to the sanitary sewer.

8. Install floor and area drains with top depressed 1/2 inch below finished floor elevation.

9. In addition to cleanouts, as shown on the Drawings, Contractor shall provide any additional cleanouts required by local codes and ordinances at no additional cost to the Owner.

10. Outlet of plumbing vents and flues shall be located a minimum of 25 feet from fresh air intakes. Provide offset as required.

11. Relief valve discharge drain from reduced pressure backflow preventers shall be piped full outlet size down to nearest floor sink. Drain line shall terminate above floor drain with air gap unless otherwise indicated on the drawings.

12. Prior to ordering and installing water hammer arrestors, verify that the pressure at the point of installation does not drop to below 30 psig at any time. If the pressure drops below 30 psig, do not install piston type water hammer arrestors. Install bellows type arrestors under low pressure circumstances. Provide access panel directly in front of each water hammer arrestor.

C. Plumbing Fixtures and Connections:

1. Furnish and install plumbing fixtures, as noted on the Drawings. Each fixture shall be complete with trim and fittings, including traps and supply fittings. Set fixture with close tolerance to wall and floor surfaces.

2. Provide all wall mounted fixtures with floor carriers. Install and secure fixtures in place with wall supports carriers and bolts. Exposed bolts, nuts, etc. shall be stainless steel or chrome-plated brass.

3. Seal fixtures to wall and floor surfaces with white mildew resistant sealant.

4. Mount fixtures to Architectural Drawings interior wall elevations, manufacturers recommended elevations or the requirements of the ADA or TAS, whichever is applicable.

5. Provide removable insulation covering on stops and supplies and drains and P-traps on all handicapped lavatories. All lavatories in rooms with handicapped water closets are considered handicapped lavatories.

6. Provide accessible stops on all water supplies to fixtures and equipment.

7. Provide accessible water hammer arresters on hot and cold water supplies to plumbing fixtures and/or fixture groups in accordance with Standard PDI-WH-201. Water hammer arresters shall be as shown on diagrams and if not shown, provide for plumbing fixtures and/or fixture groups in accordance with Standard PDI-WH-201.

8. Provide drainage and vent piping run-outs to plumbing fixtures and drains, with approved trap, of sizes indicated, but in no case smaller than required by the governing Plumbing Code.

9. Provide drainage piping run-outs to urinals of cast iron material. Copper or brass material is prohibited.

D. Trenching, Excavation and Backfill:

1. Perform excavating and backfilling necessary for the installation of Work. Shore, bail, pump and maintain all trenches dry until the Work is completed. Keep trenches open until piping has been inspected, tested and approved. Take necessary precautions to protect the public from open trenches. Erect and maintain barricades and warning devices in accordance with OSHA requirements.

2. Backfill trenches after piping has been tested and approved. Material for backfilling shall be a clean, sandy loam up to 4 inches above the top of pipe. Above that point, use overburden removed in the excavation process. Overburden shall be free of trash, debris, rocks or boulders. Deposit backfill material in 12-inch layers and compact to the density of the adjacent, undisturbed soil. Remove all excess material from the Site.

3.03 TESTING

A. Piping Systems:

1. General: Furnish pumps, compressors,-gauges, equipment and personnel required, and test as necessary to demonstrate the integrity of the finished installation.

2. Sanitary Waste and Vent, Storm Drainage: Unless otherwise directed by the authority having jurisdiction, plug all openings except for the highest opening and fill with water to the point of overflow. Perform a water test consisting of no less than 10 feet of head

shall be applied to the system. Allow to stand 1 hour or longer as required. The system should be water tight and leak free. If leaks exist, repair and retest.

3. Water: Unless otherwise directed by the authority having jurisdiction, hydrostatically test and make tight the entire system at 120 psi. Retain for 4 hours. The system should be water tight and leak free. If leaks exist, repair and retest.

4. Liquid Propane Gas: Unless otherwise directed by the authority having jurisdiction, and after flushing of gas piping, pneumatically test and make tight all new and existing gas piping systems from the meter and throughout the building. Test at 1-1/2 times the normal operating pressure and not less than 50 psi. Where the test pressure exceeds 125 psi, the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe. Reduce test pressure if required. Retain for 4 hours minimum or not less than 1/2 hour for each 500 cubic feet of pipe volume or fraction thereof. When testing a system having a volume of less than 10 cubic feet, the test duration shall be permitted to be reduced to 10 minutes. For piping systems having a volume of more than 24,000 cubic feet, the duration of the test shall not be required to be more than 2 hours. Test every pipe, fitting, regulator, valve and appurtenance on the gas system including appliances and equipment. The system shall be air tight and leak free. If leaks exist, repair and retest the entire system. Verify capacities and pressure ratings of service regulators and meters. Verify correct pressure settings for service regulators. PROVIDE A CERTIFICATE OF FLUSHING AND TESTING TO THE OWNER UPON COMPLETION, INDICATING THAT THE SYSTEM HAS BEEN TESTED IN ACCORDANCE WITH THIS SPECIFICATION AND NFPA 54, THE NATIONAL FUEL GAS CODE. CERTIFICATE SHALL INDICATE TESTING COMPANY NAME AND PERSONNEL COMPLETING TESTS AND TWO WITNESSES COMPLETE WITH NAMES AND ADDRESSES.

3.04 DEMONSTRATION OF EQUIPMENT

A. Prior to final acceptance, Contractor and Manufacturer's Representative of Domestic Water Heaters and associated accessories and controls, each shall provide a minimum of 4 hours (or as long as required by the Owner) to demonstrate to the Owner the proper operation of the equipment.

B. Prior to final acceptance, Contractor shall provide a minimum of 4 hours (or as long as required by the Owner) to demonstrate to the Owner the proper operation of all the plumbing equipment and associated accessories and controls.

3.05 FLUSHING

A. General: After piping systems have been tested and approved, systems shall be flushed. Furnished compressors, pumps, equipment, personnel, etc. required to flush piping systems.

B. Soil, Sanitary Waste and Vent, Storm Drainage: Unless otherwise directed by the authority having jurisdiction, thoroughly flush piping systems with water until free of debris, or detrimental materials that may cause partial or full blockage. As a minimum comply with the International Plumbing Code, Section 302, of the latest edition.

C. Water Piping: Unless otherwise directed by the authority having jurisdiction, flush piping with water until water flows clear for a minimum of 60 seconds per 100 linear feet of piping being flushed at a velocity of 9 feet per second.

D. Liquid Propane Gas Piping: Unless otherwise directed by the authority having jurisdiction, and prior to pipe integrity testing, flush all new and existing piping with clean, dry compressed air until air flows clear for a minimum of 60 seconds per 100 linear feet of piping being flushed at 25 cfm per 1-inch diameter of pipe from every outlet.

E. All strainers and filters shall be cleaned and replaced prior to start-up.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting Work, verify system is complete, flushed and clean.

B. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

C. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum five remote outlets.

D. Maintain disinfectant in system for 24 hours.

E. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

F. Take Samples no sooner than 24 hours after flushing, from five remote outlets and from water entry, and analyze in accordance with AWWA C601.

G. Disinfection and disinfection procedures shall be witnessed and approved by the Owners Representative.

H. After disinfection is completed, submit “Disinfection Certificate of Approval” for domestic water piping systems to the Owners Representative stating that all test results are satisfactory. Certificate of Approval must be signed by Contractor, Testing Laboratory. Certificate shall show the date, time and residual of each of the following tests:

1. Initial disinfection residual (50 ppm minimum) - five Samples.

2. Final disinfection residual (25 ppm minimum) - five Samples.

3. After flushing residual (5 ppm maximum) - five Samples.

4. Analyze in accordance AWWA C601 - five Samples.

3.07 CLOSING IN UNINSPECTED WORK

A. Do not cover up or enclose Work until it has been properly and completely inspected and approved. Should any of the Work be covered up or enclosed prior to all required inspections and approvals, uncover the Work as required. After it has been completely inspected and approved, make all repairs and replacements as necessary to the satisfaction of the Owner's representative. Repairs and replacements shall be at no additional cost to the Owner.

END OF SECTION

23 09 23 BACNET DIRECT DIGITAL CONTROL SYSTEMS FOR HVAC

1.00 GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

AMCA 500-D	(2012) Laboratory Methods of Testing Dampers for Rating

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 135	(2012; Errata 1 2013; INT 1-9 2013; Errata 2 2013; INT 10-12 2014; Errata 3 2014) BACnet— A Data Communication Protocol for Building Automation and Control Networks

ARCNET TRADE ASSOCIATION (ATA)

ATA 878.1	(1999) Local Area Network: Token Bus ASME INTERNATIONAL (ASME)
ASME B16.18	(2012) Cast Copper Alloy Solder Joint Pressure Fittings
ASME B16.22	(2013) Standard for Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
ASME B16.26	(2013) Standard for Cast Copper Alloy Fittings for Flared Copper Tubes
ASME B16.34	(2013) Valves - Flanged, Threaded and Welding End
ASME B16.5	(2013) Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard
ASME B31.1	(2014; INT 1-47) Power Piping
ASME B40.100	(2013) Pressure Gauges and Gauge Attachments
ASME BPVC	(2010) Boiler and Pressure Vessels Code

ASTM INTERNATIONAL (ASTM)

ASTM A126	(2004; R 2014) Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM B117	(2011) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B32	(2008) Standard Specification for Solder Metal
ASTM B75/B75M	(2011) Standard Specification for Seamless Copper Tube
ASTM B88	(2009) Standard Specification for Seamless Copper Water Tube
ASTM B88M	(2013) Standard Specification for Seamless Copper Water Tube (Metric)
ASTM D1238	(2013) Melt Flow Rates of Thermoplastics by Extrusion Plastometer
ASTM D1693	(2013) Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
ASTM D635	(2010) Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
ASTM D638	(2010) Standard Test Method for Tensile Properties of Plastics
ASTM D792	(2013) Density and Specific Gravity (Relative Density) of Plastics by Displacement

CONSUMER ELECTRONICS ASSOCIATION (CEA)

CEA-709.1-D	(2014) Control Network Protocol Specification

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C57.13	(2008; INT 2009) Standard Requirements for Instrument Transformers
IEEE C62.41.1	(2002; R 2008) Guide on the Surges Environment in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
IEEE C62.45	(2002; R 2008) Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000v and less) AC Power Circuits

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 8802-3	(2000) Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA/ANSI C12.10	(2011) Physical Aspects of Watthour Meters - Safety Standards

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2014; AMD 1 2013; Errata 1 2013; AMD 22013; Errata 2 2013; AMD 3 2014; Errata 3 2014) National Electrical Code
NFPA 72	(2013) National Fire Alarm and Signaling Code
NFPA 90A	(2015) Standard for the Installation of Air Conditioning and Ventilating Systems

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1966	(2005) HVAC Duct Construction Standards Metal and Flexible, 3rd Edition

UNDERWRITERS LABORATORIES (UL)

UL 1449	(2014) Surge Protective Devices
UL 506	(2008; Reprint Oct 2013) Specialty Transformers
UL 508A	(2013; Reprint Jan 2014) Industrial Control Panels
UL 916	(2007; Reprint Aug 2014) Standard for Energy Management Equipment

1.02 DEFINITIONS

A. ANSI/ASHRAE Standard 135

1. ANSI/ASHRAE Standard 135: BACnet - A Data Communication Protocol for Building Automation and Control Networks, referred to as "BACnet". ASHRAE developed BACnet to provide a method for diverse building automation devices to communicate and share data over a network.

B. ARCNET

1. ATA 878.1 - Attached Resource Computer Network. ARCNET is a deterministic LAN technology; meaning it's possible to determine the maximum delay before a device is able to transmit a message.

C. BACnet

1. Building Automation and Control Network; the common name for the communication standard ASHRAE 135. The standard defines methods and protocol for cooperating building automation devices to communicate over a variety of LAN technologies.

D. BACnet/IP

1. An extension of BACnet, Annex J, defines this mechanism using a reserved UDP socket to transmit BACnet messages over IP networks.A BACnet/IP network is a collection of one or more IP subnetworks that share the same BACnet network number.See also "BACnet Broadcast Management Device".

E. BACnet Internetwork

1. Two or more BACnet networks, possibly using different LAN technologies, connected with routers. In a BACnet internetwork, there exists only one message path between devices.

F. BACnet Network

1. One or more BACnet segments that have the same network address and are interconnected by bridges at the physical and data link layers.

G. BACnet Segment

1. One or more physical segments of BACnet devices on a BACnet network, connected at the physical layer by repeaters.

H. BBMD

1. BACnet Broadcast Management Device (BBMD). A communications device, typically combined with a BACnet router. A BBMD forwards BACnet broadcast messages to BACnet/IP devices and other BBMDs connected to the same BACnet/IP network. Every IP subnetwork that is part of a BACnet/IP network must have only one BBMD. See also "BACnet/IP".

I. BAS

1. Building Automation Systems, including DDC (Direct Digital Controls) used for facility automation and energy management.

J. BAS Owner

1. The regional or local user responsible for managing all aspects of the BAS operation, including: network connections, workstation management, submittal review, technical

support, control parameters, and daily operation. The BAS Owner for this project is Texas Military Department.

K. BIBBs

1. BACnet Interoperability Building Blocks. A collection of BACnet services used to describe supported tasks. BIBBs are often described in terms of "A" (client) and "B" (server) devices. The “A” device uses data provided by the "B" device, or requests an action from the “B” device.

L. BI

1. BACnet International, formerly two organizations: the BACnet Manufacturers Association (BMA) and the BACnet Interest Group - North America (BIG-NA).

M. BI/BTL

1. BACnet International/BACnet Testing Laboratories (Formerly BMA/BTL).The organization responsible for testing products for compliance with the BACnet standard, operated under the direction of BACnet International.

N. Bridge

1. Network hardware that connects two or more network (or BACnet internetwork) segments at the physical and data link layers. A bridge may also filter messages.

O. Broadcast

1. A message sent to all devices on a network segment.

P. Device

1. Any control system component, usually a digital controller that contains a BACnet Device Object and uses BACnet to communicate with other devices. See also "Digital Controller".

Q. Device Object

1. Every BACnet device requires one Device Object, whose properties represent the network visible properties of that device. Every Device Object requires a unique Object Identifier number on the BACnet internetwork. This number is often referred to as the device instance.

R. Device Profile

1. A collection of BIBBs determining minimum BACnet capabilities of a device, defined in ASHRAE Standard 135-2004, Annex L. Standard device profiles include BACnet Operator Workstations (B-OWS), BACnet Building Controllers (B-BC), BACnet Advanced Application Controllers (B-AAC), BACnet Application Specific Controllers (B-ASC), BACnet Smart Actuator (B-SA), and BACnet Smart Sensor (B-SS). Each device used in new construction is required to have a PICS statement listing BIBBs supported.

S. Digital Controller

1. An electronic controller, usually with internal programming logic and digital and analog input/output capability, which performs control functions. In most cases, synonymous with a BACnet device described in this specification. See also "Device".

T. Direct Digital Control (DDC)

1. Digital controllers performing control logic. Usually the controller directly senses physical values, makes control decisions with internal programs, and outputs control signals to directly operate switches, valves, dampers, and motor controllers.

U. DDC System

1. A network of digital controllers, communication architecture, and user interfaces. A DDC system may include programming, sensors, actuators, switches, relays, factory controls, operator workstations, and various other devices, components, and attributes.

V. Ethernet

1. A family of local-area-network technologies providing high-speed networking features over various media.

W. Firmware

1. Software programmed into read only memory (ROM), flash memory, electrically erasable programmable read only memory (EEPROM), or erasable programmable read only memory (EPROM) chips.

X. Gateway

1. Communication hardware connecting two or more different protocols, similar to human language translators. The Gateway translates one protocol into equivalent concepts for the other protocol. In BACnet applications, a gateway has BACnet on one side and non-BACnet (usually proprietary) protocols on the other side.

Y. Half Router

1. A device that participates as one partner in a BACnet point-to-point (PTP) connection. Two half-routers in an active PTP connection combine to form a single router.

Z. Hub

1. A common connection point for devices on a network.

AA. Internet Protocol (IP, TCP/IP, UDP/IP)

1. A communication method, the most common use is the World Wide Web. At the lowest level, it is based on Internet Protocol (IP), a method for conveying and routing packets of information over various LAN media. Two common protocols using IP are User Datagram Protocol (UDP) and Transmission Control Protocol (TCP). UDP conveys information to well-known "sockets" without confirmation of receipt. TCP establishes "sessions", which have end-to-end confirmation and guaranteed sequence of delivery.

BB. Input/Output (I/O)

1. Physical inputs and outputs to and from a device, although the term sometimes describes software, or "virtual" I/O. See also "Points".

CC. I/O Expansion Unit

1. An I/O expansion unit provides additional point capacity to a digital controller.

DD. IP subnet

1. Internet protocol (IP) identifies individual devices with a 32-bit number divided into four groups from 0 to 255. Devices are often grouped and share some portion of this number. For example, one device has IP address 209.185.47.68 and another device has IP address 209.185.47.82. These two devices share Class C subnet 209.185.47.00

EE. Local-Area Network (LAN)

1. A communication network that spans a limited geographic area and uses the same basic communication technology throughout.

FF. LonTalk

1. CEA-709.1-D. A communication protocol developed by Echelon Corp. LonTalk is an optional physical and data link layer for BACnet.

GG. MAC Address

1. Media Access Control address. The physical node address that identifies a device on a Local Area Network.

HH. Master-Slave/Token-Passing (MS/TP)

1. ISO 8802-3. One of the LAN options for BACnet. MSTP uses twisted-pair wiring for relatively low speed and low cost communication (up to 4,000 ft at 76.8K bps).

II. Native BACnet Device

1. A device that uses BACnet as its primary, if not only, method of communication with other BACnet devices without intermediary gateways. A system that uses native BACnet devices at all levels is a native BACnet system.

JJ. Network

1. Communication technology for data communications. BACnet approved network types are BACnet over Internet Protocol (IP), Point to Point (PTP) Ethernet, ARCNET, MS/TP, and LonTalk®.

KK. Network Number

1. A site-specific number assigned to each network segment to identify for routing. This network number must be unique throughout the BACnet internetwork.

LL. Object

1. The concept of organizing BACnet information into standard components with various associated properties. Examples include analog input objects and binary output objects.

MM. Object Identifier

1. An object property used to identify the object, including object type and instance. Object Identifiers must be unique within a device.

NN. Object Properties

1. Attributes of an object. Examples include present value and high limit properties of an analog input object. Properties are defined in ASHRAE 135; some are optional and some are required. Objects are controlled by reading from and writing to object properties.

OO. Peer-to-Peer

1. Peer-to-peer refers to devices where any device can initiate and respond to communication with other devices.

PP. Performance Verification Test (PVT)

1. The procedure for determining if the installed BAS meets design criteria prior to final acceptance. The PVT is performed after installation, testing, and balancing of mechanical systems. Typically the PVT is performed by the Contractor in the presence of the Government.

QQ. PID

1. Proportional, integral, and derivative control; three parameters used to control modulating equipment to maintain a setpoint. Derivative control is often not required for HVAC systems (leaving "PI" control).

RR. PICS

1. Protocol Implementation Conformance Statement (PICS), describing the BACnet capabilities of a device. See BACnet, Annex A for the standard format and content of a PICS statement.

SS. Points

1. Physical and virtual inputs and outputs. See also "Input/Output".

TT. PTP

1. Point-to-Point protocol connects individual BACnet devices or networks using serial connections like modem-to-modem links.

UU. Repeater

1. A network component that connects two or more physical segments at the physical layer.

VV. Router

1. A BACnet router is a component that joins together two or more networks using different LAN technologies. Examples include joining a BACnet Ethernet LAN to a BACnet MS/TP LAN.

WW. Stand-Alone Control

1. Refers to devices performing equipment-specific and small system control without communication to other devices or computers for physical I/O, excluding outside air and other common shared conditions. Devices are located near controlled equipment, with physical input and output points limited to 64 or less per device, except for complex individual equipment or systems. Failure of any single device will not cause other network devices to fail. BACnet "Smart" actuators (B-SA profile) and sensors (B-SS

profile) communicating on a network with a parent device are exempt from stand-alone requirements.

1.03 BACNET DIRECT DIGITAL CONTROL SYSTEMS FOR HVAC DESCRIPTION

A. Scope Description

1. For the BASE BID:

a. Provide a Tridium Niagara N4 framework global building controller (as described in Part 1.03.B) for integration of new energy meters.

2. If SECO BID OPTION #2 is selected:

a. Utilize the global building controller specified in Part 1.03.A.1 above in addition to the requirements therein.

b. Provide a new totally native BACnet based systems including a Microsoft 10 compatible operators workstation, associated equipment and accessories. The operator's workstation, all building controllers, application controllers, and all input/output devices shall be accessible using a Web browser interface and shall communicate using the protocols and network standards as defined by the latest version of the ANSI/ASHRAE Standard 135, BACnet. In other words, all workstations and controllers, including unitary controllers, shall be native BACnet devices. No gateways shall be used for communication to controllers installed under this section unless gateways are shown on the design drawings and specifically requested by the Government. Gateways may be used for communication to existing systems or to systems installed under other sections. Where gateways are allowed, they must support ASHRAE 135, including all object properties and read-write services shown on Government approved interoperability schedules. Manufacturer's products, including design, materials, fabrication, assembly, inspection, and testing shall be in accordance with ASHRAE 135, ASME B31.1, and NFPA 70, except where indicated otherwise.

B. The Global Building Controller shall be based on a Tridium Niagara N4 framework and shall be able to communicate with a Niagara N4 or AX Supervisor system. The Niagara AX Supervisor system will be provided under a separate contract and will be located in Building 18 at Camp Mabry. Provide the required Niagara N4 License to allow the N4 Global Building Controller to communicate with a Niagara AX system.

C. The Owner shall own and shall have full rights to all features of the Niagara AX software.

D. Provide all necessary BACnet-compliant hardware and software to meet the system's functional specifications. Provide Protocol Implementation Conformance Statement (PICS) for Windows-based control software and every controller in system, including unitary controllers

E. Prepare individual hardware layouts, interconnection drawings, and software configuration from project design data.

F. Implement the detailed design for all analog and binary objects, system databases, graphic displays, logs, and management reports based on control descriptions, logic drawings, configuration data, and bid documents.

G. Design, provide, and install all equipment cabinets, panels, data communication network cables needed, and all associated hardware.

H. Provide and install all interconnecting cables between supplied cabinets, application controllers, and input/output devices.

I. Provide and install all interconnecting cables between all operator's terminals and peripheral devices (such as printers, etc.) supplied under this section.

J. Provide complete manufacturer's specifications for all items that are supplied. Include vendor name of every item supplied.

K. Provide supervisory specialists and technicians at the job site to assist in all phases of system installation, startup, and commissioning.

L. Provide a comprehensive operator and technician training program as described herein.

M. Provide as-built documentation, operator's terminal software, diagrams, and all other associated project operational documentation (such as technical manuals) on approved media, the sum total of which accurately represents the final system.

N. Provide new sensors, dampers, valves, and install only new electronic actuators. No used components shall be used as any part or piece of installed system.

1.04 DESIGN REQUIREMENTS

A. Control System Drawings Title Sheet

1. Provide a title sheet for the control system drawing set. Include the project title, project location, contract number, the controls contractor preparing the drawings, an index of the control drawings in the set, and a legend of the symbols and abbreviations used throughout the control system drawings.

B. List of I/O Points

1. Also known as a Point Schedule, provide for each input and output point physically connected to a digital controller: point name, point description, point type (Analog Output (AO), Analog Input (AI), Binary Output (BO), Binary Input (BI)), point sensor range, point actuator range, point address, BACnet object, associated BIBBS (where applicable), and point connection terminal number. Typical schedules for multiple

identical equipment are allowed unless otherwise requested in design or contract criteria.

C. Control System Components List

1. Provide a complete list of control system components installed on this project. Include for each controller and device: control system schematic name, control system schematic designation, device description, manufacturer, and manufacturer part number. For sensors, include point name, sensor range, and operating limits. For valves, include body style, Cv, design flow rate, pressure drop, valve characteristic (linear or equal percentage), and pipe connection size. For actuators, include point name, spring or non-spring return, modulating or two-position action, normal (power fail) position, nominal control signal operating range (0-10 volts DC or 4-20 milliamps), and operating limits.

D. Control System Schematics

1. Provide control system schematics. Typical schematics for multiple identical equipment are allowed unless otherwise requested in design or contract criteria. Include the following:

a. Location of each input and output device

b. Flow diagram for each piece of HVAC equipment

c. Name or symbol for each control system component, such as V-1 for a valve

d. Setpoints, with differential or proportional band values

e. Written sequence of operation for the HVAC equipment

f. Valve and Damper Schedules, with normal (power fail) position

E. HVAC Equipment Electrical Ladder Diagrams

1. Provide HVAC equipment electrical ladder diagrams. Indicate required electrical interlocks.

F. Component Wiring Diagrams

1. Provide a wiring diagram for each type of input device and output device. Indicate how each device is wired and powered; showing typical connections at the digital controller and power supply. Show for all field connected devices such as control relays, motor starters, actuators, sensors, and transmitters.

G. Terminal Strip Diagrams

1. Provide a diagram of each terminal strip. Indicate the terminal strip location, termination numbers, and associated point names.

H. BACnet Communication Architecture Schematic

1. Provide a schematic showing the project's entire BACnet communication network, including addressing used for LANs, LAN devices including routers and bridges, gateways, controllers, workstations, and field interface devices. If applicable, show connection to existing networks.

1.05 SUBMITTALS

A. Submit detailed and annotated manufacturer's data, drawings, and specification sheets for each item listed, that clearly show compliance with the project specifications. Government approval is required for all submittals. Submit the following in accordance with Section 01 33 00.

1. SD-01 Firm & Installer Qualifications:

    a. Address of local office from where the site will be serviced.

    b. Address of local support facility that will be to supply parts and inventory for the site.

    c. List of similar sized projects completed by firm in past three (3) years. List start and finish dates, scope of controls and list of systems programmed.

    d. Name and qualification of the full-time, on-site experienced project manager for each site.

    e. Name and qualifications of manufacturer authorized and trained personnel who will be working on these sites.

    f. Additional supporting documents to demonstrate compliance with section 1.06/F of this document.

2. SD-02 Shop Drawings: Include the following in the project's control system drawing set:

    a. Control system drawings title sheet.

    b. List of I/O Points.

    c. Control System Components List.

    d. Control system schematics.

    e. HVAC Equipment Electrical Ladder diagrams.

    f. Component wiring diagrams.

    g. Terminal strip diagrams.

    h. BACnet communication architecture schematic.

3. SD-03 Product Data

    a. Direct Digital Controllers: Include BACnet PICS for each controller/device type, including smart sensors (B-SS) and smart actuators (B-SA).

    b. BACnet Gateways: Include BACnet and workstation display information; bi-directional communication ability; compliance with interoperability schedule; expansion capacity; handling of alarms, events, scheduling and trend data; and single device capability (not depending on multiple devices for exchanging information from either side of the gateway).

c. BACnet Protocol Analyzer: Include capability to store and report data traffic on BACnet networks, measure bandwidth usage, filter information, and identify BACnet devices.

d. DDC Software.

e. BACnet Operator Workstation.

f. BACnet Operator Workstation DDC Software. Include BACnet PICS for Operator Workstation software.

g. Notebook Computer.

h. Sensors and Input Hardware.

i. Output Hardware.

j. Surge and transient protection.

k. Indicators.

l. Duct smoke detectors.

4. SD-05 Design Data

    a. Performance Verification Testing Plan.

    b. Pre-Performance Verification Testing Checklist.

5. SD-06 Test Reports

    a. Performance Verification Testing Report.

6. SD-07 Certificates

    a. Contractor's Qualifications.

7. SD-09 Manufacturer's Field Reports

    a. Pre-PVT Checklist.

8. SD-10 Operation and Maintenance Data: Comply with requirements for data packages in Section 01 78 23 OPERATION AND MAINTENANCE DATA, except as supplemented and modified in this specification.

    a. BACnet Direct Digital Control Systems, Data Package 4.

    b. Controls System Operators Manuals, Data Package 4.

9. SD-11 Closeout Submittals

    a. Training documentation.

1.06 QUALITY ASSURANCE

A. Standard Products

1. Provide material and equipment that are standard manufacturer's products currently in production and supported by a local service organization.

2. Materials and equipment shall be manufacturer's latest standard design that complies with the specification requirements. All BAS peer-to-peer network controllers, central system controllers and local user displays shall be UL Listed under Standard UL 916, category PAZX. All electronic equipment shall conform to the requirements of FCC Regulation, Part 15, Governing Radio Frequency Electromagnetic Interference and be so labeled

B. Delivery, Storage, and Handling

1. Handle, store, and protect equipment and materials to prevent damage before and during installation according to manufacturer's recommendations, and as approved by the Contracting Officer. Replace damaged or defective items.

C. Operating Environment

1. Protect components from humidity and temperature variation, dust, and contaminants. If components are stored before installation, keep them within the manufacturer's limits.

D. Finish of New Equipment

1. New equipment finishing shall be factory provided. Manufacturer's standard factory finishing shall be proven to withstand 125 hours in a salt-spray fog test. Equipment located outdoors shall be proven to withstand 500 hours in a salt-spray fog test.

2. Salt-spray fog test shall be according to ASTM B117, with acceptance criteria as follows: immediately after completion of the test, the finish shall show no signs of degradation or loss of adhesion beyond 0.125 inch on either side of the scratch mark.

E. Verification of Dimensions

1. The contractor shall verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing work.

F. Contractor's Qualifications

1. The Building Automation System (BAS) system shall be designed, installed, commissioned, and serviced by manufacturer authorized and trained personnel. System provider shall have an in-place support facility within 2 hours response time of the site with technical staff, spare parts inventory, and necessary test and diagnostic equipment.

2. The contractor shall provide full-time, on-site, experienced project manager for this work, responsible for direct supervision of the design, installation, start-up and commissioning of the BAS system.

3. The Bidder shall be regularly engaged in the design, installation and maintenance of BAS systems and shall have demonstrated technical expertise and experience in the design, installation and maintenance of BAS systems similar in size and complexity to this project.

4. Control system shall be engineered, programmed and supported completely by representative’s local office that must be within 100 miles of project site.

5. Submit documentation supporting the above requirements and certifying the controls Contractor performing the work has completed at least three DDC systems installations of a similar design to this project, and programmed similar sequences of operation for at least two years. Controls Contractor shall provide a list of at these projects with project information and references.

G. Modification of References

1. The advisory provisions in ASME B31.1 and NFPA 70 are mandatory. Substitute "shall" for "should" wherever it appears and interpret all references to the "authority having jurisdiction" and "owner" to mean the Contracting Officer.

H. Project Sequence

1. The control system work for this project shall proceed in the following order:

   a. Submit and receive approval on the Shop Drawings, Product Data, and Certificates specified under the paragraph entitled "SUBMITTALS."

   b. Perform the control system installation work, including all field check-outs and tuning.

   c. Provide support to TAB personnel as specified under the paragraph "TEST AND BALANCE SUPPORT."

   d. Submit and receive approval of the Controls System Operators Manual specified under the paragraph "CONTROLS SYSTEM OPERATORS MANUALS."

   e. Submit and receive approval of the Performance Verification Testing Plan and the Pre-PVT Checklist specified under the paragraph "PERFORMANCE VERIFICATION TESTING."

   f. Perform the Performance Verification Testing.

   g. Submit and receive approval on the PVT Report.

   h. Submit and receive approval on the Training Documentation specified under the paragraph "INSTRUCTION TO GOVERNMENT PERSONNEL". Submit at least 30 days before training.

   i. Deliver the final Controls System Operators Manuals.

   j. Conduct Training.

   k. Submit and receive approval of Closeout Submittals.

2.00 PRODUCTS

2.01 DDC SYSTEM

Provide a networked DDC system for stand-alone control in compliance with the latest revision of the ANSI/ASHRAE Standard 135 BACnet. Include all programming, objects, and services required to meet the sequence of control. Provide BACnet communications between the DDC system and native BACnet devices furnished with HVAC equipment and plant equipment including boilers, chillers, and variable frequency drives.

Provide an operator workstation laptop with complete interface software capable of programming, configuring, and monitoring the digital controllers.

A. Direct Digital Controllers

1. Direct digital controllers shall be UL 916 rated.

B. I/O Point Limitation

1. The total number of I/O hardware points used by a single stand-alone digital controller, including I/O expansion units, shall not exceed 64, except for complex individual equipment or systems. Place I/O expansion units in the same cabinet as the digital controller.

C. Environmental Limits

1. Controllers shall be suitable for, or placed in protective enclosures suitable for the environment (temperature, humidity, dust, and vibration) where they are located.

D. Stand-Alone Control

1. Provide stand-alone digital controllers.

E. Internal Clock

1. Provide internal clocks for all BACnet Building Controllers (B-BC) and BACnet Advanced Application Controllers (B-AAC) using BACnet time synchronization services. Automatically synchronize system clocks daily from an operator-designated controller. The system shall automatically adjust for daylight saving time.

F. Memory

1. Provide sufficient memory for each controller to support the required control, communication, trends, alarms, and messages. Protect programs residing in memory with EEPROM, flash memory, or by an uninterruptible power source (battery or uninterruptible power supply). The backup power source shall have capacity to maintain the memory during a 72-hour continuous power outage. Rechargeable power sources shall be constantly charged while the controller is operating under normal line power. Batteries shall be replaceable without soldering. Trend and alarm history collected during normal operation shall not be lost during power outages less than 72 hours long.

G. Immunity to Power Fluctuations

1. Controllers shall operate at 90 percent to 110 percent nominal voltage rating.

H. Transformer

1. The controller power supply shall be fused or current limiting and rated at 125 percent power consumption.

I. Wiring Terminations

1. Use screw terminal wiring terminations for all field-installed controllers. Provide field-removable modular terminal strip or a termination card connected by a ribbon cable for all controllers other than terminal units.

J. Input and Output Interface

1. Provide hard-wired input and output interface for all controllers as follows:

    a. Protection: Shorting an input or output point to itself, to another point, or to ground shall cause no controller damage. Input or output point contact with sources up to 24 volts AC or DC for any duration shall cause no controller damage.

    b. Binary Inputs: Binary inputs shall have a toggle switch and monitor on and off contacts from a "dry" remote device without external power, and external 5-24 VDC voltage inputs.

    c. Pulse Accumulation Inputs: Pulse accumulation inputs shall conform to binary input requirements and accumulate pulses at a resolution suitable to the application.

d. d. Analog Inputs: Analog inputs shall monitor low-voltage (0-10 VDC), current (4-20 mA), or resistance (thermistor or RTD) signals.

e. Binary Outputs: Binary outputs shall have a toggle switch and send a pulsed 24 VDC low-voltage signal for modulation control, or provide a maintained open-closed position for on-off control. For HVAC equipment and plant controllers, provide for manual overrides, either with three-position (on-off-auto) override switches and status lights, or with an adjacent operator display and interface. Where appropriate, provide a method to select normally open or normally closed operation.

f. Analog Outputs: Analog outputs shall send modulating 0-10 VDC or 4-20 mA signals to control output devices.

g. Tri-State Outputs: Tri-State outputs shall provide three-point floating control of terminal unit electronic actuators.

K. Digital Controller BACnet Internetwork

1. Provide a BACnet internetwork with control products, communication media, connectors, repeaters, hubs, and routers. Provide intermediate gateways, only when requested by the Government and shown on the contract drawings, to connect existing non-BACnet devices to the BACnet internetwork. Controller and operator interface communication shall conform to ASHRAE 135, BACnet. Coordinate connections to existing Ethernet backbones with the BAS Owner and LAN administrator. If a controller becomes non-responsive, the remaining controllers shall continue operating and not be affected by the failed controller.

L. Communications Ports

1. Direct-Connect Interface Ports: Provide at least one extra communication port at each local BACnet network for direct connecting a notebook computer or BACnet hand-held terminal so all network BACnet objects and properties may be viewed and edited by the operator.

M. BACnet Gateways

1. Provide BACnet communication ports, whenever available as a plant equipment OEM standard option, for DDC integration via a single communication cable. Typical BACnet controlled plant equipment includes, but is not limited to, boilers, chillers, and variable frequency motor drives.

2. Provide gateways to connect BACnet to legacy systems, existing non-BACnet devices, and existing non-BACnet DDC controlled plant equipment, only when specifically requested and approved by the Government, and shown on the Government approved BACnet Communication Architecture Schematic. Provide with each gateway an

interoperability schedule [Use gateway interoperability schedules shown on design drawings or other project documents], showing each point or event on the legacy side that the BACnet "client" will read, and each parameter that the BACnet network will write to. Describe this interoperability in terms of BACnet services, or Interoperability Building Blocks (BIBBS), defined in ASHRAE 135 Annex K. Provide two-year minimum warranty for each gateway, including parts and labor.

3. The following minimum capabilities are required:

    a. Gateways shall be able to read and view all readable object properties listed in the interoperability schedule on the non-BACnet network to the BACnet network and vice versa where applicable.

    b. Gateways shall be able to write to all writeable object properties listed in the interoperability schedule on the non-BACnet network from the BACnet network and vice versa where applicable.

    c. Gateways shall provide single-pass (only one protocol to BACnet without intermediary protocols) translation from the non-BACnet protocol to BACnet and vice versa.

    d. Gateways shall meet the requirements of Data Sharing Read Property (DS-RP-B), Data Sharing Write Property (DS-WP-B), Device Management Dynamic Device Binding-B (DM-DDB-B), and Device Management Communication Control (DM-DCC-B) BIBBs, in accordance with ASHRAE 135.

    e. Gateways shall include all hardware, software, software licenses, and configuration tools for operator-to-gateway communications. Provide backup programming and parameters on CD media and the ability to modify, download, backup, and restore gateway configuration.

N. Digital Controller Cabinet

1. Provide each digital controller in a factory fabricated cabinet enclosure. Cabinets located indoors shall protect against dust and have a minimum NEMA 1 rating, except where indicated otherwise. Cabinets located outdoors or in damp environments shall protect against all outdoor conditions and have a minimum NEMA 4 rating. Outdoor control panels and controllers must be able to withstand extreme ambient conditions, without malfunction or failure, whether or not the controlled equipment is running. If necessary, provide a thermostatically controlled panel heater in freezing locations, and an internal ventilating fan in locations exposed to direct sunlight. Cabinets shall have a hinged lockable door and an offset removable metal back plate, except controllers integral with terminal units, like those mounted on VAV boxes. Provide like-keyed locks

for all hinged panels provided and a set of two keys at each panel, with one key inserted in the lock.

O. Main Power Switch and Receptacle

1. Provide each control cabinet with a main external power on/off switch located inside the cabinet. Also provide each cabinet with a separate 120 VAC duplex receptacle.

2.02 SOFTWARE

A. Programming

1. Provide programming to execute the sequence of operation indicated. Provide all programming and tools to configure and program all controllers. Provide programming routines in simple, easy-to-follow logic with detailed text comments describing what the logic does and how it corresponds to the project's written sequence of operation.

a. The Owner shall own and shall have full rights to all features of the software.

b. Graphic-based programming shall use a library of function blocks made from pre-programmed code designed for BAS control. Function blocks shall be assembled with interconnecting lines, depicting the control sequence in a flowchart. If providing a computer with device programming tools as part of the project, graphic programs shall be viewable in real time showing present values and logical results from each function block.

c. Menu-based programming shall be done by entering parameters, definitions, conditions, requirements, and constraints.

d. For line-by-line and text-based programming, declare variable types (local, global, real, integer, etc.) at the beginning of the program. Use descriptive comments frequently to describe the programming.

e. If providing a computer with device programming tools as part of the project, provide a means for detecting program errors and testing software strategies with a simulation tool. Simulation may be inherent within the programming software suite, or provided by physical controllers mounted in a NEMA 1 test enclosure. The test enclosure shall contain one dedicated controller of each type provided under this contract, complete with power supply and relevant accessories.

B. Parameter Modification

1. All writeable object properties, and all other programming parameters needed to comply with the project specification shall be adjustable for devices at any network level, including those accessible with web-browser communication, and regardless of programming methods used to create the applications.

C. Short Cycling Prevention

1. Provide setpoint differentials and minimum on/off times to prevent equipment short cycling.

D. Equipment Status Delay

1. Provide an adjustable delay from when equipment is commanded on or off and when the control program looks to the status input for confirmation.

E. Run Time Accumulation

1. Use the Elapsed Time Property to provide re-settable run time accumulation for each Binary Output Object connected to mechanical loads greater than 1 HP, electrical loads greater than 10 KW, or wherever else specified.

F. Timed Local Override

1. Provide an adjustable override time for each push of a timed local override button.

G. Time Synchronization

1. Provide time synchronization, including adjustments for leap years, daylight saving time, and operator time adjustments.

H. Scheduling

1. Provide operating schedules as indicated, with equipment assigned to groups. Changing the schedule of a group shall change the operating schedule of all equipment in the group. Groups shall be capable of operator creation, modification, and deletion. Provide capability to view and modify schedules in a seven-day week format. Provide capability to enter holiday and override schedules one full year at a time.

I. Object Property Override

1. Allow writeable object property values to accept overrides to any valid value. Where specified or required for the sequence of control, the Out-Of-Service property of Objects shall be modifiable using BACnet's write property service. When documented, exceptions to these requirement are allowed for life, machine, and process safeties.

J. Alarms and Events

1. Alarms and events shall be capable of having programmed time delays and high-low limits. When a computer workstation or web server is connected to the BACnet internetwork, alarms/events shall report to the computer, printer, e-mail, cell phone, as defined by an authorized operator. Otherwise alarms/events shall be stored within a device on the BACnet network until connected to a user interface device and retrieved.

Provide alarms/events in agreement with the point schedule, sequence of operation, and the BAS Owner. At a minimum, provide programming to initiate alarms/events any time a piece of equipment fails to operate, a control point is outside normal range or condition shown on schedules, communication to a device is lost, a device has failed, or a controller has lost its memory.

K. Trending

1. Provide BACnet trend services capable of trending all object present values set points, and other parameters indicated for trending on project schedules. Trends may be associated into groups, and a trend report may be set up for each group. Trends are stored within a device on the BACnet network, with operator selectable trend intervals from 10 seconds up to 60 minutes. The minimum number of consecutive trend values stored at one time shall be 100 per variable. When trend memory is full, the most recent data shall overwrite the oldest data.

2. The operator workstation shall upload trends automatically upon reaching 3/4 of the device buffer limit (via Notification Threshold property), by operator request, or by time schedule for archiving. Archived and real-time trend data shall be available for viewing numerically and graphically for at the workstation and connected notebook computers.

L. Device Diagnostics

1. Each controller shall have diagnostic LEDs for power, communication, and device fault condition. The DDC system shall recognize and report a non-responsive controller.

M. Power Loss

1. Upon restoration of power, the DDC system shall perform an orderly restart and restoration of control.

2.03 BACNET OPERATOR WORKSTATION

The workstation shall be capable of accessing all DDC system devices and communicate using the BACnet protocol. The workstation shall be capable of displaying, modifying, creating, archiving, and deleting (as applicable): all points, objects, object properties, programming, alarms, trends, messages, schedules, and reports.

A. BACnet Operator Workstation Hardware

1. Configure according to system manufacturer's specifications and conforming to BACnet Operator Workstation (B-OWS) device standards found in ASHRAE 135, Annex L. Install to permit complete monitoring and troubleshooting of the DDC system.

2. The operator workstation shall comply with the following specifications:

a. Dell Latitude 5285 2 in 1 Tablet

b. 12.3 inch IPS Display with FHD (1920 x 1080) resolution with 10-pt capacitive touch

c. Microsoft Windows 10 Pro 64 Operating System

d. 64-bit English/French Intel® HD Graphics 620

e. 16GB LPDDR3 1600MHz Memory

f. 360GB Solid State Storage

g. Qualcomm QCA61x4A 802.11ac Dual Band (2x2) Wireless Adapter+ Bluetooth 4.1

h. No DDPE Encryption Software

i. Dell Tablet Dock v2.0 with Gigabit Ethernet

j. Dell Tablet Keyboard – Mobile Documentation

k. Dell Active Stylus

l. Dell WM524 Wireless Travel Mouse

m. Dell Urban 2.0 Top load Carrying Case -15.6”

n. SCM SCR3310V2 Smart USB Card Reader

o. Targus Dell Latitude 13 Laptop Auto/Air Charger

p. 1M High Speed HDMI to HDMI Micro Cable with Ethernet (3.3ft)

q. Dell Adapter – USB 3.0 to Ethernet PXE Boot

r. C2G HDMI Micro to VGA and Stereo Audio Adapter Converter Dongle - Video converter - black Intel® Core™ M-5Y71 vPro™ processor

s. McAfee Security Center 12 month Subscription

t. Intel vPro™ Technology's Advanced Management Features

u. 38Whr Battery

v. Intel Core M-5Y71, 8GB, Wifi/WWAN near Field Communications

w. Integrated 2MP HD Webcam (front) / 8MP (back) Software Driver

x. TPM 1.2 hardware security Regulatory Label

y. 24 Watt AC Adapter

z. Manufacturer’s 3 Year Hardware Service with Onsite Service after Remote Diagnosis

aa. Manufacturer’s 3-year next business day on-site warranty with the Government listed as the warranty owner

bb. Include all original licenses, installation media, documentation, and recovery CDs capable of restoring the original configuration in a three binder with the project information and site location on cover. Include a table of contents as the first page of the binder. The Binder shall be handed over the Owner.

B. Password Protection

1. Provide at least five levels of password protection for operator interfaces. The lowest level only allow viewing graphics. The second level allows viewing graphics and changing space temperature setpoints. The third level allows the previous level's capability, plus changing operating schedules. The fourth level allows access to all functions except passwords. The highest level provides all administrator rights and allows full access to all programming, including setting new passwords and access levels. Provide the BAS Owner with the highest level password access. Provide automatic log out if no keyboard or mouse activity is detected after a user-defined time delay.

C. BACnet Operator Workstation DDC Software

1. Provide the workstation software with the manufacturer's installation CDs and licenses. Configure the software according to the DDC system manufacturer's specifications and in agreement with BACnet Operator Workstation (B-OWS) device standards found in ASHRAE 135, Annex L.

2. The workstation software shall permit complete monitoring, modification, and troubleshooting interface with the DDC system. The operator interface with the software shall be menu-driven with appropriate displays and menu commands to manipulate the DDC system's objects, point data, operating schedules, control routines, system configuration, trends, alarms, messages, graphics, and reports. Trends shall be capable of graphic display in real time, with variables plotted as functions of time. Each alarmed point shall be capable of displaying its alarm history, showing when it went into alarm, if and when it was acknowledged, and when it went out of alarm. The modification of DDC system parameters and object properties shall be accomplished with "fill in the blank" and/or "point and drag" methods. Modifications shall download to the appropriate controllers at the operator's request.

3. The Owner shall own and shall have full rights to all features of the software.

D. Graphics Software

1. Provide web-based system graphics viewable on latest versions of browsers such as Internet Explorer, Chrome, etc. using an industry-standard file format such as HTML, BMP, JPEG, or GIF.

2. Graphic displays shall have full-screen resolution when viewed on the workstation and notebook computers. Dynamic data on graphics pages shall refresh within 10 seconds using an Internet connection, or 30 seconds using a dial-up modem connection. Graphics viewing shall not require additional "plug-in" software like Java, Shockwave and Flash applications unless the software is readily available for free over the Internet, and certified for use with Reserve Component Automation System (RCAS) computers.

3. The graphics shall show the present value and object name for each of the project's I/O points on at least one graphic page. Arrange point values and names on the graphic displays in their appropriate physical locations with respect to the floor plan or equipment graphic displayed. Graphics shall allow the operator to monitor current status, view zone and equipment summaries, use point-and-click navigation between graphic pages, and edit setpoints and parameters directly from the screens. Items in alarm shall be displayed using a different color or other obvious visual indicator. Provide graphics with the following:

    a. Graphic Types: Provide at least one graphic display for each piece of HVAC equipment, building floor, and controlled zone. Indicate dynamic point values, operating statuses, alarm conditions, and control setpoints on each display. Provide summary pages where appropriate.

        1). Building Elevation: For buildings more than one story, provide an elevation view of the building with links to each of the building's floor plans. Simulate the building's architecture and include the building number and floor numbers. If possible, use an actual photograph of the building.

        2). Building Floor Plans: Provide a floor plan graphic for each of the building's floors [and roof] with dynamic display of space temperature and other important data. If used, indicate and provide links to sub-plan areas. If possible, use the project's electronic drawing files for the graphic backgrounds. Provide clear names for important areas, such as "Main Conference Room." Include room names and numbers where applicable. Include features such as stairwells, elevators, and main entrances. Where applicable, include the mechanical room, HVAC equipment, and control component locations, with corresponding links to the equipment graphics.

        3). Sub-plan Areas: Where a building's floor plan is too large to adequately display on the screen, sub-divide the plan into distinct areas, and provide a separate graphic display for each area. Provide same level of detail requested in building floor plan section above.

        4). HVAC Equipment: Provide a graphic display for each piece of HVAC equipment, such as a fan coil unit, VAV terminal, or air handling unit. Equipment shall be represented by a two or three-dimensional drawing. Where multiple pieces of

equipment combine to form a system, such as a central chiller plant or central heating plant, provide one graphic to depict the entire plant. Indicate the equipment, piping, ductwork, dampers, and control valves in the installed location. Include labels for equipment, piping, ductwork, dampers, and control valves. Show the direction of air and water flow. Include dynamic display of applicable object data with clear names in appropriate locations.

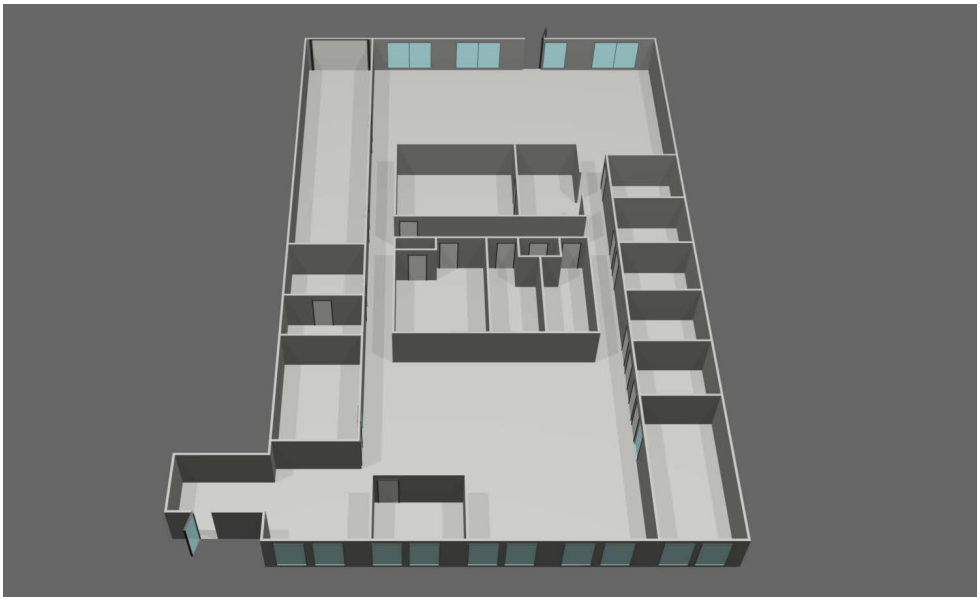
5). Sequence of Operation: Provide a graphic screen displaying the written out full sequence of operation for each piece of HVAC equipment. Provide a link to the sequence of operation displays on their respective equipment graphics.

6). The Contractor shall utilize standard Niagara AX graphics from Tridium. These graphics shall be modified or altered to match the systems and equipment in the project.

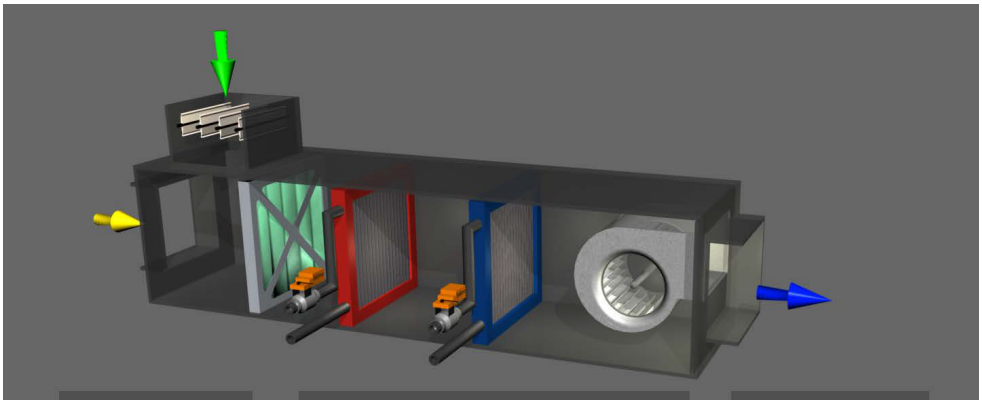
7). The BAS system shall be provided a library of graphics which may be used unaltered or modified by the operator. BAS shall include a library of equipment graphic components to assemble custom graphics. Systems that do not allow customization or creation of new graphic objects by the operator (or with third-party software) shall not be allowed.

8). Sample of Graphics:

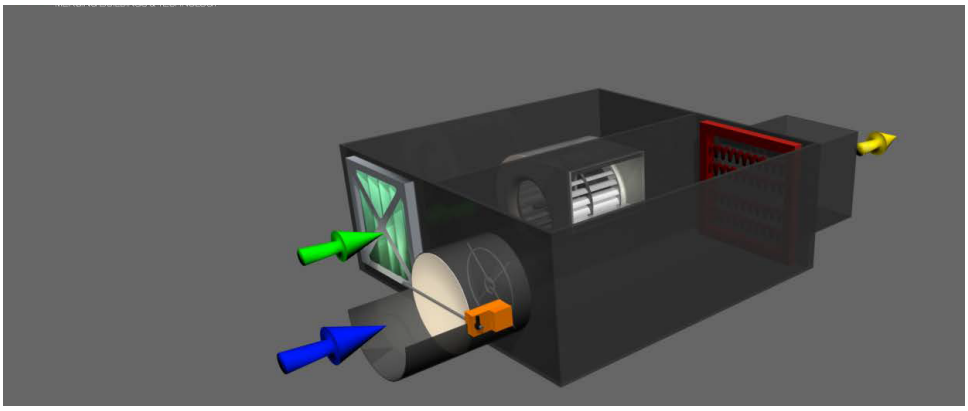
a). Floorplan.



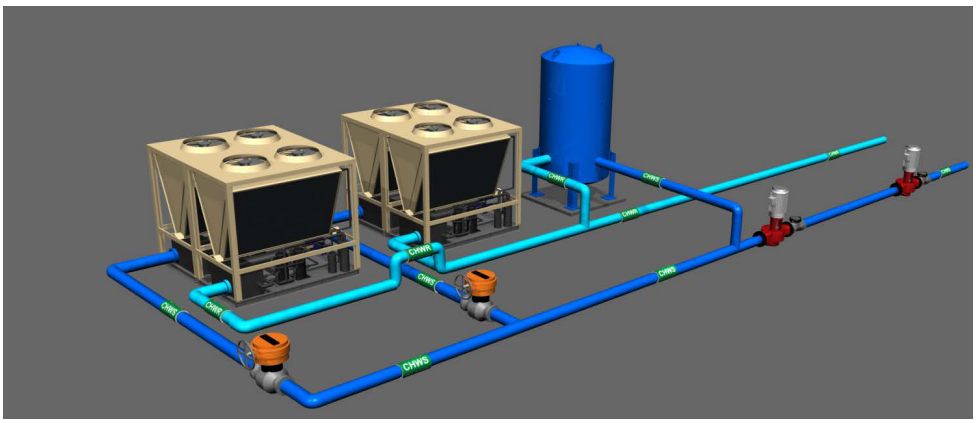
b). Air Handler (will resemble actual equipment type and configuration).



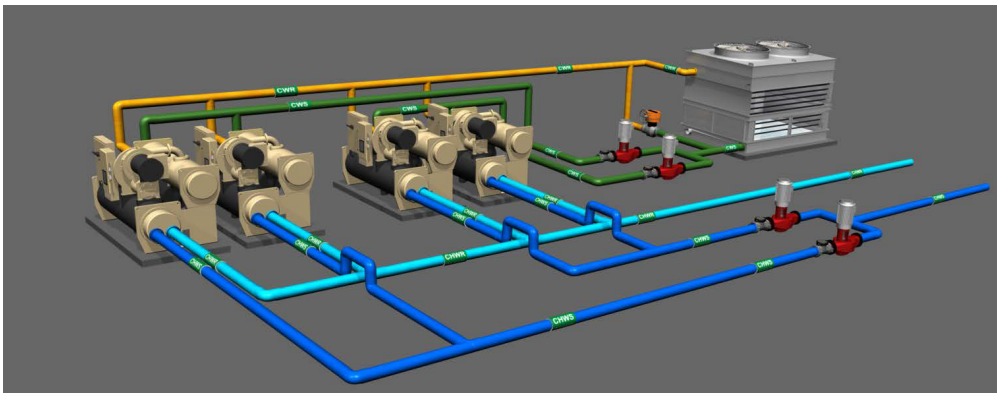
c). VAV Box (will resemble actual equipment type and configuration).



d). Air Cooled Chiller (will resemble actual equipment type and configuration).



e). Chilled Water Plant (will resemble actual equipment type and configuration).



b. Graphic Title: Provide a prominent, descriptive title on each graphic page.

c. Dynamic Update: When the workstation is on-line, all graphic I/O object values shall update with change-of-value services, or by operator selected discrete intervals.

d. Graphic Linking: Provide forward and backward linking between floor plans, sub-plans, and equipment.

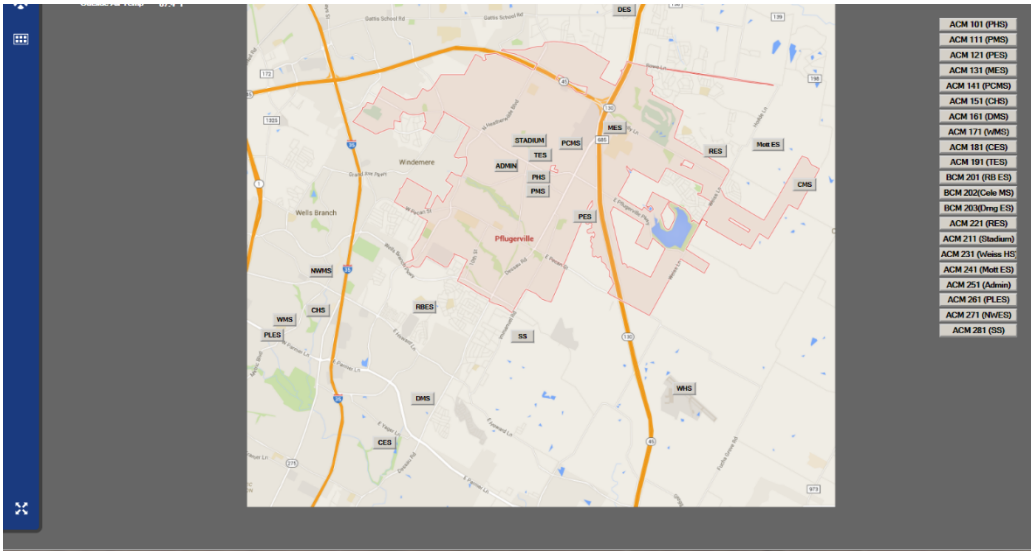
e. Graphic Editing: Provide installed software to create, modify, and delete the DDC graphics. Include the ability to store graphic symbols in a symbol directory and import these symbols into the graphics.

f. Dynamic Point Editing: Provide full editing capability for deleting, adding, and modifying dynamic points on the graphics.

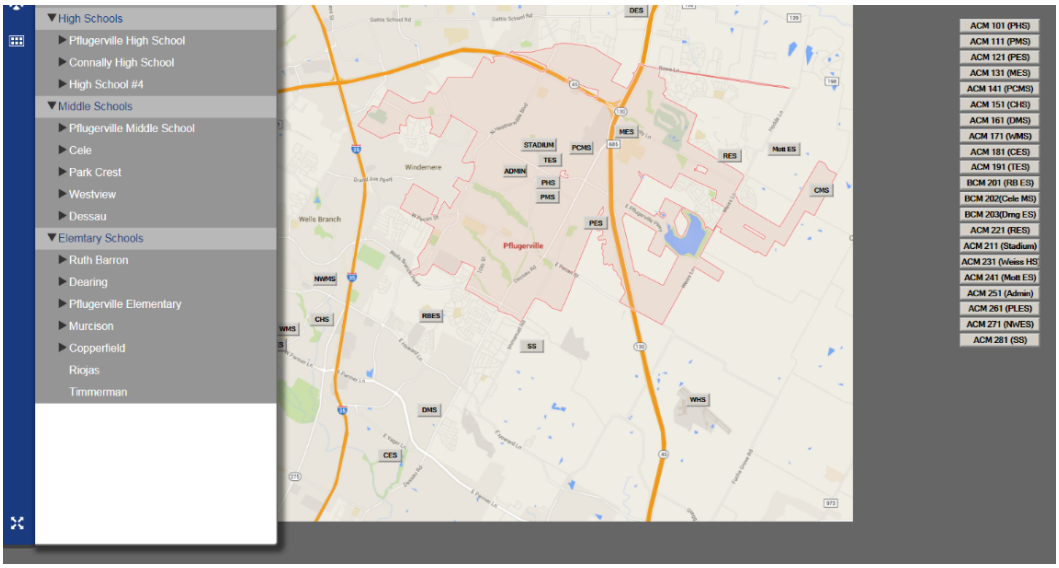
g. Character Limit < 24 characters: With new control systems the limit on the number of characters can range from 30-255 but they should be limited to less than 24 for space constraints in displays and unknown limits that may be imposed from other interfacing systems.

h. Example Front End Graphics Home Page:

1). Front End Home Page.



2). Front End Home Page with Navigation Tree.



i. Point Naming Conventions: Existing systems point names vary by system capabilities and site conventions. The site naming convention must be followed where possible. Approval is required from HNC prior to alternative point name creation. This is to ensure there are no conflicts with the MDMS gateway requirements.

1). Primary equipment names:

a). Servers are named EEDRS. However, the local data center server naming convention takes priority.

b). Building/Facility Point of Connection (BPOC/FPOC). Name is by site and building. Use no space, period or dash unless system constraints dictate otherwise: SiteBuilding#. Example: FTBRAGG3720

c). LON TP/FT10 channel names. Name in this order: Protocol Site Building#. Example: LON Bragg 100. Note that here a space is used to separate.

2). The following point naming conventions are approved for new system installations:

a). SiteName is the Post name.

b). Building# - is the building number containing the meter; it is always the number of the building, although that building number may include a letter.

c). Meter - is the meter type within the building: electric, gas, water, steam; use the word METER for electric meters and the words GAS, WATER, STEAM, BTU for the other types of meters.

d). Meter # - is the meter number (the nth number) within the building.

e). Parameter - is the name of the measured variable

For single site systems:

Building#_Meter_Meter#_Parameter

Building#.Meter_Meter#.Parameter

Example:

BLDG_2315_METER_2_VOLTS_A_B

BLDG_2315.METER_2.VOLTS_A_B

For multi-site systems, where a regional host exists:

SiteName_Building#_Meter_Meter#_Parameter

Sitename.Building#.Meter_Meter#.Parameter

Example:

HOOD_2315_METER_2_KW

HOOD_2315.METER_2.KW

Where a site area designator is required:

SiteName_Area_Building#_METER_Meter#_Parameter

Example:

Hood_A_2315_METER_2_KW

Hood_A.2315.METER_2.KW

Note: Some UMCS host software may automatically attach the Building/Facility Point of Connection (JACEx or NAE) to the point name.

4. Object Naming Conventions: The following naming conventions shall be used:

Systems & Actions	Abbreviation
Adjustment	Adj
Air	Air
Air Flow	AirFlow
Alarm	Alm
Basin	Basin
Breakglass	Breakglass
Building	Bldg
Bypass	Bypass
Carbon Dioxide	Co2
Carbon Dioxide	CO2
Carbon Monoxide	CO
Chilled	Ch
Chilled Water	CHW
Circuit	Ckt
Circuit	Circuit
Closed	Clo
Cold	Cld
Cold Deck	CldDk
Command	Cmd
Condenser	Cd
Condenser Water	CDW
Control	Control
Cooler	Cooler
Cooling	Clg
Cubic Feet per Minute	Cfm
Current	Current
Cut Out	CutOut
Damper	Dmpr
Deck	Dk
Differential	Diff
Differential Pressure	DP
Discharge	Disch
Domestic	Dom
Domestic Cold Water	DCW
Domestic Hot Water	DHW
Duct Smoke Detector	Dsd
Enable	Ena
Energy	Energy
Entering	Ent
Exhaust	Exh
Fan	Fan
Fault	Flt
Filter	Filter
Flow	Flow
Flow Switch	FlowSwitch

Systems & Actions	Abbreviation
Freeze	Freeze
Freezer	Freezer
Gas	Gas
Heat	H
Heater	Heater
Heating	Htg
Heating Hot Water	HHW
High Static	HighStatic
Hot	Hot
Hot Deck	HotDeck
Hot Gas	HotGas
Hot Gas Bypass	HotGasBypass
Hot Water	HW
Relative Humidity	RH
Inlet	Inlet
Isolation	ISO
Leaving	Lvg
Lighting	Ltg
Meter	Meter
Mixed	Mixed
Mixing	Mixing
Occupancy	Occ
Open	Opn
Outlet	Outlet
Outside Air	OA
Override	Ovr
Position	Pos
Potable	Pot
Power	Power
Pre Filter	PreFilter
Preheat	Preheat
Pressure	Press
Primary	Pri
Pulse	Pulse
Recovery	Recovery
Relative Humidity	RH
Re-Heat	ReHeat
Return	Ret
Roof Top	Rooftop
Secondary	Sec
Sensor	Sensor
Setpoint	Stpt
Signal	Signal
Smoke	Smoke
Space	Space

Systems & Actions	Abbreviation
Speed	Speed
Stage	Stage
Start Stop	StartStop
Static	S
Status	Status
Supervisory	Sup
Supply	Supply
System	Sys
Temperature	Temp
Tower	Twr
Trouble	Tbl
Valve	Vlv
Variable	V
Variable Frequency Drive	VFD
Volume	V
Warning	Warn
Water	W
Wheel	Wheel
Zone	Zone

Object Naming Conventions (Contd.)

Equipment & Devices	Abbreviation	Followed by Equipment #
Air Handling Unit	AHU	Yes
Boiler	B	Yes
Chilled Water Pump	CHWP	Yes
Chiller	CH	Yes
Condenser Water Pump	CDWP	Yes
Cooling Tower	CT	Yes
Energy Recovery Unit	ERU	Yes
Exhaust Air Damper	EAD	
Exhaust Fan	EF	Yes
Fan Coil Unit	FCU	Yes
Freezer	Freezer	Yes
Heatpump - Air Rooftop	RTHP	Yes
Heatpump - water	WSHP	Yes
Heatpump Air Split	SSHP	Yes
Hot Water Pump	HWP	Yes
Make Up Air Unit	MUA	Yes
Mixed Air Damper	MAD	
Outside Air Damper	OAD	
Outside Air Unit	OAU	Yes
Primary Chilled Water Pump	PCHWP	
Pump	P	Yes
Return Air Damper	RAD	
Rooftop AC Unit	RTAC	Yes
Secondary Chilled Water Pump	SCHWP	Yes
Split Unit AC	AC	Yes
Supply Air Damper	SAD	
SupplyFan	SF	Yes
Unit Heater	UH	Yes
Variable Air Volume	VAV	Yes

Units	Abbreviation
AC Volts	VAC
Amps	Amps
DC Volts	VDC
Gauge Pressure	PSIG
Kilowatt (real power)	Kw
Kilovolt-Amp (apparent power)	Kva
Milliamps	Ma
Power Factor	Pf
Volts	Volts

Units should always be in the Unit property or facets. These abbrevaitions are used only to differntiate points with simialr names such as as a meter with multiple units example: OutputVAC and OutputKw

Object Name Examples:

Example of Object Name using Recommended Abbreviations	Include Equipment # in Object Name
ANALOG INPUTS - Object Names	
AirFlow	
B3RetTemp	Yes
B3SupplyTemp	Yes
BldgDP	
BldgDPSPress	
CldDkSPress	
CldDkSupplyAirTemp	
CH3DP	Yes
CH3RetAirTemp	Yes
CH3SupplyAirTemp	Yes
CHWDP	
CHWRetTemp	
CHWSupplyTemp	
CoolerTemp	
CT2RetTemp	Yes
CT2SupplyTemp	Yes
CDWRetTemp	
CDWSupplyTemp	
DischAirTemp	
FreezerTemp	
HWRetTemp	
HWSupplyTemp	
KWPulse	
KwhPulse	
MixedAirTemp	
OARH	
OATemp	
PriCHW	
PreHeatTemp	
RetAirCO2	
RetAirRH	
RetAirTemp	
SpaceTemp	
SupplyAirTemp	
SpaceCO2	
SpaceRH	
ZoneSpaceCO2	
ZoneSpaceRH	
ZoneSpaceTemp	
CHWPriSupplyTemp	
CHWPriRetTemp	
CHWSecSupplyTemp	
CHWSecRetTemp	
CT2CDWHotBasinTemp	

Example of Object Name using Recommended Abbreviations	Include Equipment # in Object Name
ANALOG INPUTS - Object Names	
DHWBldgSupplyTemp	
DHWBldgRetTemp	
Meter23Current	Yes
Meter24Volts	Yes
CHWP2Speed	Yes
CHWP2Power, Kw, etc.	Yes
CH2IsoVlvPos	Yes
BINARY INPUTS - Object Names	
B1Alm	Yes
B1Status	Yes
BreakGlassAlm	
CldDkHighStaticCutOutAlm	
CH2Alm	Yes
CH2FlowSwitchAlm	Yes
CH2Status	Yes
CHWP1Status	Yes
CT2FanStatus	Yes
CDWP1Status	Yes
DmprPosStatus	
DuctSmokeDetectorAlm	
EF5Status	Yes
FilterDPStatus	
FanStatus	
FreezeAlm	
HighStaticCutOutAlm	
HWPStatus	
HotDkStaticCutOutAlm	
OccStatus	
PCHWP2Status	Yes
PreFilterDPStatus	
SpaceTempOvrStatus	
RetAirDsdAlm	
SupplyAirDsdAlm	
SCHWP2Status	Yes
ZoneTempOvrStatus	
BINARY OUTPUTS - Object Names	
B2StartStop	Yes
CH2StartStop	Yes
CH2IsoVlvCmd	Yes
CHWBypassVlvStartStop	
CHWP2StartStop	Yes
CT2FanStartStop	Yes
CT2IsoVlvCmd	Yes
CDWP1StartStop	Yes

Example of Object Name using Recommended Abbreviations	Include Equipment # in Object Name
BINARY OUTPUTS - Object Names	
CHWPIsoVlvCmd	Yes
DmprOpnCmd	
EF2StartStop	Yes
FanStartStop	
HotGasBypassCmd	
HWP2StartStop	Yes
HWP2IsoVlvCmd	Yes
LtgCktStartStop	Yes
OADOpnCmd	
PriCHWP2StartStop	Yes
RADOpnCmd	
SupplyAirFanCmd	
SCHWP2StartStop	Yes
Stage2ClgCmd	Yes
Stage2HtgCmd	Yes
ANALOG OUTPUTS - Object Names	
BypassDmprSignal	
CWP2VFDSignal	Yes
CHWVlvSignal	
CT2BasinVlvSignal	Yes
CDWP3SpeedSignal	Yes
CHWBypassVlvSignal	
DmprSignal	
EADSignal	
HWMixingVlvSignal	
HWPMixingVlvSignal	
HWVlvSignal	
OADSignal	
PCHWP2SpeedSignal	Yes
PreheatVlvSignal	
RADSignal	
ReheatVlvSignal	
SFSpeedControl	
SCHWP2SpeedSignal	Yes
Zone3DmprSignal	Yes

a. Character-Object Formatting Rules:

1). Must start with Alpha character

2). No special characters are to be used. The only special character that can be use is an underscore '_' in special cases.

3). Separate naming parts using camelback notation where the first letter is capitalized for each part. Example: DischAirTemp.

4). Specified abbreviations can be in all caps for their part. Example: OATemp

5). Whenever using the names Supply and Return on chilled and condenser water systems. Supply refers to the coldest water and return refers to the warmest water.

6). When naming the temperature output from a thermistor sensing device such as a space temperature sensor ensure the word Sensor is added to the object name, for instance SpaceTempSensor or SupplyAirTempSensor. This identifies the output as coming from the sensor before any offset or calibration. The displayed value after offset or calibration would be an AV and would be labeled as SpaceTemp or SupplyAirTemp. This approach helps to avoid confusion as to where the value comes from during searches for the temperature from thermistor devices. This rule will also apply to any other type of sensor where a raw value is brought in before correction or conversion.

2.04 BACNET PROTOCOL ANALYZER

A. Provide a BACnet protocol analyzer and required cables and fittings for connection to the BACnet network. The analyzer shall include the following minimum capabilities:

1. Capture and store to a file data traffic on all network levels.

2. Measure bandwidth usage.

3. Filtering options with ability to ignore select traffic.

2.05 SENSORS AND INPUT HARDWARE

A. Coordinate sensor types with the BAS Owner to keep them consistent with existing installations.

B. Field-Installed Temperature Sensors

1. Where feasible, provide the same sensor type throughout the project. Avoid using transmitters unless absolutely necessary.

2. Thermistors

    a. Precision thermistors may be used in applications below 200 degrees F. Sensor accuracy over the application range shall be 0.36 degree F or less between 32 to 150 degrees F. Stability error of the thermistor over five years shall not exceed 0.25 degrees F cumulative. A/D conversion resolution error shall be kept to 0.1 degrees F. Total error for a thermistor circuit shall not exceed 0.5 degrees F.

3. Resistance Temperature Detectors (RTDs)

    a. Provide RTD sensors with platinum elements compatible with the digital controllers. Encapsulate sensors in epoxy, series 300 stainless steel, anodized aluminum, or copper. Temperature sensor accuracy shall be 0.1 percent (1 ohm) of expected ohms (1000 ohms) at 32 degrees F. Temperature sensor stability error over five years shall not exceed 0.25 degrees F cumulative. Direct connection of RTDs to digital controllers without transmitters is preferred. When RTDs are connected directly, lead resistance error shall be less than 0.25 degrees F. The total error for a RTD circuit shall not exceed 0.5 degrees F.

4. Temperature Sensor Details

    a. Room Type: Provide the sensing element components within a decorative protective cover suitable for surrounding decor. Provide room temperature sensors with timed override button, setpoint adjustment lever, digital temperature display. Provide a communication port or 802.11x wireless support for a portable operator interface like a notebook computer or PDA.

    b. Duct Probe Type: Ensure the probe is long enough to properly sense the air stream temperature.

    c. Duct Averaging Type: Continuous averaging sensors shall be one foot in length for each 4 square feet of duct cross-sectional area, and a minimum length of 6 feet.

    d. Pipe Immersion Type: Provide minimum three-inch immersion. Provide each sensor with a corresponding pipe-mounted sensor well, unless indicated otherwise. Sensor wells shall be stainless steel when used in steel piping, and brass when used in copper piping. Provide the sensor well with a heat-sensitive transfer agent between the sensor and the well interior.

    e. Outside Air Type: Provide the sensing element on the building's north side with a protective weather shade that positions the sensor approximately 3 inches off the wall surface, does not inhibit free air flow across the sensing element, and protects the sensor from snow, ice, and rain.

2.06 TRANSMITTERS

A. Provide transmitters with 4 to 20 mA or 0 to 10 VDC linear output scaled to the sensed input. Transmitters shall be matched to the respective sensor, factory calibrated, and sealed. Size transmitters for an output near 50 percent of its full-scale range at normal operating conditions. The total transmitter error shall not exceed 0.1 percent at any point across the measured span. Supply voltage shall be 12 to 24 volts AC or DC. Transmitters shall have non-interactive offset and span adjustments. For temperature sensing, transmitter drift shall not exceed 0.03 degrees F a year.

1. Relative Humidity Transmitters

a. Provide transmitters with an accuracy equal to plus or minus 3 percent from 0 to 90 percent scale, and less than one percent drift per year. Sensing elements shall be the polymer type.

B. Pressure Transmitters

1. Provide transmitters integral with the pressure transducer.

C. Current Transducers

1. Provide current transducers to monitor motor amperage, unless current switches are shown on design drawings or point tables.

2. Air Quality Sensors

a. Provide power supply for each sensor.

3. CO2 Sensors

a. Provide photo-acoustic type CO2 sensors with integral transducers and linear output. The devices shall read CO2 concentrations between 0 and 2000 ppm with full scale accuracy of at least plus or minus 100 ppm.

D. Air Quality Sensors

1. Provide full spectrum air quality sensors using a hot wire element based on the Taguchi principle. The sensor shall monitor a wide range of gaseous volatile organic components common in indoor air contaminants like paint fumes, solvents, cigarette smoke, and vehicle exhaust. The sensor shall automatically compensate for temperature and humidity, have span and calibration potentiometers, operate on 24 VDC power with output of 0-10 VDC, and have a service rating of 32 to 140 degrees F and 5 to 95 percent relative humidity.

2.07 INPUT SWITCHES

A. Timed Local Overrides

1. Provide buttons or switches to override the DDC occupancy schedule programming for each major building zone during unoccupied periods, and to return HVAC equipment to the occupied mode. This requirement is waived for zones clearly intended for 24 hour continuous operation.

2.08 FREEZE PROTECTION THERMOSTATS

A. Provide special purpose thermostats with flexible capillary elements 20 feet minimum length for coil face areas up to 40 square feet. Provide longer elements for larger coils at 1-foot of element for every 4 square feet of coil face area, or provide additional thermostats. Provide switch contacts rated for the respective motor starter's control circuit voltage. Include auxiliary contacts for the switch's status condition. A freezing condition at any 18-inch increment along the sensing element's length shall activate the switch. The thermostat shall be equipped with a manual push-button reset switch so that when tripped, the thermostat requires manual resetting before the HVAC equipment can restart.

2.09 AIR FLOW MEASUREMENT STATIONS

A. Air flow measurement stations shall have an array of velocity sensing elements and straightening vanes inside a flanged sheet metal casing. The velocity sensing elements shall be the RTD or thermistor type, traversing the ducted air in at least two directions. The air flow pressure drop across the station shall not exceed 0.08 inch water gage at a velocity of 2,000 fpm. The station shall be suitable for air flows up to 5,000 fpm, and a temperature range of 40 to 120 degrees F. The station's measurement accuracy over the range of 125 to 2,500 fpm shall be plus or minus 3 percent of the measured velocity. Station transmitters shall provide a linear, temperature-compensated 4 to 20 mA or 0 to 10 VDC output. The output shall be capable of being accurately converted to a corresponding air flow rate in cubic feet per minute. Transmitters shall be a 2-wire, loop powered device. The output error of the transmitter shall not exceed 0.5 percent of the measurement.

2.10 ENERGY METERING

A. Electric Meters

1. Provide kilowatt-hour (kWh) meter(s) shown in accordance with NEMA/ANSI C12.10, suitable for the intended voltage, phases, and wye/delta configuration, with three current transformers and an output signal compatible with the DDC system. The meter shall have a box-mounted socket and an automatic circuit-closing bypass. Provide the meter with at least four pointer-type kWh registers, provisions for pulse initiation, and universal Class 2 indicating maximum kW demand register, sweep pointer indicating type, and at minimum a 15-minute interval. The meter accuracy shall be within plus or minus one percent of the actual kWh. Provide the correct multiplier on the meter face. Provide the current transformers in accordance with IEEE C57.13, with 600-volt insulation, and rated for metering with voltage, IL, momentary, and burden ratings

coordinated with the ratings of corresponding meters. Provide butyl-molded donut or window type transformers mounted on a bracket to allow secondary cables to connect to the transformer bushings. Provide wiring identification of the current transformer secondary feeders to permit field measurements to be taken with hook-on ammeters.

2. Electric meter shall be interfaced to the building automation system via BACnet MS/TP. Controls vendor to provide required communication device(s) to interface to the BACnet MS/TP trunk.

B. Gas Service Sub-Meters

1. Smart Sub-Meters: AGA/IAS-listed, positive displacement rotary type, gas meter with built-in diagnostics, compact size, no moving parts, high resolution large LCD screen, pressure compensating, non-temperature compensating, aluminum allow NEMA 3R enclosure, including a commercial grade electronic transmitter/counter and strainer. Factory set meter pressure for 5 psig. Pulse meter output set at 100 cubic feet per pulse. Powered by a replaceable lithium battery with 20-year minimum anticipated life. Provide interface interlocks with BacNet building automation system in the mechanical room. Provide a metering transmitting recording smart meter system including all required appurtenances, devices, fittings for a complete, operable system. Acceptable manufacturer and Model: Meter – Romet, RM3000, or approved equal; with electronic transmitter/counter – Romet, Adem-S, or approved equal; with Pulse output and Cable, 1 pulse = 100CF.

C. Water Meters

1. Smart Sub-Meters: Direct Couple Floating Rotor turbine meter, lead free bronze alloy housing complying with NSF/ANSI Standards 61 and 372. Meters meet or exceed registration accuracy for the low flow rates (95%), normal operating flow rates (100 ± 1.5%), and maximum continuous operation flow rates as specifically stated in AWWA Standard C700. Max. working pressure shall be 150 PSIG. Provide with register as described in paragraph 2 below. Acceptable Manufacturer and Model: Badger Meter Recordall Turbine Meter, or approved equal.

2. Register/Encoder: Electronic flow rate encoder with instant flow rate and accumulated total, and with Scaleable 4-20 mA analog output proportional to flow rate, battery operated. The 4-20mA output of this Register shall be used as the input to the Flow Monitor described in paragraph 3 below. Acceptable Manufacturer and Model: Badger Meter Recordall Encoder, Model HR-LCD 4-20; or approved equal.

3. Flow Monitor: Flow Monitor shall receive the 4-20mA output of the Register via connection cabling (twisted shielded pair). Provide with power supply accessory. Mount monitor near BAS Cabinet on wall at 5’-0”AFF. 120 V electrical power is required for the power supply accessory. Monitor shall be interlocked with and shall communicate with

BacNet building automation system via RS-485 MSTP BACnet MS/TP. Acceptable Manufacturer and Model: Badger Impeller Industrial Flow Monitor, Series 3000-11; or approved equal. Provide with Badger A1028 power supply; or approved equal.

D. BACnet MS/TP Interface

1. All meters shall be interfaced to the building automation system via BACnet MS/TP. Controls vendor to provide required communication device(s) to interface all digital meters to the BACnet MS/TP trunk interfaced to the building level controller.

E. Contactor shall comply with the requirements of the UMCS-MCX Army Metering Program Guidance for Advance Meters Dated 26 May 2016 (Revision 8). A copy of the document is included at the end of this section.

2.11 OUTPUT HARDWARE

A. Control Dampers

1. Refer to 23 33 00 “Air Duct Accessories”. Provide factory manufactured stainless steel dampers where indicated. Control dampers shall comply with SMACNA 1966 except as modified or supplemented by this specification. Published damper leakage rates and respective pressure drops shall have been verified by tests in compliance with AMCA 500-D requirements.

B. Provide damper assembly frames constructed of 0.064 inch minimum thickness stainless steel channels with mitered and welded corners. Damper axles shall be 0.5 inches minimum diameter plated steel rods supported in the damper frame by stainless steel or bronze bearings. Blades mounted vertically shall be supported by thrust bearings.

C. Dampers shall be rated for not less than 2000 fpm air velocity. The pressure drop through each damper when full-open shall not exceed 0.04 inches water gage at 1000 fpm face velocity. Damper assemblies in ductwork subject to above 3-inch water gauge static air pressure shall be constructed to meet SMACNA Seal Class "A" construction requirements.

D. Provide the damper operating linkages outside of the air stream, including crank arms, connecting rods, and other hardware that transmits motion from the damper actuators to the dampers, shall be adjustable. Additionally, operating linkages shall be designed and constructed to have a 2 to 1 safety factor when loaded with the maximum required damper operating force. Linkages shall be brass, bronze, galvanized steel, or stainless steel.

E. Provide access doors or panels in hard ceilings and walls for access to all concealed damper operators and damper locking setscrews.

F. For field-installed control dampers, a single damper section shall have blades no longer than 48 inches and no higher than 72 inches. The maximum damper blade width shall be 12 inches. Larger sized dampers shall be built using a combination of sections.

G. Frames shall be at least 2 inches wide. Flat blades shall have edges folded for rigidity. Blades shall be provided with compressible gasket seals along the full length of the blades to prevent air leakage when closed.

H. The damper frames shall be provided with jamb seals to minimize air leakage. Seals shall be suitable for an operating temperature range of minus 40 degrees F to 200 degrees F.

I. The leakage rate of each damper when full-closed shall be no more than 4 cfm per sq. foot of damper face area at 1.0 inches water gage static pressure.

2.12 ACTUATORS

A. Provide direct-drive electric actuators for all control applications, except where indicated otherwise.

B. Electric Actuators

1. Each actuator shall deliver the torque required for continuous uniform motion and shall have internal end switches to limit the travel, or be capable of withstanding continuous stalling without damage. Actuators shall function properly within 85 to 110 percent of rated line voltage. Provide actuators with hardened steel running shafts and gears of steel or copper alloy. Fiber or reinforced nylon gears may be used for torques less than 16 inch-pounds. Provide two-position actuators of single direction, spring return, or reversing type. Provide modulating actuators capable of stopping at any point in the cycle, and starting in either direction from any point. Actuators shall be equipped with a switch for reversing direction, and a button to disengage the clutch to allow manual adjustments. Provide the actuator with a hand crank for manual adjustments, as applicable. Thermal type actuators may only be used on terminal fan coil units, terminal VAV units, convectors, and unit heaters. Spring return actuators shall be provided on all control dampers and all control valves except terminal fan coil units, terminal VAV units, convectors, and unit heaters; unless indicated otherwise. Each actuator shall have distinct markings indicating the full-open and full-closed position, and the points in-between.

C. Output Switches

1. Control Relays

a. Field installed and DDC panel relays shall be double pole, double throw, UL listed, with contacts rated for the intended application, indicator light, and dust proof

enclosure. The indicator light shall be lit when the coil is energized and off when coil is not energized. Relays shall be the socket type, plug into a fixed base, and replaceable without tools or removing wiring. Encapsulated "PAM" type relays may be used for terminal control applications.

2.13 ELECTRICAL POWER AND DISTRIBUTION

A. Transformers

1. Transformers shall conform to UL 506. For control power other than terminal level equipment, provide a fuse or circuit breaker on the secondary side of each transformer.

B. Surge and Transient Protection

1. Provide each digital controller with surge and transient power protection. Surge and transient protection shall consist of the following devices, installed externally to the controllers.

2.14 POWER LINE SURGE PROTECTION

A. Provide surge suppressors on the incoming power at each controller or grouped terminal controllers. Surge suppressors shall be rated in accordance with UL 1449, have a fault indicating light, and conform to the following:

1. The device shall be a transient voltage surge suppressor, hard-wire type individual equipment protector for 120 VAC/1 phase/2 wire plus ground.

2. The device shall react within 5 nanoseconds and automatically reset.

3. The voltage protection threshold, line to neutral, shall be no more than 211 volts.

4. The device shall have an independent secondary stage equal to or greater than the primary stage joule rating.

5. The primary suppression system components shall be pure silicon avalanche diodes.

6. The secondary suppression system components shall be silicon avalanche diodes or metal oxide varistors.

7. The device shall have an indication light to indicate the protection components are functioning.

8. All system functions of the transient suppression system shall be individually fused and not short circuit the AC power line at any time.

9. The device shall have an EMI/RFI noise filter with a minimum attenuation of 13 dB at 10 kHz to 300 MHz.

10. The device shall comply with IEEE C62.41.1 and IEEE C62.41.2, Class "B" requirements and be tested according to IEEE C62.45.

11. The device shall be capable of operating between minus 20 degrees F and plus 122 degrees F.

B. Telephone and Communication Line Surge Protection

1. Provide surge and transient protection for DDC controllers and DDC network related devices connected to phone and network communication lines, in accordance with the following:

a. The device shall provide continuous, non-interrupting protection, and shall automatically reset after safely eliminating transient surges.

b. The protection shall react within 5 nanoseconds using only solid-state silicon avalanche technology.

c. The device shall be installed at the distance recommended by its manufacturer.

C. Controller Input/Output Protection

1. Provide controller inputs and outputs with surge protection via optical isolation, metal oxide varistors (MOV), or silicon avalanche devices. Fuses are not permitted for surge protection.

2.15 WIRING

Provide complete electrical wiring for the DDC System, including wiring to transformer primaries. Unless indicated otherwise, provide all normally visible or otherwise exposed wiring in conduit. Where conduit is required, control circuit wiring shall not run in the same conduit as power wiring over 100 volts. Run all circuits over 100 volts in conduit, metallic tubing, covered metal raceways, or armored cable. Use plenum-rated cable for circuits under 100 volts in enclosed spaces. Examples of these spaces include HVAC plenums, within walls, above suspended ceilings, in attics, and within ductwork.

A. Power Wiring

1. The following requirements are for field-installed wiring:

a. Wiring for 24 V circuits shall be insulated copper 18 AWG minimum and rated for 300 VAC service.

b. Wiring for 120 V circuits shall be insulated copper 14 AWG minimum and rated for 600 VAC service.

B. Analog Signal Wiring

1. Field-installed analog signal wiring shall be 18 AWG single or multiple twisted pair. Each cable shall be 100 percent shielded and have a 20 AWG drain wire. Each wire shall have insulation rated for 300 VAC service. Cables shall have an overall aluminum-polyester or tinned-copper cable-shield tape.

3.00 EXECUTION

3.01 INSTALLATION

Perform the installation under the supervision of competent technicians regularly employed in the installation of DDC systems.

A. BACnet Naming and Addressing

1. Coordinate with the BAS Owner and provide unique naming and addressing for BACnet networks and devices.

a. MAC Address

1). Every BACnet device shall have an assigned and documented MAC Address unique to its network. For Ethernet networks, document the MAC Address assigned at its creation. For ARCNET or MS/TP, assign from 00 to 64.

b. Network Numbering

1). Assign unique numbers to each new network installed on the BACnet internetwork. Provide ability for changing the network number; either by device switches, network computer, or field operator interface. The BACnet internetwork (all possible connected networks) can contain up to 65,534 possible unique networks.

c. Device Object Identifier Property Number

1). Assign unique Device "Object_Identifier" property numbers or device instances for each device on the BACnet internetwork. Provide for future modification of the device instance number; either by device switches, network computer, or field interface. BACnet allows up to 4,194,302 possible unique devices per internetwork.

d. Device Object Name Property Text

1). The Device Object Name property field shall support 32 minimum printable characters. Assign unique Device "Object_Name" property names with plain-English descriptive names for each device

2). For example:

3). The Device Object Name that for the device controlling the chiller plant at Building 3408 would be: Device Object_Name = CW System B3408

4). A Device Object Name for a VAV box controller might be: Device Object_Name = VAV BOX25

e. Object Name Property Text (Other than Device Objects)

1). The Object Name property field shall support 32 minimum printable characters. Assign Object Name properties with plain-English names descriptive of the application. Examples include "Zone 1 Temperature" and "Fan Start/Stop".

f. Object Identifier Property Number (Other than Device Objects)

1). Assign Object Identifier property numbers according to design drawings or tables if provided. If not provided, Object Identifier property numbers may be assigned at the Contractor's discretion but must be approved by the Government. In this case they must be documented and unique for like object types within the device.

B. Minimum BACnet Object Requirements

1. Use of Standard BACnet Objects

a. For the following points and parameters, use standard BACnet objects, where all relevant object properties can be read using BACnet's Read Property Service, and all relevant object properties can be modified using BACnet's Write Property Service: all device physical inputs and outputs, all set points, all PID tuning parameters, all calculated pressures, flow rates, and consumption values, all alarms, all trends, all schedules, and all equipment and lighting circuit operating status.

b. BACnet Object Description Property

1). The Object Description property shall support 32 minimum printable characters. For each object, complete the description property field using a brief, narrative, plain English description specific to the object and project application. For example: "HW Pump 1 Proof." Document compliance, length restrictions, and whether the description is writeable in the device PICS.

c. Analog Input, Output, and Value Objects

1). Support and provide Description and/or Device Type text strings matching signal type and engineering units shown on the points list.

d. Binary Input, Output, and Value Objects

1). Support and provide Inactive Text and Active Text property descriptions matching conditions shown on the points list.

e. Calendar Object

1). For devices with scheduling capability, provide at least one Calendar Object with ten-entry capacity. All operators may view Calendar Objects; authorized operators may make modifications from a workstation. Enable the writeable Date List property and support all calendar entry data types.

f. Schedule Object

1). Use Schedule Objects for all building system scheduling. All operators may view schedule entries; authorized operators may modify schedules from a workstation.

g. Loop Object or Equal

1). Use Loop Objects or equivalent BACnet objects in each applicable field device for PID control. Regardless of program method or object used, allow authorized operators to adjust the Update Interval, Setpoint, Proportional Constant, Integral Constant, and Derivative Constant using BACnet read/write services.

C. Minimum BACnet Service Requirements

1. Command Priorities: Use commandable BACnet objects to control machinery and systems, providing the priority levels listed below. If the sequence of operation requires a different priority, obtain approval from the Contracting Officer.

Priority Level	Application
1	Manual-Life Safety

2	Automatic-Life Safety
3	(User Defined)
4	(User Defined)
5	Critical Equipment Control
6	Minimum On/Off
7	(User Defined)
8	Manual Operator
9	(User Defined)
10	(User Defined)
11	Load Shedding
12	(User Defined)
13	(User Defined)
14	(User Defined)
15	(User Defined)
16	(User Defined)

2. Alarming

    a. Alarm Priorities - Coordinate alarm and event notification with the BAS Owner.

    b. Notification Class - Enable writeable Priority, Ack Required, and Recipient List properties of Notification Class objects.

    c. Event Notification Message Texts - Use condition specific narrative text and numerical references for alarm and event notification.

3. Updating Displayed Property Values

    a. Allow workstations to display property values at discrete polled intervals, or based on receipt of confirmed and unconfirmed Change of Value notifications. The COV increment shall be adjustable by an operator using BACnet services, and polled intervals shall be adjustable at the operator workstation.

D. Local Area Networks

1. Obtain Government approval before connecting new networks with existing networks. Network numbers and device instance numbers shall remain unique when joining networks. Do not change existing network addressing without Government approval. See also "BACnet Naming and Addressing".

E. BACnet Routers, Bridges, and Switches

1. Provide the quantity of BACnet routers, bridges, and switches necessary for communications shown on the BACnet Communication Architecture schematic. Provide BACnet routers with BACnet Broadcast Message Device (BBMD) capability on each BACnet internetwork communicating across an IP network. Configure each BACnet device and bridge, router, or switch to communicate on its network segment.

F. Wiring Criteria

1. Run circuits operating at more than 100 volts in rigid or flexible conduit, metallic tubing, covered metal raceways, or armored cable.

2. Do not run binary control circuit wiring in the same conduit as power wiring over 100 volts. Where analog signal wiring requires conduit, do not run in the same conduit with AC power circuits or control circuits operating at more than 100 volts.

3. Provide circuit and wiring protection required by NFPA 70.

4. Run all wiring located inside mechanical rooms in conduit.

5. Do not bury aluminum-sheathed cable or aluminum conduit in concrete.

6. Input/output identification: Permanently label each field-installed wire, cable, and pneumatic tube at each end with descriptive text using a commercial wire marking system that fully encircles the wire, cable, or tube. Locate the markers within 2 inches of each termination. Match the names and I/O number to the project's point list. Similarly label all power wiring serving control devices, including the word "power" in the label. Number each pneumatic tube every six feet. Label all terminal blocks with alpha/numeric labels. All wiring and the wiring methods shall be in accordance with UL 508A.

7. For controller power, provide new 120 VAC circuits, with ground. Provide each circuit with a dedicated breaker, and run wiring in its own conduit, separate from any control wiring. Connect the controller's ground wire to the electrical panel ground; conduit grounds are not acceptable.

8. Surge Protection: Install surge protection according to manufacturer's instructions. Multiple controllers fed from a common power supply may be protected by common surge protector, properly sized for the total connected devices.

9. Grounding: Ground controllers and cabinets to a good earth ground as specified in Section 26 20 00 INTERIOR DISTRIBUTION SYSTEM. Conduit grounding is not acceptable; all grounding shall have a direct path to the building earth ground. Ground sensor drain wire shields at the controller end.

10. The Contractor shall be responsible for correcting all associated ground loop problems.

11. Run wiring in panel enclosures in covered wire track.

G. Accessibility

1. Install all equipment so that parts requiring periodic inspection, operation, maintenance, and repair are readily accessible. Install digital controllers, data ports, and

concealed actuators, valves, dampers, and like equipment in locations freely accessible through access doors.

H. Digital Controllers

1. Install as stand alone control devices (see definitions).

2. Locate control cabinets at the locations shown on the drawings. If not shown on the drawings, install in the most accessible space, close to the controlled equipment.

I. Hand-Off-Auto Switches

1. Wire safety controls such as smoke detectors and freeze protection thermostats to protect the equipment during both hand and auto operation.

J. Temperature Sensors

1. Install temperature sensors in locations that are accessible and provide a good representation of sensed media. Installations in dead spaces are not acceptable. Calibrate sensors according to manufacturer's instructions. Do not use sensors designed for one application in a different application.

K. Room Temperature Sensors

1. Mount the sensors on interior walls to sense the average room temperature at the locations indicated. Avoid locations near heat sources such as copy machines or locations by supply air outlet drafts. Mount the center of the sensor at the heights indicated on drawings.

L. Duct Temperature Sensors

1. Probe Type: Provide a gasket between the sensor housing and the duct wall. Seal the duct penetration air tight. Seal the duct insulation penetration vapor tight.

2. Averaging Type (and coil freeze protection thermostats): Weave the capillary tube sensing element in a serpentine fashion perpendicular to the flow, across the duct or air handler cross-section, using durable non-metal supports. Prevent contact between the capillary and the duct or air handler internals. Provide a duct access door at the sensor location. The access door shall be hinged on the side, factory insulated, have cam type locks, and be as large as the duct will permit, maximum 18 by 18 inches. For sensors inside air handlers, the sensors shall be fully accessible through the air handler's access doors without removing any of the air handler's internals.

M. Outside Air Temperature Sensors

1. Provide outside air temperature sensors in weatherproof enclosures on the north side of the building, away from exhaust hoods and other areas that may affect the reading. Provide a shield to shade the sensor from direct sunlight.

N. Energy Meters

1. Locate energy meters as indicated. Connect each meter output to the DDC system, to measure both instantaneous and accumulated energy usage. Refer to design drawings for more information.

O. Damper Actuators

1. Where possible, mount actuators outside the air stream in accessible areas.

P. Thermometers and Gages

1. Mount devices to allow reading while standing on the floor or ground, as applicable.

Q. Pressure Sensors

1. Locate pressure sensors as indicated.

R. Component Identification Labeling

1. Using an electronic hand-held label maker with white tape and bold black block lettering, provide an identification label on the exterior of each new control panel, control device, actuator, and sensor. Also provide labels on the exterior of each new control actuator indicating the (full) open and (full) closed positions. For labels located outdoors, use exterior grade label tape, and provide labels on both the inside and outside of the panel door or device cover. Acceptable alternatives are white plastic labels with engraved bold black block lettering permanently attached to the control panel, control device, actuator, and sensor. Have the labels and wording approved by the BAS Owner prior to installation.

S. Network and Telephone Communication Lines

1. When telephone lines or network connections by the Government are required, provide the Contracting Officer at least 60 days advance notice of need.

3.02 TEST AND BALANCE SUPPORT

A. The controls contractor shall coordinate with and provide on-site support to the test and balance (TAB) personnel specified under Section 23 05 93 TESTING, ADJUSTING AND BALANCING. This support shall include:

1. On-site operation and manipulation of control systems during the testing and balancing.

2. Control setpoint adjustments for balancing all relevant mechanical systems, including VAV boxes.

3. Tuning control loops with setpoints and adjustments determined by TAB personnel.

3.03 CONTROLS SYSTEM OPERATORS MANUALS

A. Provide two electronic and printed copies of a Controls System Operators Manual. The manual shall be specific to the project, written to actual project conditions, and provide a complete and concise depiction of the installed work. Provide information in detail to clearly explain all operation requirements for the control system.

B. Provide with each manual: CDs of the project's control system drawings, control programs, data bases, graphics, and all items listed below. Include gateway back-up data and configuration tools where applicable. Provide CDs in jewel case with printed and dated project-specific labels on both the CD and the case. For text and drawings, use Adobe Acrobat or MS Office file types. When approved by the Government, AutoCAD and Visio files are allowed. Give files descriptive English names and organize in folders.

C. Provide printed manuals in sturdy 3-ring binders with a title sheet on the outside of each binder indicating the project title, project location, contract number, and the controls

contractor name, address, and telephone number. Each binder shall include a table of contents and tabbed dividers, with all material neatly organized. Manuals shall include the following:

1. A copy of the as-built control system (shop) drawings set, with all items specified under the paragraph "Submittals." Indicate all field changes and modifications.

2. A copy of the project's mechanical design drawings, including any official modifications and revisions.

3. A copy of the project's approved Product Data submittals provided under the paragraph "Submittals."

4. A copy of the project's approved Performance Verification Testing Plan and Report.

5. A copy of the project's approved final TAB Report.

6. Printouts of all control system programs, including controller setup pages if used. Include plain-English narratives of application programs, flowcharts, and source code.

7. Printouts of all physical input and output object properties, including tuning values, alarm limits, calibration factors, and set points.

8. A table entitled "AC Power Table" listing the electrical power source for each controller. Include the building electrical panel number, panel location, and circuit breaker number.

9. The DDC manufacturer's hardware and software manuals in both print and CD format with printed project-specific labels. Include installation and technical manuals for all controller hardware, operator manuals for all controllers, programming manuals for all controllers, operator manuals for all workstation software, installation and technical manuals for the workstation and notebook, and programming manuals for the workstation and notebook software.

10. A list of qualified control system service organizations for the work provided under this contract. Include their addresses and telephone numbers.

11. A written statement entitled "Technical Support" stating the control system manufacturer or authorized representative will provide toll-free telephone technical support at no additional cost to the Government for a minimum of two years from project acceptance, will be furnished by experienced service technicians, and will be available during normal weekday working hours. Include the toll-free technical support telephone number.

12. A written statement entitled "Software Upgrades" stating software and firmware patches and updates will be provided upon request at no additional cost to the Government for a minimum of two years from contract acceptance. Include a table of all

DDC system software and firmware provided under this contract, listing the original release dates, version numbers, part numbers, and serial numbers.

D. Storage Cabinets

1. In each project mechanical room, provide a wall-mounted metal storage cabinet with hinged doors. In addition to the number of manuals specified above, provide an additional copy of the manuals in each of these mechanical room storage cabinets. Provide cabinets large enough to hold the entire set of Controls System Operators Manuals, and the HVAC operation and maintenance manuals provided under Division 15 MECHANICAL. Locate cabinets adjacent to DDC control panels where applicable. Have each cabinet's proposed installation site approved in advance by the Contracting Officer and the BAS Owner. Prominently label each cabinet with the wording "OPERATION AND MAINTENANCE MANUALS." Prominently label each binder with the wording "MECHANICAL ROOM COPY - DO NOT REMOVE."

3.04 PERFORMANCE VERIFICATION TESTING (PVT)

A. General

1. The PVT shall demonstrate compliance of the control system work with the contract requirements. The PVT shall be performed by the Contractor and witnessed and approved by the Engineer and/or Government’s approved representative. If the project is phased, provide separate testing for each phase. A Pre-PVT meeting to review the Pre-PVT Checklist is required to coordinate all aspects of the PVT and shall include the Contractor's QA representative, the Contractor's PVT administrator, the Contracting Officer's representative, and the BAS Owner.

B. Performance Verification Testing Plan

1. Submit a detailed PVT Plan of the proposed testing for the Engineer and/or Government’s approved representative approval. Develop the PVT Plan specifically for the control system in this contract. The PVT Plan shall be a clear list of test items arranged in a logical sequence. Include the intended test procedure, the expected response, and the pass/fail criteria for every component tested.

2. The plan shall clearly describe how each item is tested, indicate where assisting personnel are required (like the mechanical contractor), and include what procedures are used to simulate conditions. Include a separate column for each checked item and extra space for comments. Where sequences of operations are checked, insert each corresponding routine from the project’s sequence of operation. For each test area, include signature and date lines for the Contractor's PVT administrator, the Contractor's QA representative, the Contracting Officer's representative, and the BAS Owner to

acknowledge successful completion. The BAS Owner can provide sample PVT forms and procedures upon request.

C. PVT Sample Size

1. Test all central plant equipment and primary air handling unit controllers unless otherwise directed. Twenty percent sample testing is allowed for identical controllers typical of terminal control like VAV boxes and fan coil units. The Engineer and/or Government's approved representative may require testing of like controllers beyond a statistical sample if sample controllers require retesting or do not have consistent results.

2. The Engineer and/or Government's approved representative may witness all testing, or random samples of PVT items. When only random samples are witnessed, the Engineer and/or Government's approved representative may choose which ones.

D. Pre-Performance Verification Testing Checklist

1. Submit the following as a list with items checked off once verified. Provide a detailed explanation for any items that are not completed or verified.

   a. Verify all required mechanical installation work is successfully completed, and all HVAC equipment is working correctly (or will be by the time the PVT is conducted).

   b. Verify HVAC motors operate below full-load amperage ratings.

   c. Verify all required control system components, wiring, and accessories are installed.

   d. Verify the installed control system architecture matches approved drawings.

   e. Verify all control circuits operate at the proper voltage and are free from grounds or faults.

   f. Verify all required surge protection is installed.

   g. Verify the A/C Power Table specified in "CONTROLS SYSTEM OPERATORS MANUALS" is accurate.

   h. Verify all DDC network communications function properly, including uploading and downloading programming changes.

   i. Using the BACnet protocol analyzer (if provided or required in this specification), verify communications are error free.

   j. Verify each digital controller's programming is backed up.

   k. Verify all wiring, components, and panels are properly labeled.

l. Verify all required points are programmed into devices.

m. Verify all TAB work affecting controls is complete.

n. Verify all valve and actuator zero and span adjustments are set properly.

o. Verify all sensor readings are accurate and calibrated.

p. Verify each control valve and actuator goes to normal position upon loss of power.

q. Verify all control loops are tuned for smooth and stable operation.

1). View trend data where applicable.

r. Verify each controller works properly in stand-alone mode.

s. Verify all safety controls and devices function properly, including freeze protection and interfaces with building fire alarm systems.

t. Verify all electrical interlocks work properly.

u. Verify all workstations, notebooks and maintenance personnel interface tools are delivered, all system and database software is installed, and graphic pages are created for each workstation and notebook.

v. Verify the as-built (shop) control drawings are completed.

E. Conducting Performance Verification Testing

1. Conduct Engineer and/or Government's approved representative witnessed PVT after approval of the PVT Plan and the completed Pre-PVT Checklist. Notify the Engineer and/or Government's approved representative of the planned PVT at least 15 days prior to testing. Provide an estimated time table required to perform the testing. Furnish personnel, equipment, instrumentation, and supplies necessary to perform all aspects of the PVT. Ensure that testing personnel are regularly employed in the testing and calibration of DDC systems. Using the project's as-built control system (shop) drawings, the project's mechanical design drawings, the approved Pre-PVT Checklist, and the approved PVT Plan, conduct the PVT.

2. During testing, identify any items that do not meet the contract requirements and if time permits, conduct immediate repairs and re-test. Otherwise, deficiencies shall be investigated, corrected, and re-tested later. Document each deficiency and corrective action taken.

3. If re-testing is required, follow the procedures for the initial PVT. The Government may require re-testing of any control system components affected by the original failed test.

F. Controller Capability and Labeling Test the following for each controller:

1. Memory: Demonstrate that programmed data, parameters, and trend/ alarm history collected during normal operation is not lost during power failure.

2. Direct Connect Interface: Demonstrate the ability to connect directly to each type of digital controller with a portable electronic device like a notebook computer or PDA. Show that maintenance personnel interface tools perform as specified in the manufacturer's technical literature.

3. Stand Alone Ability: Demonstrate controllers provide stable and reliable stand-alone operation using default values or other method for values normally read over the network.

4. Wiring and AC Power: Demonstrate the ability to disconnect any controller safely from its power source using the AC Power Table. Demonstrate the ability to match wiring labels easily with the control drawings. Demonstrate the ability to locate a controller's location using the BACnet Communication Architecture Schematic and floor plans.

5. Nameplates and Tags: Show the nameplates and tags are accurate and permanently attached to control panel doors, devices, sensors, and actuators.

G. Workstation and Software Operation: For every user workstation or notebook provided:

1. Show points lists agree with naming conventions.

2. Show that graphics are complete.

3. Show the UPS operates as specified.

H. BACnet Communications and Interoperability Areas

1. Demonstrate proper interoperability of data sharing, alarm and event management, trending, scheduling, and device and network management. If available or required in this specification, use a BACnet protocol analyzer to assist with identifying devices, viewing network traffic, and verifying interoperability. These requirements must be met even if there is only one manufacturer of equipment installed. Testing includes the following:

a. Data Presentation: On each BACnet Operator Workstation, demonstrate graphic display capabilities.

b. Reading of Any Property: Demonstrate the ability to read and display any used readable object property of any device on the network.

c. Setpoint and Parameter Modifications: Show the ability to modify all setpoints and tuning parameters in the sequence of control or listed on project schedules.

Modifications are made with BACnet messages and write services initiated by an operator using workstation graphics, or by completing a field in a menu with instructional text.

d. Peer-to-Peer Data Exchange: Show all BACnet devices are installed and configured to perform BACnet read/write services directly (without the need for operator or workstation intervention), to implement the project sequence of operation, and to share global data.

e. Alarm and Event Management: Show that alarms/events are installed and prioritized according to the BAS Owner. Demonstrate time delays and other logic is set up to avoid nuisance tripping, e.g., no status alarms during unoccupied times or high supply air during cold morning start-up. Show that operators with sufficient privilege can read and write alarm/event parameters for all standard BACnet event types. Show that operators with sufficient privilege can change routing (BACnet notification classes) for each alarm/event including the destination, priority, day of week, time of day, and the type of transition involved (TO-OFF NORMAL, TO-NORMAL, etc.).

f. Schedule Lists: Show that schedules are configured for start/stop, mode change, occupant overrides, and night setback as defined in the sequence of operations.

g. Schedule Display and Modification: Show the ability to display any schedule with start and stop times for the calendar year. Show that all calendar entries and schedules are modifiable from any connected workstation by an operator with sufficient privilege.

h. Archival Storage of Data: Show that data archiving is handled by the operator workstation/server, and local trend archiving and display is accomplished with BACnet Trend Log objects.

i. Modification of Trend Log Object Parameters: Show that an operator with sufficient privilege can change the logged data points, sampling rate, and trend duration.

j. Device and Network Management: Show the following capabilities:

    1). Display of Device Status Information

    2). Display of BACnet Object Information

    3). Silencing Devices that are Transmitting Erroneous Data

    4). Time Synchronization

    5). Remote Device Reinitialization

6). Backup and Restore Device Programming and Master Database(s)

7). Configuration Management of Half-Routers, Routers and BBMDs

I. Execution of Sequence of Operation

1. Demonstrate that the HVAC system operates properly through the complete sequence of operation. Use read/write property services to globally read and modify parameters over the internetwork.

J. Control Loop Stability and Accuracy

1. For all control loops tested, give the Engineer and/or Government's approved representative trend graphs of the control variable over time, demonstrating that the control loop responds to a 20 percent sudden change of the control variable set point without excessive overshoot and undershoot. If the process does not allow a 20 percent set point change, use the largest change possible. Show that once the new set point is reached, it is stable and maintained. Control loop trend data shall be in real-time with the time between data points 30 seconds or less.

K. Performance Verification Testing Report

1. Upon successful completion of the PVT, submit a PVT Report to the Engineer and/or Government's approved representative and prior to the Government taking use and possession of the facility. Do not submit the report until all problems are corrected and successfully re-tested. The report shall include the annotated PVT Plan used during the PVT. Where problems were identified, explain each problem and the corrective action taken. Include a written certification that the installation and testing of the control system is complete and meets all of the contract's requirements.

3.05 TRAINING REQUIREMENTS

Provide a qualified instructor (or instructors) with two years minimum field experience with the installation and programming of similar BACnet DDC systems. Orient training to the specific systems installed. Coordinate training times with the Contracting Officer and BAS Owner after receiving approval of the training course documentation. Training shall take place at the job site and/or a nearby Government-furnished location. A training day shall occur during normal working hours, last no longer than 8 hours and include a one-hour break for lunch and two additional 15-minute breaks. The project's approved Controls System Operators Manual shall be used as the training text. The Contractor shall ensure the manuals are submitted, approved, and available to hand out to the trainees before the start of training.

A. Training Documentation

1. Submit training documentation for review 30 days minimum before training. Documentation shall include an agenda for each training day, objectives, a synopses of each lesson, and the instructor's background and qualifications. The training

documentation can be submitted at the same time as the project's Controls System Operators Manual.

B. Training

1. Provide a total of 80 hours of training to the Government. This shall be split into one (1) day onsite training, one (1) day classroom training and the remaining hours shall be distributed at 8 hours training session every quarter. The training hours shall not have an expiry date. The training session shall be conducted in a classroom environment with complete audio-visual aids provided by the contractor. The trainee shall have a laptop computer connected to the DDC system workstation Provide each trainee a printed 8.5 by 11 inch hard-copy of all visual aids used. Upon completion of the Training, each trainee should fully understand the project's DDC system fundamentals and system operation. The training session shall include the following:

    a. BACnet fundamentals (objects, services, addressing) and how/where they are used on this project

    b. This project's list of control system components

    c. This project's list of points and objects

    d. This project's device and network communication architecture

    e. This project's sequences of control, and:

    f. Alarm capabilities

    g. Trending capabilities

    h. Troubleshooting communication errors

    i. Troubleshooting hardware errors

    j. A walk-through tour of the mechanical system and the installed DDC components (controllers, valves, dampers, surge protection, switches, thermostats, sensors, etc.)

    k. A discussion of the components and functions at each DDC panel c. Logging- in and navigating at each operator interface type

    l. Using each operator interface to find, read, and write to specific controllers and objects

    m. Modifying and downloading control program changes

    n. Modifying setpoints

    o. Creating, editing, and viewing trends

p. Creating, editing, and viewing alarms

q. Creating, editing, and viewing operating schedules and schedule objects

r. Backing-up and restoring programming and data bases

s. Modifying graphic text, backgrounds, dynamic data displays, and links to other graphics

t. Creating new graphics and adding new dynamic data displays and links

u. Alarm and Event management

v. Adding and removing network devices

3.06 UMCS-MCX ARMY METERING PROGRAM GUIDANCE FOR ADVANCED METERS

UMCS-MCX
Army Metering Program
Guidance for Advanced Meters

26 May 2016
Revision 8

Note: Revision 8 deletes the reference to AWWA C706 in Paragraph 3.5 Water Meter as it no longer exists and has no replacement.

Purpose:

a. The purpose of the following guidance is to achieve meter equipment compatibility with the Army Metering Program pursuant to Public Law 109-58, Section 103 of the Energy Policy Act of 2005. This does not replace the Unified Facility Guide Specifications on metering; additional technical and installation requirements and applicable references may be located there as needed. This guidance provides guidance to meet the minimum requirements for metering as established by public law and Army policy. The intent is for all advanced meters to report their data to an installation-centric energy reporting and management system such as a Utility Monitoring and Control System or Advanced Metering Data Management System (MDMS) Installation Level front end. This approach is consistent with UFC 1-200-02, High Performance and Sustainable Building Requirements**,** Paragraphs 2-4.4 and 3-4.3, Measurement, states: "All meters must be connected to a base wide energy and utility monitoring and control system using the installation's advanced metering protocols. The installation of meters is required per DoDI 4170.11." The advanced meters must provide data at least daily and measure at least hourly consumption of electricity in fifteen minute intervals.

b. General Theory of Operation: Utility Meters are installed to monitor electricity, gas, water, and steam usage. Typically, meters are connected to a field control network utilizing either LonTalk

(ANSI 709.1-C) over TP/FT-10, Modbus RTU over EIA 485, or BACnet over EIA 485. Generally, meters communicate over a local building-level network to a building/facility point of connection (BPOC/FPOC) which then communicates via the installation's Network Enterprise Center (NEC) IP network to an "Installation Level Front End", often an existing Utility Monitoring and Control System/Energy Monitoring and Control System (UMCS/EMCS) Front-End server. Meter data is provided to the graphical user interface for display and to any associated UMCS applications programmed to optimize operations. The data is then stored in a Structured Query Language (SQL) database. The SQL database may be the database regularly used by the UMCS applications or a separate SQL database installed specifically for meter data. On a regular basis the MDMS Gateway, located in the DMZ (demilitarized zone) of the installation (outside the inner firewall), or RCC (Regional Cyber Center), retrieves data from the SQL database and sends it to the MDMS Enterprise Server.

Notes:

1) In some cases electric meters may be connected directly to an IP network, but this is considered a non-standard approach.

2) The approach detailed above is used for other (non-electrical) metering also, but generally only total consumption is measured for non-electricity meters, and non-electricity meters may provide a pulse output that is measured by an electric meter digital input or controller on the network in lieu of being connected to the network themselves. Electrical meters with additional external digital inputs are allowed for other meter data collection.

c. The means for meter data transmission using open-protocols such as ANSI/CEA 709.1-C, Modbus RTU, and BACnet over Government owned transport media (LAN, telephone carrier, wireless, radio, microwave, or power line carrier, etc.) will be site specific and subject to the approval of the Network Enterprise Center (NEC). This guidance provides the flexibility needed to support the various data transmission system alternatives in addition to meeting the minimum standards for energy consumption data recording and reporting. A key element for success will be integrating these systems with the Army's Information Technology (IT) networks supported by Network Enterprise Centers (NEC).

Applicability: These requirements apply to all Army meters for use on facilities that meet the size and energy-consumption selection criteria regardless of the funding source and method of procurement (i.e. Military Construction Army (MCA) projects, Utility Privatization contracts, Energy Savings and Performance Contracts, or Sustainment Modernization and Repair projects).

Definitions:

a. Advanced Metering Data Management System Installation Level front end. This term as used in the guidance refers to the system that will collect, manage, and display the meter data for the local energy manager. It may be a new system or it may consist of the existing Legacy UMCS/EMCS and its associated building level controllers that have been upgraded with the necessary hardware/software as

required. The intent of the Army Metering Program is to provide the metering data to the local engineering staff first within the building automation system that can execute application programs to affect savings, and then transmit to the Enterprise Meter Data Management System, when activated.

b. Advanced Meters. For this guidance, Advanced Meters are those that have the capability to measure and record interval data (at least hourly for electricity), and communicate the data to a remote location in a format that can be easily integrated into an advanced meter data management system. EPAct Section 103 requires at least daily data collection capability; and although the policy requires at least hourly, to best analyze rate data, a 15 minute recording interval is recommended. Most advanced meters offer additional features which may be attractive to system owners. Advanced meters do not offer two way communications or a kill switch for power to the facility. These functions are normally associated with smart meters.

References:

a. UFGS 25 10 10, Utility Monitoring and Control System (UMCS) Front End and Integration

b. UFGS 26 27 13.10 30, Electric Meters - prepared by the Air Force

c. UFGS 26 27 14.00 20, Electricity Metering - prepared by the Navy

d. UFGS 33 51 13.00 30, Natural-Gas Metering - prepared by the Air Force

e. UFGS 33 12 33.00 30, Water Utility Metering - prepared by the Air Force

f. UFGS 33 63 23, Exterior Aboveground Steam Distribution - prepared by the Navy

g. UFC 1-200-02, High Performance and Sustainable Buildings

With respect to the two Electrical Metering Guide specifications and although these are listed as Unified in the Construction Criteria Base, the preparing activity has focused on their specific requirements that may not fulfill the Army's needs. However, as this Mandatory Center of Expertise (MCX) guidance is not intended to provide the level of detail for contract requirements, the designer should refer to these as needed, edit for the specific project, and include the detail for completeness. The Navy specification has some excellent drawings/sketches that are useful. The goal is to create a truly unified Electrical Metering Specification in FY16.

h. Additional documentation noted below is available as separate electronic media files upon request. Contact the POC listed on last page.

1. Enterprise Energy Data Reporting System Security Functional Architecture Ver. 2.3.1
2. Advanced Meter Points List

3. I3A Technical Criteria Feb 2010

CONTENT OUTLINE

1.0 Installation Level Front End Computer
- 1.1 Open Protocol
- 1.2 Meter Data Storage and Point Naming Conventions
- 1.3 Meter Identification and Location Data
- 1.4 Storage of Metered Data
- 1.5 Workstation Display
- 1.6 Energy Reports

2.0 Communications
- 2.1 Between Meters and Installation Level Front End
- 2.2 Between Installation Level Front End and Enterprise MDMS System
- 2.3 Cybersecurity Requirements

3.0 Meters
- 3.1 Environmental Tolerances of Metering Devices
- 3.2 Advanced Meter Capability
  - 3.2.1 Communication Protocol and Methods
  - 3.2.2 Pulse Input Data Port Interface
  - 3.2.3 Data Storage and Trend Logs
  - 3.2.4 Meter Display
- 3.3 Electric Meter
  - 3.3.1 Power Systems
  - 3.3.2 Measured Values (mandatory and optional)
  - 3.3.3 Accuracy
  - 3.3.4 Surge Protection
  - 3.3.5 Instrumentation (CTs and PTs)
  - 3.3.6 Disconnects and Shorting Blocks
- 3.4 Gas Meter
  - 3.4.1 Requirements
  - 3.4.2 Gas Meter Types
  - 3.4.3 Valves and Regulators
  - 3.4.4 Gas Meter Installation
  - 3.4.5 Connections
  - 3.4.6 Pressure and Leak Tests
- 3.5 Water Meter
  - 3.5.1 Requirements
  - 3.5.2 Water Meter Types
  - 3.5.3 Water Meter Installation
  - 3.5.4 Valves

1.0 INSTALLATION LEVEL FRONT END COMPUTER

1.1 Open Protocol. Where no existing UMCS/EMCS can satisfy the Advanced Metering Data Management System Installation Level requirements, the design shall include a LonWorks based, BACnet based, or Niagara Framework (Tridium) based Open System Host for the front end data management system. The Open System Host shall be installed in accordance with UFGS 25 10 10, Utility Monitoring and Control System (UMCS) Front End and Integration. There are new open protocol building level specifications published at wbdg.org:

a. UFGS 23 09 00, Instrumentation and Control for HVAC;

b. UFGS 23 09 23.01, LonWorks Direct Digital Control for HVAC and Other Building Control Systems; and

c. UFGS 23 09 23.02, BACnet Direct Digital Control for HVAC and Other Building Control Systems.

These will all provide guidance on their specific communication media.

1.2 Meter Data Storage and Point Naming Conventions. The meter data shall be stored per the defined convention shown below in a full version Microsoft SQL data base for future retrieval by others. The future site Meter Data Management System (MDMS) Gateway will retrieve and re-transmit the meter data to an Enterprise Army Meter Data Management System. The contractor supplied Microsoft SQL database may be native to the Host UMCS/Metering Front-End or an entirely separate SQL database

dedicated to SQL data storage. The Contractor must follow the applicable Security Configuration Guide for SQL partitioning and hardening procedures.

a. Existing UMCS systems point names vary by system capabilities and site conventions. The site naming convention must be followed where possible. Approval is required from HNC prior to alternative point name creation. This is to ensure there are no conflicts with the MDMS gateway requirements.

b. Primary equipment names:

- Servers are named EEDRS. However, the local data center server naming convention takes priority.

- Building/Facility Point of Connection (BPOC/FPOC). Name is by site and building. Use no space, period or dash unless system constraints dictate otherwise: SiteBuilding#. Example: FTBRAGG3720

- LON TP/FT10 channel names. Name in this order: Protocol Site Building#. Example: LON Bragg 100. Note that here a space is used to separate.

c. The following point naming conventions are approved for new system installations:

SiteName is the Post name.

Building# - is the building number containing the meter; it is always the number of the building, although that building number may include a letter.

Meter - is the meter type within the building: electric, gas, water, steam; use the word METER for electric meters and the words GAS, WATER, STEAM, BTU for the other types of meters.

Meter # - is the meter number (the nth number) within the building.

Parameter - is the name of the measured variable

For single site systems:
Building#_Meter_Meter#_Parameter
Building#.Meter_Meter#.Parameter

BLDG_2315_METER_2_VOLTS_A_B
BLDG_2315.METER_2.VOLTS_A_B

For multi-site systems, where a regional host exists:
SiteName_Building#_Meter_Meter#_Parameter
Sitename.Building#.Meter_Meter#.Parameter

Example:
HOOD_2315_METER_2_KW
HOOD_2315.METER_2.KW

Where a site area designator is required:
SiteName_Area_Building#_METER_Meter#_Parameter

Example:
Hood_A_2315_METER_2_KW
Hood_A.2315.METER_2.KW

Note: Some UMCS host software may automatically attach the Building/Facility Point of Connection (JACEx or NAE) to the point name.

d. Provide the following meter data:

PWR_TOT	Real Power (Total of Phases)	KW
KWH_TOT	Total KWH (Total Energy)	KWH
PWR_DEMAND	Demand Power	KW
PWR_DEMAND_PEAK	Historical Peak Demand Power	KW
VOLT_A_B	Rms Voltage For Phase A	VOLTS
VOLT_B_C	Rms Voltage For Phase B	VOLTS
VOLT_C_A	Rms Voltage For Phase C	VOLTS
AMP_A	Rms Current For Phase A	AMPS
AMP_B	Rms Current For Phase B	AMPS
AMP_C	Rms Current For Phase C	AMPS
PF_A	Power Factor Phase A	PF
PF_B	Power Factor Phase B	PF
PF_C	Power Factor Phase C	PF
PF_Total	Power Factor Total	PF
VAR or KVAR	Reactive Power	Power
CF	Cubic Feet	
GAL	Gallons	

1.3 Meter Identification and Location Data. Contractor shall populate the sample information document shown in the table below and display and store at Installation Level Front End Computer.

Fort Sample Electric Meter Information							
Bldg No.	**Bldg Name**	**Bldg Sqft**	**Cat Code**	**Meter Name**	**Commodity Type**	**Area served by meter (sqft)**	**Reimburs-able (Y/N)**
71	EXCH MAIN STORE	74,053	74053	BLDG_0071_METER_1_VOLTS_A_B	Electricity	74,053	y
01440 HAAF	HEALTH CLINIC	49,679	55010	BLDG_1440_METER_2_VOLTS_A_B	Electricity	49,679	N
2905	OPEN STR INST	40,264	45210	BLDG_2905_METER_1_VOLTS_A_B	Electricity	40,264	N
4541	VEH MAINT SHOP	32,648	21410	BLDG_4541_METER_3_VOLTS_A_B	Electricity	32,648	N
06007 HAAF	ARMY LODGING	43,732	72010	BLDG_6007_METER_1_VOLTS_A_B	Electricity	43,732	N
7560	DEPENDENT SCH	31,040	73046	BLDG_7560_METER_1_VOLTS_A_B	Electricity	31,040	y
7742	CO HQ BLDG	30,000	14185	BLDG_7742_METER_1_VOLTS_A_B	Electricity	30,000	N
10501	CSMS/MATES	31,093	21419	BLDG_10501_METER_2_VOLTS_A_B	Electricity	31,093	y
10531	CSMS/MATES	34,843	21419	BLDG_10531_METER_1_VOLTS_A_B	Electricity	34,843	Y

1.4 Storage of Metered Data. The Advanced Metering Data Management System Installation Level Front End shall store all required meter data for a minimum of two years. If data exceeds allotted space, storage shall grow automatically through database configuration changes without operator intervention.

1.5 Workstation Display

a. System shall display all mandatory metering data (electricity, water, gas and steam) upon request in an organized and easily readable format. Data shall be displayed in no less than 15 minutes intervals.

b. Final install of front end equipment shall, at minimum, display accurate data readings for each meter in a text format. Display capability shall include multiple graphical formats such as data vs. time (minutes, hours, days, weeks, months, and year) comparison between metered data from two or more meters and other standard meter data. Site specific graphics shall be created that display the required metered value, meter location, meter serial number and building square footage served by that meter.

In addition, contractor shall differentiate by an asterisk on the graphic display those meters that were not installed by the Army Metering Program.

c. Contractor shall provide two hardcopies and two copies on electronic media (DVD or CD) of detailed instructions for customization and integration of additional display features that are not prepared at the time of final install.

1.6 Energy Reports. The Installation Level Front End Computer shall be configured to provide monthly energy reports that show:

a. Specific building kWh and max kW use and time and day the max occurred.

b. A building's monthly kWh and max monthly kW with history over the previous 24 months. Include Heating Degree-Days (HDD) and Cooling Degree-Days (CDD) for each month.

c. Summary of what all buildings are using on an installation relative to their square footage (energy consumption density) as a function of kWh and kW peak; when meters are available include the Natural Gas (NG) and water usage including their maximum rate of use for that month. Include HHD and CDD.

d. A bar chart showing the 24 month history of what the installation is using total (kWh, KW peak, NG, and water) and the energy density based on square footage of metered buildings. Include HDD and CDD for each month.

e. A bar chart showing dollar cost for the commodities from the chart above over a 24 month period. Include HDD and CDD for each month.

f. A dirty dozen list of the buildings using the highest energy based on square footage, occupancy rates, hours of use, and a factor coefficient to decrease the rating for high energy density demand type missions. This mission coefficient shall be the same for the same type of mission and applied the same on every installation.

2.0 COMMUNICATIONS

2.1 Between Meters and Installation Level Front End

a. The communications medium shall be compatible with the Installation Level Front End Computer and the Enterprise Energy Reporting Data System (EERDS) Security Functional Architecture available as separate electronic media: Enterprise Energy Data Reporting System Security Functional Architecture.doc (see POC on last page). The installation of wire, fiber optic cable, wireless network equipment, network switches, and/or media converters is required where existing communications

infrastructure is non-existent to support communications between the buildings to be metered and the nearest base network access point. If fiber optic cable is required, coordinate with the site NEC for installation guidance and sizing (minimum requirement: 2 single mode fibers). All IP, Ethernet, or wireless communication design and implementation plans shall be approved by the site NEC. The NETCOM Commander has directed NETCOM G3/4, G5, and G6 to support the use of all available means of communication available at sites to reduce the cost of implementing the Army's metering program across all theaters of operation. The use of DSL, existing copper, wireless 900 Mhz radios, existing wireless 802.11 infrastructure, and dark fiber should all be considered as options before installing new copper or fiber. Coordination with NETCOM is recommended before installing new fiber.

b. Coordinate with the Activity and provide specific requirements "to match existing systems" when necessary. Contractor shall verify that the electricity meter installed on any building site is compatible with the post-wide metering system with respect to the types of meters selected and the method used to program the meters for initial use. Software and meter programming tools are necessary to setup the meters described by this guidance. New software tools different from the meter programming methods currently used by post personnel shall require separate approval for use. Contractor shall verify that the metering system installed on any building site is compatible with the facility-wide or post-wide communication and meter reading protocol system.

2.2 Between Installation Level Front End and Enterprise MDMS System

See Paragraph 1.2. The MDMS Contractor shall execute a retrieval of the data in the Microsoft SQL data base. The MDMS Contractor shall format the meter data to include the site specific information that uniquely identifies the installation (Fort Carson, Fort Hood, etc.). IPSec tunneling may be used to securely transport data. There will likely be a gateway between the Installation Level Front End Computer and the Enterprise MDMS.

2.3 Cybersecurity Requirements

a. The process and related requirements to attain authorization for metering systems have been revised to Risk Management Framework. DoDI 8500.01, Cybersecurity and DoDI 8510.01, Risk Management Framework (RMF) for DoD Information Technology (IT) were published in March of 2014 and outline the Risk Management Framework processes. Commands should coordinate with their local NEC to ensure compliance with the assess and authorize approach outlined in RMF. Additionally, the MCX offers guidance to shape architectural templates and influence the design process for Army installations. This document is Technical Criteria for the Installation Information Infrastructure Architecture and is available upon request from the POC.

b. The Information Systems Engineering Command's (ISEC) Military Engineering Directorate (MED, formerly IASED) in Fort Huachuca, AZ, has conducted testing and hardening for a limited number of metering host configurations that may assist in the development of documentation towards favorable authorization decisions. As the documentation is created for individual systems there exist

opportunities to leverage this knowledge to engineer a metering system that will more easily be approved by the NEC. Currently, the Army Metering Program has five accredited front end systems, various BPOCs, and advanced meter options, to include enterprise system level Certificates of Networthiness.

c. Networthiness: The contractor shall provide and prepare documentation as required by AR 25-1 and submit a request for a Certificate of Networthiness (CoN). Networthiness certification is required before connecting hardware/software to the Army Enterprise Network. The selection of system and network components from the Defense Information Systems Agency (DISA) Approved Products List (APL) is encouraged, when available. There is also a list of preapproved software that identifies those that have CoNs. The Contractor shall coordinate all Networthiness efforts with the appropriate installation NEC as well as higher NETCOM headquarters. When issued and certified, the Contractor shall comply with the applicable IATO (Interim Authority to Operate) Security Configuration Guide.

d. In the eyes of some security engineers, IP meters have been regarded as vulnerable and assumed to create a higher risk to the defense in depth architecture. Take note to properly configure these devices so that they do not face the internet. The IP meter interface offers a more robust transfer of data and the ability to remotely reset counters and offer time stamps. This risk assessment is subject to change as testing is completed.

e. While in the design and planning stage, contact the UMCS-MCX for the most recent update on metering system configurations and their affect on cybersecurity (cybersecurity has replaced 'information assurance' under Risk Management Framework (RMF).

3.0 METERS

Note: Reimbursable facilities/customers that require metering devices which exceed the requirements detailed in this guidance shall be installed per written request as approved and provided in pre-proposal documentation.

3.1 Environmental Tolerances of Metering Devices

a. Power Meters:

(1) Outdoor/exterior devices shall be rated for operation and storage from minus 40 degrees C to plus 70 degrees C or better and 5 to 100% relative humidity (RH) (non-condensing). Exterior meters shall be provided with or installed within a NEMA 4 enclosure. Enclosures shall be NEMA 4X for coastal and corrosive environments. When ambient temperature extremes exceed the rating above, provide enclosures with heat strips to maintain operable temperatures. Enclosures shall be lockable (key lock) for information security issues.

(2) Indoor/interior devices shall be rated for operation and storage from 0 degrees C to plus 50 degrees C or better and 5 to 90% relative humidity (non-condensing). Interior meters or meters located in mechanical rooms shall be provided with or installed within a NEMA 12 lockable enclosure.

b. Water Meter Operating Temperatures: 0 degrees C to plus 50 degrees C or better. Water Meter Humidity Operating Range: 5% to 90% RH (non-condensing).

When above frost line and exterior mounting is required, consider the local ambient temperature extremes and protect from freezing with insulated, moisture proof enclosures and heat tracing as required.

c. Gas Meter Operating Temperatures: minus 40 degrees C to plus 70 degrees C.
Gas Meter Humidity Operating Range: 5% to 90% RH (non-condensing).

d. Steam Meter Ambient Operating Temperatures: minus 40 degrees C to plus 80 degrees C.
Steam Meter Medium Operating Temperatures: minus 40 degrees C to plus 240 degrees C.
Humidity Operating Range: 5% to 90% RH (non-condensing)

e. All interior meters and/or remote interface displays shall be provided with or installed within a NEMA 12 enclosure.

f. Wiring: All wiring shall be UL listed.

g. Manufacturer Recommendations: The Contractor shall adhere to all manufacturer recommendations regarding wire sizing, fuse sizing, and wire types.

3.2 Advanced Meter Capability

a. All meters as installed shall provide advanced meter capabilities, either as a single product, or as installed in conjunction and collocated with another product such that the combined installation provides advanced meter capabilities.

b. Meters that do not provide factory advanced capabilities shall provide a pulse output for interfacing to an advanced meter. The minimum and maximum pulse rate and pulse width of the receiving digital input device and software, i.e., electric meter, digital input card on the UMCS or any other accumulator shall be determined by the contractor. The contractor shall provide pulse rate convertors if required. Depending on the product used, relay isolation may be required when connecting to the Input/Output (I/O) device. In addition, the contractor shall determine and eliminate false triggers caused by distance or routing near other voltage sources. It is strongly advised to adhere to the manufacturers' recommendations and industry practices and install isolation relays as field conditions dictate.

3.2.1 Communication Protocol and Methods. Meters shall communicate via either Modbus RTU, ANSI/CEA-709.1-C (LonTalk), or ASHRAE-135 (BACnet) protocols to the existing or new Advanced Metering Data Management System Installation Level Front End (or UMCS/EMCS System Host). In locations where a legacy UMCS system currently exists utilizing a non-compliant communication protocol, additional protocols may be used if approved by the Government. In that case the designer should consider meters with changeable interface communication cards so that future UMCS upgrades can be accomplished with minor changes.

3.2.2 Pulse Input Data Port Interface

a. Meters shall have a data port connection compatible with the selected protocol which communicates to the existing or new Advanced Metering Data Management System Installation Level front end. The meter's interface must be compatible with the conditions at any given site. Analog current loops shall not be used.

b. Auxiliary data ports. Unless otherwise specified, advanced meters shall have a minimum of two pulse inputs for incorporation of other external meter data.

3.2.3 Data Storage and Trend Logs

a. Unless otherwise specified, the meter must be capable of providing and storing 15 minute interval data for 20 distinct points for minimum of 30 days to non-volatile memory. The measured energy consumption shall be retained in non-volatile memory. The maximum demand and time of maximum demand shall be stored in non-volatile memory and can be reset.

b. Field Interface Tool: Contractor shall provide a field interface tool with the compatible software to extract stored trend data and logs from meters. This is a separate hand-carried device that directly connects with the meter at the installed site.

3.2.4 Meter display. Meters that are required to display data shall provide face plate configurable menus to select the desired data for display. Display requirements may be met with the installation of a local display panel connected to the meter. All collected data shall be capable of display.

3.3 Electric Meter

3.3.1 Power Systems. Meter shall be designed for multifunction electrical measurement on either single or 3 phase power systems. Meter shall support the power configuration as identified at site specific government facilities: single phase (120 or 240 volt); 3 Phase, 3 Wire Delta; 3 Phase, 4 Wire Delta; 3 Phase, 4 Wire Wye (2.5 Element); 3 Phase, 4 Wire Wye (3.0 Element). For three phase

application voltage range is 208 – 600V. All meters shall be UL 508 Listed, CSA approved, have CE marking, and meet safety standards UL 1244 or UL 1010-1.

3.3.2 Measured Values: See Electric Meter points list: Advanced Meter Points List.xls for details and additional requirements. Points list assumes a 4 wire delta power configuration. Modify to match site specific requirements.

a. Mandatory Measured values

PWR-TOT	Real Power KW (Total Phases)
KWH-TOT	Total KWH (Total Energy)
PWR-DEMAND	Demand Power
PWR-DEMAND-PEAK	Historical Peak Demand Power
VOLT A-B	Rms Voltage For Phase A
VOLT B-C	Rms Voltage For Phase B
VOLT C-A	Rms Voltage For Phase C
AMP-A	Rms Current For Phase A
AMP-B	Rms Current For Phase B
AMP-C	Rms Current For Phase C
PF-A	Power Factor For Phase A
PF-B	Power Factor For Phase B
PF-C	Power Factor For Phase C
PF-Total	Power Factor Total
VAR or KVAR	Reactive Power

b. Optional Measured values:

PWR-A	Real Power For Phase A
PWR-B	Real Power For Phase B
PWR-C	Real Power For Phase C
HZ-A	Frequency For Phase A
HZ-B	Frequency For Phase B
HZ-C	Frequency For Phase C
KVA-TOT	Total Kva
KVA-A	Kva For Phase A
KVA-B	Kva For Phase B
KVA-C	Kva For Phase C
KVAR-TOT	Total Reactive Power
KVAR-A	Reactive Power For Phase A

KVAR-B	Reactive Power For Phase B
KVAR-C	Reactive Power For Phase C
KVARH-TOT	Total Kvarh (Total Reactive Energy)
KVARH-A	Kvarh (Total Reactive Energy) For Phase A
KVARH-B	Kvarh (Total Reactive Energy) For Phase B
KVARH-C	Kvarh (Total Reactive Energy) For Phase C

3.3.3 Accuracy

a. System Accuracy: System accuracy for the meter product devices including instrument transformers shall not exceed plus or minus 1.5% as calculated using the Root Sum Square (RSS) method and assuming normal distribution.

b. Meter Accuracy: Meter certification shall be IEEE/ANSI C12.20, Accuracy class 0.5% or the meter shall be calibrated with National Institute of Standards and Technology (NIST) traceable standards to an accuracy of 0.5% or better.

c. For reimbursable tenants meter certification shall be NEMA/ANSI C12.20, Accuracy class 0.2%. These meters shall include a Meter display that can display all recorded values.

3.3.4 Surge Protection: Meters shall comply with IEEE/ANSI C37.90.1, Standard surge withstand capability (SWC) tests for relays and relay systems associated with electric power apparatus and IEEE C62.41.

3.3.5 Instrumentation (CTs and PTs)

a. Current transformers (CTs) sized properly so that the meter secondary of the transformer shall output current to ensure at least a plus or minus 0.6% accuracy of current when measured between 10% and 90% of full amperage range.

b. CTs shall not exceed 5 amps on the secondary side.

c. Burden on CTs shall not exceed rated burden for the accuracy class.

d. CTs shall be provided in solid or split core configurations.

e. CTs shall be provided in the appropriate ranges to meet the service entrance amperage requirements (e.g. building service entrance of 800 Amps requires 800:5 CTs for metering).

f. CTs shall be revenue grade and certified per IEEE/ANSI C57.13 or IEC 185.

g. CTs shall be provided that are rated for the appropriate matching frequency of the power generation (60 Hertz CONUS and 50 Hertz OCONUS as applicable).

h. Current sensors shall be sized properly for the application and provide a voltage (normally 0-2 volts) to the meter that results in at least a plus or minus 0.6% accuracy of current when measured between 10% and 90% of full amperage range.

i. Voltage or Potential Transformers (PTs) sized properly so that the meter secondary of the transformer shall output voltage to ensure at least a plus or minus 0.6% accuracy of voltage when measured from zero to the IEEE/ANSI C57.13 or IEC 185 specified standard burden, at the specified standard burden power factor, and at any value from 90% to 110% of rated voltage.

j. PTs shall be revenue grade and certified per IEEE/ANSI C57.13 or IEC 185.

k. Burden on PTs shall not exceed rated burden for accuracy class.

3.3.6 Disconnects and Shorting Blocks

a. The appropriate metering accessories, terminal blocks, shorting blocks, and fuses shall be built into each enclosure and the enclosure shall have an appropriate grounding termination point per standard industry practices. Disconnect wiring blocks shall be provided between the current transformer and the meter where 5 AMP current transformers are used. A shorting mechanism shall be built into the wiring block to allow the current transformer wiring to be changed between shorting block and meter without removing power to the transformer. The wiring blocks shall be located where they are accessible without the necessity of disconnecting power to the transformer. For multi-ratio current transformers, provide a shorting block from each tap to the common lead. The shorting mechanism must be capable of carrying the current of each current transformer so that the electric meter can be safely removed from the circuit for testing or repair. Low voltage, 0-5 volt current sensors are exempt from the shorting block requirement.

b. Voltage-monitoring circuits shall be equipped with disconnect switches to isolate the meter base or socket from the voltage source.

c. Short circuit protection for each power supply circuit or measuring voltage circuit entering the enclosure must be included in the enclosure. This shall be appropriately sized to protect equipment and personnel should an accidental short occur during maintenance inside the enclosure. Fuses or breakers with appropriate UL ratings shall be used. Fuse type and rating shall be depicted on the As-Built drawings.

d. Switching mechanisms adequate to de-energize all power supply and voltage circuits entering the enclosure must be included in the enclosure. If a breaker is utilized for the short circuit protection that can fulfill this function, no additional hardware will be required.

3.4 Gas Meter

3.4.1 Requirements

a. In addition to the requirements listed below, Natural Gas Distribution and Monitoring Equipment shall be in accordance with UFGS SECTION 33 51 13.00 30. Gas meters measure a defined volume, regardless of the pressurized quantity or quality of the gas flowing through the meter. Temperature, pressure and heating value compensation must be made to measure actual amount and value of gas moving through a meter.

b. Gas distribution equipment shall be installed in accordance with all applicable federal, state and local codes and regulations. Gas distribution equipment shall be installed in conformance with the manufacturer's recommendations and applicable sections of American Society of Mechanical Engineers (ASME) B31.8, American Gas Association (AGA) XR0104 and 49 CFR 192. Gas distribution equipment installed in areas where they will be subject to damage shall be protected by appropriate physical barriers (i.e. bollards).

c. Natural Gas Meters shall be the Diaphragm, Rotary, or for high volume applications Turbine type with pulse output chosen to meet the specific application.

Quantity Measured: Cubic Feet of Natural Gas

Accuracy: plus or minus 1% of scale.

Resolution: minimum of 100 cubic feet of gas

Measurement Configuration: Natural Gas service to a building. For buildings that already have a gas meter with a pulse output, ensure that the pulse output is connected to a data gathering device (i.e. electric meter). For buildings where a natural gas meter already exists but does not have a pulse output, add a pulse kit to the existing meter and tie the output to a data gathering device. If the existing gas meter will not accept a pulse kit or if no meter exists a new natural gas meter shall be installed, also requiring a pulse output to a data gathering device. Ensure the pulse frequency and electronic characteristics are compatible with the existing data gathering device, if any.

3.4.2 Gas Meter Types

a. Provide gas meters for the natural gas service line to the building. Natural gas meters shall be the Diaphragm, Rotary, or for high volume applications Turbine type with pulse output chosen to meet the specific application. Temperature, pressure and heating value compensation must be made to measure actual amount and value of gas moving through a meter.

b. Diaphragm Gas Meters with flow rates less than 500 cubic feet per hour shall conform to AGA B109.1. Diaphragm Gas Meters with flow rates of 500 cubic feet per hour and higher shall conform to AGA B109.2. Rotary Type Gas Meters shall conform to AGA B109.3. Turbine Type Gas Meters shall conform to ASME MFC-4M. Meters shall be pipe or pedestal mounted and be provided with a strainer immediately upstream. Meters shall be provided with over-pressure protection as specified in ASME B31.8. Include tamper-proof protection, frost protection and fungus-proof protection as applicable. Meters shall be suitable for accurately measuring and handling gas at pressures, temperatures, and flow rates present. Meters shall have a pulse switch initiator capable of operating up to speeds of 500 pulses per minute with no false pulses and shall require no field adjustments or calibration. Initiators shall provide the maximum number of pulses up to 500 per minute that is obtainable from the manufacturer. The minimum pulse rate shall not be less than one pulse per 100 cubic feet of gas.

3.4.3 Valves and Regulators

a. Valves shall be suitable for shutoff or isolation service and shall conform to the following: Steel valves 1-1/2 inches and smaller installed above ground shall conform to ASME B16.34, carbon steel, socket weld or threaded ends with handwheel or wrench operator. Steel valves 2 inches and larger installed above ground shall conform to American Petroleum Institute (API) Spec 6D, carbon steel, butt-weld or flanged ends, with handwheel or wrench operator.

b. Valves and pressure regulators are necessary at all points where pressure reduction or regulation is required by the user. Install a shut-off valve upstream of the regulator and both upstream and downstream of the meter. Provide a gas meter bypass line with a lockable valve for buildings with critical service.

c. Service Line Regulators. Pressure regulators for individual service lines shall have ferrous bodies. Regulator shall be capable of reducing distribution line pressure to pressures required for users. Regulators shall be provided where gas will be distributed at pressures in excess of 10 inches of water column. Pressure relief shall be set at a lower pressure than would cause unsafe operation of any connected user. Regulator shall have single port with orifice diameter no greater than that recommended by the manufacturer for the maximum gas pressure at the regulator inlet. Regulator valve vent shall be of resilient materials designed to withstand flow conditions when pressed against the valve port. Regulator shall be capable of regulating downstream pressure within limits of accuracy and shall be capable of limiting the buildup of pressure under no-flow conditions to 50 percent or less of the discharge pressure maintained under flow conditions. Regulator shall have a self-contained service regulator. Regulator pipe connections shall not exceed 2 inch size.

3.4.4 Gas Meter Installation

a. A shutoff valve, meter set assembly, and service regulator shall be installed on the service line outside the building, 18 inches above the ground on the riser. An insulating joint (dielectric connection)

shall be installed on the inlet side of the meter set assembly and service regulator and shall be constructed to prevent flow of electrical current. A 3/8 inch tapped fitting equipped with a plug shall be provided on both sides of the service regulator for installation of pressure gauges for adjusting the regulator. All service regulator vents and relief vents shall terminate in the outside air in rain and insect resistant fittings. The open end of the vent shall be located where gas can escape freely into the atmosphere, away from any openings into the building and above areas subject to flooding.

b. Meters shall be installed in accordance with ASME B31.8. Permanent gas meters shall be installed with provisions for isolation and removal for calibration and maintenance, and shall be suitable for operation in conjunction with an energy monitoring and control system.

3.4.5 Connections

a. Connections to Publicly or Privately Operated Gas Utility Lines: The contractor shall include all materials for the connections to the existing gas lines. Final connections and the turning on of gas shall be made by the utility. The Contractor shall notify the Contracting Officer, in writing, 10 days before final connections and turning on of gas lines. The Contractor shall make necessary arrangements with the Utility for tie in and activation of new gas lines. Only the Operating Agency/Utility Company may reactivate the system after tie in. The Contractor shall furnish to the Contracting Officer a certification by the Operating Agency/Utility Company that all Utility work has been satisfactorily completed.

b. Connection to Government Owned/Operated Gas Lines: Provide the name and location of the utility or operating agency of the existing gas lines. Show on the drawings, the location of valves to be operated for existing system deactivation. The Contractor shall provide connections to the existing gas lines in accordance with approved procedures. Reactivation of any existing gas lines will only be done by the Government. The Contractor's Connection Plan shall be submitted to the Contracting Officer and approved prior to making any connections to existing gas lines. This plan shall include the Operating Agency's required procedures which may be obtained from the Contracting Officer. The Contractor shall notify the Contracting Officer, in writing, 10 days before connections to existing lines are to be made.

3.4.6 Pressure and Leak Tests

a. Prior to putting the gas line back to service, ensure that all pressure and leak testing has been completed per specification section 22 00 01 Plumbing Systems.

3.5 Water Meter

3.5.1 Requirements:

a. The water meters must comply with the applicable requirements of ASHRAE 189.1. Where conflicts occur between this guidance and the ASHRAE standard, ASHRAE 189.1 shall prevail.

b. In addition to the requirements listed below Water Meters shall be in accordance with UFGS SECTION 33 12 33.00 30. Water Meters shall be the turbine, propeller, or displacement type with pulse output chosen to meet the specific application (pipe size, flow, pressure, etc.). Water Meters shall be manufactured by Neptune, SeaMetrics, Badger Meter Inc., DLJ, or approved equal. The location of meters and meter boxes shall be shown on the as built drawings. The meters shall be centered in the boxes to allow for reading and ease of removal or maintenance.

Quantities Measured: Gallons of Water (pulse for every 10 gallons)

Accuracy: 1.5% of scale.

Resolution: 1 Gallons per Minute (GPM)

Measurement Configuration: Water Supply to a building. For buildings that already have a water meter with a pulse output, ensure that the pulse output is connected to a data gathering device (i.e. electric meter). For buildings where a water meter already exists but does not have a pulse output, add a pulse kit to the existing meter and tie the output into a data gathering device. If the existing meter will not accept a pulse kit or if no meter exists, a new water meter shall be installed, also requiring a pulse output to a data gathering device.

3.5.2 Water Meter Types

a. Turbine Type Meters: Turbine type meters shall conform to American Water Works Association (AWWA) C701 Class I or Class II depending on the application. The main casing shall be bronze or cast iron protected by corrosion resistant coating with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register or an encoder type remote register designed in accordance with AWWA C707 but must be compatible with the local UMCS. Meters shall comply with the accuracy and capacity requirements of AWWA C701.

b. Propeller Type Meters: Propeller type meters shall conform to AWWA C704. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register or an encoder-type remote register designed in accordance with AWWA C707 but must be compatible with the local UMCS. Meters shall comply with the accuracy and capacity requirements of AWWA C704.

c. Displacement Type Meters: Displacement type meters shall conform to AWWA C700. Registers shall be straight-reading and shall read in U.S. gallons. Meters in sizes 1/2 through 1 inches shall be frost-protection design as required by the local environmental conditions. Connections shall be

suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register or an encoder type remote register designed in accordance with AWWA C707 but must be compatible with the local UMCS. Meters shall comply with the accuracy and capacity requirements of AWWA C700.

d. Compound Type Meters: Compound type meters shall conform to AWWA C702 and shall be furnished with strainers. The main casing shall be bronze or cast iron protected by corrosion resistant coating with stainless steel external fasteners. The main casing shall be tapped for field testing purposes. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register or an encoder type remote register designed in accordance with AWWA C707 but must be compatible with the local UMCS. Meters shall comply with the accuracy and capacity requirements of AWWA C702.

e. Fire Service Type Meters: Provide Fire Service Type Meters as required by the Installation. Fire service type meters shall be proportional type or turbine type conforming to AWWA C703 and shall be furnished with strainers. The main casing shall be bronze or cast iron protected by corrosion resistant coating with stainless steel external fasteners. Registers shall be straight-reading type, shall be permanently sealed and shall read in U.S. gallons. The meter shall be equipped with a coordinating register. Connections shall be suitable to the type of pipe and conditions encountered. Register type shall be a direct-reading remote register or an encoder type remote register designed in accordance with AWWA C707 but must be compatible with the local UMCS. Meters shall comply with the accuracy and capacity requirements of AWWA C703. When turbine type main line meters are used, the meter shall be supplied with a separate check valve, as a unit.

[NOTE: There is no published UFGS for the ultrasonic flow meter.]

f. Ultrasonic Flow Meter: The Ultrasonic Flow Meter must be furnished complete with matched transducers, self-aligning installation hardware and transducer cables. Ultrasonic transducers must be optimized for the specific pipe and process conditions for the application. The flow meter accuracy must +/- 1% of rate from 0 to 40 ft/sec (0.3 to 12 meters/sec). The flowmeter, must include either dry contact pulse outputs, 4-20mA, 0-10Vdc or 0-5Vdc output.

3.5.3 Water Meter Installation

a. Meter Boxes: Meter boxes shall be of cast iron, concrete, or plastic. The boxes shall be of sufficient size to completely enclose the meter and shutoff valve or service stop. Meter boxes set in paved areas subject to vehicular traffic shall be cast iron, or concrete with cast iron lid and cast iron meter reader lid suitable for vehicle wheel loads. Boxes set in sidewalks, not subject to vehicular traffic, shall be concrete with cast iron lid and cast iron meter reader lid. Plastic boxes and lids can be used in unpaved areas or grass areas not subject to vehicular traffic. Box height shall extend from invert of the meter to final grade at the meter location. The lid shall have the word "WATER" cast in it.

b. Dielectric Fittings: Dielectric fittings shall be installed between threaded ferrous and nonferrous metallic pipe, fittings and valves, except where corporation stops join mains. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure.

3.5.4 Valves

a. Gate Valves Smaller than 3 Inch in Size: Gate valves that are smaller than 3 inch in size shall meet Manufacturers Standardization Society (MSS) SP-80, Class 150 and have a solid wedge, non-rising stem. Valves shall have flanged or threaded end connections, with a union on one side of the valve. Provide hand wheel operators. Valves shall open by counterclockwise rotation of the valve stem.

b. Gate Valves 3 Inch Size and Larger: Gate valves 3 inch size and larger shall meet AWWA C500 or UL 262 and be of one manufacturer. Valves shall be AWWA C500, non-rising stem type with double-disc gates or UL 262, inside-screw type with operating nut, split wedge or double disc type gate, and designed for a hydraulic working pressure of 175 psi. Valves shall open by counterclockwise rotation of the valve stem.

3.5.5 Connections

a. Connections to Publicly or Privately Operated Water Utility Lines: Contractor shall provide materials for the connections to the existing water lines. Final connections and the turning on of water shall be made by the Utility. The Contractor shall notify the Contracting Officer, in writing, 10 days before final connections and turning on of water lines. The Contractor shall make necessary arrangements with the Utility for tie in and activation of new water lines. Only the Operating Agency/Utility Company may reactivate the system after tie in. The Contractor shall furnish a certification by the Operating Agency/Utility Company that all Utility work has been satisfactorily completed.

b. Connection to Government Owned/Operated Water Lines: Provide the name and location of the utility or operating agency of the existing water lines. Show on the drawings, the location of valves to be operated for existing system deactivation. The Contractor shall provide connections to the existing water lines in accordance with approved procedures. The Contractor's Connection Plan shall be submitted to the Contracting Officer and approved prior to making any connections to existing water lines. This plan shall include the Operating Agency's required procedures which may be obtained from the Contracting Officer. The Contractor shall notify the Contracting Officer, in writing, 10 days before connections to existing lines are to be made. Reactivation of any existing water lines will only be done by the Government.

3.5.6 Disinfection: Prior to disinfection, obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. Disinfect existing water piping

affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the new water piping being placed into service. Disinfection of systems supplying non-potable water is not required. Chlorinating materials shall conform to the following: Chlorine, Liquid: AWWA B301, Hypochlorite, Calcium and Sodium: AWWA B300.

3.5.7 Tests and Inspections

a. Prior to putting the water line back to service, ensure that all pressure and leak testing has been completed per specification section 22 00 01 Plumbing Systems.

3.6 Steam Meter: NOT USED.

4.0 EXECUTION

4.1 Installation: Electrical installations shall conform to IEEE C2, NFPA 70, and to the requirements specified herein. Provide new equipment and materials unless indicated or specified otherwise. Specific installation instructions are located in each meter section above.

a. All current, power, and voltage circuit wiring entering the meter or enclosure must be clearly marked, to avoid installation error and simplify future identification of wires for maintenance purposes. Unless prewired by manufacturer, use the following color code to mark the conductors:

(1) Red - Phase A CT - C1
(2) Orange - Phase B CT - C2
(3) Brown - Phase C CT - C3
(4) Gray with white stripe - neutral current return - C0
(5) Black - Phase A voltage - V1
(6) Yellow - Phase B voltage - V2
(7) Blue - Phase C voltage - V3
(8) White - Neutral voltage

b. Labels: The contractor shall install permanent labels identifying the installed components. Labels shall be lamacoid or similar, and shall be white on black. Approximate size: 1.5” x 3.5”. Information contained should include: Building #, Volts/#Phases/CT Ratio, Meter Type # of #. Example: Line 1 – Building 2415; Line 2 – 208/3/800; Line 3 – EM 1 of 2. Additional information may be required at the behest of the garrison’s Directorate of Public Works.

4.2 Drawings: These identifying markings shown above shall be reflected on the As-Built drawings. Documentation shall contain detailed design data, drawings, cut sheets on selected equipment, design documents, and building list as applicable. In addition to the requirements above, Contractor shall provide the following drawings:

a. plan view of building showing the outline and the approximate location of the meter with designation (i.e. room number), the voltage/# of phases/CT Ratio (i.e. 120/3/600) of the meter, BPOC, approximate conduit and cable routing, wire sizes, and number of conductors;

b. schematics displaying 3 phase 4 wire wye, 3 phase 3 wire delta, and 1 phase configurations, CT orientation/polarity markings;

c. connection drawings that show all wires, color codes of wires, wire sizes, and connection points;

d. general site overview drawing depicting locations of buildings being metered;

e. communications riser diagram containing as much information as is known at the time of the design.

4.3 Scheduling of Work and Outages

a. Installation of current transformers and potential transformers shall require that power be disconnected from the transformer and/or building. No "hot work" allowed unless prior Government approval is granted.

b. The Contract Clauses shall govern regarding permission for power outages, scheduling of work, coordination with Government personnel, and special working conditions.

c. Building Schedule Concurrence Agreement: The contractor shall submit to the Contracting Officer's Representative (COR) a list of buildings with approved, scheduled utility outages prior to beginning any meter installation. The approval authority for outages is the local Public Works engineering office.

d. Monthly Status Report: The contractor shall report the number of installed meters and the associated building number by the tenth of each month to the Government Project Manager. Major equipment installation, servers, network installation, and software installation shall be included in the report.

4.4 Field Applied Painting

Where field painting of enclosures is required to correct damage to the manufacturer's factory-applied coatings, provide manufacturer's recommended coatings and apply in accordance with manufacturer's instructions.

4.5 Cleanup

Upon completion of the installation all debris and surplus materials resulting from the work shall be removed. Daily housekeeping site clean-up is required.

5.0 TESTING AND CHECKOUT

[Note: This section is not all inclusive of specific testing requirements. Additional testing requirements for proper installation of water, gas, and steam meters are above (piping test, pressure tests, etc.]

5.1 Performance Verification Test (PVT)

a. Perform all Testing, Adjusting, and Commissioning in accordance with UFGS 25 08 10, manufacturer's recommendations, and referenced contract specifications and requirements. Provide certification of compliance. Prepare testing procedures as defined by product manufacturer's standard published written testing procedures and in accordance with UFGS 25 08 10. All electrical meter product certifications shall be performed in accordance with the certification tests described in ANSI C12.20 for 0.5% accuracy class meters, unless noted otherwise below.

b. The Contractor shall complete a Performance Verification Test (PVT). The PVT shall demonstrate to the Government that the actual power utilized by the electrical service being metered is calculated and displayed on the meter display and/or software accurately. The services being verified will be a random sample selected by the Government. The PVT shall utilize suitable test equipment connected to the electrical service being metered that is capable of displaying instantaneous 3-Phase values of Voltage, Current, Phase Power Factor / Phase Angle, Volt Amperes, Watts, and Vars.

c. All safety measures for connectivity to an energized source shall be followed as outlined in Safety Manual EM 385-1-1, Section 11B (latest version). Connectivity to an energized source is contingent on approval from the Government Safety Officer and Government approval of PVT plan. Additionally, a compliance validation assessment will be completed by the Government at its discretion as part of the test and checkout process. Any deviations from the required configurations will require resolution or correction by the Contractor at no additional cost to the Government.

d. The PVT procedures shall encompass testing of the entire system: meter installation, operation, conduit and wiring, data collection at front end, etc. All meters (100%) may not be completely tested in the PVT; however, procedures should take into account the entire system for the meters that are tested.

e. Pre-determined electric meters will be chosen (based on the CFT data) to be fully tested during the PVT. The Contractor will dress out in protective clothing (as appropriate), connect power analyzer with rope or clamp on CTs to the feeds and compare the meter readings between the frontend and the power analyzer.

5.2 Contractor's Field Tests (CFT):

a. As part of the installation and prior to the PVT, the contractor shall perform a Contractor Field Test (CFT) on all meters installed by this work effort. The CFT shall be composed of various screen captures from the metering software which demonstrate proper installation and operation of the newly installed meters and front-end. The CFT documentation shall be provided to the Government for review and approval 30 days before the PVT is scheduled. The meters selected by the Government for inclusion in the PVT will be developed from the CFT. There is no set number limit of meters for PVT.

b. The Contactor shall provide all test equipment. Test equipment shall be calibrated, stickered and show last calibration date, next calibration date and prove capable of the required accuracy, linearity, and repeatability, and shall be traceable to a nationally recognized testing standard (i.e. NIST, ANSI, etc.). No testing shall be accomplished with un-calibrated test or measurement equipment.

c. Contractor shall test 100% of the meters, verify the accuracy, correct any problems, and submit a report to the Government for review. Testing shall include the front-end server and associated workstation. The CFT report shall only be submitted for approval after all issues have been addressed and corrected.

d. The Contractor shall review the CFT report before submission and correct any apparent and known issues. A CFT Report which indicates obvious installation errors will be rejected. The PVT will not be scheduled until an acceptable CFT report has been approved. The CFT shall serve as the Contractor's opportunity to identify any installation or wiring errors and solve any issues prior to the Government coming to the site to perform the PVT.

e. Provide the screen shots to display the following parameters, as applicable:

Front-End:

- Screen shot showing all connected meters along with data values listed below

Electric Meters: (all values shall be per phase where applicable)

- Line to Line voltages (volts)
- Line-to-neutral voltages (volts)
- Voltage phasor angles (degrees)

- Currents magnitudes (amps)
- Current phase angles (degrees)
- Power: Apparent (kVA), Reactive (kVAr), Real (kW)
- Phase Power Factors (pf)
- CT ratio (i.e. 400:5)
- Electrical Service rating and type (i.e. 277/480-volt, 3Ph, 4-wire, 3CTs, 3PTs,Wye Connected)
- Phasor Diagrams

Pulse Meters (Gas/Water):

- Initial reading of actual physical meter dial to obtain baseline data
- Initial screen shots of front end values for the meter for the same date/time the dials were read.
- Second reading of actual physical meter dial to obtain baseline data
- Second screen shot of front end values for the meter for the same date/time the dials were read.
- Pulse multiplier values (1 pulse = 100 cubic ft)
- Pulses per revolution
- Accumulator baseline or offset values (if applicable)
- BPOC (Building Point of Connection) information or BLC (Building Level Controller)
- The initial (or baseline readings) shall be compared against the second reading for verification of the pulse meter. The difference between the gas meter dial readings will be compared against the difference between the front end readings. The differences shall be within the resolution of 1 pulse count.

f. The data which is accumulated (pulses) should have baseline data to compare for the CFT and during the PVT. The values at the meter dial (e.g. gas, water, steam) and the front end shall be recorded and compared to the values at another point in time. The delta between the meter readings shall be compared to the delta between the front end values to insure the proper multiplier, Lon address mapping, and programming are all correct.

g. CFT Submittals will be rejected if they do not contain enough information to properly verify meter installation and operation. If there is sufficient data in the CFT that supports a properly installed and functioning meter, only a visual inspection of the meter may be necessary during the PVT instead of requiring the Contractor to suit up and connect a power analyzer; however, the Government reserves the right to test any and all meters during the PVT as deemed necessary.

6.0 TRAINING

The Contractor shall conduct a training course for meter configuration, operation, and maintenance of the system as specified. The training shall be oriented for all components and systems installed under

this contract. Training manuals shall be delivered for 10 trainees with two additional copies delivered for archiving at the project site. The Contractor shall furnish all audiovisual equipment and all other training materials and supplies. A training day is defined as eight hours of classroom instruction, including two 15-minute breaks and excluding lunchtime, Monday through Friday, during the daytime shift in effect at the project site. For guidance in planning the required instruction, the Contractor shall assume that attendees have a high school education or equivalent, and are familiar with utility systems. Approval of the planned training schedule shall be obtained from the Government at least 30 days prior to the training.

Training: The course shall be taught at the project site within thirty days after completion of the installation period. Contractor shall coordinate with the Government POC to determine the number of trainees who will attend the course and the schedule at least 30 days in advance of the scheduled date. The training shall include:

a. Physical layout of each piece of hardware.
b. Meter configuration, troubleshooting and diagnostics procedures.
c. Repair instructions.
d. Preventive maintenance procedures and schedules.
e. Testing and calibration procedures.

For more information, please contact:

U.S. Army Engineering and Support Center, Huntsville
P.O. Box 1600
CEHNC-EDM-U (UMCS-MCX)
Huntsville, Alabama 35807-4301

Utility Monitoring and Control System
Mandatory Center of Expertise (UMCS-MCX)
Will.White@usace.army.mil
256 895-1739

END OF SECTION

32 31 13.53 HIGH-SECURITY CHAIN LINK FENCES AND GATES

1.00 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. High-security chain-link fences.

2. Gates: Horizontal top trolly cantilever slide and swing.

B. Related Sections include the following:

1. Section 31 00 00 “Earthwork” for excavation, filling, and grading work.

2. Section 03 30 00.01 “Cast-In-Place Concrete” for concrete post concrete fill and continuous concrete grade beam.

1.03 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide chain-link fences and gates capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Line Post Design: Provide line posts of size and in spacing indicated but not less than sizes and spacings required to comply with ASTM F1916, Tables 1 through 5 inclusive in resisting the following wind-load criteria, based on fence height, mesh size, and pattern indicated:

a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed and exposure category indicated below and according to CLFMI WLG 2445:

1). Wind Speed: 90 mph.

2). Exposure Category: C.

b. Fence Height: 6 feet.

c. Fence Framework Material Group: IA, ASTM F1043, Schedule 40 steel pipe.

2. Provide framework for fences that comply with ASTM F1043, based on the following criteria:

    a. Fence Framework Material Group: IA, Schedule 40 round steel pipe.

    b. Fence Height: 6 feet.

    c. Line Post Spacing: 10 feet (3 m).

3. Fabric Tension: Provide fences in which fabric deflections do not exceed those indicated in Table X1.1 of ASTM F1916 when tested by applying a 30-lbf (133-N) force at midpoint between rails and horizontally between posts for every eighth lower panel along the fence line.

4. Fence Post Rigidity: Provide fences in which post deflections do not exceed 3/4 inch (19 mm) when tested according to ASTM F1916 by applying a 50-lbf (222-N) force at mid-height of every eighth post along the fence line.

B. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

1.04 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates:

1. Fence and gate posts, rails, and fittings.

2. Chain-link fabric, reinforcements, and attachments.

3. Gates and hardware.

4. Accessories: Barbed tape.

B. Shop Drawings: Show locations of fences, gates, posts, rails, tension wires, details of extended posts, extension arms, gate swing, or other operation, hardware, and accessories. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, gate elevations, sections, details of post anchorage, attachment, bracing, and other required installation and operational clearances.

1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product Certificates: For each type of chain-link fence, and gate, signed by product manufacturer.

1. Strength test results for framing according to ASTM F1043.

D. Qualification Data: For Installer.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed chain-link fences and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1. Engineering Responsibility: Preparation of data for chain-link fences and gates, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Mockups: Build mockups to set quality standards for fabrication and installation.

1. Include 10-ft. (3-m) length of fence complying with requirements.

a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.

b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.06 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

B. Interruption of Existing Utility Services: Do not interrupt utility services to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner no fewer than 2] days in advance of proposed interruption of utility services.

2. Do not proceed with interruption of utility services without Owner's written permission.

1.07 COORDINATION

A. Coordinate, schedule, and obtain Owner's written approval of interruptions to existing perimeter security fences and systems for installation of new Work.

1.08 WARRANTY

A. Special Warranty: Manufacturer's standard form in which Installer agrees to repair or replace components of high-security chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of gate operators and controls.

b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

c. Deflection of fence fabric beyond design limits.

2. Warranty Period: 5 years from date of Substantial Completion.

2.00 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Chain-Link Fences and Gates:

a. Ameristar Fence

b. Southwest wire

c. Merchants metal

d. General Wire and Supply Co.

2. Barbed Tape:

a. Razor Ribbon

b. Birmingham Barbed Tape

c. Puma Barbed Tape Co.

d. Jacksons Security.

2.02 CHAIN-LINK FENCE FABRIC

A. Chain-Link Fence Fabric: 6 foot. Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage. Comply with ASTM A392, CLFMI CLF 2445, and with requirements indicated below:

1. Steel Wire Fabric: Metallic coated.

2. Fabric 6 feet (1.8 m) high.

a. Wire Diameter: 0.148 inch (3.76 mm).

b. Mesh Size: 2 inch (51 mm) with 1 inch at Personnel gate.

c. Weight of Metallic (Zinc) Coating: ASTM A392, Type II, Class 1, 1.2 oz/sq. ft. (366 g/sq. m) with zinc coating applied before weaving.

d. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.

3. Selvage: Twisted and barbed top and bottom.

2.03 SECURITY FENCE FRAMING

A. Posts and Rails: Comply with ASTM F1043 for framing of the following material group and strength requirement for fences of height indicated:

1. Framework Material Group: IA, round steel pipe, Schedule 40.

2. Fence Height: 6 feet (1.8 m).

3. Strength Requirement: Heavy industrial fence.

4. Post Diameter and Thickness: Provide posts of sizes indicated below that comply with ASTM F1043.

a. Top Rail: 1.66-inch (42.2-mm) diameter, 0.140-inch (3.6-mm) thickness.

b. Line Post: 2.875-inch (73-mm) diameter, 0.203-inch (5.2-mm) thickness].

c. End, Corner, and Pull Post: 4-inch (102-mm) diameter, 0.237-inch (6.02-mm) thickness.

d. Swing Gate Post: According to ASTM F900

e. Horizontal-Slide Gate Post: According to ASTM F1184.

1). Openings width refer to drawings, Overhead Clearance up to 22 Feet (6.7 m): Steel post, 4-inch (102-mm) diameter, and 8.65-ft-lb (12.88-kg/m) weight.

2). Guide Posts for Class 1 horizontal-slide gates, equal gate post height, one size smaller, but weight is not less than 3.11 ft-lb (4.63-kg/m), installed adjacent to gate post to permit gate to slide in space between.

5. Metallic Coatings for Steel Framing:

a. Type A, consisting of not less than minimum 2.0-oz./sq. ft. (0.61-kg/sq. m) average zinc coating per ASTM A123/A123M or 4.0-oz./sq. ft. (1.22-kg/sq. m) zinc coating per ASTM A653/A653M.

2.04 TENSION WIRE

A. General: Provide horizontal tension wire at the following locations:

1. Location: Extended along bottom of fence fabric.

2. Location: Extended along top of barbed wire arms and top of fence fabric for supporting barbed tape.

B. Metallic-Coated Steel Wire: 0.177-inch (4.5-mm) diameter, marcelled tension wire complying with ASTM A824 and the following:

1. Metallic Coating: Type [II, zinc coated (galvanized) by hot-dip process, with the following minimum coating weight:

a. Class 3: Not less than 2.0 oz./sq. ft. (610 g/sq. m) of uncoated wire surface.

2.05 SWING GATES

A. General: Comply with ASTM F900 for double swing gate types.

1. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F1043 and ASTM F1083 for materials and protective coatings.

2. Metal Pipe and Tubing: Steel. Comply with ASTM B429 and ASTM F1043 for materials and protective coatings.

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F900 and the following:

1. Gate Fabric Height: 2 inches (51 mm) less than adjacent fence height.

2. Leaf Width: As indicated.

3. Frame Members:

a. Tubular Steel: 2.875 inches (73 mm) round.

C. Frame Corner Construction:

1. Welded and 3/8-inch (9.5-mm) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.

D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches (305 mm)] [as indicated as required to attach barbed wire and tape assemblies.

E. Provide separate isolated gate frame according to ASTM F1916 and as indicated.

1. Group: IA, round steel pipe, Schedule 40].

2. Post: 4 inches (102 mm) and refer to drawings.

3. Separation between Hinge and Latch Post and Fence Termination Post: 2 inches (51 mm) minimum, 2-1/2 inches (63.5 mm) maximum.

F. Hardware:

1. Hinges: Offset type, malleable iron, 180-degree swing.

2. Latches permitting operation from both sides of gate. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.06 HORIZONTAL-SLIDE GATES

A. General: Comply with ASTM F1184 for single slide gate types and refer to drawings:

1. Classification: Type II Cantilever Slide, Class 2 with internal roller assemblies.

2. Metal Pipe and Tubing: Galvanized steel. Comply with ASTM F1184 for materials and protective coatings.

B. Frames and Bracing: Fabricate members from round, galvanized steel tubing with outside dimension and weight according to ASTM F1184 and the following:

1. Gate Fabric Height: 6 feet (1.8 m).

2. Gate Opening Width: **30** feet (1.2 m).

3. Frame Members:

a. Tubular Steel 1.90 inches (48.3 mm) round.

4. Bracing Members:

a. Tubular Steel 1.90 inches (48.3 mm) round.

C. Frame Corner Construction:

1. Welded frame with panels assembled with bolted or riveted corner fittings and 5/16-inch (7.9-mm) diameter, adjustable truss rods for panels 5 feet (1.52 m) wide or wider.

D. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame 12 inches (305 mm) as required to attach barbed tape assemblies.

E. Roller Guards: As required per ASTM F1184 for Type II, Class 1 gates.

F. Hardware:

1. Latches permitting operation from both sides of gate. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2. Padlocks and chains. Verify with owner's keying requirements.

2.07 FITTINGS

A. General: Comply with ASTM F626.

1. Line post caps with loop to receive tension wire or top rail.

B. Rail and Brace Ends: Attach rails securely to each gate, corner, pull, and end post.

C. Rail Fittings: Provide the following:

1. Rail Clamps: Line and corner boulevard clamps for connecting intermediate rails in the fence line to line posts.

D. Tension and Brace Bands: Pressed steel, 0.105 inch (2.66 mm) thick, with 1.2-oz/sq. ft. (366-g/sq. m) metallic (zinc) coating.

E. Tension Bars: Steel, length not less than 2 inches (51 mm) shorter than full height of chain-link fabric with 1.2-oz/sq. ft. (366-g/sq. m) metallic (zinc) coating. Provide one bar for each gate and end post, and two for each corner and pull post unless fabric is integrally woven into post.

F. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

G. Barbed Wire Arms: Pressed steel or cast iron, with clips, slots, or other means for attaching strands of barbed wire , and means for attaching to posts , integral with post cap; for each post, unless otherwise indicated, and as follows:

1. Line posts with arms designed with opening to accommodate top rail or tension wire.

2. Corner arms at fence corner posts, unless extended posts are indicated.

3. Type I, single slanted arm.

4. Bolts or rivets for connection to post.

H. Tie Wires, Clips, and Fasteners: According to ASTM F626 and ASTM F1916.

1. High-Security Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:

a. Weight of Metallic (Zinc) Coating: ASTM A641/A 641M, Class B, 2.0 oz./sq. ft. (610 g/sq. m).

2.08 BARBED WIRE

A. Zinc-Coated Steel Barbed Wire: Comply with ASTM A121, Chain-Link Fence grade for the following two-strand barbed wire:

1. Standard Size and Construction: 0.099-inch (2.51-mm) diameter line wire with 0.080-inch (2.03-mm) diameter, two-point round barbs spaced not more than 3 inches (76 mm) o.c.

2.09 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.

2.10 FENCE GROUNDING

a. Not Used

3.00 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, site clearing, earthwork, pavement work, and other conditions affecting performance.

1. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.

2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (152 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.03 INSTALLATION, GENERAL

A. Install chain-link fencing to comply with ASTM F567 and more stringent requirements specified.

1. Install fencing on established boundary lines inside property line.

3.04 CHAIN-LINK FENCE INSTALLATION

A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

B. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.

2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.

a. Exposed Concrete: Extend 2 inches (51 mm) above grade or to same elevation as concrete grade beam; shape and smooth to shed water.

C. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings.

D. Line Posts: Space line posts uniformly at 10 feet (3 m) o.c.

E. Post Bracing and Intermediate Rails: Install according to ASTM F567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts.

1. Locate horizontal braces at mid-height of fabric 6 feet (1.8 m) or higher, on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

F. Barbed Wire Arms: Bolt or rivet to top of post. Angle single arms away from approach side of fence.

G. Tension Wire: Install according to ASTM F567 and ASTM F1916, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with

0.120-inch (3.05-mm) diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches (610 mm) o.c. Install tension wire in locations indicated before stretching fabric.

1. Bottom Tension Wire: Install tension wire within 6 inches (152 mm) of bottom of fabric and tie to each post with not less than same diameter and type of wire.

H. Top Rail: Install according to ASTM F567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.

I. Chain-Link Fabric: Apply fabric to inside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

1. Leave 1 inch (25.4 mm) between finish grade or surface and bottom selvage, unless otherwise indicated.

2. Overlapping Fabric: At or between post or rail according to ASTM F1916 with wire ties or steel strap method.

J. Concrete Grade Beams: Cast-in-place concrete, depth not less than 12 inches (305 mm) below grade and as indicated on Drawings; slope top surface to drain.

K. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches (381 mm) o.c.

L. Tie Wires: Power-fastened or manually fastened ties configured to wrap a full 360 degrees around rail or post and a minimum of one complete diamond of fabric. Twist ends one and one-half machine twists or three full manual twists, and cut-off protruding ends to preclude untwisting by hand.

1. Maximum Spacing: Tie fabric to line posts at 12 inches (305 mm) o.c. and to braces at 24 inches (610 mm) o.c.

2. Fasten fabric to line posts 12 inches (305 mm) o.c. and to braces 24 inches (610 mm) o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

N. Barbed Wire: Install barbed wire uniformly spaced as indicated on Drawings. Pull wire taut and install securely to extension arms and secure to end post or terminal arms.

O. Barbed Tape: Install barbed tape uniformly in configurations indicated and fasten securely to prevent movement or displacement according to ASTM F1911.

P. Grounding Barrier Stakes: Stake coils at 10 feet (3 m) o.c., driven to full depth.

3.05 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using

tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.06 GROUNDING AND BONDING

A. Not Used

3.07 FIELD QUALITY CONTROL

A. Fabric Testing: Test fabric tension according to ASTM F1916.

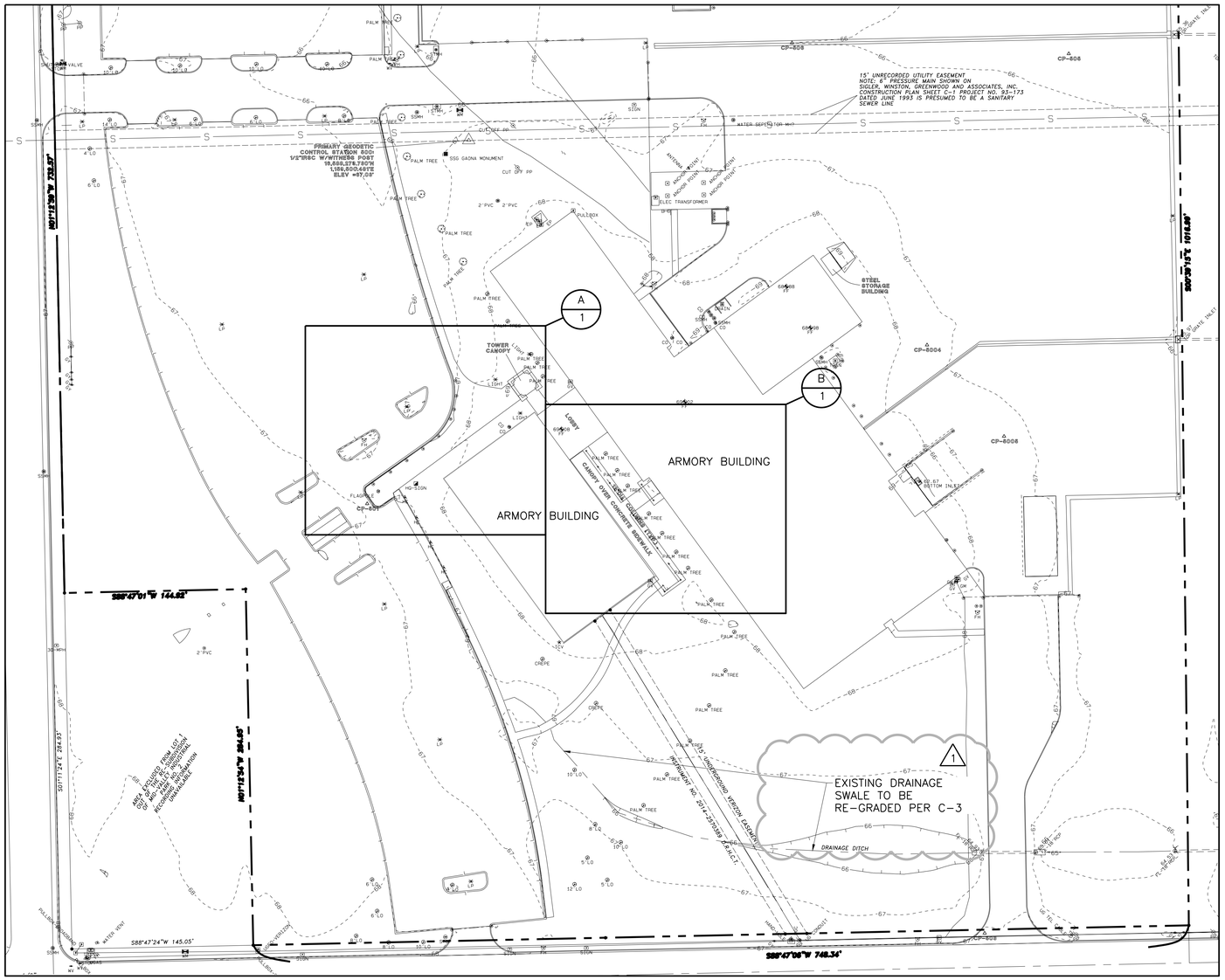
B. Fence Post Rigidity Testing: Test line posts for rigidity according to ASTM F1916.

C. Grounding-Resistance Testing: Not used

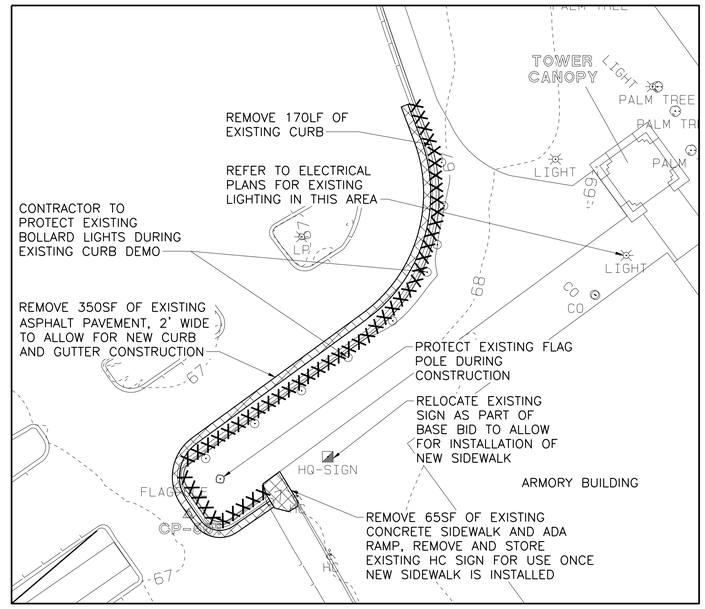
3.08 ADJUSTING

A. Gate: Adjust gate to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

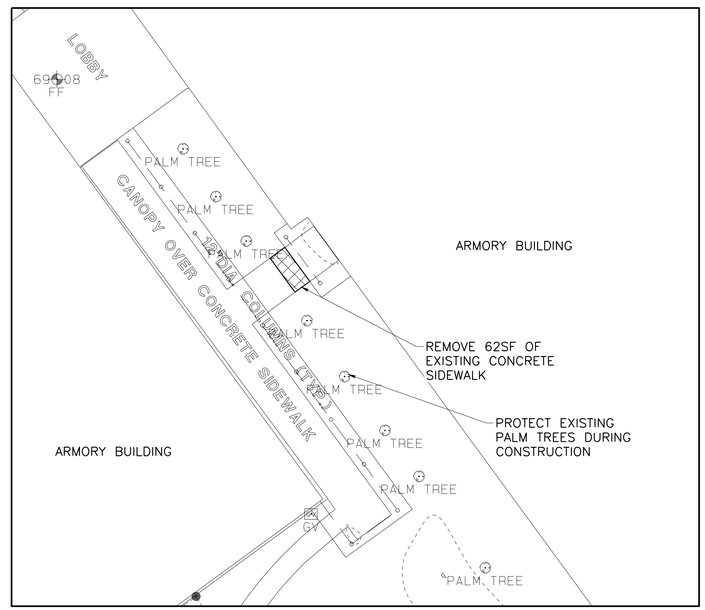
END OF SECTION



NORTH 1 — OVERALL DEMO PLAN
1" = 50'-0"



NORTH A 1 — DETAIL ENTRANCE DEMO BASE BID
1" = 20'-0"



NORTH B 1 — DETAIL BREEZEWAY DEMO BID OPTION (7)
1" = 20'-0"

0 10' 20' 40'
SCALE IN FEET

0 50' 100'
SCALE IN FEET

LEGEND

- EXISTING PAVEMENT DEMOLITION AS BASE AND BID OPTION 7
- XXXXXX — TO BE DEMOLISHED
- PROPERTY LINE

NOTES

1. SUMMARY OF CIVIL BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. CONTRACTOR SHALL CONSULT WITH OWNER FOR MATERIAL STORAGE AND LAY-DOWN AREAS.

BID OPTIONS "◯"

(1)
6. EXTERIOR BUILDING/EXISTING MOV PARKING MAINTENANCE EFFORT/BUILDING SIGN.
7. EXTERIOR EARTHWORK & DRAINAGE.
9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.

STATE OF TEXAS
BRETT M. BRISTOW
101000
LICENSED
PROFESSIONAL ENGINEER
08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: BMB
REVIEWED BY: THH

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CIVIL
DEMOLITION PLAN

C-1

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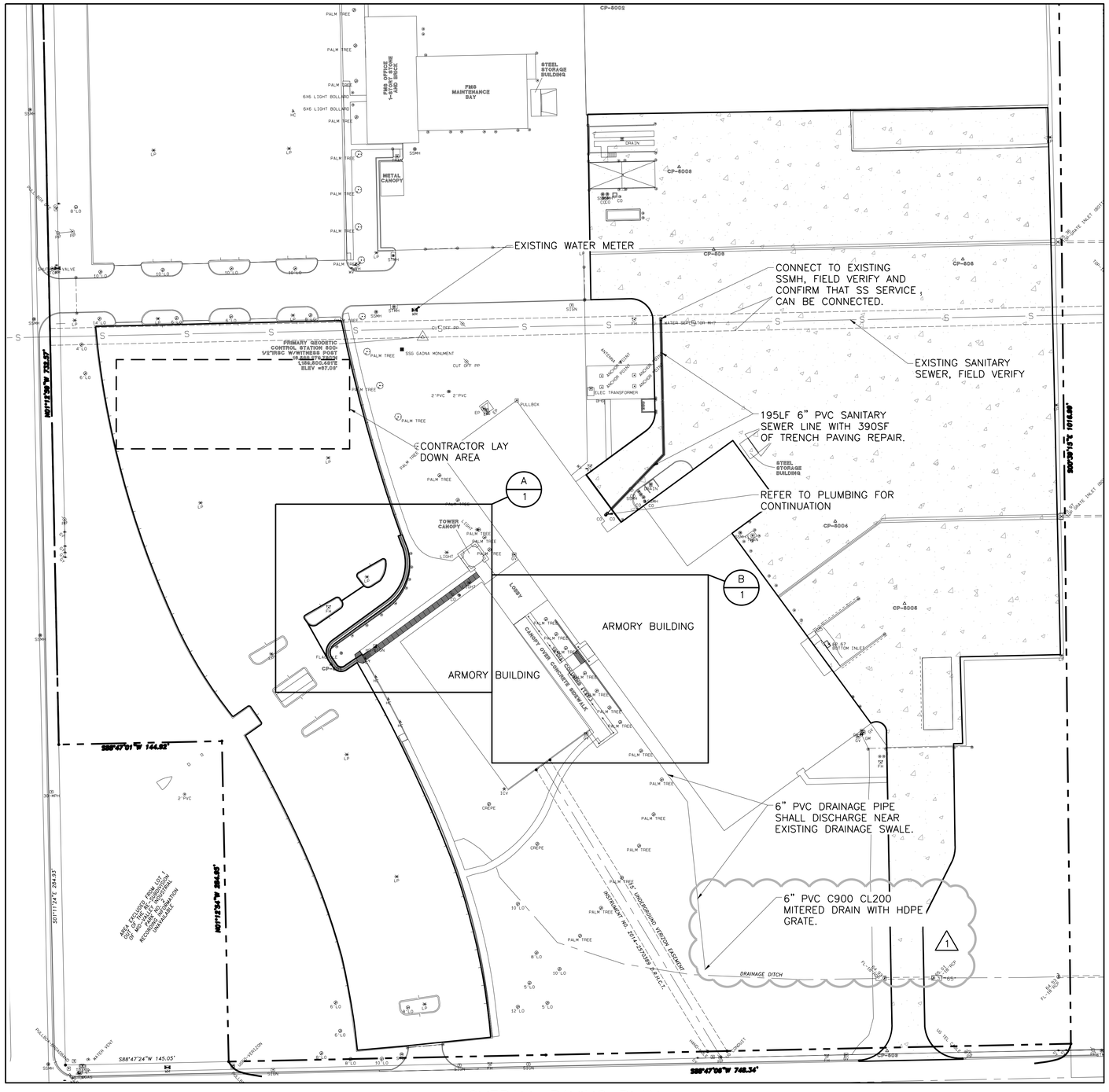


LEGEND

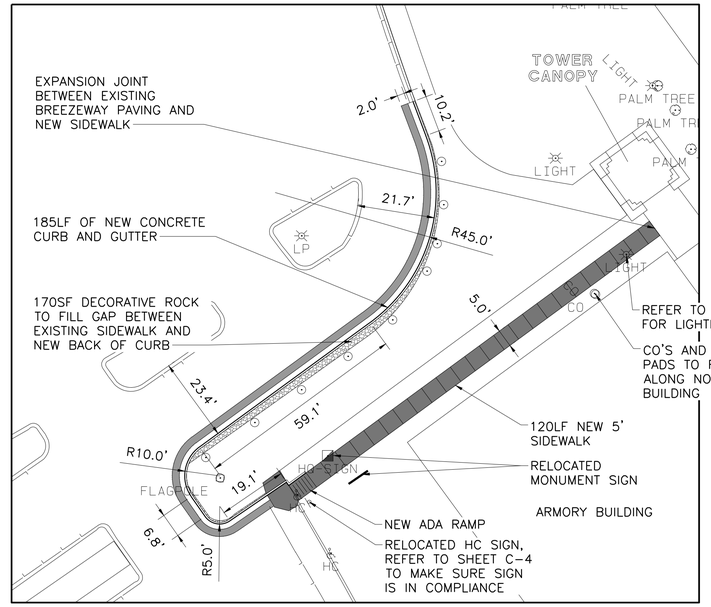
- EXISTING CONCRETE MAINTENANCE EFFORT, BID OPTION (6)
- NEW CONCRETE SIDEWALK FOR ADA COMPLIANCE, BASE BID
- 2' ASPHALT PAVING FOR INSTALLATION OF CURB AND GUTTER, BASE BID

NORTH 1/– OVERALL PAVING PLAN BASE AND BID OPTIONS 6&7

1" = 50'-0"

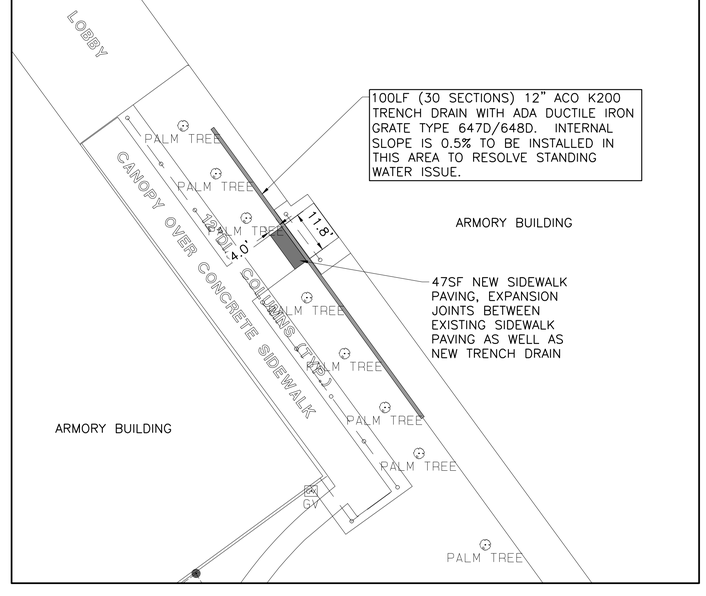
BID OPTIONS "◯"

6. EXTERIOR BUILDING/EXISTING MOV PARKING MAINTENANCE EFFORT/BUILDING SIGN. (1)
7. EXTERIOR EARTHWORK & DRAINAGE.
9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.



NORTH A/1 DETAIL ENTRANCE PAVING BASE BID

1" = 20'-0"



NORTH B/1 DETAIL BREEZEWAY PAVING BID OPTION (7)

1" = 20'-0"

0 10' 20' 40' SCALE IN FEET

0 50' 100' SCALE IN FEET

NOTES:

1. REFER TO ARCHITECTURE SHEETS FOR UPDATED SECURITY FENCING LOCATIONS.
2. SUMMARY OF THE PROJECTS BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
3. ALL DIMENSIONS AND COORDINATES ARE TO FACE OF CURB OR EDGE OF PAVEMENT UNLESS NOTED OTHERWISE.
4. SEE SHEET C-4 FOR PAVING DETAILS, PAVEMENT SECTIONS AND JOINTING NOTES.
5. ALL NEW SIDEWALKS AND RAMPS SHOWN ON DRAWINGS MUST BE IN COMPLIANCE WITH CURRENT TEXAS ACCESSIBILITY STANDARDS AND ADA.
6. IF ANY CURBS THAT ARE NOT PART OF THE BASE BID CONSTRUCTION ARE DAMAGED CONTRACTOR SHALL REPLACE CURB. (1)

STATE OF TEXAS BRETT M. BRISTOW 101000 LICENSED PROFESSIONAL ENGINEER
08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
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RC MAJOR MAINTENANCE

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CIVIL PAVING PLAN

C-2

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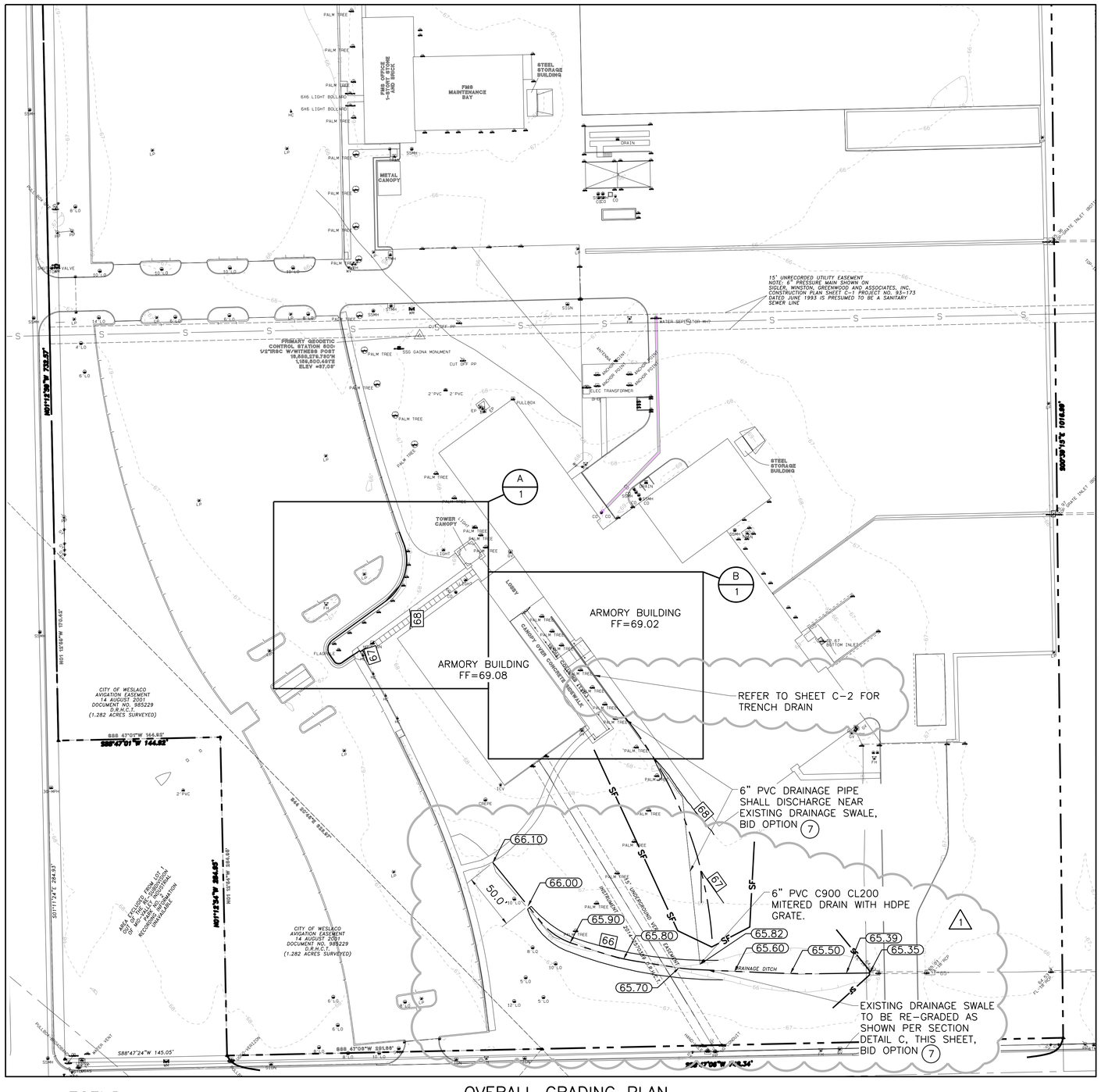


LEGEND

- 65.00 — TOP OF PAVEMENT
- 65.00 — NATURAL GROUND
- 65.00 — EXISTING SHOT
- 65 — EXISTING CONTOURS
- 65 — PROPOSED CONTOURS
- SF — SILT FENCE, REFER TO DETAIL 1, SHEET C-5
- FLOW LINE

OVERALL GRADING PLAN BASE AND BID OPTIONS 6&7

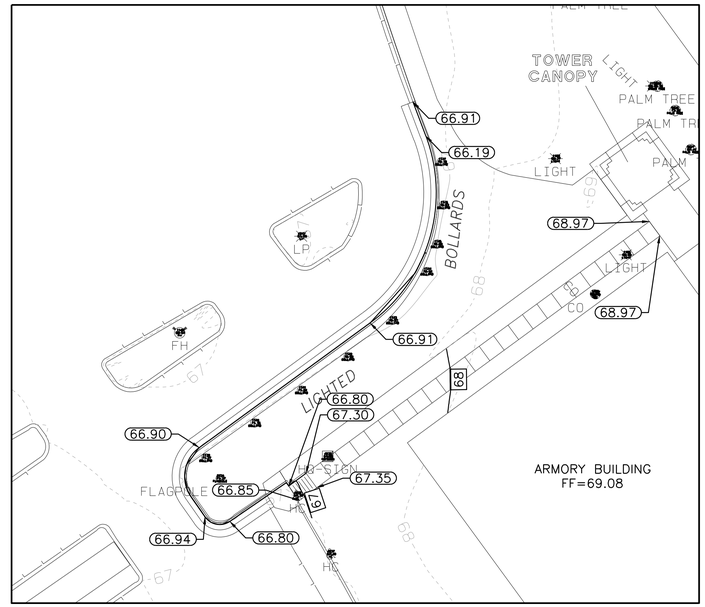
NORTH 1 – 1" = 50'-0"

BID OPTIONS "○"

6. EXTERIOR BUILDING/EXISTING MOV PARKING MAINTENANCE EFFORTS/BUILDING SIGN. (1)
7. EXTERIOR EARTHWORK & DRAINAGE.
9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.

NOTES:

1. SUMMARY OF THE PROJECTS BID OPTIONS CAN BE FOUND ON SHEET G-1.
2. ALL PROPOSED SIDEWALKS AND HANDICAP RAMPS MUST BE INSTALLED SO THEY ARE IN COMPLIANCE WITH CURRENT TEXAS ACCESSIBILITY STANDARDS AND ADA.
3. REFER TO SHEET C-5 FOR EROSION CONTROL DETAILS.
4. ALL DISTURBED AREAS AS A RESULT OF TRENCHING OR RE-GRADING SHALL BE SEEDED PER SPEC 31 25 13.13 (1)



DETAIL ENTRANCE GRADING BASE BID

NORTH A 1 — 1" = 20'-0"

DETAIL BREEZEWAY GRADING BID OPTION (7)

NORTH B 1 — 1" = 20'-0"

DRAINAGE SWALE SECTION DETAIL BID OPTION (7)

NORTH B 1 — NOT TO SCALE (1)

0 10' 20' 40' SCALE IN FEET

0 50' 100' SCALE IN FEET

STATE OF TEXAS — BRETT M. BRISTOW — 101000 — LICENSED PROFESSIONAL ENGINEER — 08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT: HOMER SAENZ, AIA
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CIVIL GRADING PLAN

C-3

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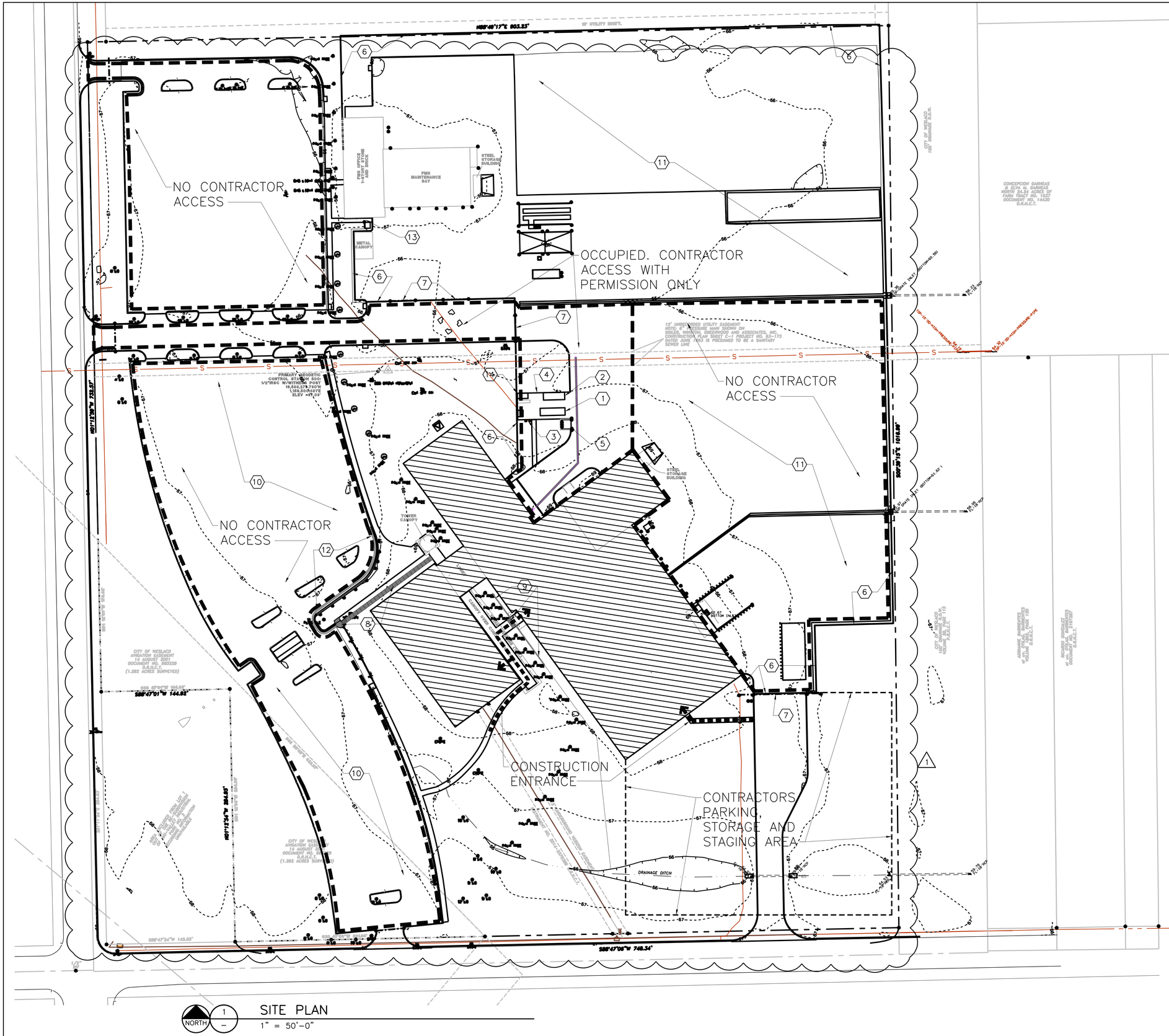

SITE PLAN
1" = 50'-0"

GENERAL NOTES

1. A SUMMARY OF THE PROJECTS BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. COORDINATE WITH OWNER TO DETERMINE LOCACTION(S) OF TEMPORARY FIELD OFFICES, STORAGE BUILDINGS, PARKING, TRAILERS, CONTAINTERS, STAGING AND STORAGE AREAS. PROVIDE TEMPORARY FENCING AND SIGNAGE. PROTECT FROM WEATHER, DAMAGE AND THEFT. PROVIDE TEMPORARY BARRICADES AND SIGNAGE AT WORK AREAS FOR UTILITY LINE INSTALLATIONS. PROVIDE TEMPORARY SIGNAGE AT MOV PARKING AREA TO LIMIT CONTRACTOR ACCESS WITH GOVERNMENT ESCORT.
3. DUE TO INCREASED SECURITY, DAILY ACCESS TO THE PROJECT SHALL GO THROUGH THE FRONT DOOR ENTRANCE AND SHALL BE COORDINATED WITH OWNER. NOTE THAT CERTAIN PARTS OF THE BUILDING AND THE SECURED MOV PARKING WILL BE OFF LIMITS.

NOTES BY SYMBOL "⬡"

1. LOCATIION OF TEMPORARY MODULAR RESTROOM BUILDING.
2. LOCATION OF TEMPORARY MODULAR SHOWER BUIDLING.
3. EXISTING ELECTRICAL SERVICE FOR TEMPORARY MODULAR BUILDING – G.C. TO FIELD VERIFY.
4. EXISTING CONCRETE PAD FOR TEMPORARY MODULAR BUILDINGS.
5. EXISTING DUMPSTER TO REMAIN.
6. NEW FENCE TO MEET ATFP REQUIREMENTS PER DETAILS ON SHEET A-5. EXISTING FENCE TO BE REMOVED AND DISPOSAL CONDUCTED BY THE GC WASTE MANAGEMENT PLAN. 1
7. NEW GATE TO MEET ATFP REQUIREMENTS PER DETAILS ON SHEET A-4. EXISTING GATE TO BE REMOVED AND DISPOSAL CONDUCTED BY THE GC WASTE MANAGEMENT PLAN. 1
8. NEW SIDEWALK – REFER DETAIL A ON SHEET C-2.
9. NEW TRENCH DRAIN AND PAVING – REFER DETAIL B ON SHEET C-2.
10. EXISTING POV PARKING – REFER CIVIL SHEET C-2.
11. EXISTING MOV PARKING AREA.
12. NEW CONCRETE CURB AND GUTTER AND ROCK INFILL – REFER DETAIL A ON SHEET C-2.
13. NEW PERSONNEL GATE TO MEET ATFP REQUIREMENTS PER DETAILS ON SHEET A-4. EXISTING PERSONNEL GATE TO BE REMOVED AND DISPOSAL CONDUCTED BY THE GC WASTE MANAGEMENT PLAN.
14. LOCATION OF ADA COMPLIANT TEMPORARY COMBINATION RESTROOM/SHOWER BUILDING. 1

BID OPTIONS "◯"

1. TEMPORARY RESTROOM PORTABLE UNIT AND ADA-COMPLIANT RESTROOM/SHOWER UNIT.
2. TEMPORARY SHOWER PORTABLE UNIT.
6. EXTERIOR BOLLARDS / PARKING IMPROVEMENTS/ BUILDING SIGN.
7. EXTERIOR EARTHWORK & DRAINAGE.
8. ELECTRICAL GENERATOR PROVISIONS.
9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.

0 50' 100'
SCALE IN FEET

REGISTERED ARCHITECT ROMEO SAENZ 25041 STATE OF TEXAS
08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
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REVIEWED BY: JWW

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ARCHITECTURAL SITE PLAN

A-3

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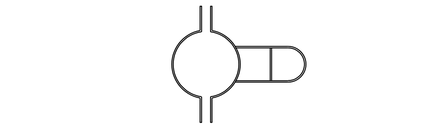
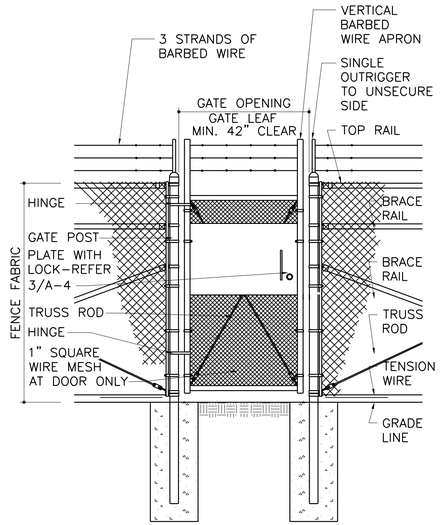


STANDARD HINGE



GATE POSTS OUTSIDE DEIMENSION (NOMINAL) TO BE 2.875"

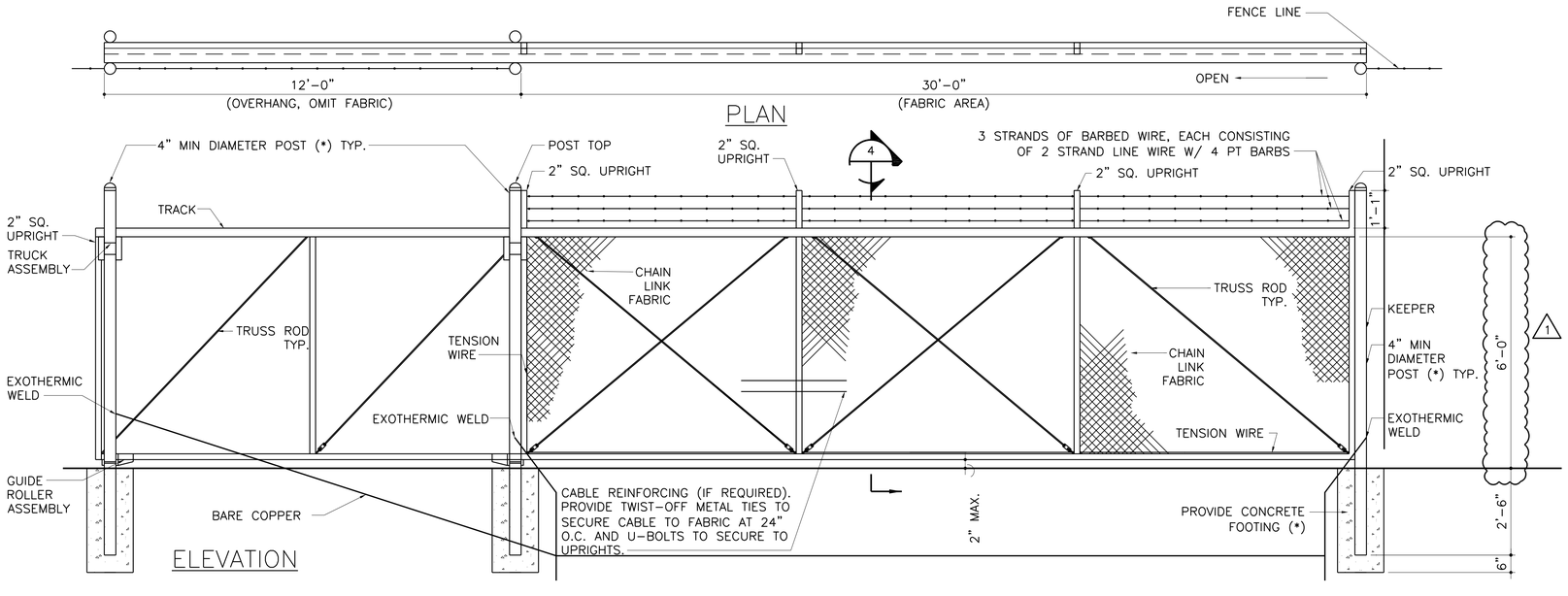
NOTES:

1. FOR NON-SENSORED FENCES, DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPE OF FENCE SECTIONS AND METHODS OF INSTALLATION WHICH COMPLY WITH THE SPECIFICATIONS.
2. SWING GATES SHALL BE CONSTRUCTED WITH DROP RODS, PADLOCKS, LATCH ASSEMBLY AND GATE KEEPERS EXCEPT AS NOTED.
3. ALL GATE FRAMES SHALL MEET THE
4. MINIMUM REQUIREMENTS OF ASTM F900 1.90" NOMINAL (ROUND) OR 2.00" NOMINAL (SQUARE). GATE FRAMES SHALL BE OF WELDED CONSTRUCTION OR SHALL BE ASSEMBLED USING HEAVY FITTINGS. AT CONTRACTOR'S OPTION A WELDED HORIZONTAL BRACE MAY BE USED IN LIEU OF TRUSS RODS TO BRACE ALL WELDED GATE FRAMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER RIGID CONSTRUCTION OF ALL GATES SUPPLIED.
5. GATES SHALL BE DESIGNATED AS FOLLOWS:

FENCE TYPE	–	FE5, FE6, ETC.
FENCE HEIGHT	–	INCHES
TYPE OPENING	–	SO (SINGLE)
	–	DO (DOUBLE)
HINGE	–	RA (STANDARD)
	–	HO (OFFSET)
OPENING	–	FEET (CLEAR OPENING BETWEEN GATE POSTS)
EXAMPLES:		FE6-84-DO-RA-24
		FE5-48-SO-GO-6

6. UNLESS NOTED OTHERWISE, PROVIDE FE6-72-DO-HO-42.
7. SEE DRAWINGS PER NUMBER, WIDTH AND TYPE OF GATE OPENINGS.

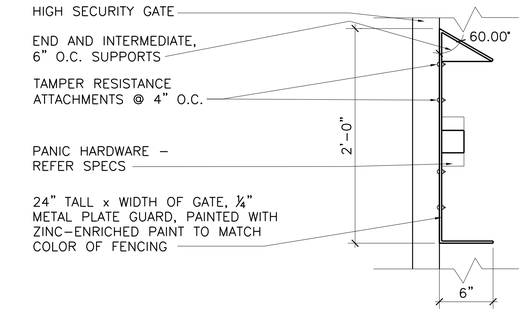
1 – PERSONNEL GATE TYPE FE-6 FENCE
NTS



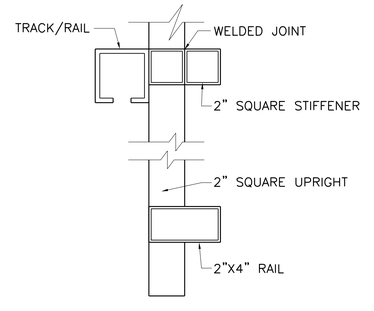
(*) POST SIZE AND ASSOCIATED FOOTING DIAMETER TO BE DETERMINED BY MANUFACTURER, BASED ON LEAF WEIGHT AND DIMENSION. MINIMUM FOOTING DIAMETERS (TO BE FILLED WITH 4000 PSI CONCRET: 40" DIAMETER FOR 8" POST; 36" DIAMETER FOR 6" POST; 24" DIAMETER FOR 4" POST; OTHER SIZES TO BE DESIGNED BY MANUFACTURER OR KTR. NO FOOTING WIDTH SHALL BE LESS THAN 4(X) THE POST WIDTH.

BARBED WIRE NOT SHOWN ON FENCE PORTION FOR CLARITY. SEE SHEET A-5 FOR FENCE DESIGN AND BARBED WIRE.

2 – SINGLE CANTILEVERED SLIDING GATE 3 FABRIC BAYS/2 WITHOUT
NTS



3 – PANIC HARDWARE GUARD AT PERSONNEL GATE
1 1/2" = 1'-0"



4 – SECTION (TYP)
NTS

0 4" 8" 1'
1-1/2"=1'-0"

0 6" 1' 2'
3/4"=1'-0

0 1' 2' 4' 8'
1/4"=1'-0"

BID OPTIONS "◯"

9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.

THE STATE OF TEXAS

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HOMER SAENZ, AIA
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ARCHITECTURAL SITE DETAILS - BID OPTION 9

A-4

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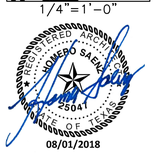
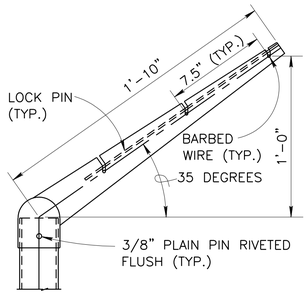
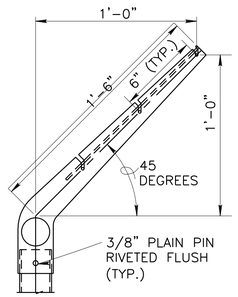


08/01/2018

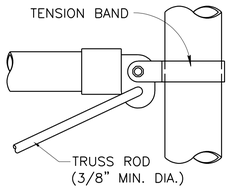


CORNER POST

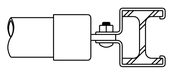


LINE POST

EXTENSION ARM DETAILS
NO SCALE

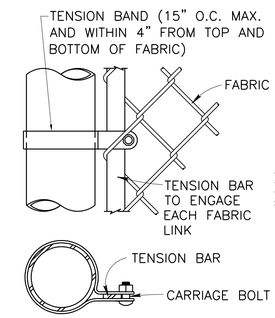


ROUND POST

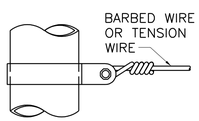


H-BEAM

BRACE RAIL CLAMP DETAILS

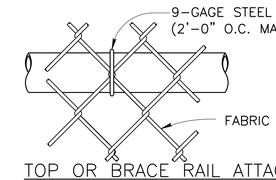


END OR GATE POST DETAIL

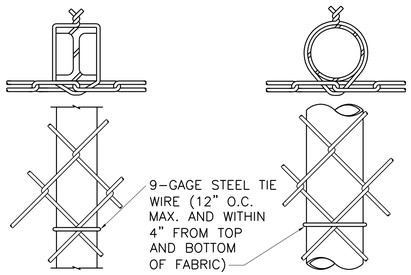


TENSION BAND DETAIL

FASTENING DETAILS
NO SCALE

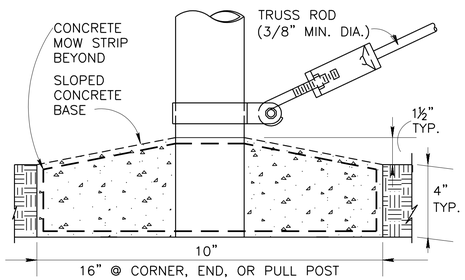


TOP OR BRACE RAIL ATTACHMENT

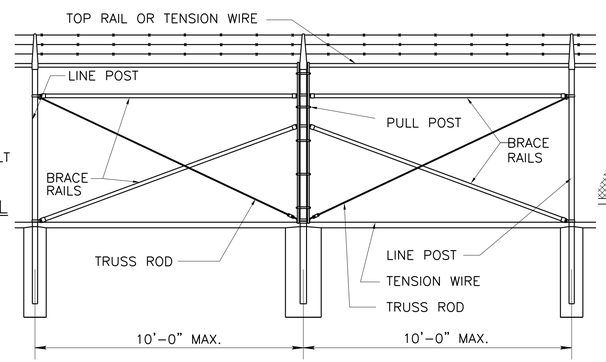


H-BEAM ROUND POST

LINE POST ATTACHMENTS
NO SCALE

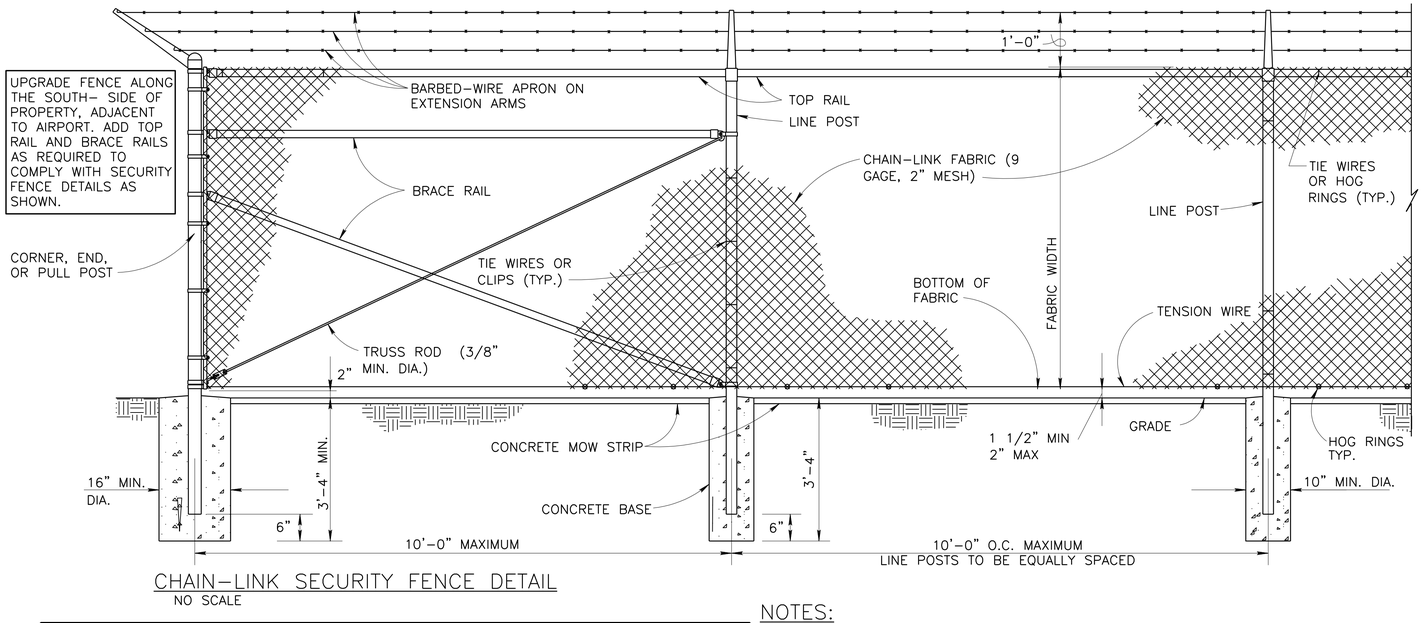


TRUSS ROD AND BAND
NO SCALE



BRACE PANEL DETAIL
NO SCALE

NOTE: PROVIDE BRACE PANEL WHENEVER STRAIGHT RUNS EXCEED 500 FEET.



CHAIN-LINK SECURITY FENCE DETAIL
NO SCALE

STEEL POST SCHEDULE

USE AND SECTION	MINIMUM OUTSIDE DIMENSIONS (NOMINAL)		
	FABRIC WIDTH < 72"	FABRIC WIDTH 84" TO 96"	FABRIC WIDTH >108"
CORNER, END & PULL POSTS			
TUBULAR – ROUND	4.00" O.D.		
TUBULAR – SQUARE	3.00" SQ.		
C-SECTION (ROLL-FORMED)			
LINE POSTS			
TUBULAR – ROUND	2.875" O.D.		
H-SECTION	2.25" X 1.70"		
C-SECTION (ROLL-FORMED)			
TOP, BOTTOM & BRACE RAILS			
TUBULAR – ROUND	1.66" O.D.		
TUBULAR – SQUARE	1.50" SQ.		
H-SECTION	1.625" X 1.50"		
C-SECTION (ROLL-FORMED)	1.625" X 1.25"		

1

NOTES:

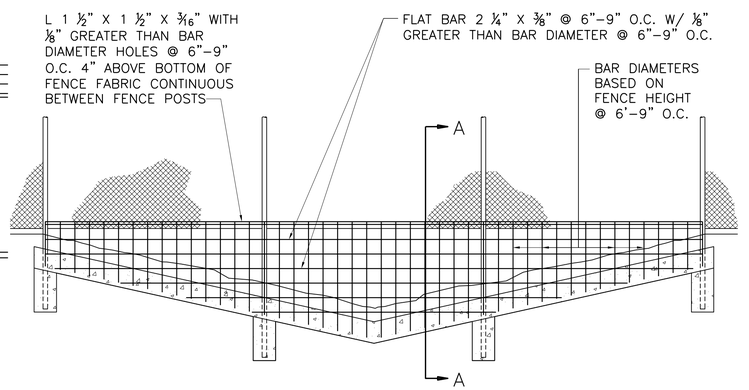
1. U.N.O. PROVIDE FENCE TYPE FE6, TR
2. DETAILS SHOWN ARE TO CLARIFY REQUIREMENTS AND ARE NOT INTENDED TO LIMIT OTHER TYPES OF FENCE SECTIONS AND METHODS OF INSTALLATION THAT COMPLY WITH THE SPECIFICATIONS.
3. WIRE TIES, RAILS, POSTS, AND BRACES SHALL BE CONSTRUCTED ON THE SECURE SIDE OF THE FENCE ALIGNMENT. CHAIN-LINK FABRIC SHALL BE PLACED ON THE SIDE OPPOSITE THE SECURE AREA.
4. UNLESS SPECIFICALLY SHOWN OR SPECIFIED, ALL FE6 FENCE SHALL HAVE AN APRON EXTENDED OUTWARD FROM THE AREA BEING PROTECTED.
5. C-SECTION POSTS SHALL BE INSTALLED SO THAT THE VOID INSIDE THE POST IS COMPLETELY FILLED WITH CONCRETE UP TO THE TOP OF THE FOUNDATION.
6. MODIFY FENCING AT SWALES AND GRADE DIPS PER UFC STANDARDS. COORDINATE WITH OWNER.

FENCE LEGEND:

TYPE FE5 – CHAIN-LINK FENCE WITHOUT BARBED-WIRE APRON
TYPE FE6 – CHAIN-LINK FENCE W/BARBED-WIRE ON SINGLE OUTRIGGER
TYPE FE7 – CHAIN-LINK FENCE W/BARBED WIRE ON DOUBLE OUTRIGGER
TYPE FE8 – CHAIN-LINK FENCE W/BARBED-WIRE AND BARBED-TAPE ON DOUBLE OUTRIGGER
TR – FENCE WITH TOP RAIL AND TENSION WIRE AT BOTTOM
TBR – FENCE WITH TOP AND BOTTOM RAILS
TWB – TENSION WIRE TOP AND BOTTOM
TWBR – FENCE WITH TOP TENSION WIRE AND BOTTOM RAIL
FINAL NUMBER IS FABRIC WIDTH IN INCHES.

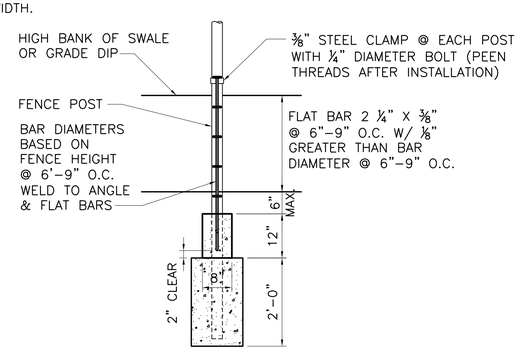
EXAMPLES

FE6-TR-72 – CHAIN-LINK SECURITY FENCE WITH BARBED-WIRE ON SINGLE OUTRIGGER, TOP RAIL, AND 72 INCH FABRIC WIDTH.
FE5-TWB-84 – CHAIN-LINK SECURITY FENCE WITH NO APRON, TOP AND BOTTOM TENSION WIRE, AND
84 INCH FABRIC WIDTH.



ELEVATION

FENCE SECURITY BARRIER AT SWALE OR GRADE DIP
NO SCALE



SECTION A-A

BID OPTIONS "◯"

9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: HS
REVIEWED BY: JWW

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NO.	DATE	ISSUE
1	08/01/18	ADDENDUM 1
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TEXAS MILITARY FORCES
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STAR CAMPAIGN FY18 - WESLACO
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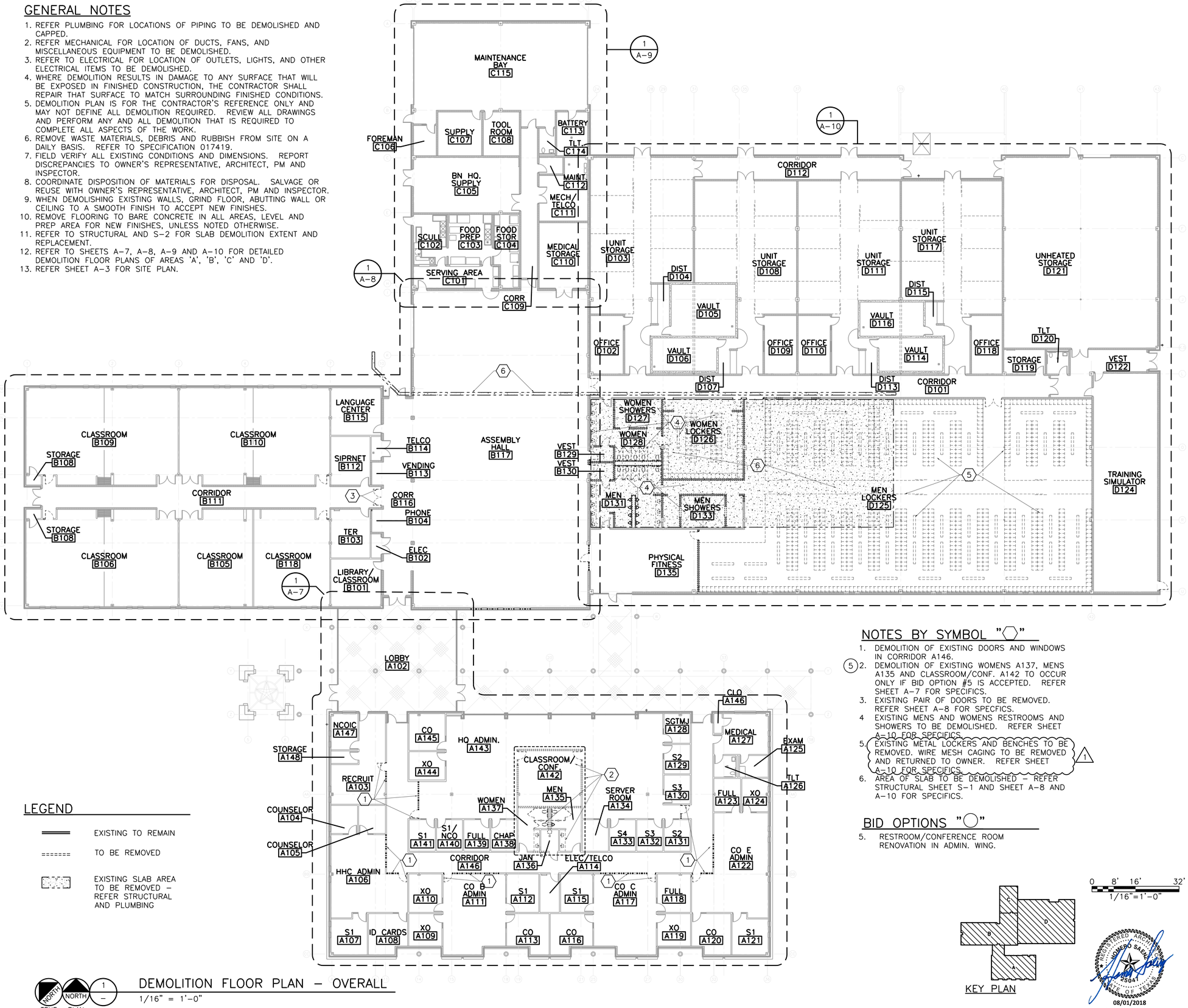
ARCHITECTURAL SECURITY FENCING DETAILS - BID OPTION 9

A-5

SHT. 12 of 129

GENERAL NOTES

1. REFER PLUMBING FOR LOCATIONS OF PIPING TO BE DEMOLISHED AND CAPPED.
2. REFER MECHANICAL FOR LOCATION OF DUCTS, FANS, AND MISCELLANEOUS EQUIPMENT TO BE DEMOLISHED.
3. REFER TO ELECTRICAL FOR LOCATION OF OUTLETS, LIGHTS, AND OTHER ELECTRICAL ITEMS TO BE DEMOLISHED.
4. WHERE DEMOLITION RESULTS IN DAMAGE TO ANY SURFACE THAT WILL BE EXPOSED IN FINISHED CONSTRUCTION, THE CONTRACTOR SHALL REPAIR THAT SURFACE TO MATCH SURROUNDING FINISHED CONDITIONS.
5. DEMOLITION PLAN IS FOR THE CONTRACTOR'S REFERENCE ONLY AND MAY NOT DEFINE ALL DEMOLITION REQUIRED. REVIEW ALL DRAWINGS AND PERFORM ANY AND ALL DEMOLITION THAT IS REQUIRED TO COMPLETE ALL ASPECTS OF THE WORK.
6. REMOVE WASTE MATERIALS, DEBRIS AND RUBBISH FROM SITE ON A DAILY BASIS. REFER TO SPECIFICATION 017419.
7. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. REPORT DISCREPANCIES TO OWNER'S REPRESENTATIVE, ARCHITECT, PM AND INSPECTOR.
8. COORDINATE DISPOSITION OF MATERIALS FOR DISPOSAL. SALVAGE OR REUSE WITH OWNER'S REPRESENTATIVE, ARCHITECT, PM AND INSPECTOR.
9. WHEN DEMOLISHING EXISTING WALLS, GRIND FLOOR, ABUTTING WALL OR CEILING TO A SMOOTH FINISH TO ACCEPT NEW FINISHES.
10. REMOVE FLOORING TO BARE CONCRETE IN ALL AREAS, LEVEL AND PREP AREA FOR NEW FINISHES, UNLESS NOTED OTHERWISE.
11. REFER TO STRUCTURAL AND S-2 FOR SLAB DEMOLITION EXTENT AND REPLACEMENT.
12. REFER TO SHEETS A-7, A-8, A-9 AND A-10 FOR DETAILED DEMOLITION FLOOR PLANS OF AREAS 'A', 'B', 'C' AND 'D'.
13. REFER SHEET A-3 FOR SITE PLAN.



NOTES BY SYMBOL "⬡"

1. DEMOLITION OF EXISTING DOORS AND WINDOWS IN CORRIDOR A146.
2. (5) DEMOLITION OF EXISTING WOMENS A137, MENS A135 AND CLASSROOM/CONF. A142 TO OCCUR ONLY IF BID OPTION #5 IS ACCEPTED. REFER SHEET A-7 FOR SPECIFICS.
3. EXISTING PAIR OF DOORS TO BE REMOVED. REFER SHEET A-8 FOR SPECFICS.
4. EXISTING MENS AND WOMENS RESTROOMS AND SHOWERS TO BE DEMOLISHED. REFER SHEET A-10 FOR SPECIFICS.
5. EXISTING METAL LOCKERS AND BENCHES TO BE REMOVED. WIRE MESH CAGING TO BE REMOVED AND RETURNED TO OWNER. REFER SHEET A-10 FOR SPECIFICS. (1)
6. AREA OF SLAB TO BE DEMOLISHED - REFER STRUCTURAL SHEET S-1 AND SHEET A-8 AND A-10 FOR SPECIFICS.

BID OPTIONS "◯"

5. RESTROOM/CONFERENCE ROOM RENOVATION IN ADMIN. WING.

LEGEND

- EXISTING TO REMAIN
- TO BE REMOVED
- EXISTING SLAB AREA TO BE REMOVED - REFER STRUCTURAL AND PLUMBING

KEY PLAN

0 8' 16' 32'
1/16"=1'-0"

08/01/2018

NORTH TRUE NORTH 1 – DEMOLITION FLOOR PLAN - OVERALL
1/16" = 1'-0"

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: HS
REVIEWED BY: JWW

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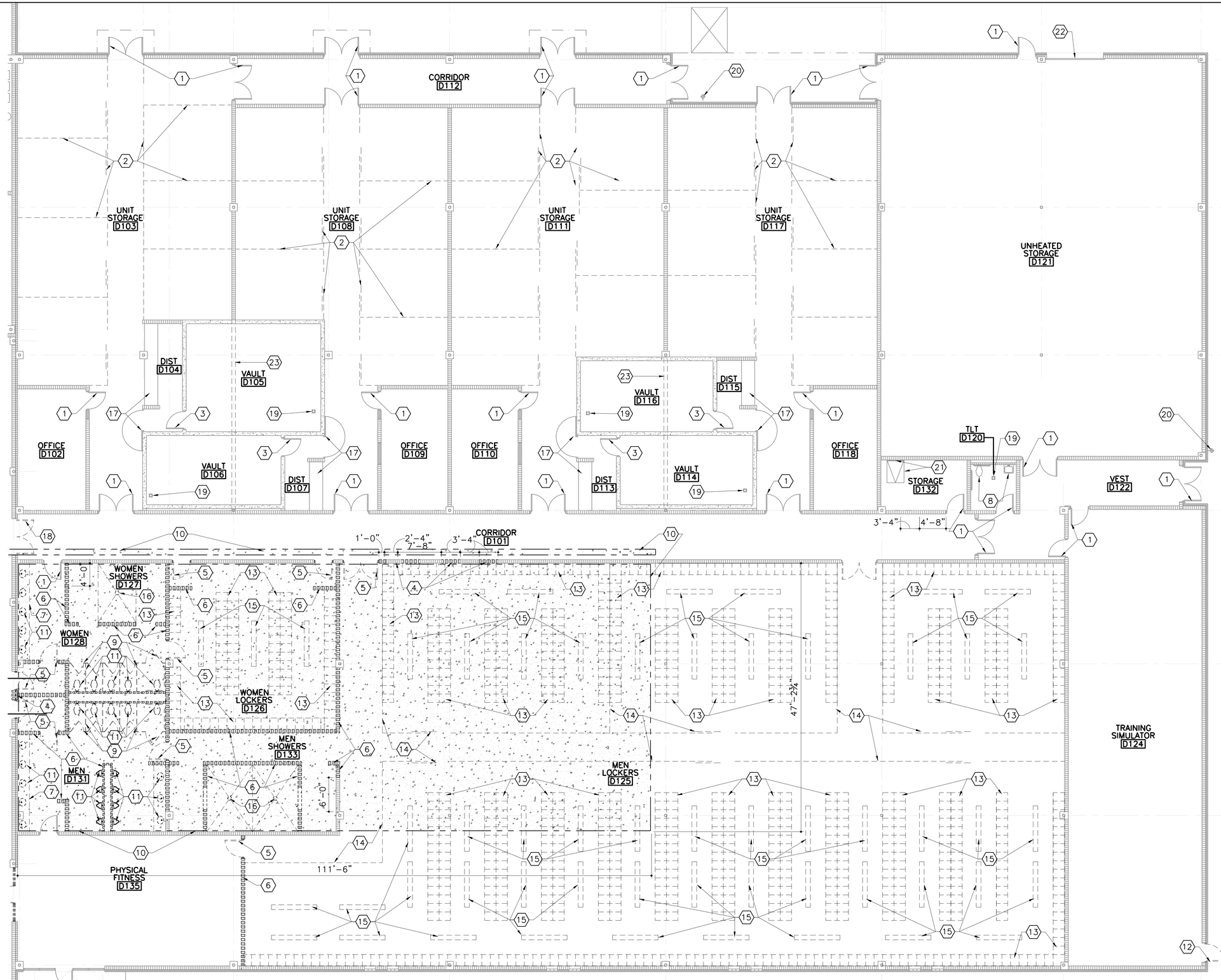
ARCHITECTURAL
OVERALL DEMOLITION FLOOR PLAN

A-6

SHT. 13 of 129



GENERAL NOTES

1. REFER PLUMBING FOR LOCATIONS OF PIPING TO BE DEMOLISHED AND CAPPED.
2. REFER MECHANICAL FOR LOCATION OF DUCTS, FANS, AND MISCELLANEOUS EQUIPMENT TO BE DEMOLISHED.
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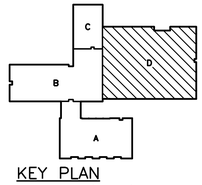
9. WHEN DEMOLISHING EXISTING WALLS, GRIND FLOOR, ABUTTING WALL OR CEILING TO A SMOOTH FINISH TO ACCEPT NEW FINISHES.
10. REMOVE FLOORING TO BARE CONCRETE IN ALL AREAS, LEVEL AND PREP AREA FOR NEW FINISHES, UNLESS NOTED OTHERWISE.
11. REFER TO STRUCTURAL AND S-1 FOR SLAB DEMOLITION EXTENT AND REPLACEMENT.

NOTES BY SYMBOL "⬡"

1. EXISTING DOOR TO REMAIN.
2. EXISTING WIRE MESH, DOOR AND PANEL TO REMAIN.
3. EXISTING VAULT DOOR TO REMAIN.
4. REMOVE PORTION OF WALL FOR NEW OPENING. REF: STRUCTURAL.
5. REMOVE EXISTING DOOR AND FRAME.
6. REMOVE EXISTING CMU WALL.
7. REMOVE EXISTING COUNTERTOP.
8. EXISTING PLUMBING TO REMAIN. REF: PLUMBING.
9. REMOVE EXISTING TOILET PARTITIONS.
10. DEMOLISH FLOOR AS NOTED. REF: STRUCTURAL.
11. REMOVE EXISTING PLUMBING FIXTURE AND ASSOCIATED PIPING. REF: PLUMBING.
12. REMOVE EXISTING ACCESS DOOR AND FRAME.
13. REMOVE EXISTING METAL LOCKERS.
14. REMOVE EXISTING WIRE MESH PANELS AND DOORS AND RETURN TO OWNER.
15. REMOVE EXISTING FLOOR MOUNTED BENCH.
16. REMOVE EXISTING GANG SHOWER PEDESTAL.
17. ISSUE COUNTER AND GATE TO REMAIN.
18. REMOVE DOORS, FRAME TO REMAIN.
19. EXISTING FLOOR DRAIN TO REMAIN.
20. EXISTING HOSE BIB TO BE DEMOLISHED. REF: PLUMBING.
21. EXISTING ROOF ACCESS HATCH AND WALL MOUNTED LADDER TO REMAIN.
22. EXISTING OVERHEAD DOOR TO REMAIN.
23. EXISTING 8" CMU WALL CONTINUES ACROSS THE TOP OF VAULT AREA TO THE BOTTOM OF DECK.



KEY PLAN

0 4' 8' 16'
1/8"=1'-0"

LEGEND

EXISTING TO REMAIN

TO BE REMOVED

EXISTING SLAB AREA TO BE REMOVED - REFER STRUCTURAL AND PLUMBING

NORTH TRUE NORTH PLAN

DEMOLITION FLOOR PLAN – AREA "D"

1/8" = 1'-0"

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: HS
REVIEWED BY: JWW

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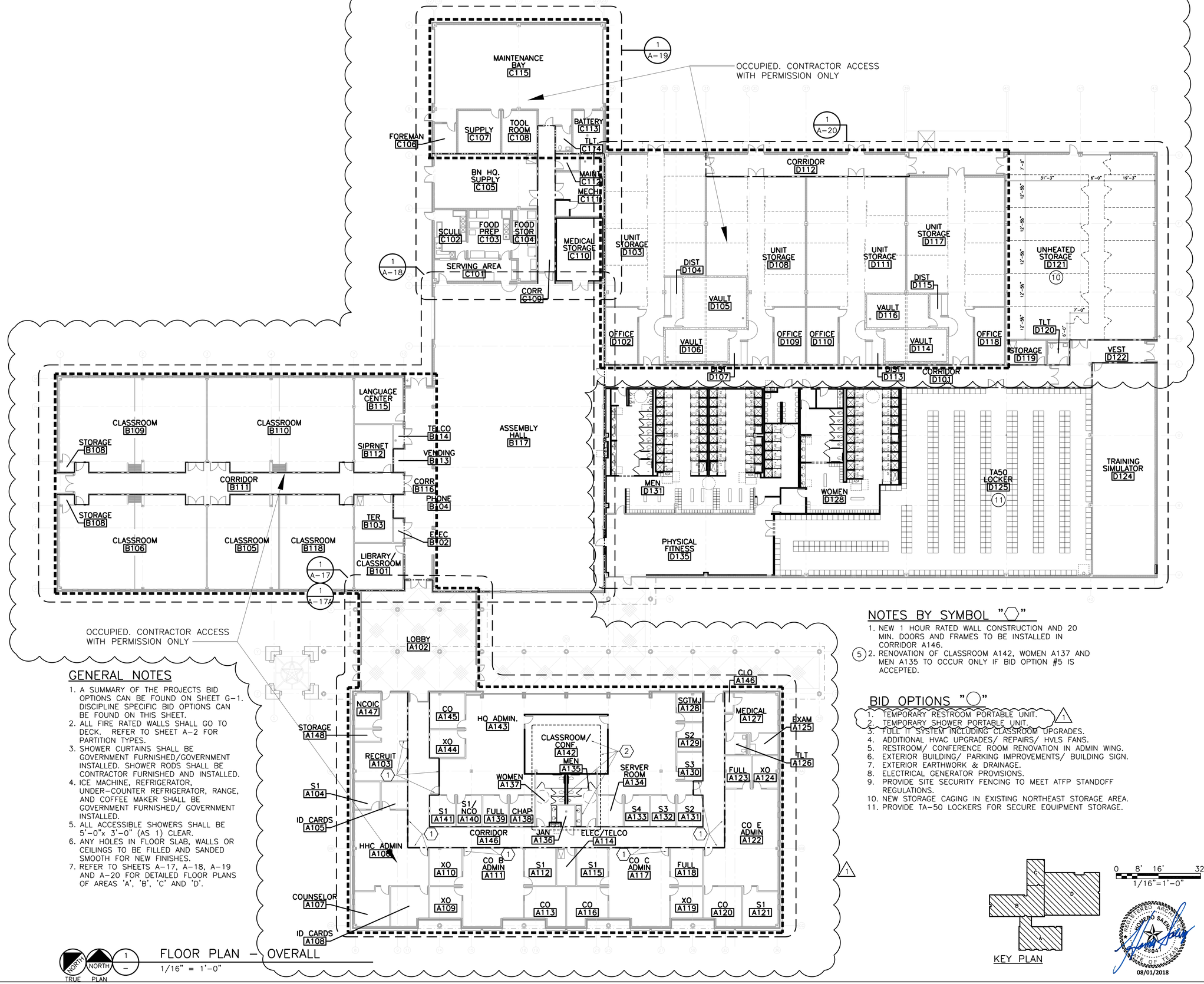
ARCHITECTURAL DEMOLITION FLOOR PLAN - AREA 'D'

A-10

SHT. 17 of 129

REGISTERED ARCHITECT HOMERO SAENZ 25041 STATE OF TEXAS
08/01/2018



GENERAL NOTES

1. A SUMMARY OF THE PROJECTS BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. ALL FIRE RATED WALLS SHALL GO TO DECK. REFER TO SHEET A-2 FOR PARTITION TYPES.
3. SHOWER CURTAINS SHALL BE GOVERNMENT FURNISHED/GOVERNMENT INSTALLED. SHOWER RODS SHALL BE CONTRACTOR FURNISHED AND INSTALLED.
4. ICE MACHINE, REFRIGERATOR, UNDER-COUNTER REFRIGERATOR, RANGE, AND COFFEE MAKER SHALL BE GOVERNMENT FURNISHED/ GOVERNMENT INSTALLED.
5. ALL ACCESSIBLE SHOWERS SHALL BE 5'-0"x 3'-0" (AS 1) CLEAR.
6. ANY HOLES IN FLOOR SLAB, WALLS OR CEILINGS TO BE FILLED AND SANDED SMOOTH FOR NEW FINISHES.
7. REFER TO SHEETS A-17, A-18, A-19 AND A-20 FOR DETAILED FLOOR PLANS OF AREAS 'A', 'B', 'C' AND 'D'.

NOTES BY SYMBOL "⬡"

1. NEW 1 HOUR RATED WALL CONSTRUCTION AND 20 MIN. DOORS AND FRAMES TO BE INSTALLED IN CORRIDOR A146.
(5) 2. RENOVATION OF CLASSROOM A142, WOMEN A137 AND MEN A135 TO OCCUR ONLY IF BID OPTION #5 IS ACCEPTED.

BID OPTIONS "◯"

1. TEMPORARY RESTROOM PORTABLE UNIT. (1)
2. TEMPORARY SHOWER PORTABLE UNIT.
3. FULL IT SYSTEM INCLUDING CLASSROOM UPGRADES.
4. ADDITIONAL HVAC UPGRADES/ REPAIRS/ HVLS FANS.
5. RESTROOM/ CONFERENCE ROOM RENOVATION IN ADMIN WING.
6. EXTERIOR BUILDING/ PARKING IMPROVEMENTS/ BUILDING SIGN.
7. EXTERIOR EARTHWORK & DRAINAGE.
8. ELECTRICAL GENERATOR PROVISIONS.
9. PROVIDE SITE SECURITY FENCING TO MEET ATFP STANDOFF REGULATIONS.
10. NEW STORAGE CAGING IN EXISTING NORTHEAST STORAGE AREA.
11. PROVIDE TA-50 LOCKERS FOR SECURE EQUIPMENT STORAGE.

NORTH TRUE / NORTH PLAN — 1 — FLOOR PLAN – OVERALL

1/16" = 1'-0"

KEY PLAN

0 8' 16' 32'

1/16"=1'-0"

08/01/2018

PROJECT ARCHITECT:
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ARCHITECTURAL OVERALL FLOOR PLAN

A-16

SHT. 23 of 129

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS				CEILING	HEIGHT	NOTES
				NORTH	EAST	SOUTH	WEST			
A102	LOBBY	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A103	RECRUIT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A104	COUNSELOR	CPT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	8'-8"	
A105	COUNSELOR	CPT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	8'-8"	
A106	HHC ADMIN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A107	S1	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A108	ID CARDS	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A109	XO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A110	XO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A111	CO B ADMIN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A112	S1	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A113	CO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A114	ELEC/ TELCO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A115	S1	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A116	CO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A117	CO C ADMIN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A118	FULL	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A119	ZO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A120	CO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A121	S1	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A122	CO E ADMIN	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A123	FULL	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A124	XO	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A125	EXAM	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A126	TLT	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A127	MEDICAL	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A127B	CLO	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A128	SGTMJ	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A129	S2	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A130	S3	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A131	S2	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A132	S3	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A133	S4	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A134	SERVER ROOM	CPT-1	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A135	MEN	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-2	8'-8"	
A136	JAN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A137	WOMEN	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-2	8'-8"	
A138	CHAP	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A139	FULL	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A140	S1/ NCO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A141	S1	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A142	CLASSROOM/ CONF.	CPT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	8'-8"	
A143	HQ ADMIN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A144	XO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A145	CO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A146	CLO	ETR	RB-1	ETR	ETR	ETR	ETR	ETR	8'-8"	
A147	NCOIC	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
A148	STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B101	LIBRARY/ CLASSROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B102	ELEC	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B103	TANG. AND STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B104	PHONE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B105	CLASSROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B106	CLASSROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B107	STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B108	STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B109	CLASSROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B110	CLASSROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B111	CORRIDOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B112	A/V STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B113	VENDING	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B114	TELCO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B115	LANGUAGE CENTER	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B116	CORRIDOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
B117	ASSEMBLY HALL	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	1
C101	SERVING AREA	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C102	SCULL	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C103	FOOD PREP	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C104	FOOD STOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C105	BN HQ. SUPPLY	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C106	FOREMAN	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C107	SUPPLY	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C108	TOOL ROOM	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C109	CORRIDOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C110	MEDICAL STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	3

NOTES:

1. STRIP EXISTING FLOOR. SAND SMOOTH, CLEAN AND RESEAL.
2. APPLY PT-1 FINISH AT DRYWALL PARTITIONS NEW AND EXISTING. CLEAN AND REPAINT EXISTING MASONRY PARTITIONS. APPLY BLOCK FILLER & PAINT NEW MASONRY PARTITIONS, PT-1 FINISH.
3. APPLY SPRAYED INSULATION AND INTUMESCENT COATING TO BOTTOM OF STRUCTURAL DECK AND EXPOSED STRUCTURAL MEMBERS ABOVE.

ROOM FINISH SCHEDULE

ROOM NO.	ROOM NAME	FLOOR	BASE	WALLS				CEILING	HEIGHT	NOTES
				NORTH	EAST	SOUTH	WEST			
C111	MECH/ TELCO	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C112	MAINT.	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C113	BATTERY	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C114	TLT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C115	MAINTENANCE BAY	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
C116	TER	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D101	CORRIDOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	1
D102	OFFICE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D103	UNIT STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D104	DIST	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D105	VAULT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D106	VAULT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D107	DIST	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D108	UNIT STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D109	OFFICE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D110	OFFICE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D111	UNIT STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D112	CORRIDOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D113	DIST	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D114	VAULT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D115	DIST	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D116	VAULT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D117	UNIT STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D118	OFFICE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D119	STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D120	TLT	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D121	UNHEATED STORAGE	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D122	VEST	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D124	TRAINING SIMULATOR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D125	TA50 LOCKERS	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	
D126	LACTATION	VCT-1	RB-1	PT-1	PT-1	PT-1	PT-1	ACT-1	8'-8"	3
D128	WOMEN	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-2	8'-8"	3
D128A	VESTIBULE	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-1	8'-8"	3
D128B	VESTIBULE	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-1	8'-8"	3
D129	WATER HTR	ETR	ETR	ETR	ETR	ETR	ETR	ETR	8'-8"	3
D131	MEN	CT-1	CTB-1	CT-2	CT-2	CT-2	CT-2	ACT-2	8'-8"	3
D135	PHYSICAL FITNESS	RAF/SC-1	RB-1	PT-1	PT-1	PT-1	PT-1	ESFP	8'-8"	2,3

INTERIOR MATERIAL SCHEDULE

MARK	ITEM	DESCRIPTION/COLOR	NOTES
ACT-1	CEILING TILE	ARMSTRONG FINE FISSURED 1729 2X2	
ACT-2	CEILING TILE, FRP	2x2 FIBERCORR BY NUDO, WHITE, SMOOTH	
CG-1	CORNER GUARD	2½"x2½" STAINLESS STEEL	
CPT-1	CARPET TILE	MOHAWK	
CT-1	CERAMIC TILE, 2x2	DALTILE, DESERT GRAY SPECKLE, D200	
CT-2	CERAMIC TILE, 4¼x4¼	DALTILE, DESERT GRAY, X114	
CTB-1	CERAMIC TILE BASE	DALTILE, DESERT GRAY 4x4 COVED	
ETR	EXISTING TO REMAIN		
ES	EXPOSED STRUCTURE	EXISTING TO REMAIN, PT-1 FINISH	
ESFP	EXPOSED STRUCTURE W/ SPRAYED ON FIREPROOFING	EXISTING TO REMAIN, SPRAYED ON FIREPROOFING	REPAIR/REPLACE SPRAY ON FIREPROOFING AS REQUIRED
FRP-1	FRP WAINSCOT	NUDO, FIBERLITE WHITE, SMOOTH	
GB-1	GYPSUM BOARD	PT-1 FINISH	
PL-1	PLASTIC LAMINATE	WILSONART, COSMIC STRANDZ, 4941K-18	CABINETS
PL-2	PLASTIC LAMINATE	WILSONART, NORTH SEA D90-60	RESTROOM APRONS
PT-1	ACRYLIC PAINT - SATIN	SHERWIN WILLIAMS, SW 7006, EXTRA WHITE	
PT-2	ACRYLIC PAINT - SEMI-GLOSS	SHERWIN WILLIAMS, SW 7065, ARGOS	METAL DOORS & FRAMES
PT-3	ACRYLIC PAINT - SEMI-GLOSS	SHERWIN WILLIAMS, SW 7061, NITE OWL	
PD-1	HDPE	AMPCO, NORTH SEA D90-60	TOILET, URINAL & SHOWER DRESS COMPARTMENT SCREENS
RB-1	RUBBER BASE	ROPPE, 150 DARK GREY, STANDARD TOE	
SC-1	SEALED CONCRETE	CHEM MASTERS SAFE CURE AND SEAL 309	
SS-1	SOLID SURFACE	DUPONT ZODIAC, MYSTIC BLACK	
SS-2	SOLID SURFACE	DUPONT ZODIAC, STORM GREY	LACTATION
VCT-1	VINYL COMPOSITION TILE	ARMSTRONG, 12X12 POLAR WHITE STANDARD EXCELON	
VCT-2	VCT-ANTI STATIC	ARMSTRONG, PEARL WHITE 51953	WITH GROUNDING WIRES AND MASTIC
QT	QUARRY TILE	MATCH EXISTING	
CMU	CONCRETE MASONRY UNITS	PT-1 FINISH	
OPW	OPERABLE WALL PARTITION		
RAF	RUBBER ATHLETIC FLOORING	ROPPE, RECOIL TILES 36"X36", 100 BLACK	

PROJECT ARCHITECT:
HOMER SAENZ, AIA
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ISSUE DATE: 04/20/18
DRAWN BY: HS
REVIEWED BY: JWW

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NO.	DATE	ISSUE
1	08/01/18	ADDENDUM 1
2		
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TEXAS MILITARY FORCES
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ARCHITECTURAL ROOM FINISH SCHEDULE

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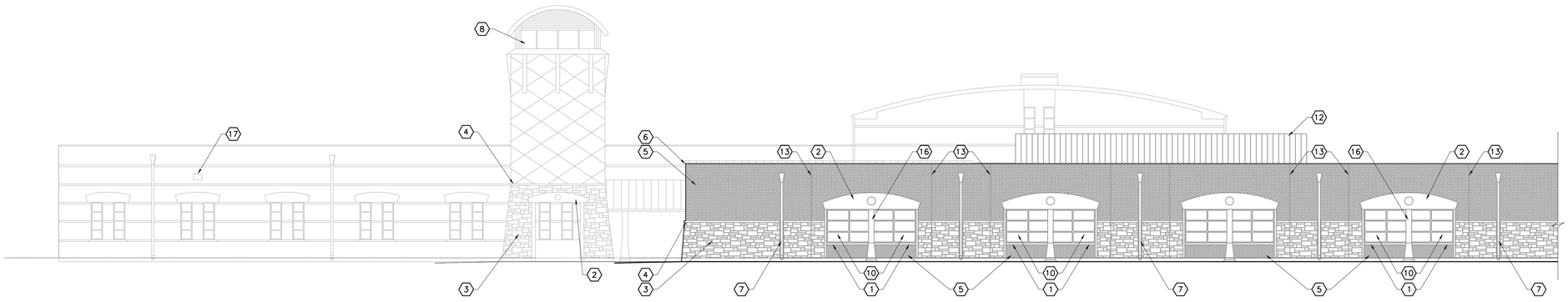
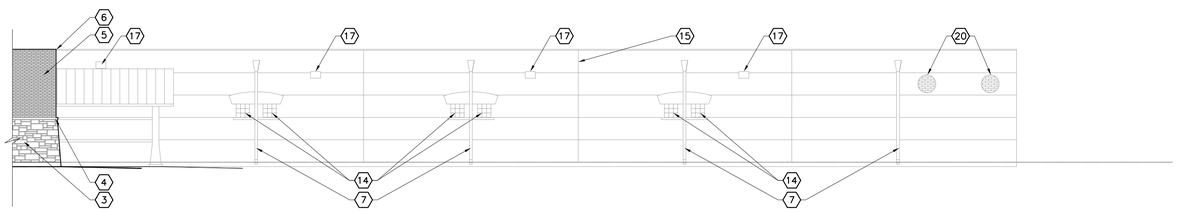
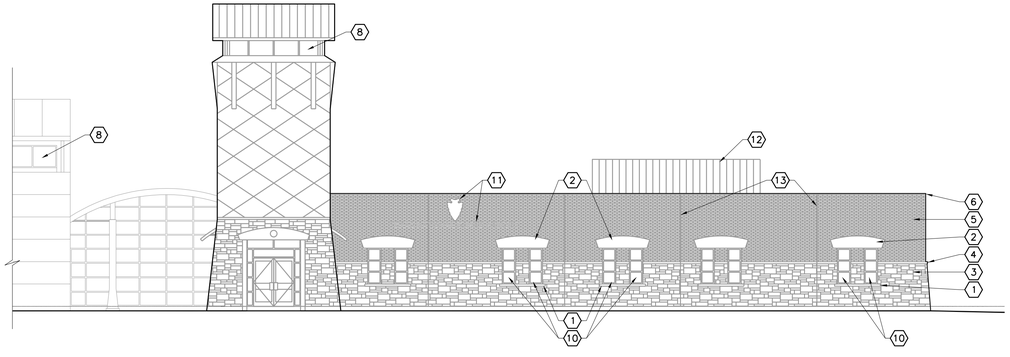


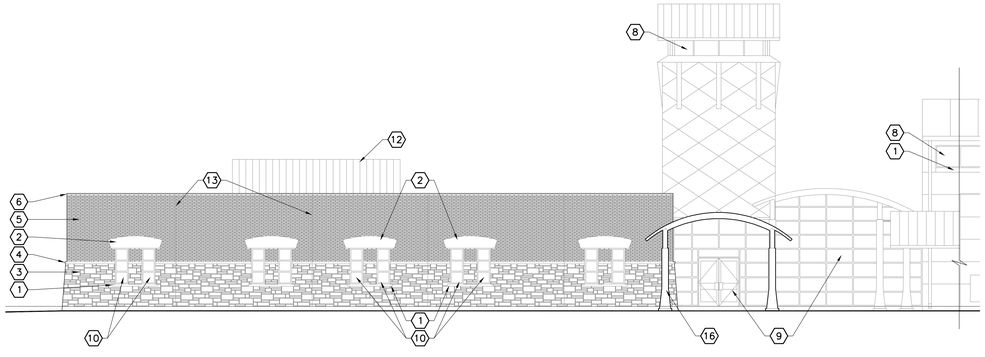
1 PARTIAL SOUTH ELEVATION
3/32" = 1'-0"



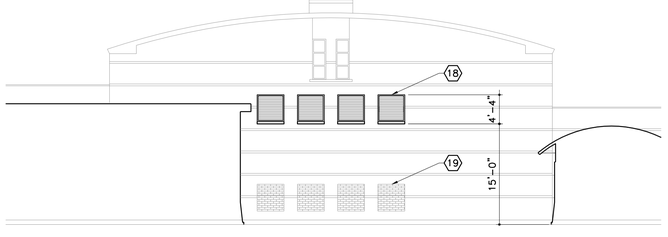
2 PARTIAL SOUTH ELEVATION
3/32" = 1'-0"



3 PARTIAL WEST ELEVATION
3/32" = 1'-0"



4 PARTIAL EAST ELEVATION
3/32" = 1'-0"



5 PARTIAL ELEVATION – DRILL HALL SOUTH WALL
3/32" = 1'-0"

GENERAL NOTES

1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THE COVER SHEET.
2. ELEVATIONS BASED ON PLAN NORTH ORIENTATION.

NOTES BY SYMBOL "⬡"

6 1. EXISTING CAST STONE SILL – CLEAN EXISTING STAINS AND SEAL.
6 2. EXISTING CAST STONE HEAD – CLEAN EXISTING STAINS AND SEAL.
6 3. EXSTING LIMESTONE VENEER – CLEAN EXISTING STAINS AND SEAL.
6 4. EXISTING CAST STONE WATERTABLE – CLEAN EXISTING STAINS AND SEAL.
5. EXISTING BRICK VENEER TO REMAIN.
6. EXISTING METAL COPING TO REMAIN.
7. EXISTING DOWNSPOUT.
8. EXISTING CLERESTORY WINDOW.
9. EXISTING STOREFRONT AND DOOR SYSTEM.
6 10. EXISTING WINDOWS TO REMAIN, CAULK AND RESEAL EXTERIOR. RE-CAULK AT INTERIOR.
11. EXISTING BUILDING SIGNAGE TO REMAIN. (1)
12. EXISTING METAL PANEL – HVAC SCREEN TO REMAIN.
13. EXISTING EXPANSION JOINT, REPLACE
6 ELASTOMERIC SEALANT – TYPICAL.
14. EXISTING GLASS BLOCK WINDOW TO
6 REMAIN, CAULK AND RESEAL EXTERIOR AND INTERIOR – TYPICAL.
15. EXISTING MASONRY CONTROL JOINT,
6 REPLACE ELASTOMERIC SEALANT – TYPICAL.
16. EXISTING COLUMN TO REMAIN.
17. NEW LIGHT FIXTURE – RE:
6 ELECTRICAL.
18. NEW ALUMINUM LOUVERS.
19. INFILL EXISTING LOUVER OPENINGS, RE: 1/A-2.
20. INFILL EXISTING EXHAUST FAN OPENINGS, RE: 1/A-2.

BID OPTIONS "◯"

6. EXTERIOR BUILDING IMPROVEMENTS.

0 4' 8' 16'
3/32"=1'-0"

PROJECT ARCHITECT:
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1	08/01/18	ADDENDUM 1

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ARCHITECTURAL EXTERIOR ELEVATIONS

A-32

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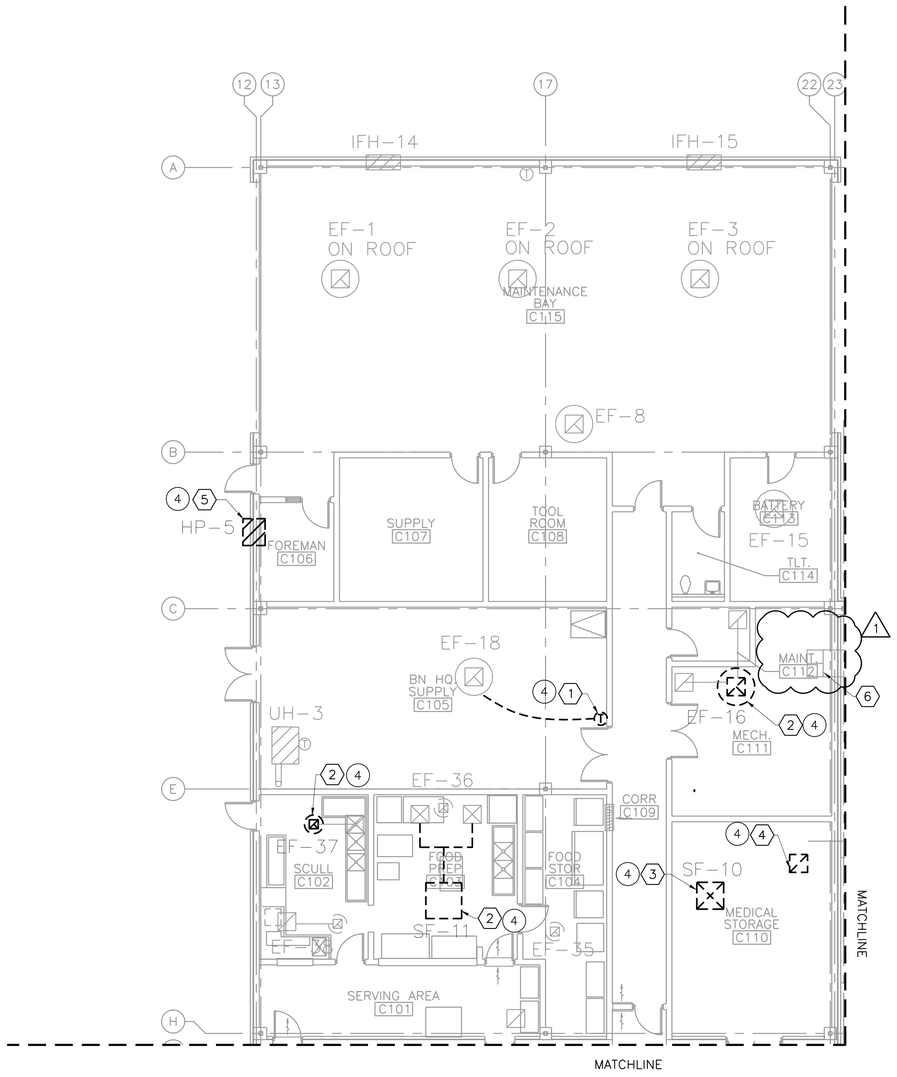


DEMOLITION FLOOR PLAN – C

1/8"=1'-0"

GENERAL NOTES:

1. REFER TO DIVISION 23 SECTION AND OTHER RELATED PORTIONS OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO HVAC SYSTEM.
2. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL WORK RELATED TO HVAC EQUIPMENT.
3. REFER TO SHEET M-0 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.
4. REFER TO ARCHITECTURAL DRAWINGS FOR WALL AND ROOF MODIFICATIONS ASSOCIATED WITH MECHANICAL DEMOLITION.
5. PATCH OPENINGS IN WALL THAT RESULT FROM DUCT DEMOLITION TO MATCH ADJOINING WALL IN CONSTRUCTION AND FINISH.

NOTES BY SYMBOL "⬡"

(4) 1. IF BID OPTION #4 IS SELECTED, DEMOLISH EXISTING THERMOSTATS. RETAIN CONDUIT FOR REUSE TO EXTENT POSSIBLE.

(4) 2. IF BID OPTION #4 IS SELECTED, DEMOLISH EXISTING ROOF-MOUNTED FAN. RETAIN ROOF CURB, DUCTWORK, HOOD, WIRING, CONDUIT AND CONTROLS FOR REUSE TO EXTENT POSSIBLE.

(4) 3. IF BID OPTION #4 IS SELECTED, DEMOLISH ROOF-MOUNTED FAN AND ASSOCIATED DUCTWORK, DIFFUSERS, AND CONTROLS. CAP ROOF OPENING IN ACCORDANCE WITH ROOF WARRANTY.

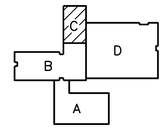
(4) 4. IF BID OPTION #4 IS SELECTED, DEMOLISH ROOF-MOUNTED INTAKE HOOD. CAP ROOF OPENING IN ACCORDANCE WITH ROOF WARRANTY.

(4) 5. IF BID OPTION #4 IS SELECTED, DEMOLISH EXISTING PACKAGED IN-WALL AC UNIT AND ASSOCIATED WIRING AND CONTROLS. RETAIN WALL OPENING.

6. INTAKE DUCTWORK TO REMAIN. (1)

BID OPTIONS "◯"

4. ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.



KEY PLAN

STATE OF TEXAS
VAN CASHEN
118595
LICENSED
PROFESSIONAL ENGINEER
08/01/2018

0 4' 8' 16'
1/8"=1'-0"

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: AJS
REVIEWED BY: VMC

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MECHANICAL
DEMOLITION PLAN - C

M-3 (4)

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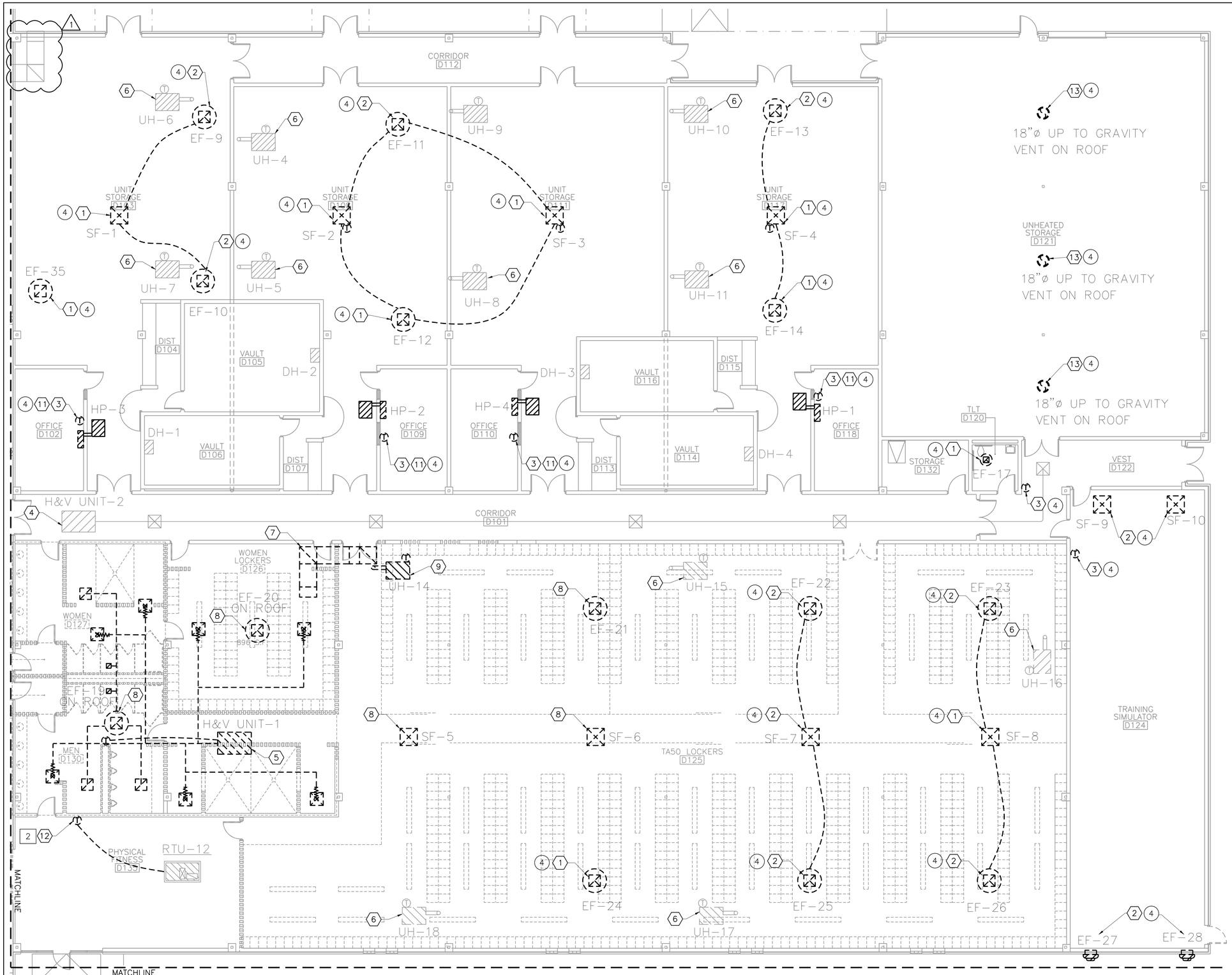


DEMOLITION FLOOR PLAN – D

1/8"=1'-0"

GENERAL NOTES:

1. REFER TO DIVISION 23 SECTION AND OTHER RELATED PORTIONS OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO HVAC SYSTEM.
2. REFER TO ELECTRICAL DRAWINGS FOR ADDITOINAL WORK RELATED TO HVAC EQUIPMENT.
3. REFER TO SHEET M-0 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.
4. REFER TO ARCHITECTURAL DRAWINGS FOR WALL AND ROOF MODIFICATIONS ASSOCIATED WITH MECHANICAL DEMOLITION.
5. PATCH OPENINGS IN WALL THAT RESULT FROM DUCT AND PIPING DEMOLITION TO MATCH ADJOINING WALL IN CONSTRUCTION AND FINISH.
6. CAP ALL ROOF PENETRATIONS RESULTING FROM HVAC DEMOLITION THAT ARE NOT BEING REUSED.

NOTES BY SYMBOL "⬡"

(4) 1. IF BID OPTION #4 IS SELECTED, DEMOLISH ROOF-MOUNTED FAN AND ASSOCIATED DUCTWORK, DIFFUSERS, WIRING AND CONTROLS. RETAIN CURB FOR REUSE.

(4) 2. IF BID OPTION #4 IS SELECTED, DEMOLISH ROOF-MOUNTED FANS AND ASSOCIATED DUCTWORK, DIFFUSERS WIRING, AND CONTROLS. PATCH ROOF OPENING PER ROOF MANUFACTURER'S WARRANTY AND ARCHITECTURAL DETAILS.

(4) 3. IF BID OPTION #4 IS SELECTED, DEMOLISH EXITING THERMOSTATS. RETAIN CONDUIT FOR REUSE TO EXTENT POSSIBLE.

4. EXISTING HEATING VENTILATOR UNIT TO REMAIN.
5. DEMOLISH EXISTING HEATING VENTILATOR UNIT AND ASSOCIATED DUCTWORK, DIFFUSERS, WIRING AND CONTROLS.CAP CURB PER MANUFACTURER'S WARRANTY.
6. EXISTING UNIT HEATER TO REMAIN.
7. DEMOLISH EXISTING TRANSFER DUCT AND CAP WALL PENETRATIONS IN WALLS TO REMAIN PER ARCH SHEETS.
8. DEMOLISH ROOF-MOUNTED FAN AND ASSOCIATED DUCTWORK, DIFFUSERS WIRING, AND CONTROLS. CAP CURB PER MANUFACTURER'S WARRANTY.
9. DEMOLISH EXISTING UNIT HEATER AND ASSOCIATED CONTROLS, WIRING, AND FLUE.
10. NOT USED. (1)

(4) 11. IF BID OPTION #4 IS SELECTED, DEMOLISH EXISTING MINI SPLIT HEAT PUMP AIR HANDLER, CONTROLS, REFRIGERANT PIPING, CONDENSER UNIT, AND ACCESSORIES. RETAIN AND REUSE ROOF PENETRATIONS FOR NEW EQUIPMENT.

[2] 12. IF SECO OPTION #2 IS SELECTED, DEMOLISH EXITING THERMOSTATS. RETAIN WIRING AND CONDUIT FOR REUSE TO EXTENT POSSIBLE.

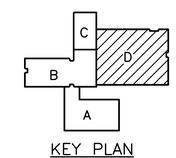
(4) 13. IF BID OPTION #4 IS SELECTED, DEMOLISH 18"ø ROOF VENT; PATCH ROOF PENETRATION PER ROOF MANUFACTURER'S WARRANTY AND ARCHITECTURAL DETAILS.

BID OPTIONS "◯"

4. ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.

SECO OPTIONS "□"

2. PROVIDE DDC CONTROL SYSTEM.



KEY PLAN

VAN CASHEN 118595 LICENSED PROFESSIONAL ENGINEER 08/01/2018

0 4' 8' 16'

1/8"=1'-0"

THE STATE OF TEXAS

PROJECT ARCHITECT: HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: AJS
REVIEWED BY: VMC

FREESE AND NICHOLS
4055 International Plaza, Suite 200
Fort Worth, Texas 76109-4895
Phone – (817) 735-7300
Fax – (817) 735-7491
Freese and Nichols, Inc.
Texas Registered Engineering Firm F-2144

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(512) 782-6131 FAX (512) 782-1481

STAR CAMPAIGN FY18 - WESLACO
RC MAJOR MAINTENANCE

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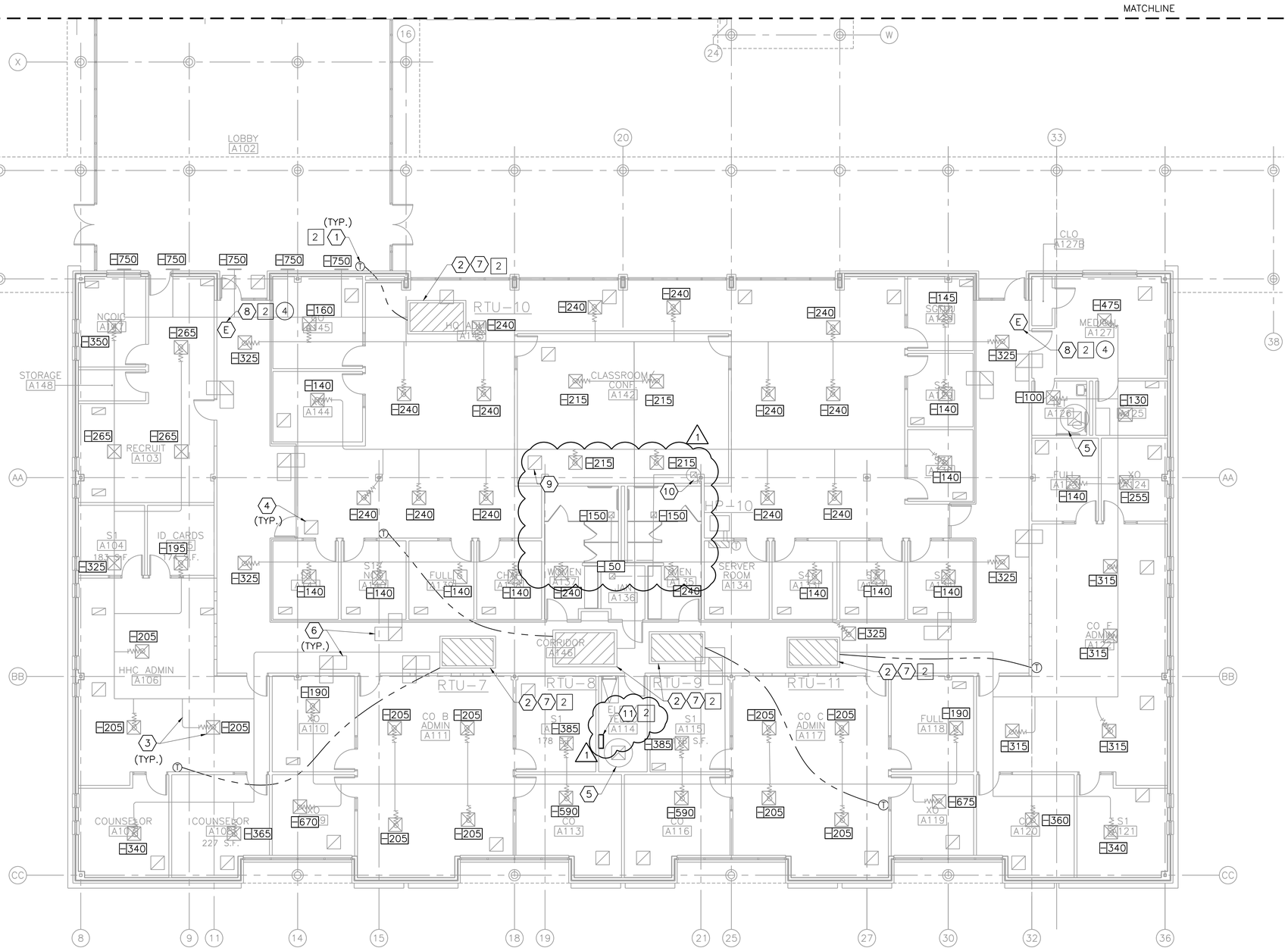
MECHANICAL
DEMOLITION PLAN - D

M-4 (4) [2]

SHT. 51 of 129



GENERAL NOTES:

1. REFER TO DIVISION 23 SECTION AND OTHER RELATED PORTIONS OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO HVAC SYSTEM.
2. REFER TO ELECTRICAL DRAWINGS FOR ADDITOINAL WORK RELATED TO HVAC EQUIPMENT.
3. REFER TO SHEET M-0 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.
4. REFER TO ARCHITECTURAL DRAWINGS FOR WALL AND ROOF MODIFICATIONS ASSOCIATED WITH MECHANICAL DEMOLITION.
5. IF BID OPTION #4 IS ACCEPTED, MODIFY EXISTING DUCT ROUTING AS NECESSARY TO ACCOMMODATE FLOWS INDICATED.
6. PROVIDE MANUAL BALANCING DAMPERS AS REQUIRED TO FACILITATE PROPER SYSTEM BALANCING.
7. REUSE EXISTING WALL PENETRATIONS FOR DUCT ROUTING WHERE POSSIBLE.

NOTES BY SYMBOL "⬡"

2
1. IF SECO OPTION #2 IS ACCEPTED, PROVIDE BAS-INTEGRATED ZONE TEMPERATURE SENSOR WITH ADJUSTABLE SETPOINT CONTROL.
2. EXISTING ROOF TOP UNITS TO REMAIN.
3. EXISTING DUCTWORK, DIFFUSERS, AND SUPPORTS TO REMAIN. CONTRACTOR TO FIELD VERIFY LOCATION OF BALANCING DAMPERS FOR EACH DIFFUSER AND RE-BALANCE FLOW RATES AS SPECIFIED ON THIS SHEET. IF EXISTING DUCTWORK IS INSUFFICIENT TO MEET DESIGN FLOWS, COORDINATE WITH ENGINEER FOR DIRECTION.
4. EXISTING RETURN AIR GRILLES TO REMAIN.
5. EXISTING EXHAUST FAN AND ASSOCIATED DUCTWORK TO REMAIN.
6. EXISTING TRANSFER DUCT TO REMAIN.

2
7. IF SECO OPTION #2 IS SELECTED, PROVIDE NEW BACNET CONTROLLER INTERFACED TO EXISTING RTU CONTROLLER PER 4/M-11.

4 2
8. IF BID OPTION #4 AND SECO OPTION #2 ARE ACCEPTED, PROVIDE EMERGENCY SHUTDOWN SWITCH WITH NON-LOCKING CLEAR PLASTIC COVER TO SHUT DOWN ALL EQUIPMENT CONNECTED TO BAS.

1
5
9. IF BID OPTION 5 IS ACCEPTED, RELOCATE RETURN GRILL INTO NEW CONFERENCE ROOM CEILING.
10. REBALANCE EXISTING FAN AND DUCTWORK AS INDICATED.

2
11. IF SECO OPTION #2 IS ACCEPTED, PROVIDE BAS PANEL. RE: 1/M-10 FOR MORE DETAILS. COORDINATE LOCATION AND ROUTING WITH OTHER DISCIPLINES TO AVOID CONFLICT. MAINTAIN ALL CLEARANCES.

BID OPTIONS "◯"

4. ~~ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.~~
5. RESTROOM/CONFERENCE ROOM RENOVATION IN ADMIN WING.

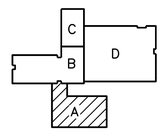
SECO OPTIONS "□"

2. PROVIDE DDC CONTROL SYSTEM.

NORTH TRUE / NORTH PLAN — 1 / M-5

FLOOR PLAN - A

1/8"=1'-0"



KEY PLAN

08/01/2018

0 4' 8' 16'

1/8"=1'-0"

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
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STAR CAMPAIGN FY18 - WESLACO
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MECHANICAL
FLOOR PLAN - A

M-5 (4) (2)

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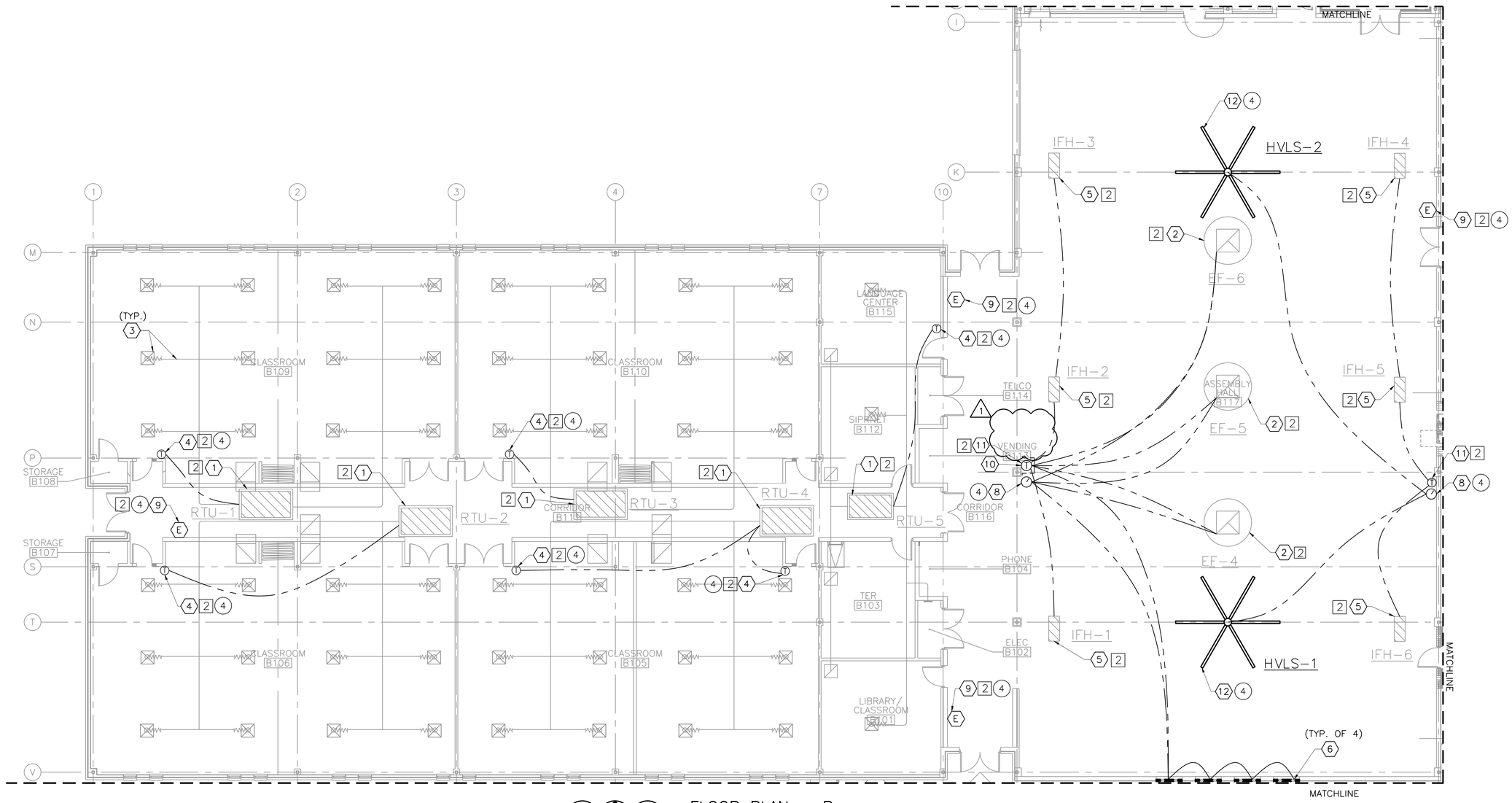


NORTH TRUE / NORTH PLAN — 1 / M-6

FLOOR PLAN – B

1/8"=1'-0"

GENERAL NOTES:

1. REFER TO SHEET M-0 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.
2. REFER TO ARCHITECTURAL DRAWINGS FOR WALL AND ROOF MODIFICATIONS ASSOCIATED WITH MECHANICAL DEMOLITION.
3. REFER TO DIVISION 23 SECTION AND OTHER RELATED PORTIONS OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO HVAC SYSTEM.

NOTES BY SYMBOL "⬡"

2 1. EXISTING ROOF TOP UNITS TO REMAIN. IF SECO OPTION #2 IS ACCEPTED, CONNECT TO BAS PER DETAILS ON 1/M-10.

2 2. EXISTING ROOF MOUNTED EXHAUST FANS TO REMAIN. IF BID OPTION #2 IS ACCEPTED, CONNECT TO BAS AND CONTROL PER 1/M-10.

3. EXISTING DUCTWORK, DIFFUSERS, SUPPORTS, AND CONTROLS TO REMAIN.

2 4 4. IF SECO OPTION #2 IS ACCEPTED, PROVIDE BAS-INTEGRATED ZONE TEMPERATURE SENSOR WITH ADJUSTABLE SETPOINT CONTROL.

2 5. EXISTING RADIANT GAS-FIRED HEATERS TO REMAIN. IF SECO OPTION #2 IS ACCEPTED, CONNECT TO BAS AND CONTROL PER 3/M-11.

6. PROVIDE NEW COMBINATION LOUVER/DAMPERS WITH MOTORIZED ACTUATORS INTERLOCKED WITH EXHAUST FANS; CONTROL PER 1/M-10.

1 7. NOT USED.

4 8. IF BID OPTION #4 IS ACCEPTED, PROVIDE 2 HOUR (ADJ.) TIMER TO CONTROL HVLS FANS.

4 2 9. IF BID OPTION #4 AND SECO OPTION #2 ARE ACCEPTED, PROVIDE EMERGENCY SHUTDOWN SWITCH WITH NON-LOCKING CLEAR PLASTIC COVER TO SHUT DOWN ALL EQUIPMENT CONNECTED TO BAS.

10. PROVIDE TIMER AND THERMOSTAT TO CONTROL EXHAUST FANS. RE: 2/M-10 FOR MORE DETAILS AND CONTROL INFORMATION.

2 11. PROVIDE NEW THERMOSTAT TO CONTROL EXISTING INFRARED HEATERS TO MAINTAIN A ROOM TEMPERATURE AT 45°F (ADJ.) IF SECO OPTION #2 IS SELECTED, PROVIDE BAS-COMPATABLE TEMPERATURE SENSOR AND CONTROL PER 3/M-11.

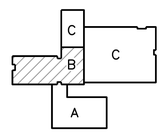
4 12. IF BID OPTION #4 IS SELECTED, PROVIDE NEW HIGH VOLUME LOW SPEED CIRCULATION FAN. MOUNT AT THE SAME LEVEL AS LIGHTS IN THIS ROOM.

BID OPTIONS "◯"

4. ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.

SECO OPTIONS "□"

2. PROVIDE DDC CONTROL SYSTEM.



KEY PLAN

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STAR CAMPAIGN FY18 - WESLACO
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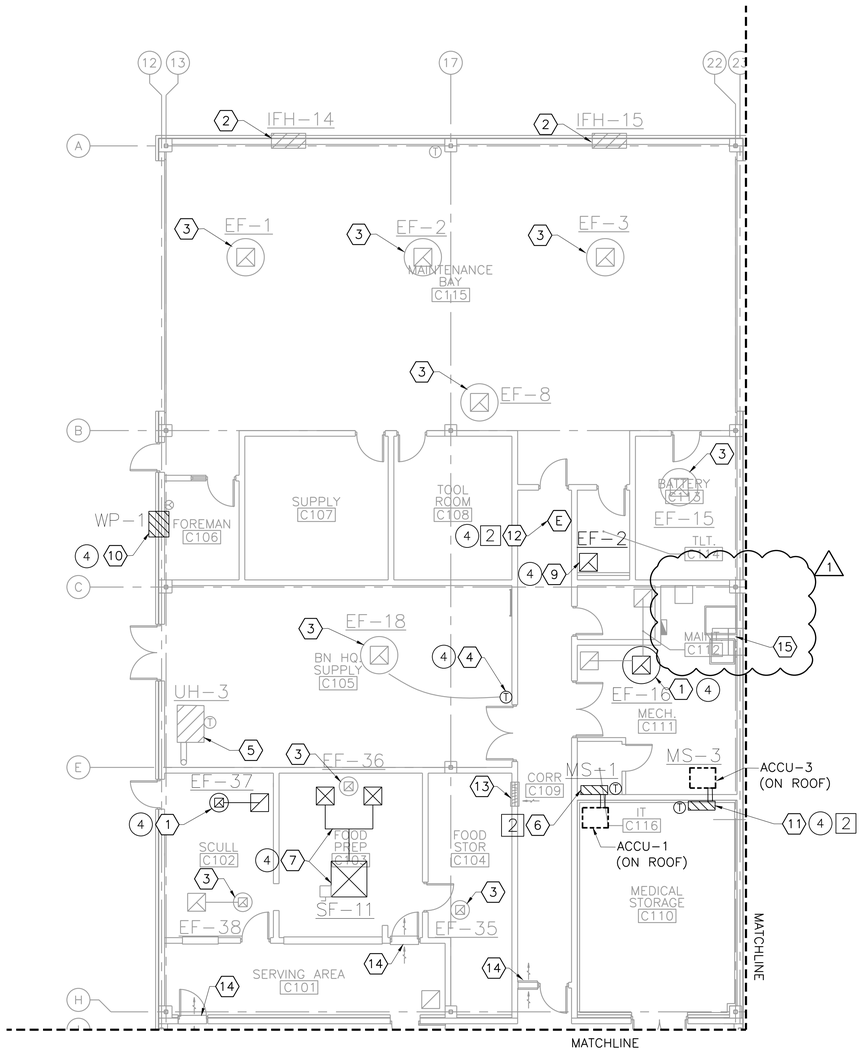
MECHANICAL
FLOOR PLAN - B

M-6 2 4

SHT. 53 of 129



NORTH TRUE / NORTH PLAN — 1 / M-7

FLOOR PLAN – C

1/8"=1'-0"

GENERAL NOTES:

1. REFER TO SHEET M-0 FOR LEGEND, ABBREVIATIONS, AND GENERAL NOTES.
2. REFER TO ARCHITECTURAL DRAWINGS FOR WALL AND ROOF MODIFICATIONS ASSOCIATED WITH MECHANICAL DEMOLITION.
3. PATCH OPENINGS IN WALL THAT RESULT FROM DUCT DEMOLITION TO MATCH ADJOINING WALL IN CONSTRUCTION AND FINISH.
4. REFER TO DIVISION 23 SECTION AND OTHER RELATED PORTIONS OF THE TECHNICAL SPECIFICATIONS FOR ADDITIONAL WORK RELATED TO HVAC SYSTEM.

NOTES BY SYMBOL "⬡"

(4) 1. IF BID OPTION #4 IS ACCEPTED, PROVIDE NEW FAN AS SCHEDULED ON EXISTING CURB. PROVIDE CURB ADAPTOR AS NECESSARY.

2. EXISTING INFRARED UNIT HEATERS TO REMAIN.

3. EXISTING ROOF MOUNTED EXHAUST FANS TO REMAIN.

(4) 4. IF BID OPTION #4 IS ACCEPTED, PROVIDE THERMOSTAT TO ENABLE EXHAUST FANS WHEN TEMPERATURE RISES ABOVE 85°F (ADJ.).

5. EXISTING UNIT HEATER TO REMAIN.

[2] 6. PROVIDE NEW MINI SPLIT AC UNIT. REFRIGERANT LINE TO BE ROUTED PER MANUFACTURER'S RECOMMENDATIONS. AIR-COOLED CONDENSING UNIT TO BE LOCATED ON ROOF. IF SECO OPTION #2 IS ACCEPTED, CONNECT TO BAS AND CONTROL PER 2/M-12.

(4) 7. IF BID OPTION #4 IS ACCEPTED, PROVIDE NEW MAKEUP AIR UNIT ON ROOF AS SCHEDULED. INTERCONNECT TO EF-36 SUCH THAT BOTH FANS OPERATE SIMULTANEOUSLY. BALANCE AS INDICATED ON MECHANICAL SCHEDULES ON M-9.

△1 8. NOT USED.

(4) 9. IF BID OPTION #4 IS ACCEPTED, PROVIDE CEILING MOUNTED EXHAUST FAN AS SCHEDULED; WIRE TO OPERATE IN CONJUNCTION WITH LIGHT SWITCH.

(4) 10. IF BID OPTION #4 IS ACCEPTED, PROVIDE PACKAGED WALL UNIT AS SCHEDULED. MODIFY EXISTING OPENING TO ACCOMMODATE NEW UNIT SIZE.

[2](4) 11. IF BID OPTION #4 IS ACCEPTED, PROVIDE NEW MINI SPLIT HEAT PUMP. REFRIGERANT LINE TO BE ROUTED PER MANUFACTURER'S RECOMMENDATIONS. AIR-COOLED CONDENSING UNIT TO BE LOCATED ON ROOF. IF SECO OPTION #2 IS ACCEPTED, CONNECT TO BAS AND CONTROL PER 1/M-12.

[2](4) 12. IF BID OPTION #4 AND SECO OPTION #2 ARE ACCEPTED, PROVIDE EMERGENCY SHUTDOWN SWITCH WITH NON-LOCKING CLEAR PLASTIC COVER TO SHUT DOWN ALL EQUIPMENT CONNECTED TO BAS.

13. EXISTING MOTORIZED DAMPER TO REMAIN.

14. EXISTING AIR TRANSFER DUCT TO REMAIN.

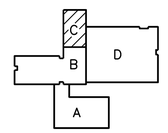
△1 15. MODIFY DUCTWORK AS NECESSARY TO AVOID ELECTRICAL PANELS.

BID OPTIONS "◯"

4. ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.

SECO OPTIONS "□"

2. PROVIDE DDC CONTROL SYSTEM.



KEY PLAN

VAN CASHEN 118595 LICENSED PROFESSIONAL ENGINEER 08/01/2018

0 4' 8' 16'

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PROJECT ARCHITECT: HOMER SAENZ, AIA
PROJECT NO. ADG17589A
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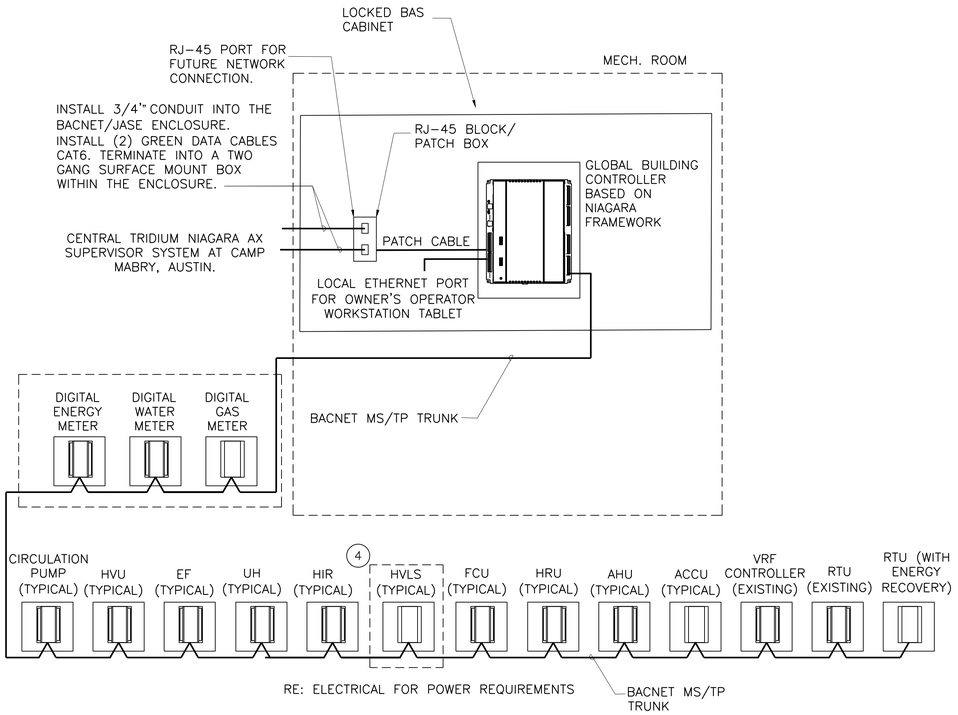
MECHANICAL
FLOOR PLAN - C

M-7 [2](4)

SHT. 54 of 129



NOTE:

BASE BID: PROVIDE GLOBAL BUILDING CONTROLLER AND DIGITAL ENERGY METERS. METERS TO BE INTEGRATED TO GLOBAL CONTROLLER VIA BACNET MS/TP AS SHOWN.

SECO BID OPTION #2: UTILIZE THE NIAGARA GLOBAL BUILDING CONTROLLER FOR INTEGRATION OF ALL OTHER EQUIPMENT SHOWN ON DIAGRAM AND P&ID DETAILS.

2 — 1/M-10 NETWORK ARCHITECTURE DIAGRAM

NTS

BAS INPUT/OUTPUT POINT LIST												
		HARDWARE POINTS				SOFTWARE POINTS						
TAG	POINT NAME	AI	AO	DI	DO	AV	BV	TREND	ALARM	ADJUSTABLE	SHOW ON GRAPHIC
1	WATER FLOW RATE	X						X			
2	DEMAND							X			X
3	PEAK MONTH-TO-DATE							X			X
4	PEAK TODAY							X			X
5	PEAK YEAR-TO-DATE							X			X
6	USAGE MONTH-TO-DATE							X			X
7	USAGE TODAY							X			X
8	USAGE YEAR-TO-DATE							X			X
9	GAS METER FAILURE								X		

WATER METER POINTS LIST

BAS INPUT/OUTPUT POINT LIST												
		HARDWARE POINTS				SOFTWARE POINTS						
TAG	POINT NAME	AI	AO	DI	DO	AV	BV	TREND	ALARM	ADJUSTABLE	SHOW ON GRAPHIC
1	GAS FLOW RATE	X						X			
2	DEMAND							X			X
3	PEAK MONTH-TO-DATE							X			X
4	PEAK TODAY							X			X
5	PEAK YEAR-TO-DATE							X			X
6	USAGE MONTH-TO-DATE							X			X
7	USAGE TODAY							X			X
8	USAGE YEAR-TO-DATE							X			X
9	GAS METER FAILURE								X		

GAS METER POINTS LIST

BAS INPUT/OUTPUT POINT LIST												
		HARDWARE POINTS				SOFTWARE POINTS						
TAG	POINT NAME	AI	AO	DI	DO	AV	BV	TREND	ALARM	ADJUSTABLE	SHOW ON GRAPHIC
1	REAL POWER - KW TOTAL					X		X			X
2	REAL ENERGY - KWH TOTAL					X		X			X
3	PWR-DEMAND					X		X			X
4	PWR-DEMAND-PEAK					X		X			X
5	VOLTAGE A-B					X		X			X
6	VOLTAGE A-N					X		X			X
7	VOLTAGE B-C					X		X			X
8	VOLTAGE B-N					X		X			X
9	VOLTAGE C-A					X		X			X
10	VOLTAGE C-N					X		X			X
11	AMP A					X		X			X
12	AMP B					X		X			X
13	AMP C					X		X			X
14	POWER FACTOR A					X		X			X
15	POWER FACTOR B					X		X			X
16	POWER FACTOR C					X		X			X
17	POWER FACTOR TOTAL					X		X			X
18	REACTIVE POWER - KVAR					X		X			X

ELEC. METER POINTS LIST

2

BAS GENERAL NOTES:

1. PROVIDE A TOTALLY NATIVE BACNET BASED DIRECT DIGITAL CONTROL (DDC) SYSTEM INCLUDING A COMPATIBLE OPERATOR WORKSTATION LAPTOP BASED ON THE NETWORK ARCHITECTURE DIAGRAM SHOWN IN DETAIL 1 ON THIS SHEET.
2. THE GLOBAL BUILDING CONTROLLER SHALL BE BASED ON THE TRIDIUM NIAGARA N4 FRAMEWORK AND SHALL BE ABLE TO ESTABLISH AND MAINTAIN TWO WAY COMMUNICATION AND CONTROL WITH THE EXISTING NIAGARA AX SUPERVISOR VIA THE OWNER – FURNISHED RCAS NETWORK. PROVIDE REQUIRED NIAGARA AX LICENSING FOR THE N4 CONTROLLER.
3. THE OWNER SHALL OWN AND SHALL HAVE FULL RIGHTS TO ALL FEATURES OF THE NIAGARA AX SOFTWARE.
4. THE LOCAL BUILDING CONTROLLER/JACE SHALL BE CONFIGURED WITH DCHP ADDRESSING.
5. CONTRACTOR SHALL CONTACT AND COORDINATE WITH TRIDIUM TO ACQUIRE THE STANDARD NIAGARA AX GRAPHICS AND SHALL MODIFY/ALTER THESE GRAPHICS TO MATCH SYSTEMS AND EQUIPMENT IN THIS PROJECT. REFER TO TECHNICAL SPECIFICATION SECTION 23 09 23 FOR MORE INFORMATION.
6. REFER TO TECHNICAL SPECIFICATION SECTION 23 09 23 FOR STANDARD NOMENCLATURE AND FILE NAMING CONVENTIONS.
7. REFER TO TECHNICAL SPECIFICATION SECTION 23 09 23 TO COMPLY WITH REQUIREMENTS OF UMCS-MCX ARMY METERING PROGRAM GUIDANCE FOR ADVANCED METERS.
8. ALL EQUIPMENT (EXISTING AND NEW) SHALL CONNECT TO THE GLOBAL BUILDING CONTROLLER VIA THE BACNET MS/TP TRUNK. PROVIDE REQUIRED CONTROLLERS TO INTERFACE EQUIPMENT

ZONE TEMPERATURE CONTROL:

1. THE BAS SHALL INCLUDE 7-DAY OCCUPANCY SCHEDULES FOR INDIVIDUAL EQUIPMENT AND A 7-DAY MASTER OCCUPANCY SCHEDULE FOR THE BUILDING. THE ZONE TEMPERATURE CONTROL SHALL BE BASED ON OCCUPANCY SCHEDULE AND THE OCCUPANCY STATUS OF THE ROOM (WHERE PROVIDED WITH OCCUPANCY SENSORS).
2. OCCUPIED MODE: THE BUILDING SHALL BE "OCCUPIED" FROM 8 A.M. (ADJ.) TO 6 P.M. (ADJ.), MONDAY THRU FRIDAY. TEMPERATURE SETPOINTS: COOLING: 75°F (ADJ.), HEATING 70°F (ADJ.).
3. UNOCCUPIED MODE: THE BUILDING SHALL BE "UNOCCUPIED" FROM 6 P.M. (ADJ.) TO 8 A.M. (ADJ.) MONDAY THRU FRIDAY AND ENTIRE DAY ON SATURDAY AND SUNDAY. TEMPERATURE SETPOINTS: COOLING: 85°F (ADJ.) AND HEATING: 60°F (ADJ).
4. ZONE SETPOINT ADJUST: THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SET POINTS AT THE ZONE SENSOR BY ±2°F.
5. 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 (INITIALLY SET AT 2 HOURS) PERIOD OF TIME. AT THE EXPIRATION OF THIS TIME, CONTROL OF THE UNIT SHALL AUTOMATICALLY RETURN TO THE MASTER SCHEDULE.
6. ASSEMBLY HALL ZONE TEMPERATURE CONTROL: REFER TO 3/M-11 FOR TEMPERATURE SETPOINTS FOR THE ASSEMBLY HALL.
7. TEMPERATURE CONTROL DEVICES SHALL BE EQUIPPED WITH DEADBANDS THAT COMPLY WITH IECC 2015.

1

SECO OPTIONS "□"

1. PROVIDE OCCUPANCY SENSORS
2. PROVIDE DDC CONTROL SYSTEM

BID OPTIONS "◯"

4. ADDITIONAL HVAC UPGRADES/REPAIRS/HVLS FANS.

STATE OF TEXAS
VAN CASHEN
118595
LICENSED PROFESSIONAL ENGINEER
08/01/2018

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: RWE
REVIEWED BY: VMC

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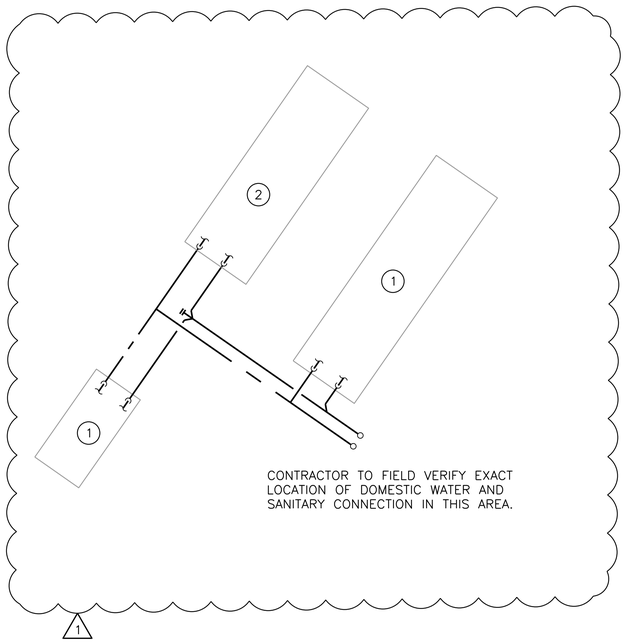
STAR CAMPAIGN FY18 - WESLACO RC MAJOR MAINTENANCE

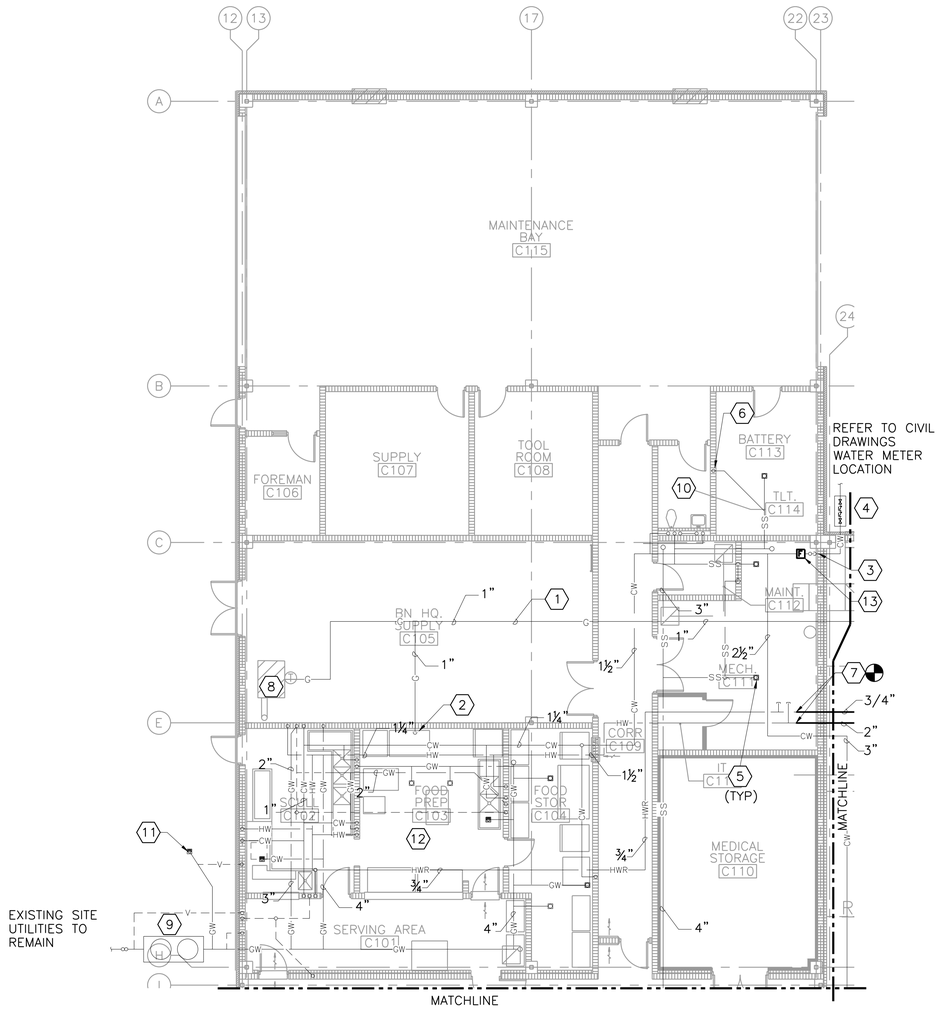
TXARNG CFMO

MECHANICAL NETWORK ARCHITECTURE DIAGRAM

M-10 2

SHT. 57 of 129





NORTH PLAN NORTH · NORTH TRUE NORTH · 1 — FLOOR PLAN – C

1/8"=1'-0"

GENERAL NOTES:

1. A SUMMARY OF THE PROJECT'S BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. REFER TO SHEET P-0 FOR LEGEND, GENERAL NOTES, ABBREVIATIONS AND SCHEDULES.
3. EXISTING ROOF DRAINAGE SYSTEM TO REMAIN AS IS UNLESS INDICATED OTHERWISE.
4. PROVIDE NEW TRAP SEAL DEVICE IN ALL EXISTING AND NEW FLOOR DRAINS, FLOOR SINKS, AND HUB DRAINS.
5. ALL EXTERIOR AND INTERIOR GAS PIPING TO BE PAINTED SAFETY YELLOW.

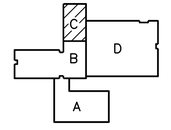
NOTES BY SYMBOL "⬡"

1. EXISTING GAS PIPING ON ROOF.
2. EXISTING GAS PIPE DOWN THROUGH ROOF.
3. EXISTING VALVED 3" DOMESTIC WATER RISER.
4. EXISTING 3" BACKFLOW PREVENTOR IN VAULT.
5. EXISTING FLOOR DRAIN.
6. EXISTING VENT THROUGH ROOF (VTR).
7. CONNECT NEW 2" HW AND 3/4" HWR PIPE AND EXTEND AS INDICATED.
8. EXISTING GAS FIRED HVAC EQUIPMENT.
9. EXISTING CONCRETE GREASE SEPARATOR TO REMAIN. PUMP OUT AND PROPERLY DISPOSE OF GREASE LADEN WASTE. AFTER SEPARATOR IS COMPLETELY EMPTY AND DRY, CLEAN SEPARATOR INTERIOR WITH ALKALINE DEGREASER AND PRESSURE WASH. PERMANENTLY INJECT ALL CRACKS WITH COMMERCIAL GRADE LOW PRESSURE CRACK SEALANT. SEAL INTERIOR CONCRETE SURFACES WITH SILICONATE MULTI-SURFACE SMOOTH WB PENETRATING SEALANT.
10. EXISTING PLUMBING FIXTURES TO REMAIN.
11. EXISTING 3" CAN WASH DRAIN.
12. ALL PIPING AND EQUIPMENT IN KITCHEN AREA TO REMAIN IN SERVICE.
13. PROVIDE NEW DIGITAL FLOW METER WITH VALVED BYPASS ASSEMBLY. WATER METER PROVIDED BY BUILDING AUTOMATION SYSTEM CONTRACTOR. RE: SPECIFICATION 230923.

BID OPTIONS "◯"

1. CONTRACTOR TO CONNECT TEMPORARY RESTROOM BUILDING TO EXISTING DOMESTIC WATER. CONTRACTOR TO CONNECT TEMPORARY RESTROOM BUILDING TO EXISTING SANITARY WASTE CONNECTION.CONTRACTOR TO SIZE PIPE PER BUILDING MANUFACTURES RECOMMENDATIONS. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING CONNECTIONS. UTILITY TO REMAIN IN OWNERS NAME AND PAID BY THE OWNER.
2. CONTRACTOR TO CONNECT TEMPORARY SHOWER BUILDING TO EXISTING DOMESTIC WATER. CONTRACTOR TO CONNECT TEMPORARY SHOWER BUILDING TO EXISTING SANITARY WASTE CONNECTION. CONTRACTOR TO SIZE PIPE PER BUILDING MANUFACTURES RECOMMENDATIONS. CONTRACTOR TO FIELD VERIFY EXACT LOCATION OF EXISTING CONNECTIONS. UTILITY TO REMAIN IN OWNERS NAME AND PAID BY THE OWNER.

1



KEY PLAN

0 4' 8' 16'

1/8"=1'-0"

STATE OF TEXAS · VAN CASHEN · 118595 · LICENSED PROFESSIONAL ENGINEER

08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: MRB
REVIEWED BY: RJK

FREESE AND NICHOLS
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Fort Worth, Texas 76109-4895
Phone – (817) 735-7300
Fax – (817) 735-7491

Freese and Nichols, Inc.
Texas Registered Engineering
Firm F-2144

NO.	DATE	ISSUE
1	ADD1 07/30/18	
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(512) 782-6131 FAX (512) 782-1481

STAR CAMPAIGN FY18 - WESLACO
RC MAJOR MAINTENANCE

TXARNG CFMO

PLUMBING
FLOOR PLAN - C

P-7

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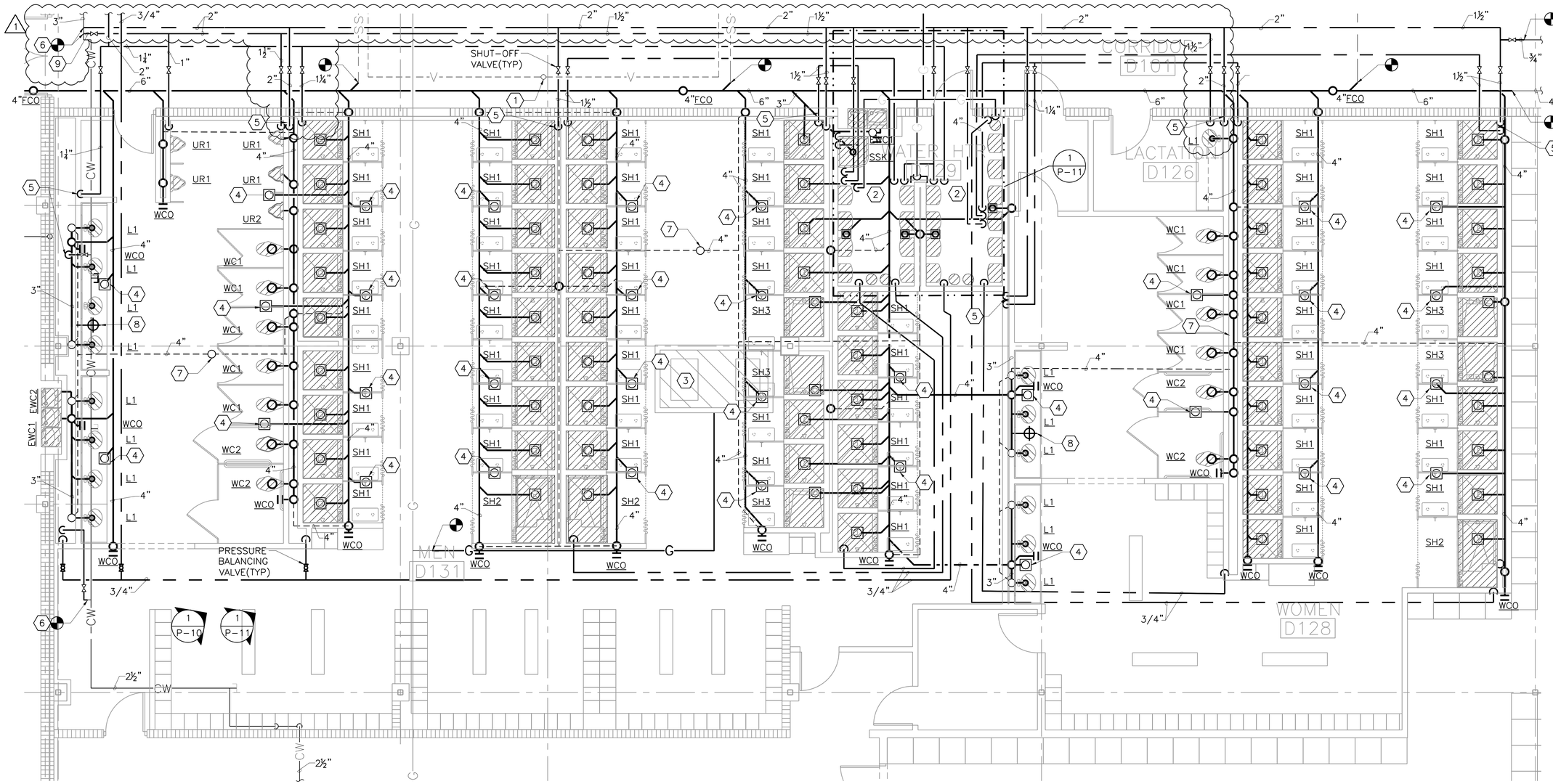


NOTES BY SYMBOL "⬡"

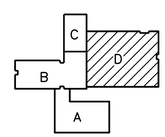
1. EXISTING VTR TO REMAIN.
2. NEW NATURAL GAS-FIRED INSTANTANEOUS TANKLESS WATER HEATERS. 200 CFH EACH AT 10" W.C. 18 REQUIRED FOR NEW LAYOUT. RE: 1, 2 & 3/P-12 AND SCHEDULE ON SHEET P-0.
3. NEW GAS FIRED HVAC UNIT.
4. NEW 2" FLOOR DRAIN WITH TRAP GUARD INSERT.
5. DROP HW AND CW FROM ABOVE INTO PLUMBING CHASE TO SERVE BATTERY OF PLUMBING FIXTURES.
6. EXISTING CW PIPE TO REMAIN IN SERVICE UNTIL CONSTRUCTION IS OF NEW RESTROOM AND SHOWER AREAS ARE COMPLETE. THE EXISTING CW PIPING IS TO BE REMOVED FOLLOWING THE INSTALLMENT OF ALL NEW CW PIPING SERVING THESE AREAS IS COMPLETED AND OPERATIONAL INCLUDING SERVICE SWITCH OVER.
7. NEW 4" VTR. COORDINATE ROOF PENETRATION WITH ROOFING WARRANTY.
8. NEW ½" HOSE BIBB UNDER COUNTER AT 12" AFF.
1. 9. NEW CW PIPE WITH SHUT-OFF VALVE TO SERVE WATER CLOSETS AND URINALS. CONTRACTOR TO PAINT PIPE INSULATION PURPLE DOWN STREAM OF THIS POINT FOR FUTURE RAIN WATER USE.

GENERAL NOTES:

1. A SUMMARY OF THE PROJECT'S BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. REFER TO SHEET P-0 FOR LEGEND, GENERAL NOTES, ABBREVIATIONS AND SCHEDULES.
3. EXISTING ROOF DRAINAGE SYSTEM NOT SHOWN FOR CLARITY.
4. PROVIDE NEW TRAP SEAL DEVICE IN ALL EXISTING AND NEW FLOOR DRAINS, FLOOR SINKS, AND HUB DRAINS.
5. ALL EXTERIOR AND INTERIOR NATURAL GAS PIPING TO BE PAINTED SAFETY YELLOW.

NOTE:
ENTIRE EXISTING CONCRETE FLOOR SLAB TO BE REMOVED/REPLACED IN RESTROOM, SHOWER AND LOCKER AREAS DURING CONSTRUCTION. COORDINATE NEW UNDER FLOOR SS PIPE INSTALLATION WITH NEW CONCRETE SLAB, GRADE BEAMS AND SLAB INSTALLATION. RE: STRUCTURAL DRAWINGS FOR CONCRETE SLAB REMOVAL, REPLACEMENT, TRENCHING AND BACKFILL.

NORTH (PLAN NORTH) NORTH (TRUE NORTH) 1/– ENLARGED FLOOR PLAN
1/4"=1'-0"



KEY PLAN

0 1' 2' 4' 8'
1/4"=1'-0"

VAN CASHEN 118595 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS
08/01/2018

THE STATE OF TEXAS

PROJECT ARCHITECT: HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: MRB
REVIEWED BY: RJK

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Freese and Nichols, Inc.
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RC MAJOR MAINTENANCE

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PLUMBING
ENLARGED FLOOR PLAN
P-9
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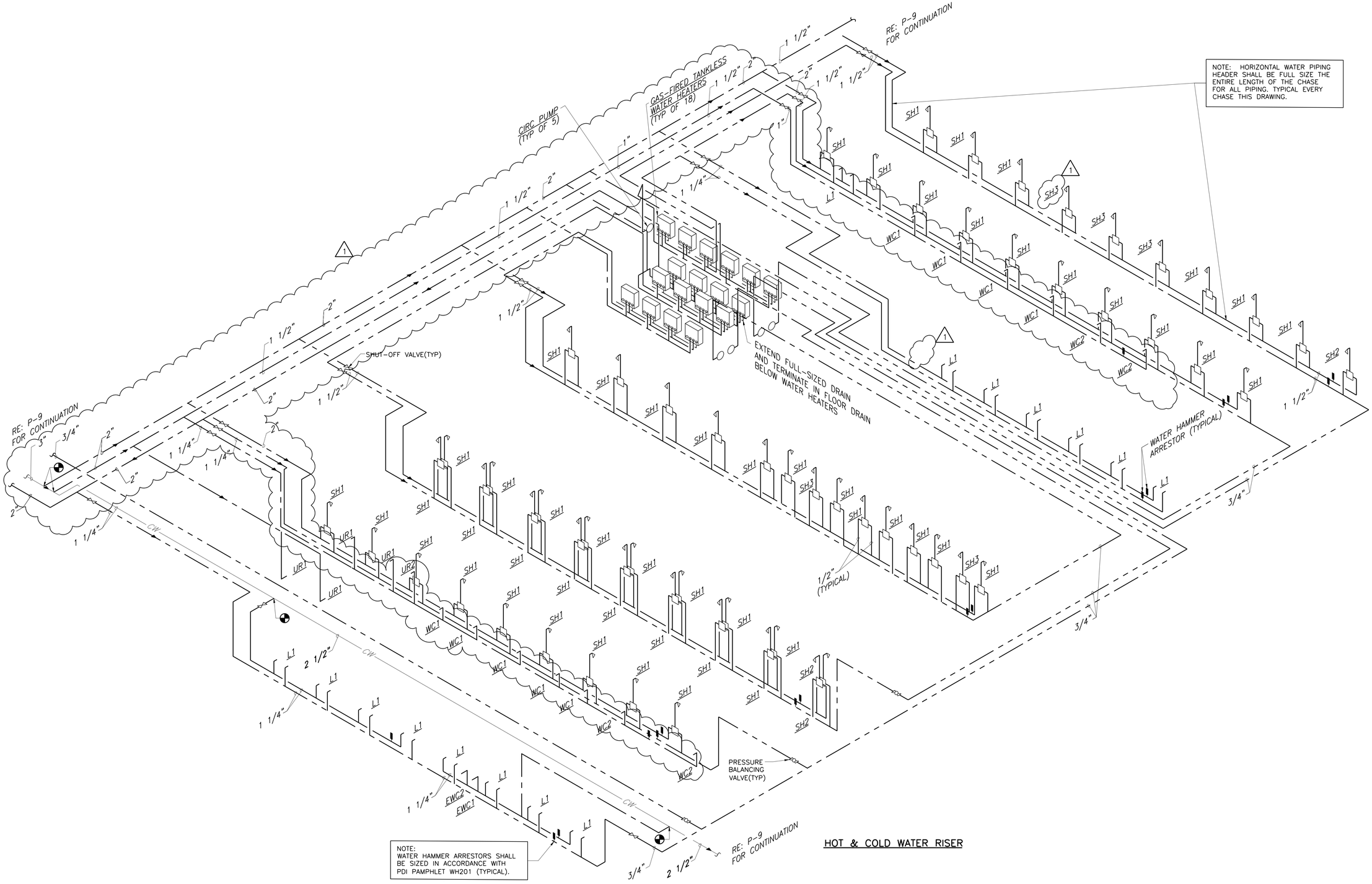

HOT & COLD WATER RISER

1 DOMESTIC WATER RISER DIAGRAM
NOT TO SCALE

VAN CASHEN
118595
LICENSED PROFESSIONAL ENGINEER
08/01/2018

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: MB
REVIEWED BY: .

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ELECTRICAL DOMESTIC WATER RISER DIAGRAMS

P-11

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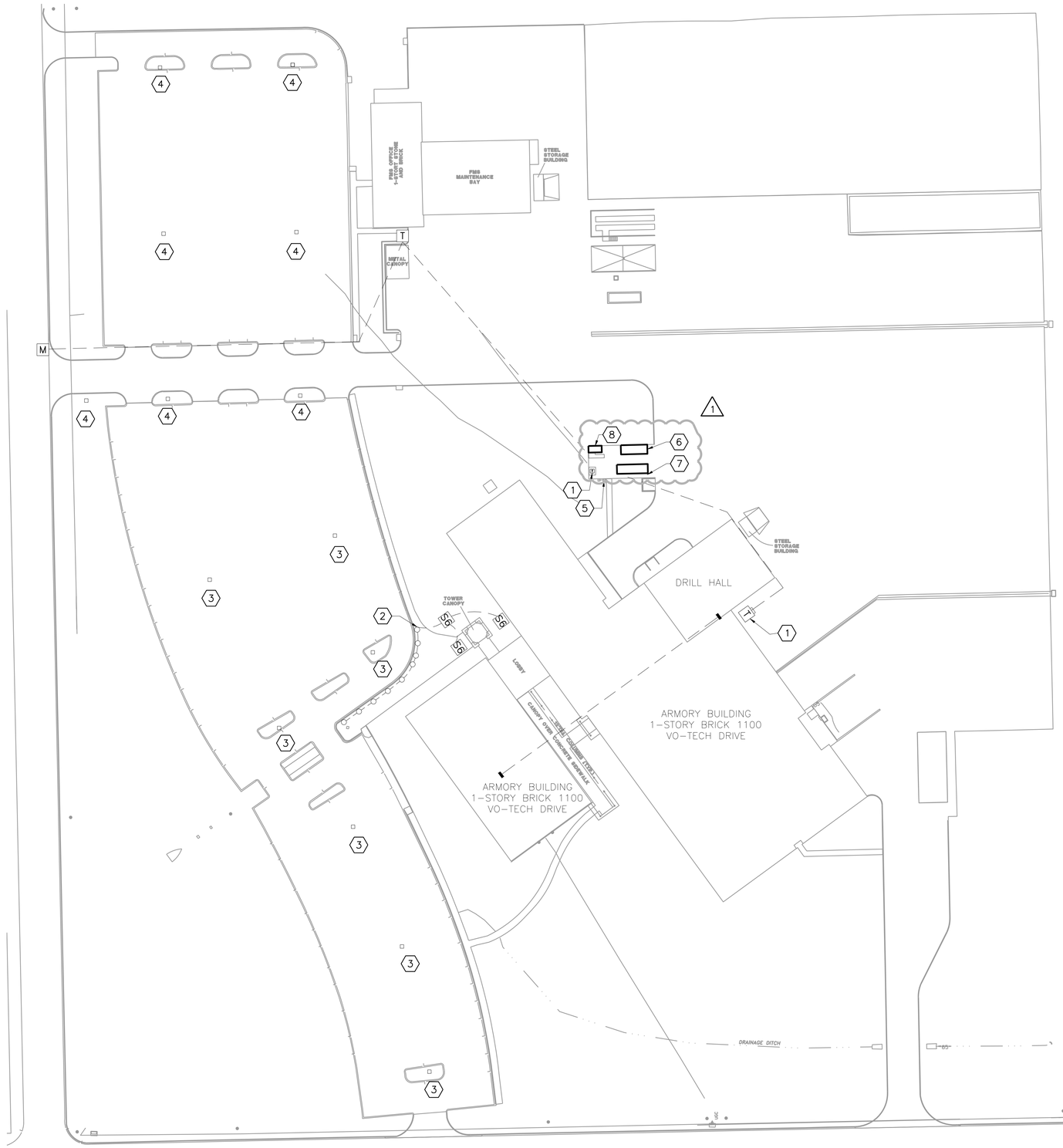

NORTH TRUE

ELECTRICAL SITE PLAN

1"= 50'-0"

GENERAL NOTES:

1. A SUMMARY OF THE PROJECT BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. THE OWNER SHALL BE GIVEN THE FIRST RIGHT OF REFUSAL FOR ALL EQUIPMENT BEING DEMOLISHED (FIXTURES, SWITCHES, ETC.). THE CONTRACTOR SHALL STORE ALL EQUIPMENT THAT THE OWNER ELECTS TO KEEP AT THE LOCATION ON SITE TO BE DESIGNATED BY THE OWNER. ALL OTHER EQUIPMENT SHALL BE DEMOLISHED AND PROPERLY DISPOSED OF BY THE CONTRACTOR.
3. ALL EXISTING TO REMAIN CIRCUITS SHALL BE TRACED BY THE ELECTRICAL CONTRACTOR AND MARKED ACCORDINGLY BEFORE BEGINNING WORK.

NOTES BY SYMBOL "⬡"

1. EXISTING UTILITY TRANSFORMER TO REMAIN.
2. BOLLARDS WITH 50W HPS LAMPS SHALL REMAIN.
3. LED LIGHT FIXTURES/POLES SHALL REMAIN.
4. EXISTING LIGHT POLES WITH 1000W HPS LAMPS SHALL REMAIN.

(1)(2) 5. EXISTING ELECTRICAL SERVICE PANEL H1 AND ASSOCIATED APPLETON RECEPTACLES SHALL BE USED TO SERVE TEMPORARY BUILDINGS. CONTRACTOR SHALL MAKE FINAL CONNECTIONS FROM THE ELECTRICAL SERVICE TO THE TEMPORARY BUILDINGS BUT WILL NOT BE RESPONSIBLE FOR UTILITY COSTS. RE: 2/E-23 FOR ONE-LINE DIAGRAM.

(2) 6. TEMPORARY SHOWER BUILDING RE: 1/A-3. BUILDING REQUIRES THREE (3) 30A, 120V CIRCUIT BREAKERS OR A 3-PRONG SPECIAL RECEPTACLE. FIELD VERIFY THAT EXISTING APPLETON RECEPTACLE IS COMPATIBLE WITH THE BUILDING PLUG AND MAKE CONNECTION.

(1) 7. TEMPORARY RESTROOM BUILDING RE: 1/A-3. BUILDING REQUIRES THREE (3) 30A, 120V CIRCUIT BREAKERS OR A 3-PRONG SPECIAL RECEPTACLE. FIELD VERIFY THAT EXISTING APPLETON RECEPTACLE IS COMPATIBLE WITH THE BUILDING PLUG AND MAKE CONNECTION.

(1) 8. TEMPORARY ADA BUILDING RE: 1/A-3. BUILDING REQUIRES ONE (1) 30A, 120V CIRCUIT BREAKER OR A 3-PRONG SPECIAL RECEPTACLE. FIELD VERIFY THAT EXISTING APPLETON RECEPTACLE IS COMPATIBLE WITH THE BUILDING PLUG AND MAKE CONNECTION.

BID OPTIONS "◯"

1. TEMPORARY RESTROOM BUILDING.
2. TEMPORARY SHOWER BUILDING.

0 50' 100'
SCALE IN FEET

STATE OF TEXAS
TERESA CASTILLON
111323
LICENSED
PROFESSIONAL ENGINEER
08/01/18

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: AT
REVIEWED BY: MTC

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ELECTRICAL
ELECTRICAL SITE PLAN

E-1

SHT. □□ of 129

GENERAL NOTES:

1. A SUMMARY OF THE PROJECT BID OPTIONS CAN BE FOUND ON SHEET G-1. DISCIPLINE SPECIFIC BID OPTIONS CAN BE FOUND ON THIS SHEET.
2. REMOVE ALL LIGHT FIXTURES, EXIT SIGNS, AND SWITCHES SHOWN HATCHED. REMOVE ASSOCIATED CIRCUITRY TO NEAREST JUNCTION BOX. SWITCH BACK BOXES MAY REMAIN WHERE SWITCHES WILL BE INSTALLED IN SAME LOCATION DURING THE CONSTRUCTION PHASE.
3. FIXTURES AND DEVICES SHOWN AT A LIGHT LINE WEIGHT SHALL REMAIN. RETAIN EXISTING CONDUCTORS AND CONDUITS FOR REUSE WHERE FEASIBLE.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL ABANDONED CONDUIT. FIELD VERIFY ALL REQUIREMENTS. INCLUDE ALL COSTS IN BASE BID.
5. THE OWNER SHALL BE GIVEN THE FIRST RIGHT OF REFUSAL FOR ALL EQUIPMENT BEING DEMOLISHED (FIXTURES, SWITCHES, ETC.). THE CONTRACTOR SHALL STORE ALL EQUIPMENT THAT THE OWNER ELECTS TO KEEP AT THE LOCATION ON SITE TO BE DESIGNATED BY THE OWNER. ALL OTHER EQUIPMENT SHALL BE DEMOLISHED AND PROPERLY DISPOSED OF BY THE CONTRACTOR.
6. THE ELECTRICAL DEMOLITION DRAWINGS ARE DIAGRAMMATIC IN NATURE AND ARE PROVIDED TO CONVEY THE GENERAL SCOPE OF WORK. ALL EXISTING LIGHT FIXTURES, SWITCHES ETC. SHALL BE FIELD VERIFIED PRIOR TO BEGINNING WORK OR SUBMITTING PRICES. IT IS THE INTENT OF THESE DOCUMENTS THAT ALL EXISTING LIGHT FIXTURES, SWITCHES, AND ASSOCIATED RACEWAYS, CIRCUITRY, AND EQUIPMENT IN THIS AREA BE DEMOLISHED UNLESS OTHERWISE NOTED.
7. ALL EXISTING TO REMAIN CIRCUITS SHALL BE TRACED BY THE ELECTRICAL CONTRACTOR AND MARKED ACCORDINGLY BEFORE BEGINNING WORK.
8. ALL VOIDS LEFT FROM CONDUIT/WIRING REMOVAL IN BUILDING EXTERIOR WALLS SHALL BE SEALED WATER TIGHT. ALL VOIDS LEFT FROM CONDUIT/WIRING REMOVAL IN INTERIOR WALLS SHALL BE PATCHED AND FIREPROOFED AS REQUIRED TO MAINTAIN THE INTEGRITY OF THE PARTITION.
9. GROUT AND SEAL ALL PENETRATIONS WHERE CONDUIT HAS BEEN REMOVED.

NOTES BY SYMBOL "⬡"

(5) 1. IF BID OPTION NO. 5 IS SELECTED, REMOVE LIGHT FIXTURE AND SWITCH. RETAIN CONDUCTORS AND CONDUIT FOR REUSE AS MUCH AS PRACTICAL. . ENSURE THAT ADJACENT LIGHT FIXTURES TO REMAIN ARE CONNECTED BACK TO THE APPROPRIATE LIGHTING CIRCUIT. IF BID OPTION NO. 5 IS NOT SELECTED, LIGHT FIXTURES SHALL REMAIN AS THEY ARE.

(6) 2. IF BID OPTION NO. 6 IS SELECTED, REMOVE EXTERIOR LIGHT FIXTURES. RETAIN WIRING AND CONDUIT FOR REUSE AS MUCH AS PRACTICAL. IF BID OPTION NO. 6 IS NOT SELECTED, LIGHT FIXTURES ALL REMAIN AS THEY ARE.

(6) 3. IF BID OPTION NO. 6 IS SELECTED, REMOVE LIGHTING CONTACTORS, TIMERS, AND ASSOCIATED CIRCUITRY BACK TO SOURCE. FIELD VERIFY EXISTING CONDITIONS AND REQUIREMENTS.

(6) 4. IF BID OPTION NO. 6 IS SELECTED, GROUND MOUNTED LIGHT FIXTURES. RETAIN WIRING AND CONDUIT FOR REUSE AS MUCH AS PRACTICAL. IF BID OPTION NO. 6 IS NOT SELECTED, LIGHT FIXTURES ALL REMAIN AS THEY ARE.

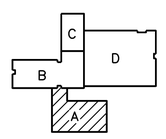
BID OPTIONS "◯"

5. RESTROOM/CONFERENCE ROOM RENOVATION IN ADMIN WING.
6. EXTERIOR BUILDING/PARKING IMPROVEMENTS/BUILDING SIGN.

△1 5. REMOVE LIGHT FIXTURE BASE TO ACCOMMODATE FOR NEW SIDEWALK.

LIGHTING DEMOLITION PLAN – AREA 'A'

1/8"=1'-0"



KEY PLAN

0 4' 8' 16'

1/8"=1'-0"

STATE OF TEXAS
TERESA CASTILLON
111323
LICENSED
PROFESSIONAL ENGINEER
08/01/18

PROJECT ARCHITECT:
HOMER SAENZ, AIA
PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: AT
REVIEWED BY: MTC

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ELECTRICAL LIGHTING DEMOLITION PLAN - AREA 'A'

E-2

SHT. □□ of 129

GENERAL NOTES:

1. ALL LIGHT FIXTURES SHOWN DARK AND WITH A LETTER DESIGNATION ARE TO BE PROVIDED UNDER BASE BID. LIGHT FIXTURES SHOWN AT A LIGHT LINE WEIGHT AND WITH NO DESIGNATION ARE EXISTING TO REMAIN.
2. ALL LIGHTING CIRCUITRY SHALL BE #12, WITH A #12G., IN A ¾"C. UNLESS NOTED OTHERWISE, FOR LIGHTING CIRCUITS GREATER THAN 100' PROVIDE #10, WITH A #10G., IN A ¾"C. FOR LIGHTING CIRCUITS GREATER THAN 250' PROVIDE #8, WITH A #8G., IN A ¾"C. PROVIDE ALL CONDUCTORS AND CONDUIT AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING AND PROVIDING ALL JUNCTION AND PULL BOXES IN ACCORDANCE WITH THE NEC.
4. CONDUIT SHALL NOT BE ROUTED ON THE OUTSIDE OF THE BUILDING FOR EXTERIOR LIGHTS.
5. ALL EXPOSED CONDUIT AND ASSOCIATED MOUNTING HARDWARE SHALL BE PAINTED TO MATCH THE SURFACE IT IS ATTACHED TO. FIELD VERIFY ALL REQUIREMENTS.
6. REFERENCE E-14 LIGHTING CONTROLS LEGEND FOR SWITCHES' AND SWITCH SENSOR'S.

NOTES BY SYMBOL "⬡"

(5) 1. IF BID OPTION NO. 5 IS SELECTED, PROVIDE LIGHT FIXTURES AND ASSOCIATED CIRCUITRY AS SHOWN IN THE CLASSROOM/CONFERENCE ROOM, WOMEN'S RESTROOM A137, AND MEN'S RESTROOM A135.

(6) 2. PROVIDE EXTERIOR LIGHT FIXTURE.

3. CONNECT BACK TO EXISTING CIRCUIT. PROVIDE ADDITIONAL WIRING AND CONDUIT AS REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM.

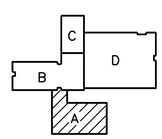
(6) 4. LIGHT FIXTURE SHALL BE MOUNTED IN THE GROUND IN THE SAME LOCATION WHERE THE EXISTING FIXTURES WERE PREVIOUSLY LOCATED.

1 (6) 5. PROVIDE LIGHT FIXTURE NEAR THE ORIGINAL LOCATION OF THE DEMOLISHED FIXTURE AND OUTSIDE OF THE NEW SIDEWALK.

BID OPTIONS "◯"

5. RESTROOM/CONFERENCE ROOM RENOVATION IN ADMIN WING.
6. EXTERIOR BUILDING/PARKING IMPROVEMENTS/ BUILDING SIGN.

NORTH TRUE NORTH PLAN (1) — LIGHTING PLAN – AREA 'A'
1/8"=1'-0"



KEY PLAN

0 4' 8' 16'
1/8"=1'-0"

STATE OF TEXAS TERESA CASTILLON 111323 LICENSED PROFESSIONAL ENGINEER
08/01/18

THE STATE OF TEXAS

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
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STAR CAMPAIGN FY18 - WESLACO
RC MAJOR MAINTENANCE

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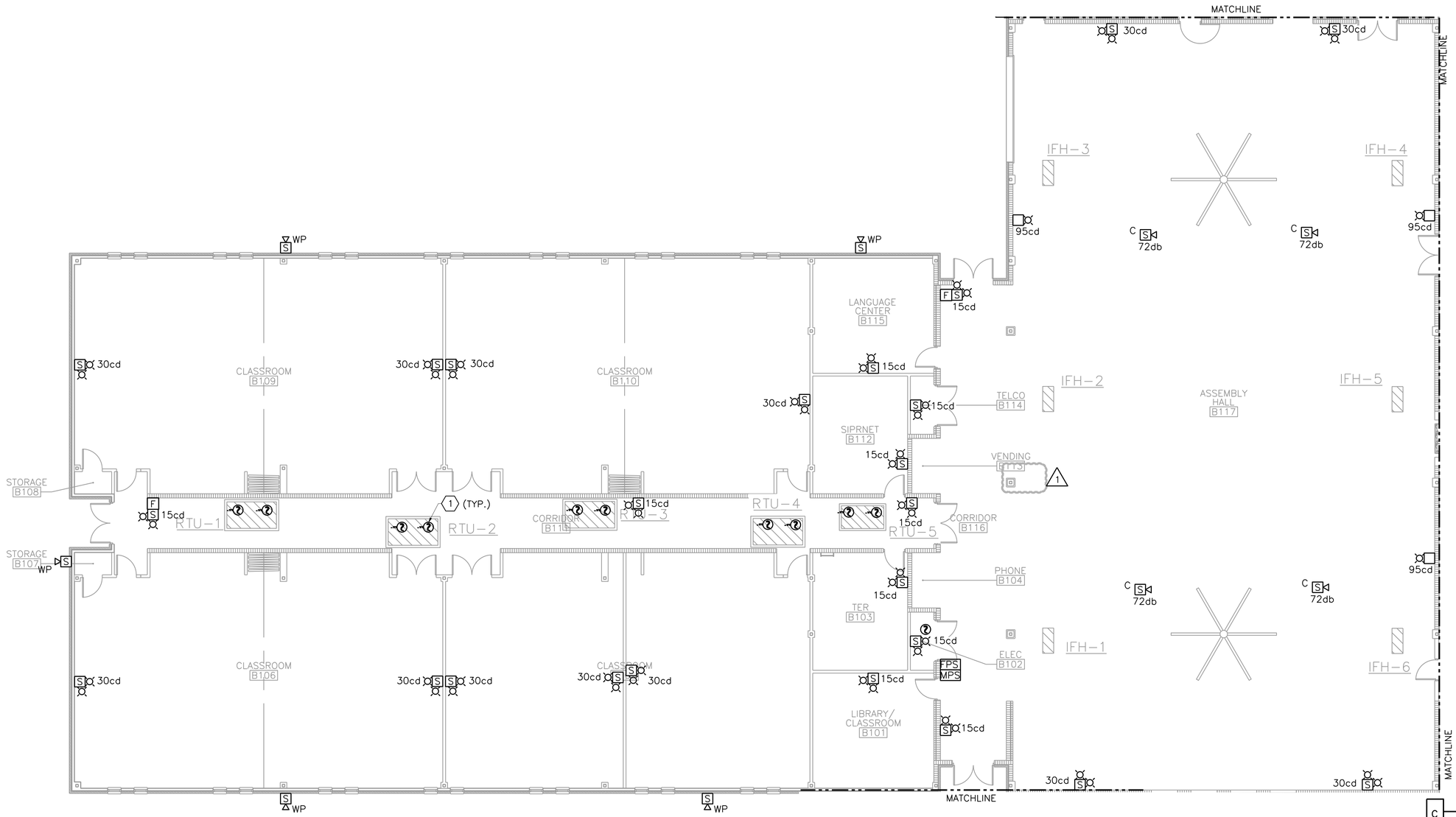
ELECTRICAL LIGHTING PLAN - AREA 'A'

E-10

SHT. 8 of 129

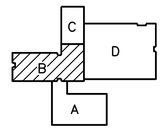
NOTES BY SYMBOL "⬡"

1. DUCT DETECORS TO BE PROVIDED BY OTHERS. PROVIDE CONNECTION TO FIRE ALARM/MASS NOTIFICATION SYSTEM. COORDINATE REQUIREMENTS WITH MECHANICAL CONTRACTOR.



NORTH TRUE NORTH PLAN 1 – FIRE ALARM PLAN – AREA 'B'

1/8"=1'-0"



KEY PLAN

0 4' 8' 16'

1/8"=1'-0"

STATE OF TEXAS TERESA CASTILLON 111323 LICENSED PROFESSIONAL ENGINEER 08/01/18

PROJECT ARCHITECT:
HOMER SAENZ, AIA

PROJECT NO. ADG17589A
ISSUE DATE: 04/20/18
DRAWN BY: HW
REVIEWED BY: MTC

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CONSTRUCTION & FACILITIES MANAGEMENT OFFICE-CFMO
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STAR CAMPAIGN FY18 - WESLACO RC MAJOR MAINTENANCE

TXARNG CFMO

FIRE ALARM PLAN - AREA 'B'

FA-7

SHT. 111 of 129

Industrial Hygiene and Safety Technology, Inc.

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Report of

Indoor Mold Assessment

Weslaco Readiness Center
100 Vo Tech Drive
Weslaco, Texas 78599

Prepared for:
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, TX 76109

Author: Tracy Bramlett, Industrial Hygienist, Mold Assessment Consultant

Report Date: December 6, 2017

Executive Summary

On November 28, 2017, Industrial Hygiene and Safety Technology, Inc. (IHST) performed a mold assessment at the Weslaco Readiness Center addressed at 100 Vo Tech Drive, Weslaco, Texas. The assessment was conducted by Tracy Bramlett, Certified Industrial Hygienist and Mold Assessment Consultant, representing IHST. The assessment was authorized by Freese and Nichols, Inc.

Bioaerosol sample analysis indicated no atypical mold species or unusually amplified spore counts of mold species detected in the occupied office areas of the Weslaco Readiness Center. Fungal spores detected indoors were representative of the species detected outdoors, and not at levels that constitute an unacceptable health risk to building occupants.

Multiple moisture stains from past water intrusions were identified on the interior walls and ceilings of the first and second floors with a majority of the intrusion stains located along the exterior window perimeters of the building. The moisture stains ranged from less than 1 square foot to 4 square feet and do not require licensed mold remediation for renovation and demolition activities.

Leaking windows at various locations on the exterior of the building may have hidden mold behind the walls which should be removed if the building is renovated.

Minor areas of mold growth were identified on metal HVAC supply registers where dust accumulation and surface condensation had occurred. The minor areas of mold were less than 25 contiguous square feet do not require licensed mold remediation for renovation and demolition activities.

Pigeon droppings were observed on the floor under a ceiling fan in the men's locker room. A dead pigeon was also observed in the ceiling fan.

Recommendations

Stained ceiling tiles should be removed and replaced with new tiles until repairs to the roof or a new roof is installed on the south side of the building.

The exterior of the building should be power washed to remove the dark discoloration.

The coils on HVAC systems on the roof of the building should be cleaned.

The ceiling fan in the men's locker room should sealed to prevent pigeons from access.

The floor of the men's locker room should be cleaned and disinfected where the pigeon droppings were observed.

Contents

Purpose and Scope

On November 28, 2017, Industrial Hygiene and Safety Technology, Inc. (IHST) performed a mold assessment at the Weslaco Readiness Center addressed at 100 Vo Tech Drive, Weslaco, Texas. The assessment was conducted by Tracy Bramlett, Certified Industrial Hygienist and Mold Assessment Consultant, representing IHST. The assessment was authorized by Freese and Nichols, Inc.

The purpose was to assess for moisture damage, visible mold, and collect analytical samples as necessary to verify the presence of microbial contamination in the facility.

The scope of the assessment included measured substrate moisture readings, the collection of indoor bioaerosol samples and mold tape-lift samples, and a thorough visual inspection with photographic documentation throughout Building 1.

Materials and Methods

This section describes the methods, materials and equipment used for the assessment activities described in this report.

Equipment and Methods for Bioaerosol Characterization

Bioaerosol samples were collected to determine airborne mold concentrations in the building. Outdoor air samples were collected for reference evaluation to the indoor sample analysis prior to and following samples collected from the indoor air spaces. The air samples were collected on *Allergenco D* spore trap cassettes. The samples were collected over a five (5) minute period with the pumps calibrated at fifteen (15) liters of air per minute. Samples were analyzed by EMLab P&K, of Phoenix, Arizona (AIHA-LAP ID: 102297), using Phase Contrast Microscopy (PCM) methods.

No generally recognized standards have yet been codified for interpretation of bioaerosol sampling results. Unless otherwise noted, IHST applies the interpretations currently considered best industry practice, and classifies bioaerosol concentrations acceptable when the following conditions are met:

- The combined concentration of all spores in each indoor sample is less than the average combined concentration of spores in the outdoor samples;
- The concentration of each identified spore genus in each indoor sample is less than the average concentration of the same genus in the outdoor samples; and,
- The mold species or spore genera identified in the indoor samples are not identified in the outdoor samples or are present only at low concentrations.

Equipment and Methods for Mold Tape Lift Sample Analysis

Tape lift samples were collected at various locations in the building to identify suspect mold using a pre-sealed, adhesive Environmental Monitoring Systems Mold Tape Slide for sample collection. A clean pair of disposable lab exam gloves was worn prior to each tape lift sample collected to prevent cross-contamination interferences. The sealed adhesive side of the clear tape slide was exposed and pressed

gently on the surface of the sample substrate, re-sealed, and labeled. Samples were carefully packaged, and submitted to the laboratory for analysis.

The tape lift samples were analyzed by EM Lab P&K, of Phoenix, Arizona (AIHA-LAP ID: 102297). The laboratory analysis report of the tape lift sample is provided in the report appendix: *Bioaerosol and Mold Tape Lift Laboratory Analysis Report.*

Equipment and Methods for Indoor Environmental Quality Characterization

The mold assessment performed by IHST, Inc. included a visual / sensory inspection, as well as collection of tape samples. IHST used results of the visual / sensory inspection and analytical data to develop opinions regarding the various factors affecting environmental conditions of the area(s) assessed, as well as for development of appropriate corrective action recommendations. Unless otherwise noted in this section, IHST's inspection was limited to practical accessible areas, and the inspector used no destructive investigation techniques.

Industrial hygienists employed by IHST for microbial assessments are licensed by the Texas Department of State Health Services (TDSHS) as Mold Consultants. IHST, Inc. holds a company licensed from the TDHSH as a Mold Consulting Company, license ACO0161.

Visual / Sensory Inspection

IHST performed a thorough visual inspection of the areas to be assessed, with close attention to detection of unusual or unpleasant odors and sensations. This inspection included the following specific parameters:

- Assess for visible mold growth on building substrates or evidence of indoor building moisture intrusion damage (i.e., stains, wood rot, wet or damp substrates, plumbing leaks, standing water, etc.) on building materials;
- Assess for excessive dust buildup and areas of moisture condensation
- Assess condition of heating ventilation and air conditioning (HVAC) systems utilized for building occupancy.

Results of Bioaerosol Sample Analyses

The table *Bioaerosol Sample Evaluation Summary* presents the interpretation of the results of bioaerosol sampling for airborne mold spores. Full laboratory analysis data of the bioaerosol samples is provided in the report appendices: *Bioaerosol and Mold Tape Lift Laboratory Analysis Report.* This table provides a summarization of the indoor bioaerosol sample results compared to those collected outdoors.

- The ***Sample ID Number(s)*** column shows the sample(s) collected in each indoor space.
- The ***Spore Types Differ Compared to Outdoors?*** column indicates whether the types of spores detected inside differ appreciably from those in the outdoor environment. This column will contain a Yes if spore types

are detected indoors that are not present outdoors. A *Yes* may indicate a potential reservoir of indoor mold growth.

- The ***Spores Elevated Compared to Outdoors?*** column indicates whether counts of overall or individual spores are elevated in the indoor samples, compared to levels in the outdoor samples. A *Yes* may indicate a potential reservoir of indoor mold growth.
- The ***Atypical Spores Present Inside?*** column indicates whether water-loving or other unusual spore types are present in the indoor samples. A *Yes* may indicate a potential reservoir of indoor mold growth.
- The ***Overall Air Quality Impact*** column indicates whether the interpretation of the sample analysis results for the specified location is acceptable, or suggests a need for corrective action.

Outdoor samples collected for this assessment include:

- **2142232 – Outdoor, Pre-Survey Sample, 11/28/2017**
- **1956305 – Outdoor, Post-Survey Sample, 11/28/2017**

Table 2. Bioaerosol Sample Evaluation Summary

Sample Description		Summary of Sample Analyses and Evaluation			
Location/Time Sampled	Sample ID Number(s)	Spore Types Differ Compared to Outdoors?	Spores Elevated Compared to Outdoors?	Atypical Spores Present Indoors?	Overall Air Quality Impact
Headquarters, Administration Office	2142241	No	No	No	Acceptable
Classroom, Northwest Side of Building	2142618	No	No	No	Acceptable
HHC Administration Area	2142239	No	No	No	Acceptable

Results of Tape Lift Sample Analyses

The table *Tape Lift Sample Mold Analysis Summary* presents the interpretation of the results of sample collected for fungi identification. The laboratory analysis report is provided in the report appendices. This table summarizes the results of the tape lift sample analysis.

- The ***Sample ID Number(s)*** column shows the sample collected and particular location.
- The ***Mold Growth Present ?*** column indicates whether mold growth with mycelial and/or sporulating structures were present on the sampled surface . A *Yes* may indicate a potential indoor mold concern.
- The ***Species of Mold Present?*** column indicates the types of mold specie detected on the sampled surface.
- The ***Extensive Mold in Sample?*** column indicates whether excessive fungal colonies are present in the sample. A *Yes* may indicate unsanitary conditions or confirms the presence of mold growth on the substrate.

  The ***Overall Air Quality Impact*** column indicates whether the interpretation of the sample analysis results for the specified location is acceptable, or suggests a need for corrective action.

Table 1: Tape Lift Sample Mold Analysis Summary

Sample Description		Summary of Sample Analyses and Evaluation			
Location Sampled	**Sample ID Number(s)**	**Mold Growth Present?**	**Species of Mold Present?**	**Extensive Mold in Sample?**	**Overall Air Quality Impact**
Stained Ceiling Tile, Janitor's Closet	11281701	**Yes**	*Stachybotrys*	**No**	See WA-01 Footnote.
Stained Ceiling Tile, Hall Across From Janitor's Closet	11281702	**Yes**	*Stachybotrys*	**No**	See WA-01 Footnote.
Bulk Gypsum Wall Board on Exterior Wall in Recruiting Office	11281703	**No**	NA	**No**	See WA-02 Footnote.
Exterior of Building By Window	11281704	**Yes**	*Cladosporium*	**No**	See WA-03

Table 1 Footnotes:

- WA-01: Visible stains on ceiling tiles in the janitor's closet and adjacent hallway was observed. The surface area of the mold was determined to be less than 1 square foot. The source of the mold appear to be from roof leaks. The surface mold was not in excess of 25 contiguous square feet, which require a TDSHS-licensed mold remediation contractor to clean and remove the identified mold following a written Mold Assessment Remediation Protocol under the Texas Mold Assessment and Remediation Rules. Maintenance personnel in the building should replace the ceiling tile. The roof leaks in this area should be repaired or the roof replaced. In addition, water stains were observed on ceiling tiles at other locations in the building. See drawings for sample locations and water stained areas.
- WA-02: Visible stains were not observed in this area, however, the gypsum walls appear to have been wet at one time. Exterior walls under windows were observed to be buckling and possibly wet at one time. The walls have all been painted under the windows, however, it is hypothesized that because of the evidence of moisture intrusion that there may be mold behind the walls. The source of the water appears to be from leaking windows on the exterior of the building.

- WA-03: Black discoloration was observed on the exterior walls of the building around some windows. The dark discoloration was determined to be mold. It is recommended that the exterior of the building be pressure washed to clean the surfaces of the microbial growth.

Conclusions and Recommendations

Conclusions

Bioaerosol sample analysis indicated no atypical mold species or unusually amplified spore counts of mold species detected in the occupied office areas of the Weslaco Readiness Center. Fungal spores detected indoors were representative of the species detected outdoors, and not at levels that constitute an unacceptable health risk to building occupants.

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Recommendations

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The exterior of the building should be power washed to remove the dark discoloration.

The coils on HVAC systems on the roof of the building should be cleaned.

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The floor of the men's locker room should be cleaned and disinfected where the pigeon droppings were observed.

Limitations

The items observed and documented in this report are necessarily limited to the conditions of the subject properties on the survey date(s). Any samples or other data collected during this study provide information necessarily limited to specific materials or conditions observed on the survey date(s).

This document is the rendering of a professional service, the essence of which is the advice, judgment, opinion, or professional skill. In the event that additional information becomes available that could affect the conclusions reached in this investigation, IHST reserves the right to review and change if required, some or all of the opinions presented herein.

This report has been prepared for exclusive use of the client and their representatives. No unauthorized reuse of reproduction of this report, in part or whole, shall be permitted without prior written consent. If you have any questions concerning this report, please do not hesitate to contact our office.

Tracy K. Bramlett, CIH, CSP
President, IHST, Inc.

Appendix: Bioaerosol and Mold Tape Lift Laboratory Analysis Report

EMLab P&K
A TestAmerica Company

Report for:

Mr. Tracy Bramlett
IHST, Inc.
2235 Keller Way
Carrollton, TX 75006

Regarding: Project: 21816; Weslaco Readiness Center
EML ID: 1840647

Approved by:

Operations Manager
Joshua Cox

Dates of Analysis:
Spore trap analysis: 12-04-2017

Service SOPs: Spore trap analysis (EM-MY-S-1038)
AIHA-LAP, LLC accredited service, Lab ID #102297

EMLab P&K
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 Fax (623) 780-7695 www.emlab.com

Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	2142232: OD (Pre)			2142241: Headquarters Administration		
Comments (see below)	None			None		
Lab ID-Version‡:	8623806-1			8623807-1		
Analysis Date:	12/04/2017			12/04/2017		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Alternaria	8	100	110			
Ascospores	19	25	1,000	1	25	53
Basidiospores	8	25	430	5	25	270
Bipolaris/Drechslera group	1	100	13	1	100	13
Cercospora	1	100	13			
Chaetomium						
Cladosporium	114	25	6,100	9	25	480
Curvularia						
Nigrospora	3	100	40			
Other brown				1	100	13
Other colorless						
Penicillium/Aspergillus types†	3	25	160	2	25	110
Pithomyces						
Rusts						
Smuts, Periconia, Myxomycetes	6	100	80	2	100	27
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	3+			2+		
Hyphal fragments/m3	67			27		
Pollen/m3	13			< 13		
Skin cells (1-4+)	< 1+			1+		
Sample volume (liters)	75			75		
§ TOTAL SPORES/m3			7,900			960

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.
† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium, Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
††Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

The analytical sensitivity is the spores/m^3 divided by the raw count, expressed in spores/m^3. The limit of detection is the analytical sensitivity (in spores/m^3) multiplied by the sample volume (in liters) divided by 1000 liters.

For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	2142618: Classroom N.W. Side			2142239: HHC Administration		
Comments (see below)	None			None		
Lab ID-Version‡:	8623808-1			8623809-1		
Analysis Date:	12/04/2017			12/04/2017		
	raw ct.	% read	spores/m3	raw ct.	% read	spores/m3
Alternaria						
Ascospores	2	25	110			
Basidiospores	2	25	110	3	25	160
Bipolaris/Drechslera group						
Cercospora						
Chaetomium						
Cladosporium	4	25	210	5	25	270
Curvularia	1	100	13			
Nigrospora						
Other brown						
Other colorless						
Penicillium/Aspergillus types†	2	25	110	1	25	53
Pithomyces						
Rusts						
Smuts, Periconia, Myxomycetes						
Stachybotrys						
Stemphylium						
Torula						
Ulocladium						
Zygomycetes						
Background debris (1-4+)††	2+			2+		
Hyphal fragments/m3	< 13			< 13		
Pollen/m3	< 13			< 13		
Skin cells (1-4+)	< 1+			< 1+		
Sample volume (liters)	75			75		
§ TOTAL SPORES/m3			550			480

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.
† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium, Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
††Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

The analytical sensitivity is the spores/m^3 divided by the raw count, expressed in spores/m^3. The limit of detection is the analytical sensitivity (in spores/m^3) multiplied by the sample volume (in liters) divided by 1000 liters.

For more information regarding analytical sensitivity, please contact QA by calling the laboratory.
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§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

SPORE TRAP REPORT: NON-VIABLE METHODOLOGY

Location:	1956305: OD (Post)		
Comments (see below)	None		
Lab ID-Version‡:	8623810-1		
Analysis Date:	12/04/2017		
	raw ct.	% read	spores/m3
Alternaria	1	100	13
Ascospores	5	25	270
Basidiospores	15	25	800
Bipolaris/Drechslera group	8	100	110
Cercospora			
Chaetomium			
Cladosporium	39	25	2,100
Curvularia			
Nigrospora	4	100	53
Other brown			
Other colorless			
Penicillium/Aspergillus types†	3	25	160
Pithomyces			
Rusts			
Smuts, Periconia, Myxomycetes	4	100	53
Stachybotrys			
Stemphylium			
Torula			
Ulocladium			
Zygomycetes			
Background debris (1-4+)††	3+		
Hyphal fragments/m3	67		
Pollen/m3	< 13		
Skin cells (1-4+)	< 1+		
Sample volume (liters)	75		
§ TOTAL SPORES/m3			3,500

Comments:

Spore types listed without a count or data entry were not detected during the course of the analysis for the respective sample, indicating a raw count of <1 spore.
† The spores of *Aspergillus* and *Penicillium* (and others such as *Acremonium, Paecilomyces*) are small and round with very few distinguishing characteristics. They cannot be differentiated by non-viable sampling methods. Also, some species with very small spores are easily missed, and may be undercounted.
††Background debris indicates the amount of non-biological particulate matter present on the trace (dust in the air) and the resulting visibility for the analyst. It is rated from 1+ (low) to 4+ (high). Counts from areas with 4+ background debris should be regarded as minimal counts and may be higher than reported. It is important to account for samples volumes when evaluating dust levels.

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A TestAmerica Company

Report for:

Mr. Tracy Bramlett
IHST, Inc.
2235 Keller Way
Carrollton, TX 75006

Regarding: Project: 21816; Weslaco Readiness Center
EML ID: 1840647

Approved by:

Operations Manager
Joshua Cox

Dates of Analysis:
Direct microscopic exam (Qualitative): 12-04-2017

Service SOPs: Direct microscopic exam (Qualitative) (EM-MY-S-1039)
AIHA-LAP, LLC accredited service, Lab ID #102297

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

DIRECT MICROSCOPIC EXAMINATION REPORT

Background Debris and/or Description	Miscellaneous Spores Present*	MOLD GROWTH: Molds seen with underlying mycelial and/or sporulating structures†	Other Comments††	General Impression
Lab ID-Version‡: 8623831-1, Analysis Date: 12/04/2017: Tape sample 11281701: Janitors Closet				
Light	Very few	3+ *Stachybotrys* species (spores, hyphae, conidiophores)	None	Mold growth
Lab ID-Version: 8623832-1, Analysis Date: 12/04/2017: Tape sample 11281702: Hall By Janitors Closet				
Moderate	Very few	3+ *Stachybotrys* species (spores, hyphae, conidiophores)	None	Mold growth
Lab ID-Version: 8623830-1, Analysis Date: 12/04/2017: Bulk sample 11281703: Sheetrock In Recruiting				
Substrate unidentified	Very few	None	None	Normal trapping
Lab ID-Version: 8623833-1, Analysis Date: 12/04/2017: Tape sample 11281704: Exterior Wall				
Heavy	Very few	2+ *Cladosporium* species (spores, hyphae) 1+ brown spore type, ID unknown (spores)	None	Mold growth

* Indicative of normal conditions, i.e. seen on surfaces everywhere. Includes basidiospores (mushroom spores), myxomycetes, plant pathogens such as ascospores, rusts and smuts, and a mix of saprophytic genera with no particular spore type predominating. Distribution of spore types seen mirrors that usually seen outdoors.

† Quantities of molds seen growing are listed in the MOLD GROWTH column and are graded <1+ to 4+, with 4+ denoting the highest numbers.

†† Some comments may refer to the following: Most surfaces collect a mix of spores which are normally present in the outdoor environment. At times it is possible to note a skewing of the distribution of spore types, and also to note "marker" genera which may indicate indoor mold growth. Marker genera are those spore types which are present normally in very small numbers, but which multiply indoors when conditions are favorable for growth.

‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".
The limit of detection is < 1+ when mold growth is detected.

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

MoldRANGE™: Extended Outdoor Comparison

Outdoor Location: 2142232, OD (Pre)

Fungi Identified	Outdoor data	Typical Outdoor Data for: November in Texas† (n‡=1626)						Typical Outdoor Data for: The entire year in Texas† (n‡=20974)					
	spores/m3	very low	low	med	high	very high	freq %	very low	low	med	high	very high	freq %
Generally able to grow indoors*													
Alternaria	110	13	13	40	120	190	71	13	20	53	160	290	72
Bipolaris/Drechslera group	13	13	13	27	53	93	47	13	13	27	67	120	45
Chaetomium	-	13	13	13	27	40	8	13	13	13	27	40	7
Cladosporium	6,100	190	370	1,300	4,200	7,100	98	150	320	1,200	3,900	6,900	96
Curvularia	-	13	13	27	67	130	46	13	13	27	80	160	40
Nigrospora	40	13	13	32	80	130	58	13	13	40	110	170	49
Other brown	-	13	13	27	67	93	21	13	13	27	53	80	19
Penicillium/Aspergillus types	160	53	110	360	910	1,500	84	53	110	360	1,000	1,700	83
Stachybotrys	-	13	13	27	41	110	2	13	13	13	40	67	2
Torula	-	13	13	13	40	67	16	13	13	20	53	80	16
Seldom found growing indoors**													
Ascospores	1,000	51	53	210	640	1,300	86	53	80	290	1,000	2,000	88
Basidiospores	430	53	130	480	2,200	4,400	94	67	150	530	2,500	5,400	94
Cercospora	13	13	13	40	110	190	33	13	13	40	150	270	38
Rusts	-	13	13	13	53	78	27	13	13	13	40	67	17
Smuts, Periconia, Myxomycetes	80	13	40	93	250	400	87	13	27	80	230	370	81
§ TOTAL SPORES/m3	7,900												

†The 'Typical Outdoor Data' represents the typical outdoor spore levels for the location and time frame indicated. The last column represents the frequency of occurrence. The very low, low, med, high, and very high values represent the 10, 20, 50, 80, and 90 percentile values of the spore type when it is detected. For example, if the frequency of occurrence is 63% and the low value is 53, it would mean that the given spore type is detected 63% of the time and, when detected, 20% of the time it is present in levels above the detection limit and below 53 spores/m3. These values are updated periodically, and if enough data is not available to make a statistically meaningful assessment, it is indicated with a dash.

§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

* The spores in this category are generally capable of growing on wet building materials in addition to growing outdoors. Building related growth is dependent upon the fungal type, moisture level, type of material, and other factors. *Cladosporium* is one of the predominant spore types worldwide and is frequently present in high numbers. *Penicillium/Aspergillus* species colonize both outdoor and indoor wet surfaces rapidly and are very easily dispersed. Other genera are usually present in lesser numbers.

** These fungi are generally not found growing on wet building materials. For example, the rusts and smuts are obligate plant pathogens. However, in each group there are notable exceptions. For example, agents of wood decay are members of the basidiomycetes and high counts of a single morphological type of basidiospore on an inside sample should be considered significant.

‡n = number of samples used to calculate data.

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

MoldRANGE™: Extended Outdoor Comparison

Outdoor Location: 1956305, OD (Post)

Fungi Identified	Outdoor data	Typical Outdoor Data for: November in Texas† (n‡=1626)						Typical Outdoor Data for: The entire year in Texas† (n‡=20974)					
	spores/m3	very low	low	med	high	very high	freq %	very low	low	med	high	very high	freq %
Generally able to grow indoors*													
Alternaria	13	13	13	40	120	190	71	13	20	53	160	290	72
Bipolaris/Drechslera group	110	13	13	27	53	93	47	13	13	27	67	120	45
Chaetomium	-	13	13	13	27	40	8	13	13	13	27	40	7
Cladosporium	2,100	190	370	1,300	4,200	7,100	98	150	320	1,200	3,900	6,900	96
Curvularia	-	13	13	27	67	130	46	13	13	27	80	160	40
Nigrospora	53	13	13	32	80	130	58	13	13	40	110	170	49
Other brown	-	13	13	27	67	93	21	13	13	27	53	80	19
Penicillium/Aspergillus types	160	53	110	360	910	1,500	84	53	110	360	1,000	1,700	83
Stachybotrys	-	13	13	27	41	110	2	13	13	13	40	67	2
Torula	-	13	13	13	40	67	16	13	13	20	53	80	16
Seldom found growing indoors**													
Ascospores	270	51	53	210	640	1,300	86	53	80	290	1,000	2,000	88
Basidiospores	800	53	130	480	2,200	4,400	94	67	150	530	2,500	5,400	94
Cercospora	-	13	13	40	110	190	33	13	13	40	150	270	38
Rusts	-	13	13	13	53	78	27	13	13	13	40	67	17
Smuts, Periconia, Myxomycetes	53	13	40	93	250	400	87	13	27	80	230	370	81
§ TOTAL SPORES/m3	3,500												

†The 'Typical Outdoor Data' represents the typical outdoor spore levels for the location and time frame indicated. The last column represents the frequency of occurrence. The very low, low, med, high, and very high values represent the 10, 20, 50, 80, and 90 percentile values of the spore type when it is detected. For example, if the frequency of occurrence is 63% and the low value is 53, it would mean that the given spore type is detected 63% of the time and, when detected, 20% of the time it is present in levels above the detection limit and below 53 spores/m3. These values are updated periodically, and if enough data is not available to make a statistically meaningful assessment, it is indicated with a dash.

§ Total Spores/m3 has been rounded to two significant figures to reflect analytical precision.

* The spores in this category are generally capable of growing on wet building materials in addition to growing outdoors. Building related growth is dependent upon the fungal type, moisture level, type of material, and other factors. *Cladosporium* is one of the predominant spore types worldwide and is frequently present in high numbers. *Penicillium/Aspergillus* species colonize both outdoor and indoor wet surfaces rapidly and are very easily dispersed. Other genera are usually present in lesser numbers.

** These fungi are generally not found growing on wet building materials. For example, the rusts and smuts are obligate plant pathogens. However, in each group there are notable exceptions. For example, agents of wood decay are members of the basidiomycetes and high counts of a single morphological type of basidiospore on an inside sample should be considered significant.

‡n = number of samples used to calculate data.

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

MoldSTAT™: Supplementary Statistical Spore Trap Report

Outdoor Summary: 2142232: OD (Pre)

Species detected	Outdoor sample spores/m3 (<100 / 1K / 10K / >100K)	Typical outdoor ranges (North America)	Freq. %
Alternaria	110	7 - 33 - 430	43
Ascospores	1,000	13 - 230 - 6,400	77
Basidiospores	430	13 - 480 - 23,000	91
Bipolaris/Drechslera group	13	7 - 13 - 240	16
Cercospora	13	7 - 40 - 560	14
Cladosporium	6,100	27 - 490 - 9,400	90
Nigrospora	40	7 - 20 - 270	17
Penicillium/Aspergillus types	160	13 - 190 - 2,600	67
Smuts, Periconia, Myxomycetes	80	7 - 53 - 1,100	65
Total	7,900		

The "Typical outdoor ranges" and "Freq. %" columns show the typical low, medium, and high spore counts per cubic meter and the frequency of occurrence for the given spore type. The low, medium, and high values represent the 2.5, 50, and 97.5 percentile values when the spore type is detected. For example, if the low value is 53 and the frequency of occurence is 63%, it would mean that we typically detect the given spore type on 63 percent of all outdoor samples and, when detected, 2.5% of the time it is present in levels below 53 spores/m3.

Indoor Samples

Location: 2142241: Headquarters Administration

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 12%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.7500	dF: 10 Result: 0.7364 Critical value: 0.5515 Outside Similar: Yes	Score: 123 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Ascospores	53
Basidiospores	270
Bipolaris/Drechslera group	13
Cladosporium	480
Other brown	13
Penicillium/Aspergillus types	110
Smuts, Periconia, Myxomycetes	27
Total	960

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Client: IHST, Inc.
C/O: Mr. Tracy Bramlett
Re: 21816; Weslaco Readiness Center

Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

MoldSTAT™: Supplementary Statistical Spore Trap Report

Location: 2142618: Classroom N.W. Side

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 6%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.5714	dF: 10 Result: 0.7485 Critical value: 0.5515 Outside Similar: Yes	Score: 116 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Ascospores	110
Basidiospores	110
Cladosporium	210
Curvularia	13
Penicillium/Aspergillus types	110
Total	550

Location: 2142239: HHC Administration

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 6%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.5000	dF: 9 Result: 0.7250 Critical value: 0.5833 Outside Similar: Yes	Score: 114 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Basidiospores	160
Cladosporium	270
Penicillium/Aspergillus types	53
Total	480

* The Friedman chi-square statistic is a non-parametric test that examines variation in a set of data (in this case, all indoor spore counts). The null hypothesis (H0) being tested is that there is no meaningful difference in the data for all indoor locations. The alternative hypothesis (used if the test disproves the null hypothesis) is that there is a difference between the indoor locations. The null hypothesis is rejected when the result of the test is greater than the critical value. The critical value that is displayed is based on the degrees of freedom (dF) of the test and a significance level of 0.05.

** An agreement ratio is a simple method for assessing the similarity of two samples (in this case the indoor sample and the outdoor summary) based on the spore types present. A score of one indicates that the types detected in one location are the same as that in the other. A score of zero indicates that none of the types detected indoors are present outdoors. Typically, an agreement of 0.8 or higher is considered high.

*** The Spearman rank correlation is a non-parametric test that examines correlation between two sets of data (in this case the indoor location and the outdoor summary). The null hypothesis (H0) being tested is that the indoor and outdoor samples are unrelated. The alternative hypothesis (used if the test disproves the null hypothesis) is that the samples are similar. The null hypothesis is rejected when the result of the test is greater than the critical value. The critical value that is displayed is based on the degrees of freedom (dF) of the test and a significance level of 0.05.

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Date of Sampling: 11-28-2017
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MoldSTAT™: Supplementary Statistical Spore Trap Report

**** MoldSCORE™ is a specialized method for examining air sampling data. It is a score between 100 and 300, with 100 indicating a greater likelihood that the airborne indoor spores originated from the outside, and 300 indicating a greater likelihood that they originated from an inside source. The Result displayed is based on the numeric score given and will be either Low, Medium, or High, indicating a low, medium, or high likelihood that the spores detected originated from an indoor source. EMLab P&Kreserves the right to, and may at anytime, modify or change the MoldScore algorithm without notice.

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Date of Sampling: 11-28-2017
Date of Receipt: 11-30-2017
Date of Report: 12-04-2017

MoldSTAT™: Supplementary Statistical Spore Trap Report

Outdoor Summary: 1956305: OD (Post)

Species detected	Outdoor sample spores/m3 (<100 / 1K / 10K / >100K)	Typical outdoor ranges (North America)	Freq. %
Alternaria	13	7 - 33 - 430	43
Ascospores	270	13 - 230 - 6,400	77
Basidiospores	800	13 - 480 - 23,000	91
Bipolaris/Drechslera group	110	7 - 13 - 240	16
Cladosporium	2,100	27 - 490 - 9,400	90
Nigrospora	53	7 - 20 - 270	17
Penicillium/Aspergillus types	160	13 - 190 - 2,600	67
Smuts, Periconia, Myxomycetes	53	7 - 53 - 1,100	65
Total	3,500		

The "Typical outdoor ranges" and "Freq. %" columns show the typical low, medium, and high spore counts per cubic meter and the frequency of occurrence for the given spore type. The low, medium, and high values represent the 2.5, 50, and 97.5 percentile values when the spore type is detected. For example, if the low value is 53 and the frequency of occurence is 63%, it would mean that we typically detect the given spore type on 63 percent of all outdoor samples and, when detected, 2.5% of the time it is present in levels below 53 spores/m3.

Indoor Samples

Location: 2142241: Headquarters Administration

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 27%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.8000	dF: 9 Result: 0.8583 Critical value: 0.5833 Outside Similar: Yes	Score: 111 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Ascospores	53
Basidiospores	270
Bipolaris/Drechslera group	13
Cladosporium	480
Other brown	13
Penicillium/Aspergillus types	110
Smuts, Periconia, Myxomycetes	27
Total	960

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MoldSTAT™: Supplementary Statistical Spore Trap Report

Location: 2142618: Classroom N.W. Side

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 15%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.6154	dF: 9 Result: 0.7792 Critical value: 0.5833 Outside Similar: Yes	Score: 114 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Ascospores	110
Basidiospores	110
Cladosporium	210
Curvularia	13
Penicillium/Aspergillus types	110
Total	550

Location: 2142239: HHC Administration

% of outdoor total spores/m3	Friedman chi-square* (indoor variation)	Agreement ratio** (indoor/outdoor)	Spearman rank correlation*** (indoor/outdoor)	MoldSCORE**** (indoor/outdoor)
Result: 13%	dF: 2 Result: 5.2500 Critical value: 5.9915 Inside Similar: Yes	Result: 0.5455	dF: 8 Result: 0.8155 Critical value: 0.6190 Outside Similar: Yes	Score: 105 Result: Low

Species Detected	Spores/m3 (<100 / 1K / 10K / >100K)
Basidiospores	160
Cladosporium	270
Penicillium/Aspergillus types	53
Total	480

* The Friedman chi-square statistic is a non-parametric test that examines variation in a set of data (in this case, all indoor spore counts). The null hypothesis (H0) being tested is that there is no meaningful difference in the data for all indoor locations. The alternative hypothesis (used if the test disproves the null hypothesis) is that there is a difference between the indoor locations. The null hypothesis is rejected when the result of the test is greater than the critical value. The critical value that is displayed is based on the degrees of freedom (dF) of the test and a significance level of 0.05.

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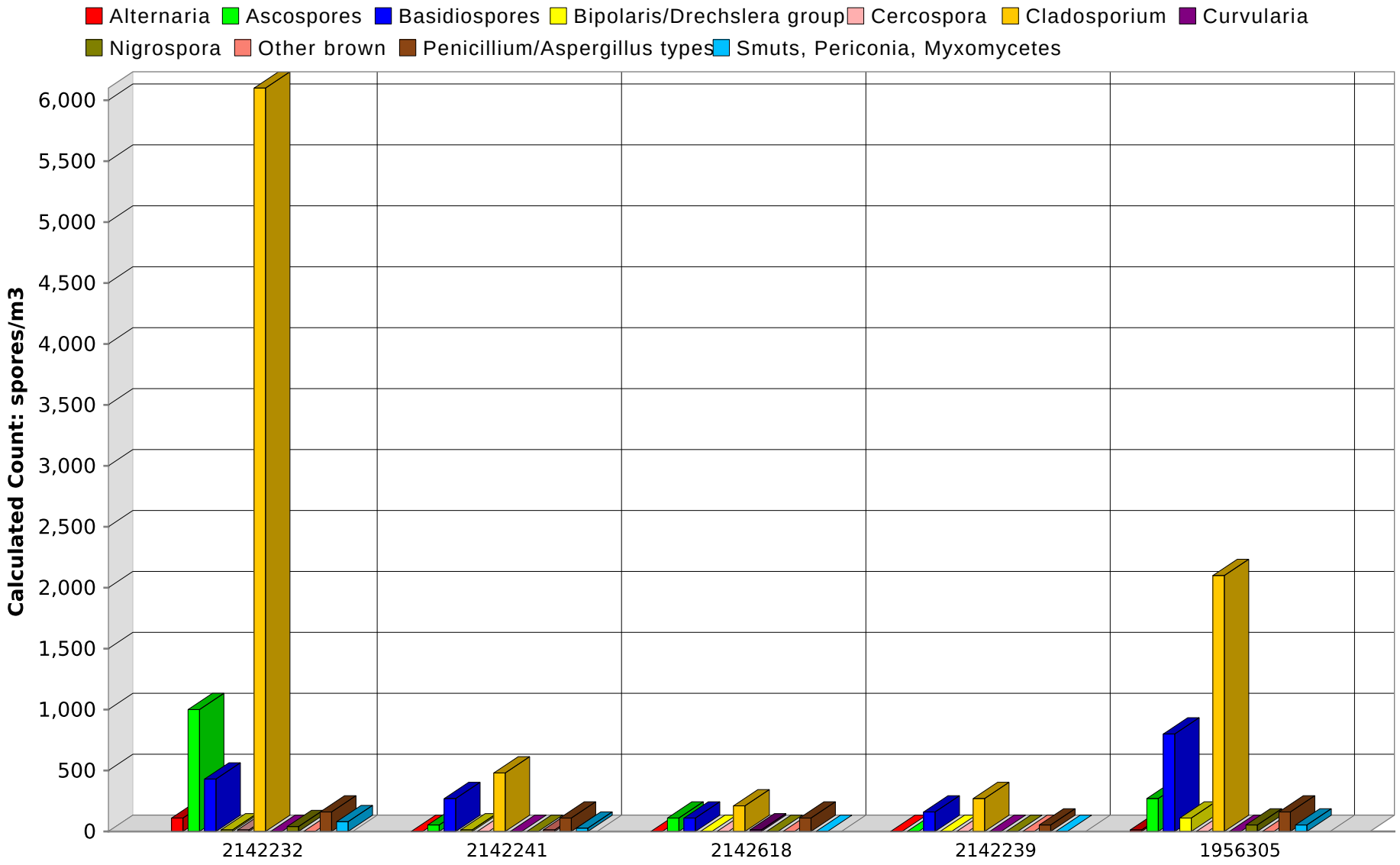
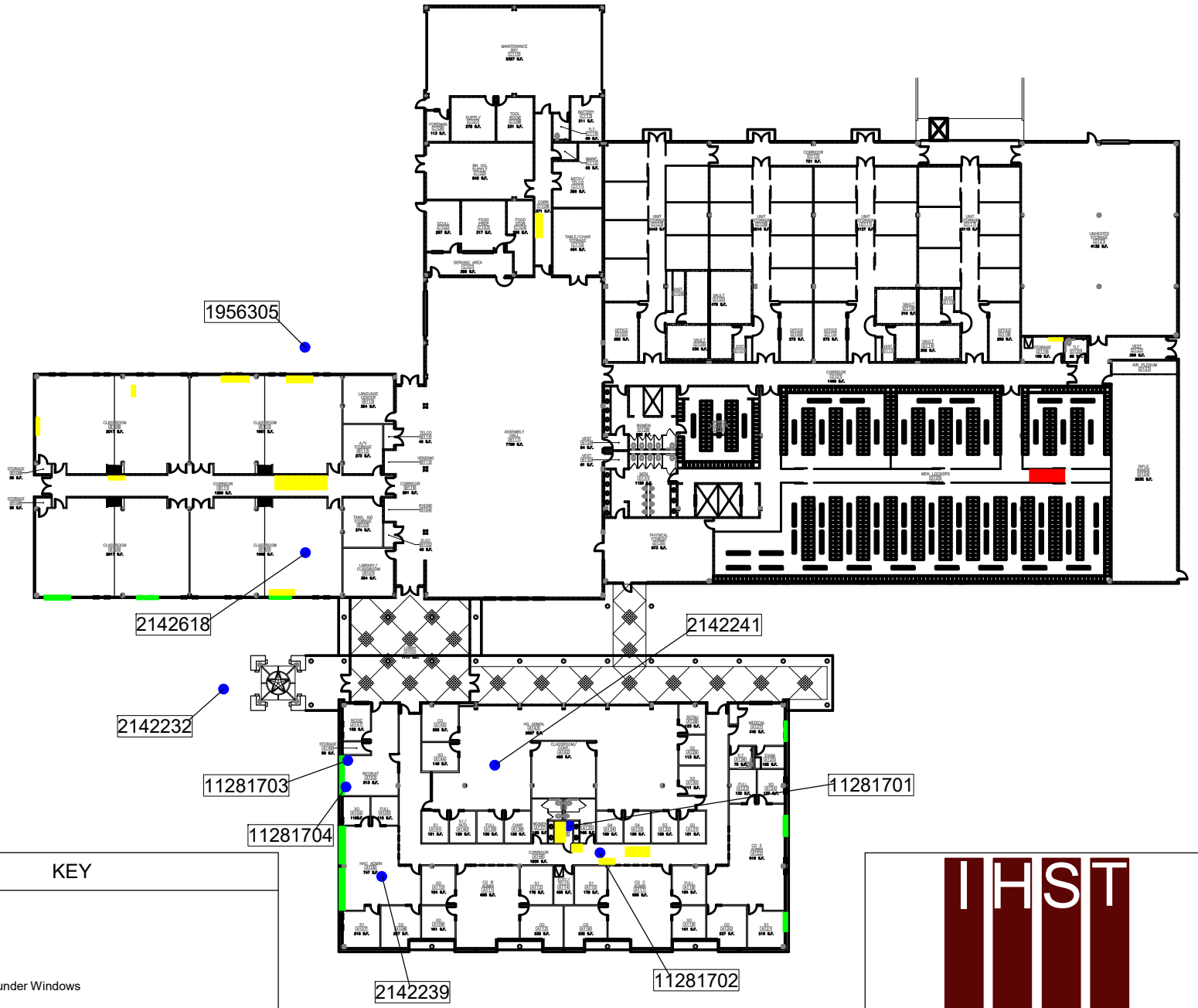
SPORE TRAP REPORT: NON-VIABLE METHODOLOGY



Comments:

Note: Graphical output may understate the importance of certain "marker" genera.
Aerotech Laboratories, Inc

Appendix: Sample Locations and Site Diagram of Identified Mold and Water Damage



KEY

- Mold Sample Locations
- Stained Ceiling TIles
- Suspect Water Damage under Windows
- Pigeon Droppings

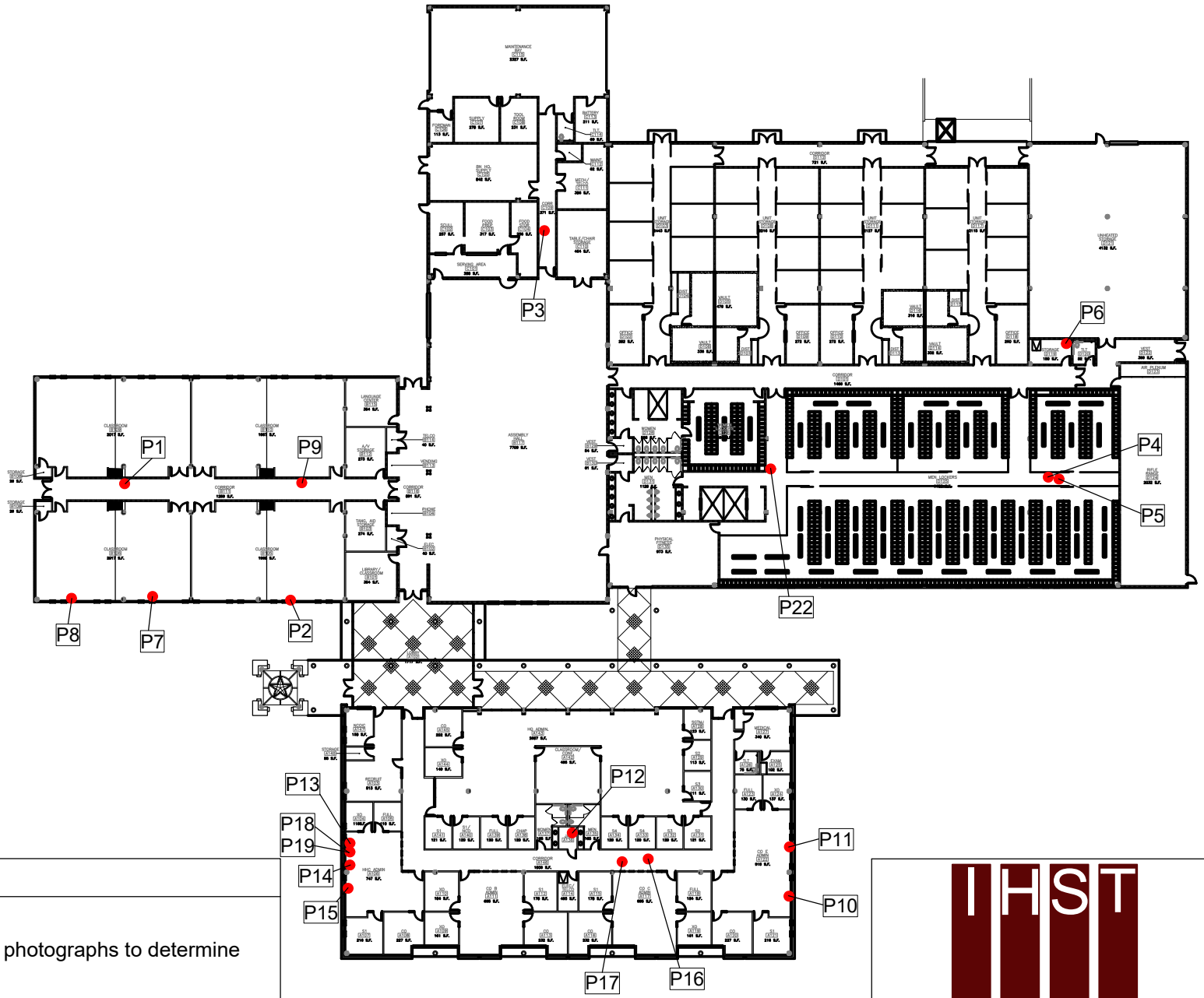
IHST

Industrial Hygiene
and
Safety Technology, Inc.

DRAWING TITLE:

Freese & Nichols
Weslaco Readiness Center
1100 Vo Tech
Weslaco, TX 78599

JOB NUMBER:	DRAWN BY:	DATE:	CAD File:	Scale:	Sheet:
21816	K. Girton	11/02/2017	Freese & Nichols Weslaco Readiness Center.TCW	None	1 of 2



Photograph Locations

Please refer to photographs to determine condition

IHST

Industrial Hygiene
and
Safety Technology, Inc.

DRAWING TITLE:

Freese & Nichols
Weslaco Readiness Center
1100 Vo Tech
Weslaco, TX 78599

JOB NUMBER:	DRAWN BY:	DATE:	CAD File:	Scale:	Sheet:
21816	K. Girton	11/02/2017	Freese & Nichols Weslaco Readiness Center.TCW	None	2 of 2

Appendix: Inspection Photographs

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Weslaco Readiness Center

Weslaco Readiness Cente

Photo 1

Photo 2

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 3

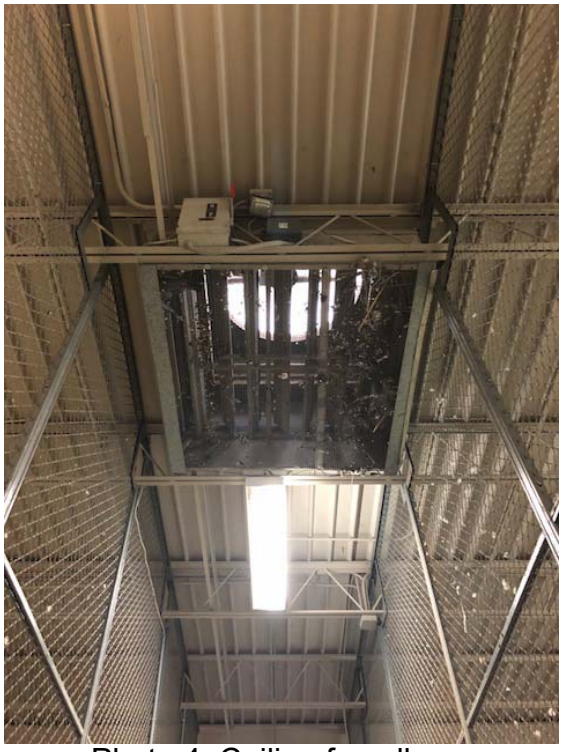


Photo 4, Ceiling fan allows bird droppings to get on floor

Photo 5, Bird droppings on floor

Photo 6

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 7

Photo 8

Photo 9

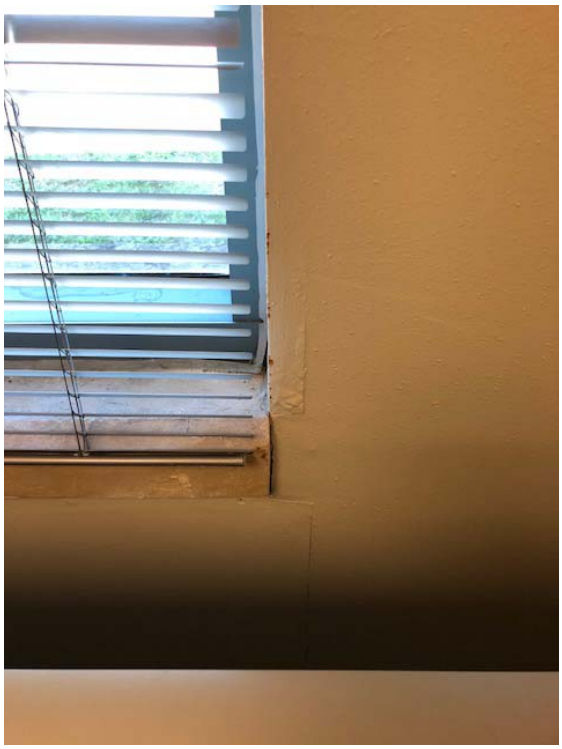


Photo 10, Evidence of moisture intrusion under window

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 11. Evidence of water intrustion

Photo 12

Photo 13, Evidence of water intrustion

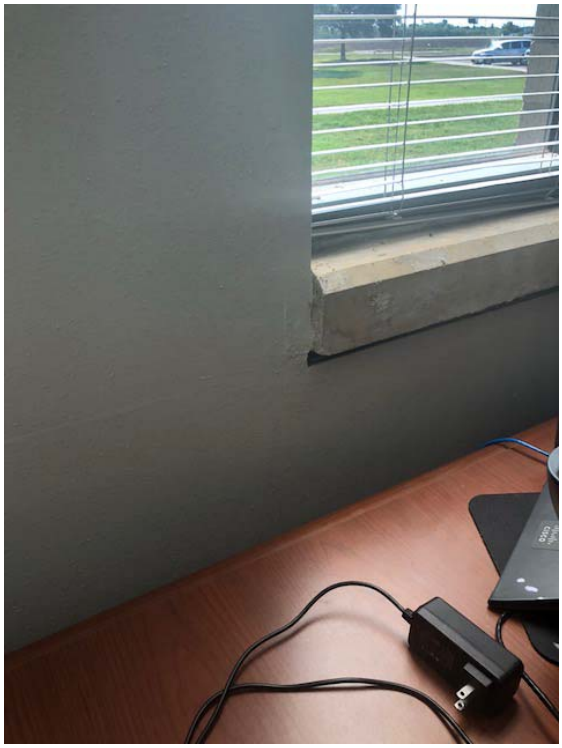


Photo 14, Evidence of water intrustion

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 15, Evidence of water intrustion

Photo 16

Photo 17

Photo 18, Mold on exterior of building

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 19, Mold on exterior of building

Photo 20, Damaged roof

Photo 21, Roof top Unit

Photo 22, Dirty return air in men's locker room

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Photo 23, Dirty coils, RTU 7

Photo 24, Damaged roof

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Report of

Comprehensive Asbestos **and Lead** Survey

Prepared for:

Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, TX 76109

Building Surveyed:

Weslaco Readiness Center
100 Vo Tech Drive
Weslaco, TX 78599
(Texas Army National Guard - Weslaco)

Report Date:

Thursday, November 09, 2017

Comprehensive Asbestos **and Lead** Survey

Weslaco Readiness Center

100 Vo Tech Drive

Weslaco, TX 78599

(Texas Army National Guard - Weslaco)

Table of Contents

1.0 Introduction

This document is a report of a Comprehensive Asbestos Survey performed by Industrial Hygiene and Safety Technology, Inc.(IHST). IHST is licensed by the Texas Department of State Health Services (DSHS), formerly the Texas Department of Health, as an Asbestos Consultant Agency (DSHS License #10-0145. Figure 1 provides a description of the assessment described by this report.

Figure 1. Comprehensive Asbestos Survey Profile

Client Name:	Freese and Nichols, Inc.
Facility/Campus	Texas Army National Guard - Weslaco
Building:	*Weslaco Readiness Center* 100 Vo Tech Drive Weslaco, TX 78599
Survey Date(s):	10/25/2017
Inspector(s):	Jose Reyes - DSHS Asbestos Inspector License #60-3316

2.0 Purpose and Scope

The purpose of this project was to locate, identify, and assess the condition of asbestos containing material (ACM) present at the subject building, and to develop recommendations based on existing and potential asbestos related hazards. The following scope of work was used during the asbestos assessment for the subject property:

A. Collecting and analyzing bulk samples of suspected asbestos-containing materials.

B. Quantification of the suspected asbestos-containing material.

C. Preparing a report discussing the findings and remedial recommendations.

3.0 Report Organization

This report is divided into sections which discuss the review of available documentation, field investigation, laboratory analysis, hazard assessments, and recommendations. Illustrations, such as tables and figures follow the text. Other supporting documentation, such as laboratory reports are also included.

4.0 Field Investigation

The survey was conducted to determine the amount of asbestos-containing materials present in the subject building. The survey included an observation of accessible areas and unusual conditions; and bulk sampling of suspected asbestos-containing materials. Bulk samples were collected of suspect materials and analyzed by Polarized Light Microscopy (PLM) with dispersion staining, in accordance with the Environmental Protection Agency's (EPA) Method for the Determination of Asbestos in Bulk Insulation Samples (Method 600/R-93/116). All of the samples that tested greater than 1% by the PLM method for counting asbestos were reanalyzed using the Transmission Electron Microscopy (TEM) method. This technique characterizes asbestos more precisely than PLM. Laboratory reports containing sample location and results are included with this report.

The survey was designed to identify the presence of both friable and non-friable asbestos- containing materials present in the surveyed area. Friable means that the material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. Building materials suspected of containing asbestos were grouped into "Homogeneous" sampling areas. The homogeneous areas were defined

based on uniform texture, color, and appearance. Additionally, homogeneous areas were further defined based on building construction date(s). Each of the items sampled were classified into one of three categories:

1.) Surfacing Material: A surfacing material is a building material which has been applied to a surface (i.e., walls or ceilings) or structural members. Examples of surfacing materials which may contain asbestos are: spray-applied fireproofing, spray-applied acoustical texture, and trowel-applied textured ceilings and walls.

2.) Thermal System Insulation: All types of insulation used on a building's mechanical system are classified into the category of thermal system insulation. Examples of thermal system materials which may contain asbestos are: boilers and related piping, or duct insulation.

3.) Miscellaneous: All remaining materials which do not fall into the two above categories are placed in the miscellaneous category. Examples of miscellaneous materials which may contain asbestos are: lay-in ceiling tile, floor tile, mastic adhesives and roofing felt.

An assessment was conducted for each building material sampled. The physical assessment consists of evaluating the condition of the suspect material and the potential for future disturbance. Recommendations made for a building material which contains asbestos are based on the assessments made by the inspector during the survey. The data developed during the asbestos survey is presented in the following sections of this report.

Table 1 contains the Summary of Bulk Sample Analysis and Assessment. This table presents specific locations, results of additional asbestos analysis, time schedules, and quantities of asbestos.

5.0 Sampling

Sampling during the field investigation included the collection of bulk samples of suspected asbestos containing materials, as listed in Table 1., Summary of Bulk Sample Analysis and Assessment. After sample recovery, samples were placed in secure containers, and the sampling vicinity was cleaned and sealed. Appropriate chain-of-custody protocols were initiated at that time to track handling of bulk samples.

5.1 Laboratory Analysis

The samples were transported to and analyzed by the analytical laboratory specified in Figure 2., a successful participant in the Department of Commerce, National Institute of Standards and Technology's (NIST) National Voluntary Laboratory Accreditation Program and licensed by the Texas Department of State Health Services (DSHS), formerly the Texas Department of Health. Ten percent (10%) of the bulk samples were reanalyzed independently as part of the quality assurance and quality control programs.

Figure 2. Bulk Sample Laboratory Profile

Laboratory Name:	Moody Labs		
DSHS License Number:	#30-0084		
NVLAP Lab ID:	#102056-0	**Expires:**	5/31/2018

5.2 Analytical Methods

Bulk samples were analyzed by Polarized Light Microscopy (PLM). This technique characterizes the materials refractive indices, fiber morphology, birefringence, extinction angle, sign of elongation, and dispersion staining colors to detect asbestos. Percentage estimates are based on approximate area compositions under a stereo-microscope. All of the samples that tested greater than 1% by the PLM method for counting asbestos were reanalyzed using the Transmission Electron Microscopy (TEM) method. This technique characterizes asbestos more precisely than PLM.

5.3 Bulk Sample Results

The results of the sample analysis are presented in Table 1, and the laboratory analysis report is included as Appendix B.

Figure 3. Materials with Asbestos Detected at 1% or Greater

No materials were identified which contained 1% or more of asbestos.

Figure 4. Materials with NO Asbestos Detected (Pursuant to EPA and DSHS Definition)

Mat'l Type	*Description*	*Location*
Sheetrock	Drywall/Joint Compound/Sand Texture	Walls Throughout A & B Rooms
ACT	2'x4' SACT	Ceilings Throughout A Rooms
Adhesive	Clear Carpet Glue	Various Floors ikn A & B Rooms
Cove Base	4" Gray Cove Base/Yellow Mastic	Various Walls Throughout Building
Flooring Matls	12"x12" Beige Floor Tile/Yellow Mastic	Various Floors Throughout Building
Undercoating	White Sink Undercoating	Room A125
ACT	2'x4' Old SACT	Various Ceilings in B, C, & D Rooms
Cove Base	4" Black Cove Base/White Mastic	Room B105
PlasterSurf	Plaster	Exterior Awnings & Ceiling in Room D127
Sheetrock	2"x4" Smooth SACT	Various Ceilings in C & D Rooms
Caulking	Silver Caulk	Rooms C101 & C102
ACT	2'x4' New SACT	Room D135
Caulking	Exterior Gray Caulk	Around Exterior Windows & Doors
Mastic	Gray Duct Mastic	Duct Work Above Ceiling Tile Throughout the Building

6.0 Hazard Assessment

Asbestos is an airborne hazard. A hazard assessment refers to the process by which we evaluate a material's potential to release fibers into the air. Fibers may be released spontaneously as part of the aging process, or as a result of sudden impact, vibration, air movement, or localized deterioration. Assessing a material's potential for fiber release, and hence its associated hazard, is based upon evaluating the material's condition and potential for further disturbance, damage, or deterioration.

6.1 Hazard Assessment Rankings

Any material identified as asbestos containing that exhibits damage, should be considered a hazard to anyone who works in the area. Typically, damage is classified as minor or significant. Minor damage is characterized by small cuts, tears, scuffs, small openings, or other limited disturbance to asbestos containing materials. Areas with minor damage represent varying degrees of hazards from slight to high depending on:

* The nature of the damage;
* Proximity to disturbers, such as airstreams;
* Location with respect to building occupants;
* Activity in the immediate area; and
* Frequency of maintenance in the area.

Significant damage is characterized by large openings, visible flaking, loose particles, and debris on surfaces below the material. Asbestos containing materials which exhibit significant damage are either high or critical hazards, depending upon accessibility. High hazards exist where significantly damaged materials are generally inaccessible; however, where significant damage is accessible, or in the vicinity of building occupants, there is a critical hazard. The recommended action for addressing asbestos related hazards depends upon the degree of hazard. For example:

* An immediate hazard or critical assessment describes a situation in which the material is exposed and friable, accessible to personnel, and is disturbed releasing fibers in the air. In this situation, immediate action should be taken. At a minimum, the area should be isolated and access restricted.

* A high assessment describes a situation in which the material is in poor condition, exposed and friable, with a potential for disturbance. In this case, interim controls should be instituted, and the material should be removed when practical. Repairs should be made to the ACM if abatement is not scheduled.

* A medium or moderate assessment describes a situation in which a combination of the determining factors vary, such as a material that is in good condition but has a high asbestos content and is generally accessible. In situations like this, abatement can be scheduled with future building renovation or maintenance.

* A low or slight assessment describes a situation in which the material is in good condition and has a low potential for disturbance, damage, or deterioration. In this situation, an O&M program is usually all that is needed.

In general, those areas that are classified as critical or high damage should be abated. These are areas where a high probability of exposure could occur. Moderately damaged areas would require an Operations and Maintenance (O&M) Program to be instituted. In addition, these areas should be considered for abatement, or at the very least repaired.

6.2 Asbestos-Containing Material Assessments

Figure 5 provides a summary of the asbestos identified during the survey, along with a hazard assessment for each type and condition of asbestos-containing material.

Figure 5. Hazard Assessments for Asbestos-Containing Materials

No asbestos-containing materials were identified during the survey.

7.0 Hazard Assessment Summary

In the event other building materials are discovered in addition to the materials sampled in this survey, those building materials should be presumed to contain asbestos and treated as such until proven otherwise by PLM laboratory analysis.

7.1 Response Actions

No asbestos-containing materials were identified during the survey. No additional recommendations are necessary.

7.2 Explanation of Response Ratings

Table 1 includes a response rating based on factors such as friability, accessibility, potential for disturbance, etc. Definitions for the response ratings are listed below:

0 = Material does not contain detectable amounts of asbestos and requires no asbestos-related abatement action.

1 = Material contains asbestos, was non-friable, and requires no abatement action unless sanded, abraded, drilled or otherwise disturbed.

2 = Material contains asbestos and was friable. Damage was not observed; no immediate abatement action is required.

3 = Material contains asbestos, was friable, and shows signs of localized damage with a potential for disturbance.

4 = Material contains friable asbestos and was significantly damaged.

8.0 Qualifications

Industrial Hygiene and Safety Technology, Inc. has attempted to observe the existing conditions within the aforementioned building utilizing generally accepted procedures. Regardless of the thoroughness of a survey, the possibility exists that some areas containing asbestos were overlooked, inaccessible or different from those at specific locations. Furthermore, renovation and/or construction may reveal altered conditions.

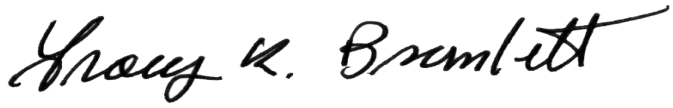
This report describes only the conditions present at the time of the survey, in the areas surveyed. The recommendations presented apply to the conditions that were observed during the survey. IHST policies are to not perform destructive sampling unless previously authorized by the client. Therefore, IHST does not perform core sampling of roofing materials unless previously authorized and accompanied by the owner and/or his representative. Other conditions may exist in unsurveyed or inaccessible areas such as behind walls and above permanent ceilings. In addition, the conditions of asbestos-containing materials may change gradually or suddenly depending upon use, maintenance or accident. As a result, the recommendations presented should be periodically reviewed and updated.

The quantity estimates presented in this report were based upon observations during the survey as well as information from building plans provided by the owner. While it is believed that the estimated quantities are reasonable, unanticipated conditions could be present in inaccessible or unsurveyed areas. Industrial Hygiene & Safety Technology, Inc. do not warrant or guarantee the quantity estimates. The use of such estimates shall be at the user's own risk and shall constitute a release and agreement to defend and indemnify Industrial Hygiene & Safety Technology, Inc. from and against any liability.

If you have any questions or comments regarding the content of this report, I would be glad to discuss them at your convenience.

Sincerely,

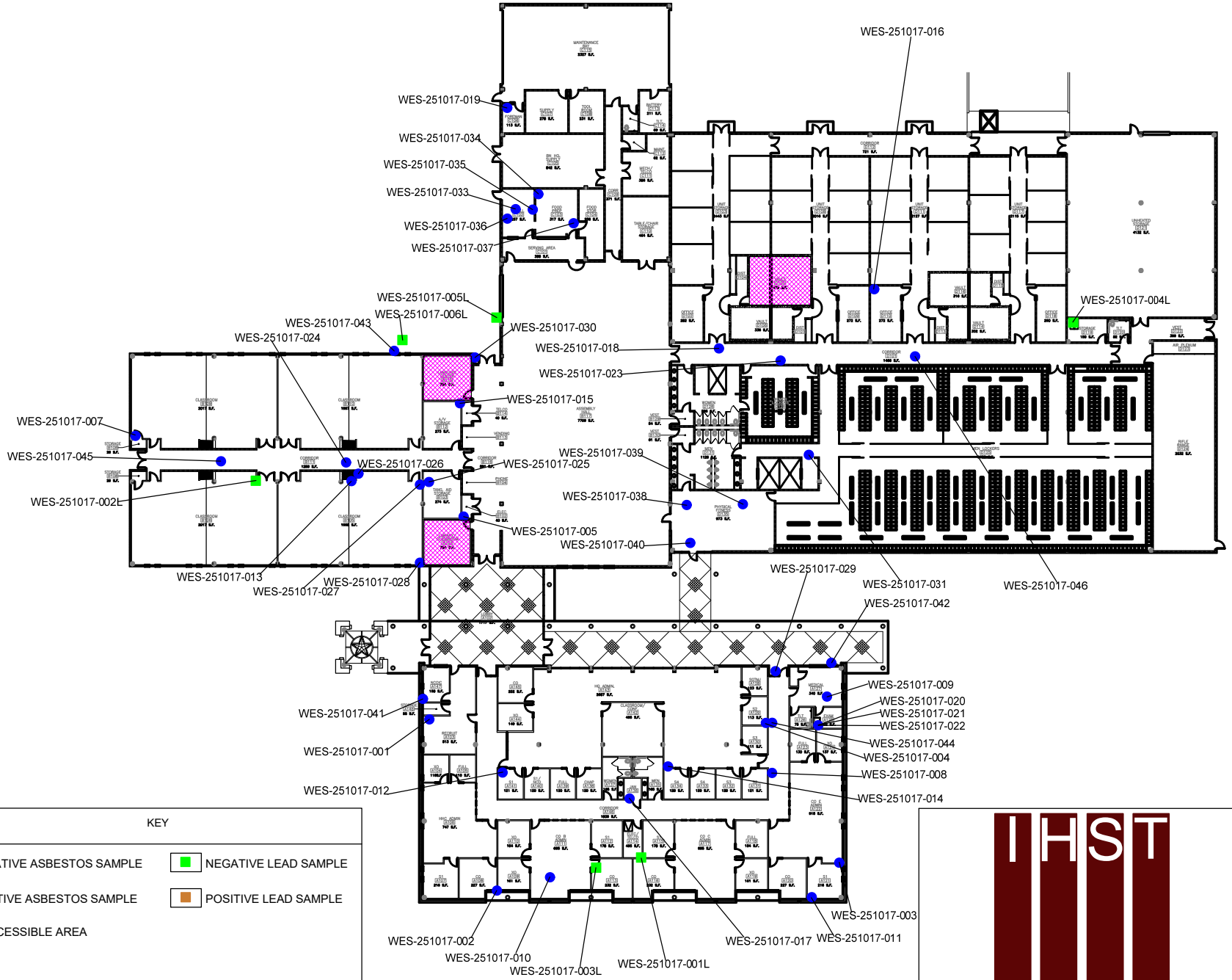
Jose Reyes - DSHS Asbestos Inspector License #60-3316



Tracy K. Bramlett
President
DSHS Individual Asbestos Consultant License #10-5040

Appendix:

Appendix A: Site Drawings



KEY

- NEGATIVE ASBESTOS SAMPLE
- NEGATIVE LEAD SAMPLE
- POSITIVE ASBESTOS SAMPLE
- POSITIVE LEAD SAMPLE
- INACCESSIBLE AREA

*POSITIVE ASBESTOS CONTAINING MATERIAL IS CLASSIFIED AS BEING GREATER THAN 1% ASBESTOS.

*POSITIVE LEAD CONTAINING MATERIAL IS CLASSIFIED AS BEING GREATER THAN OR EQUAL TO 0.5% LEAD BY WEIGHT.

IHST

Industrial Hygiene
and
Safety Technology, Inc.

DRAWING TITLE:

Freese & Nichols
Weslaco Readiness Center
1100 Vo Tech
Weslaco, TX 78599

JOB NUMBER:	DRAWN BY:	DATE:	CAD File:	Scale:	Sheet:
21816	K. Girton	11/02/2017	Freese & Nichols Weslaco Readiness Center.TCW	None	1 of 1

Appendix:

Appendix B: Lab Results

PLM Summary Report

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 17B-12807
Report Date : 10/30/2017
Sample Date : 10/25/2017

On 10/27/2017, forty six (46) bulk material samples were submitted by Jose Reyes of Industrial Hygiene & Safety Technology for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
WES-251017-001	Drywall / Joint Compound / Texture (Sand), Room A103	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-002	Drywall / Joint Compound / Texture (Sand), Room A108	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-003	Drywall / Joint Compound / Texture (Sand), Room A122	None Detected - Drywall Material None Detected - Texture / Joint Cmpd
WES-251017-004	Drywall / Joint Compound / Texture (Sand), Room A129	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-005	Drywall / Joint Compound / Texture (Sand), Room B102	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-006	Drywall / Joint Compound / Texture (Sand), Room B105B	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-007	Drywall / Joint Compound / Texture (Sand), Room B109B	None Detected - Drywall Material None Detected - Joint Compound None Detected - Texture
WES-251017-008	2' x 4' Suspended Acoustic Ceiling Tile, Corridor A146	None Detected - Acoustic Tile
WES-251017-009	2' x 4' Suspended Acoustic Ceiling Tile, Room A127	None Detected - Acoustic Tile
WES-251017-010	2' x 4' Suspended Acoustic Ceiling Tile, Room A111	None Detected - Acoustic Tile
WES-251017-011	Carpet Glue (Clear), Room A121	None Detected - Clear Mastic
WES-251017-012	Carpet Glue (Clear), Room A141	None Detected - Clear Mastic
WES-251017-013	Carpet Glue (Clear), Room B105A	None Detected - Clear Mastic
WES-251017-014	4" Cove Base (Gray) / Mastic (Yellow), Room A143	None Detected - Cove Base None Detected - Yellow Mastic

PLM Summary Report

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 17B-12807
Report Date : 10/30/2017
Sample Date : 10/25/2017

On 10/27/2017, forty six (46) bulk material samples were submitted by Jose Reyes of Industrial Hygiene & Safety Technology for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
WES-251017-015	4" Cove Base (Gray) / Mastic (Yellow), Room B112	None Detected - Cove Base None Detected - Yellow Mastic
WES-251017-016	4" Cove Base (Gray) / Mastic (Yellow), Room D110	None Detected - Cove Base None Detected - Yellow Mastic
WES-251017-017	12" x 12" Floor Tile (Beige) / Mastic (Yellow), Room A136	None Detected - Floor Tile None Detected - Yellow Mastic
WES-251017-018	12" x 12" Floor Tile (Beige) / Mastic (Yellow), Corridor D101	None Detected - Floor Tile None Detected - Yellow Mastic
WES-251017-019	12" x 12" Floor Tile (Beige) / Mastic (Yellow), Room C106	None Detected - Floor Tile None Detected - Yellow Mastic
WES-251017-020	Sink Undercoating (White), Room A125	None Detected - Sink Undercoating
WES-251017-021	Sink Undercoating (White), Room A125	None Detected - Sink Undercoating
WES-251017-022	Sink Undercoating (White), Room A125	None Detected - Sink Undercoating
WES-251017-023	2' x 4' Old Suspended Acoustic Ceiling Tile, Corridor D101	None Detected - Acoustic Tile
WES-251017-024	2' x 4' Old Suspended Acoustic Ceiling Tile, Corridor B111	None Detected - Acoustic Tile
WES-251017-025	2' x 4' Old Suspended Acoustic Ceiling Tile, Corridor B103	None Detected - Acoustic Tile
WES-251017-026	4" Cove Base (Black) / Mastic (White), Room B105A	None Detected - Cove Base None Detected - Cream Mastic
WES-251017-027	4" Cove Base (Black) / Mastic (White), Room B105A	None Detected - Cove Base None Detected - Cream Mastic
WES-251017-028	4" Cove Base (Black) / Mastic (White), Room B105A	None Detected - Cove Base None Detected - Cream Mastic
WES-251017-029	Plaster, Exterior Awnings	None Detected - Plaster
WES-251017-030	Plaster, Exterior Awnings	None Detected - Plaster

PLM Summary Report

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816
Identification : Asbestos, Bulk Sample Analysis
Test Method : Polarized Light Microscopy / Dispersion Staining (PLM/DS)
EPA Method 600 / R-93 / 116

Lab Job No. : 17B-12807
Report Date : 10/30/2017
Sample Date : 10/25/2017

On 10/27/2017, forty six (46) bulk material samples were submitted by Jose Reyes of Industrial Hygiene & Safety Technology for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content
WES-251017-031	Plaster, Room D127	None Detected - Plaster
WES-251017-032	2' x 4' Suspended Acoustic Ceiling Tile (Smooth), Room C101	None Detected - Drywall Tile None Detected - Vinyl Facing
WES-251017-033	2' x 4' Suspended Acoustic Ceiling Tile (Smooth), Room C102	None Detected - Drywall Tile None Detected - Vinyl Facing
WES-251017-034	2' x 4' Suspended Acoustic Ceiling Tile (Smooth), Room C103	None Detected - Drywall Tile None Detected - Vinyl Facing
WES-251017-035	Caulk (Silver), Room C102	None Detected - Caulking
WES-251017-036	Caulk (Silver), Room C102	None Detected - Caulking
WES-251017-037	Caulk (Silver), Room C103	None Detected - Caulking
WES-251017-038	2' x 4' New Suspended Acoustic Ceiling Tile, Room D135	None Detected - Acoustic Tile
WES-251017-039	2' x 4' New Suspended Acoustic Ceiling Tile, Room D135	None Detected - Acoustic Tile
WES-251017-040	2' x 4' New Suspended Acoustic Ceiling Tile, Room D135	None Detected - Acoustic Tile
WES-251017-041	Exterior Caulk (Gray), Exterior Windows and Doors	None Detected - Caulking
WES-251017-042	Exterior Caulk (Gray), Exterior Windows and Doors	None Detected - Caulking
WES-251017-043	Exterior Caulk (Gray), Exterior Windows and Doors	None Detected - Caulking
WES-251017-044	Duct Mastic (Gray), Ducts above Ceiling Tile	None Detected - Grey Mastic
WES-251017-045	Duct Mastic (Gray), Ducts above Ceiling Tile	None Detected - Grey Mastic
WES-251017-046	Duct Mastic (Gray), Ducts above Ceiling Tile	None Detected - Grey Mastic

PLM Summary Report

2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client :	Industrial Hygiene & Safety Technology	Lab Job No. :	17B-12807
Project :	Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech	Report Date :	10/30/2017
Project # :	21816	Sample Date :	10/25/2017
Identification :	Asbestos, Bulk Sample Analysis		
Test Method :	Polarized Light Microscopy / Dispersion Staining (PLM/DS) EPA Method 600 / R-93 / 116		

On 10/27/2017, forty six (46) bulk material samples were submitted by Jose Reyes of Industrial Hygiene & Safety Technology for asbestos analysis by PLM/DS. The PLM Detail Report is attached; additional information may be found therein. The results are summarized below:

Sample Number	Client Sample Description / Location	Asbestos Content

NVLAP LAB #102056-0

Analyst(s): Willie Pruitt

Lab Manager : Heather Lopez — Approved Signatory : Heather Lopez

Lab Director : Bruce Crabb — Approved Signatory : Bruce Crabb

Thank you for choosing Moody Labs

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816

Lab Job No. : 17B-12807
Report Date : 10/30/2017

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
WES-251017-001	Drywall Material (Pale Pink)	40%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (White)	23%	Calcite / Talc / Binders	100%		
	Texture (White)	2%	Calcite / Talc / Binders	100%		
WES-251017-002	Drywall Material (Pale Pink)	40%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	35%	Cellulose Fibers	100%		
	Joint Compound (White)	23%	Calcite / Talc / Binders	100%		
	Texture (White)	2%	Calcite / Talc / Binders	100%		
WES-251017-003	Drywall Material (White)	5%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper Facing (Tan)	5%	Cellulose Fibers	100%		
	Texture / Joint Cmpd (White)	90%	Calcite / Talc / Binders	100%		
WES-251017-004	Drywall Material (White)	45%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	25%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Calcite / Talc / Binders	100%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		
WES-251017-005	Drywall Material (White)	55%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	15%	Cellulose Fibers	100%		
	Joint Compound (White)	25%	Calcite / Talc / Binders	100%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816

Lab Job No. : 17B-12807
Report Date : 10/30/2017

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
WES-251017-006	Drywall Material (Pale Pink)	80%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	13%	Cellulose Fibers	100%		
	Joint Compound (White)	5%	Calcite / Talc / Binders	100%		
	Texture (White)	2%	Calcite / Talc / Binders	100%		
WES-251017-007	Drywall Material (Pale Pink)	70%	Glass Wool Fibers	2%	10/30	WP
			Cellulose Fibers	1%		
			Gypsum / Binders	97%		
	DW Paper / Tape (Tan / White)	15%	Cellulose Fibers	100%		
	Joint Compound (White)	10%	Calcite / Talc / Binders	100%		
	Texture (White)	5%	Calcite / Talc / Binders	100%		
WES-251017-008	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-009	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-010	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-011	Clear Mastic (Clear)	100%	Glue Binders	100%	10/30	WP
WES-251017-012	Clear Mastic (Clear)	100%	Glue Binders	100%	10/30	WP
WES-251017-013	Clear Mastic (Clear)	100%	Glue Binders	100%	10/30	WP
WES-251017-014	Cove Base (Grey)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	50%	Glue Binders	100%		
WES-251017-015	Cove Base (Grey)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	50%	Glue Binders	100%		

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816

Lab Job No. : 17B-12807
Report Date : 10/30/2017

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
WES-251017-016	Cove Base (Grey)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	50%	Glue Binders	100%		
WES-251017-017	Floor Tile (Beige / Black Spots)	99%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
WES-251017-018	Floor Tile (Beige / Black Spots)	99%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
WES-251017-019	Floor Tile (Beige / Black Spots)	99%	Calcite / Vinyl Binders	100%	10/30	WP
	Yellow Mastic (Yellow)	1%	Glue Binders	100%		
WES-251017-020	Sink Undercoating (Off-White)	100%	Cellulose Fibers	10%	10/30	WP
			Calcite / Talc	50%		
			Binders / Fillers	40%		
WES-251017-021	Sink Undercoating (Off-White)	100%	Cellulose Fibers	10%	10/30	WP
			Calcite / Talc	50%		
			Binders / Fillers	40%		
WES-251017-022	Sink Undercoating (Off-White)	100%	Cellulose Fibers	10%	10/30	WP
			Calcite / Talc	50%		
			Binders / Fillers	40%		
WES-251017-023	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-024	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-025	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-026	Cove Base (Black)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Cream Mastic (Cream)	50%	Calcite	50%		
			Glue Binders	50%		

Moody Labs
2051 Valley View Lane
Farmers Branch, TX 75234 Phone: (972) 241-8460

PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816

Lab Job No. : 17B-12807
Report Date : 10/30/2017

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
WES-251017-027	Cove Base (Black)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Cream Mastic (Cream)	50%	Calcite	50%		
			Glue Binders	50%		
WES-251017-028	Cove Base (Black)	50%	Calcite / Vinyl Binders	100%	10/30	WP
	Cream Mastic (Cream)	50%	Calcite	50%		
			Glue Binders	50%		
WES-251017-029	Plaster (White)	100%	Aggregate	65%	10/30	WP
			Calcite / Binders	35%		
WES-251017-030	Plaster (White)	100%	Aggregate	65%	10/30	WP
			Calcite / Binders	35%		
WES-251017-031	Plaster (White)	100%	Aggregate	65%	10/30	WP
			Calcite / Binders	35%		
WES-251017-032	Drywall Tile (Pale Pink)	94%	Cellulose Fibers	2%	10/30	WP
			Glass Wool Fibers	2%		
			Mica	<1%		
			Gypsum / Binders	96%		
	DW Paper Facing (Tan)	5%	Cellulose Fibers	100%		
	Vinyl Facing (White)	1%	Vinyl Binders	100%		
WES-251017-033	Drywall Tile (Pale Pink)	94%	Cellulose Fibers	2%	10/30	WP
			Glass Wool Fibers	2%		
			Mica	<1%		
			Gypsum / Binders	96%		
	DW Paper Facing (Tan)	5%	Cellulose Fibers	100%		
	Vinyl Facing (White)	1%	Vinyl Binders	100%		
WES-251017-034	Drywall Tile (Pale Pink)	94%	Cellulose Fibers	2%	10/30	WP
			Glass Wool Fibers	2%		
			Mica	<1%		
			Gypsum / Binders	96%		
	DW Paper Facing (Tan)	5%	Cellulose Fibers	100%		
	Vinyl Facing (White)	1%	Vinyl Binders	100%		

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PLM Detail Report

Supplement to PLM Summary Report

NVLAP Lab Code 102056-0
TDSHS License No. 30-0084

Client : Industrial Hygiene & Safety Technology
Project : Freese & Nichols, Weslaco Readiness Ctr., 1100 Vo Tech
Project # : 21816

Lab Job No. : 17B-12807
Report Date : 10/30/2017

Sample Number	Layer	% Of Sample	Components	% of Layer	Analysis Date	Analyst
WES-251017-035	Caulking (Silver)	100%	Silicone Binders	100%	10/30	WP
WES-251017-036	Caulking (Silver)	100%	Silicone Binders	100%	10/30	WP
WES-251017-037	Caulking (Silver)	100%	Silicone Binders	100%	10/30	WP
WES-251017-038	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-039	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-040	Acoustic Tile (Light Grey)	100%	Cellulose Fibers	50%	10/30	WP
			Mineral Wool Fibers	30%		
			Perlite	20%		
WES-251017-041	Caulking (Grey)	100%	Binders / Fillers	100%	10/30	WP
WES-251017-042	Caulking (Grey)	100%	Binders / Fillers	100%	10/30	WP
WES-251017-043	Caulking (Grey)	100%	Binders / Fillers	100%	10/30	WP
WES-251017-044	Grey Mastic (Grey)	100%	Calcite	60%	10/30	WP
			Glue Binders	40%		
WES-251017-045	Grey Mastic (Grey)	100%	Calcite	60%	10/30	WP
			Glue Binders	40%		
WES-251017-046	Grey Mastic (Grey)	100%	Calcite	60%	10/30	WP
			Glue Binders	40%		

IHST PROJECT #: 21816

PROJECT TITLE: Weslaco Readiness Center

PROJECT ADDRESS: 1100 Va Tech Dr
Weslaco, TX 78599

Analyze nll 17-12807 PLM 46

:DATE 10/25/2017

:INSPECTOR/TDH# Jose Reyes / 60-3316

:CLIENT/CONTACT Freese & Nichols

Turnaround Time ( ) Immediate ( )1 Day (x) 2 day ( ) 3 Day

HOMO AREA #	SAMPLE # WES-25/017-	SAMPLE DESCRIPTION	LOCATION	ESTIMATED QUANTITY (SF/LF/ea.)	TYPE of ACM	F NF I NF II	CONDITION (G/D/SD)	POTENTIAL FOR DISTURBANCE	RESPONSE RATING
1	001	Drywall/Joint Compound/Sand Texture	Room A103	67,081 SF	S	NF II	G	L	
	002		Room A108						
	003		Room A122						
	004		Room A129						
	005		Room B102						
	006		Room B105B						
	007		Room B109B						
2	008	2'X4' SACT	Corridor A146	11,562 SF	FM	F	G	L	
	009		Room A127						
	010		Room A111						
3	011	Clear Carpet Glue	Room A121	5,318 SF	M	NF I	G	L	
	012		Room A141						

Released by:	Date/Time:	Received by:	Date/Time:
	10/27/17 1050	Monica Tobar	10/30/17 1050 Am
Released by:	Date/Time:	Received by:	Date/Time:

Industrial Hygiene & Safety Technology, Inc. • 2235 Keller Way • Carrollton, Texas 75006 • 972-478-7415 • Fax 972-478-7615 TDH License #10-0145

E-mail address: labresults@ihst.com

IHST PROJECT #: 21816

PROJECT TITLE: Weslaco Readiness Center

PROJECT ADDRESS: 1100 Va Tech Dr
Weslaco TX 78599

17B-12807
:DATE

10/25/2017
Jose Reyes / 60-3316 :INSPECTOR/TDH#
Freese & Nichols :CLIENT/CONTACT

Turnaround Time ( ) Immediate ( )1 Day (x) 2 day ( ) 3 Day

HOMO AREA #	SAMPLE # WES-251017-	SAMPLE DESCRIPTION	LOCATION	ESTIMATED QUANTITY (SF/LF/ea.)	TYPE of ACM	F NF I NF II	CONDITION (G/D/SD)	POTENTIAL FOR DISTURBANCE	RESPONSE RATING
3	013	Clear Carpet Glue	Room B105A	5,318SF	M	NFI	G	L	
4	014	4" Gray Cove base/Yellow Mastic	Room A143	6,814LF	M	NFII	G	L	
↓	015	↓	Room B112	↓	↓	↓	↓	↓	
↓	016	↓	Room D110	↓	↓	↓	↓	↓	
5	017	12"X12" Beige FT/Yellow Mastic	Room A136	18,889SF	M	NFII	G	L	
↓	018	↓	Corridor D101	↓	↓	↓	↓	↓	
↓	019	↓	Room C106	↓	↓	↓	↓	↓	
6	020	White Sink Undercoating	Room A125	1SF	M	NFII	G	L	
↓	021	↓	↓	↓	↓	↓	↓	↓	
↓	022	↓	↓	↓	↓	↓	↓	↓	
7	023	2'X4' OLD SACT	Corridor D101	11,984SF	M	F	G	L	
↓	024	↓	Corridor B111	↓	↓	↓	↓	↓	

Released by:	Date/Time:	Received by:	Date/Time:
Released by:	Date/Time:	Received by:	Date/Time:

IHST PROJECT #: 21816

PROJECT TITLE: Weslaco Readiness Center

PROJECT ADDRESS: 1100 Va Tech Dr
Weslaco, TX 78599

17B-12807 :DATE

10/25/17

Jose Reyes / 60-3316 :INSPECTOR/TDH#

Freese & Nichols :CLIENT/CONTACT

Turnaround Time ( ) Immediate ( )1 Day (x) 2 day ( ) 3 Day

HOMO AREA #	SAMPLE # WES-25/017-	SAMPLE DESCRIPTION	LOCATION	ESTIMATED QUANTITY (SF/LF/ea.)	TYPE of ACM	F NF I NF II	CONDITION (G/D/SD)	POTENTIAL FOR DISTURBANCE	RESPONSE RATING
7	025	2'X4' OLD SACT	Room B103	11,984SF	M	F	G	L	
8	026	4" Black Cove base / white Mastic	Room B105 A	134LF	M	NF II	G	L	
↓	027	↓	↓	↓	↓	↓	↓	↓	
↓	028	↓	↓	↓	↓	↓	↓	↓	
9	029	Plaster	Exterior Awnings	868SF	S	NF II	G	L	
↓	030	↓	↓	↓	↓	↓	↓	↓	
↓	031	↓	Room D127	↓	↓	↓	↓	↓	
10	032	2'X4' Smooth SACT	Room C101	1,618SF	M	NF II	G	L	
↓	033	↓	Room C102	↓	↓	↓	↓	↓	
↓	034	↓	Room C103	↓	↓	↓	↓	↓	
11	035	Silver Caulk	Room C102	52LF	M	NF II	G	L	
↓	↓ 036	↓	↓	↓	↓	↓	↓	↓	

Released by:	Date/Time:	Received by:	Date/Time:
Released by:	Date/Time:	Received by:	Date/Time:

176-12807

IHST PROJECT #: 21816

PROJECT TITLE: Weslaco Readiness Center

PROJECT ADDRESS: 1100 Vo Tech Dr
Weslaco, TX 78599

IHST

:DATE 10/25/2017

:INSPECTOR/TDH# Jose Reyes/60-3316

:CLIENT/CONTACT

Turnaround Time ( ) Immediate ( )1 Day (x) 2 day ( ) 3 Day

HOMO AREA #	SAMPLE # WES-251017-	SAMPLE DESCRIPTION	LOCATION	ESTIMATED QUANTITY (SF/LF/ea.)	TYPE of ACM	F NF I NF II	CONDITION (G/D/SD)	POTENTIAL FOR DISTURBANCE	RESPONSE RATING
11	037	Silver Caulk	Room C103	52 LF	M	NF II	G	L	
12	038	2'X4' New SACT	Room D135	880 SF	M	F	G	L	
↓	039	↓	↓	↓	↓	↓	↓	↓	
↓	040	↓	↓	↓	↓	↓	↓	↓	
13	041	Exterior Gray Caulk	Exterior Windows & Doors	802 LF	M	NF II	G	L	
↓	042	↓	↓	↓	↓	↓	↓	↓	
↓	043	↓	↓	↓	↓	↓	↓	↓	
14	044	Gray Duct Mastic	Ducts Above Ceiling Tile	2,306 LF	M	NF II	G	L	
↓	045	↓	↓	↓	↓	↓	↓	↓	
↓	046	↓	↓	↓	↓	↓	↓	↓	

Released by:	Date/Time:	Received by:	Date/Time:
Released by:	Date/Time:	Received by:	Date/Time:

Appendix:

Appendix C: Bulk Summary Report

Table 1. Summary of Bulk Sample Analysis and Assessment

Freese and Nichols, Inc.

Weslaco Readiness Center
100 Vo Tech Drive
Weslaco, TX 78599

Survey Date(s): 10/25/2017 through 10/25/2017

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-001	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-002	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-003	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Texture/Joint Cmpd	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-004	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-005	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-006	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-007	Drywall/Joint Compound/Sand Texture (homogeneous area # 01)	Walls Throughout A & B Rooms	NAD - Drywall Material NAD - Joint Compound NAD - Texture	67081 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-008	2'x4' SACT (homogeneous area # 02)	Ceilings Throughout A Rooms	NAD - Acoustic Tile	11562 s.f.	Misc	F	Good	Low	0
WES-251017-009	2'x4' SACT (homogeneous area # 02)	Ceilings Throughout A Rooms	NAD - Acoustic Tile	11562 s.f.	Misc	F	Good	Low	0
WES-251017-010	2'x4' SACT (homogeneous area # 02)	Ceilings Throughout A Rooms	NAD - Acoustic Tile	11562 s.f.	Misc	F	Good	Low	0
WES-251017-011	Clear Carpet Glue (homogeneous area # 03)	Various Floors ikn A & B Rooms	NAD - Clear Mastic	5318 s.f.	Misc	NF I	Good	Low	0
WES-251017-012	Clear Carpet Glue (homogeneous area # 03)	Various Floors ikn A & B Rooms	NAD - Clear Mastic	5318 s.f.	Misc	NF I	Good	Low	0
WES-251017-013	Clear Carpet Glue (homogeneous area # 03)	Various Floors ikn A & B Rooms	NAD - Clear Mastic	5318 s.f.	Misc	NF I	Good	Low	0
WES-251017-014	4" Gray Cove Base/Yellow Mastic (homogeneous area # 04)	Various Walls Throughout Building	NAD - Cove Base NAD - Yellow Mastic	6814 l.f.	Misc	NF II	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-015	4" Gray Cove Base/Yellow Mastic (homogeneous area # 04)	Various Walls Throughout Building	NAD - Cove Base NAD - Yellow Mastic	6814 l.f.	Misc	NF II	Good	Low	0
WES-251017-016	4" Gray Cove Base/Yellow Mastic (homogeneous area # 04)	Various Walls Throughout Building	NAD - Cove Base NAD - Yellow Mastic	6814 l.f.	Misc	NF II	Good	Low	0
WES-251017-017	12"x12" Beige Floor Tile/Yellow Mastic (homogeneous area # 05)	Various Floors Throughout Building	NAD Floor Tile NAD - Yellow Mastic	18889 s.f.	Misc	NF I	Good	Low	0
WES-251017-018	12"x12" Beige Floor Tile/Yellow Mastic (homogeneous area # 05)	Various Floors Throughout Building	NAD Floor Tile NAD - Yellow Mastic	18889 s.f.	Misc	NF I	Good	Low	0
WES-251017-019	12"x12" Beige Floor Tile/Yellow Mastic (homogeneous area # 05)	Various Floors Throughout Building	NAD Floor Tile NAD - Yellow Mastic	18889 s.f.	Misc	NF I	Good	Low	0
WES-251017-020	White Sink Undercoating (homogeneous area # 06)	Room A125	NAD - Sink Undercoating	1 s.f.	Misc	NF I	Good	Low	0
WES-251017-021	White Sink Undercoating (homogeneous area # 06)	Room A125	NAD - Sink Undercoating	1 s.f.	Misc	NF I	Good	Low	0
WES-251017-022	White Sink Undercoating (homogeneous area # 06)	Room A125	NAD - Sink Undercoating	1 s.f.	Misc	NF I	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-023	2'x4' Old SACT (homogeneous area # 07)	Various Ceilings in B, C, & D Rooms	NAD - Acoustic Tile	11984 s.f.	Misc	F	Good	Low	0
WES-251017-024	2'x4' Old SACT (homogeneous area # 07)	Various Ceilings in B, C, & D Rooms	NAD - Acoustic Tile	11984 s.f.	Misc	F	Good	Low	0
WES-251017-025	2'x4' Old SACT (homogeneous area # 07)	Various Ceilings in B, C, & D Rooms	NAD - Acoustic Tile	11984 s.f.	Misc	F	Good	Low	0
WES-251017-026	4" Black Cove Base/White Mastic (homogeneous area # 08)	Room B105	NAD - Cove Base NAD - Cream Mastic	134 l.f.	Misc	NF II	Good	Low	0
WES-251017-027	4" Black Cove Base/White Mastic (homogeneous area # 08)	Room B105	NAD - Cove Base NAD - Cream Mastic	134 l.f.	Misc	NF II	Good	Low	0
WES-251017-028	4" Black Cove Base/White Mastic (homogeneous area # 08)	Room B105	NAD - Cove Base NAD - Cream Mastic	134 l.f.	Misc	NF II	Good	Low	0
WES-251017-029	Plaster (homogeneous area # 09)	Exterior Awnings & Ceiling in Room D127	NAD - Plaster	868 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-030	Plaster (homogeneous area # 09)	Exterior Awnings & Ceiling in Room D127	NAD - Plaster	868 s.f.	Surfacing	NF II	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-031	Plaster (homogeneous area # 09)	Exterior Awnings & Ceiling in Room D127	NAD - Plaster	868 s.f.	Surfacing	NF II	Good	Low	0
WES-251017-032	2"x4" Smooth SACT (homogeneous area # 10)	Various Ceilings in C & D Rooms	NAD - Drywall Tile NAD - Vinyl Facing	1618 s.f.	Misc	NF II	Good	Low	0
WES-251017-033	2"x4" Smooth SACT (homogeneous area # 10)	Various Ceilings in C & D Rooms	NAD - Drywall Tile NAD - Vinyl Facing	1618 s.f.	Misc	NF II	Good	Low	0
WES-251017-034	2"x4" Smooth SACT (homogeneous area # 10)	Various Ceilings in C & D Rooms	NAD - Drywall Tile NAD - Vinyl Facing	1618 s.f.	Misc	NF II	Good	Low	0
WES-251017-035	Silver Caulk (homogeneous area # 11)	Rooms C101 & C102	NAD - Caulking	52 l.f.	Misc	NF II	Good	Low	0
WES-251017-036	Silver Caulk (homogeneous area # 11)	Rooms C101 & C102	NAD - Caulking	52 l.f.	Misc	NF II	Good	Low	0
WES-251017-037	Silver Caulk (homogeneous area # 11)	Rooms C101 & C102	NAD - Caulking	52 l.f.	Misc	NF II	Good	Low	0
WES-251017-038	2'x4' New SACT (homogeneous area # 12)	Room D135	NAD - Acoustic Tile	880 s.f.	Misc	F	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating
WES-251017-039	2'x4' New SACT (homogeneous area # 12)	Room D135	NAD - Acoustic Tile	880 s.f.	Misc	F	Good	Low	0
WES-251017-040	2'x4' New SACT (homogeneous area # 12)	Room D135	NAD - Acoustic Tile	880 s.f.	Misc	F	Good	Low	0
WES-251017-041	Exterior Gray Caulk (homogeneous area # 13)	Around Exterior Windows & Doors	NAD - Caulking	802 l.f.	Misc	NF II	Good	Low	0
WES-251017-042	Exterior Gray Caulk (homogeneous area # 13)	Around Exterior Windows & Doors	NAD - Caulking	802 l.f.	Misc	NF II	Good	Low	0
WES-251017-043	Exterior Gray Caulk (homogeneous area # 13)	Around Exterior Windows & Doors	NAD - Caulking	802 l.f.	Misc	NF II	Good	Low	0
WES-251017-044	Gray Duct Mastic (homogeneous area # 14)	Duct Work Above Ceiling Tile Throughout the Building	NAD - Gray Mastic	2306 l.f.	Misc	NF II	Good	Low	0
WES-251017-045	Gray Duct Mastic (homogeneous area # 14)	Duct Work Above Ceiling Tile Throughout the Building	NAD - Gray Mastic	2306 l.f.	Misc	NF II	Good	Low	0
WES-251017-046	Gray Duct Mastic (homogeneous area # 14)	Duct Work Above Ceiling Tile Throughout the Building	NAD - Gray Mastic	2306 l.f.	Misc	NF II	Good	Low	0

Sample ID#	Sample Description	Material Location	Percent & Type of Asbestos Detected (a)	Estimated Quantity	Type of ACM (b)	Friability (c)	Physical Condition	Potential for Disturbance	Response Rating

Table Key:

(a) CH = Chrysotile; AM = Amosite; CR = Crocidolite; AN = Anthophyllite; AC = Actinolite; NAD = NAD = No Asbestos Detected
(b) Misc = Miscellaneous; TSI = Thermal Systems Insulation
(c) F = Friable; NF I = Non-Friable Category I; NF II = Non-Friable Category II

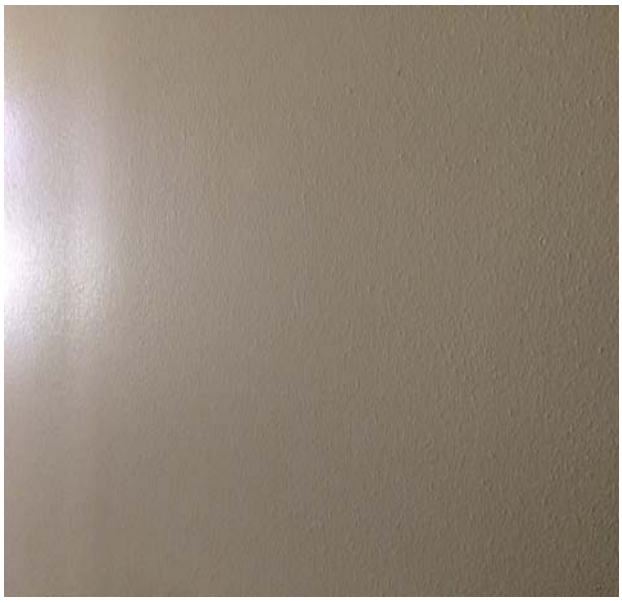
Appendix:

Appendix D: Photographs

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Weslaco Readiness Center - Weslaco

Weslaco Readiness Center - Weslaco



Samples 001-007

Samples 004-046

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Samples 008-010

Samples 011-013

Samples 014-016

Samples 017-019

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Samples 020-022

Samples 023-025

Samples 026-028

Samples 029-031

Weslaco Readiness Center
1100 Vo Tech
Weslaco, Texas

Samples 032-034

Samples 035-037

Samples 038-040

Samples 041-043

Appendix:

Appendix E: Lead Report

INDUSTRIAL HYGIENE AND
SAFETY TECHNOLOGY, INC.

November 6, 2017

Mr. Parris Jones
Freese and Nichols, Inc.
4055 International Plaza, Suite 200
Fort Worth, Texas 76109

RE: Lead Base Paint Building Materials Survey
Location: Weslaco Readiness Center, 1100 Vo Tech Drive, Weslaco, TX 78599
Sample Date: October 25, 2017
IHST Job #: 21816

Dear Mr. Jones,

Mr. Jose Reyes representing Industrial Hygiene and Safety Technology, Inc. performed a visual inspection and collected bulk samples of suspect lead based paint at address listed above.

Six (6) suspect lead based painted materials were identified during the visual inspection of the structure. Table 1 list the materials sampled and the results of the lead based paint analysis. EMSL Analytical Inc. was contracted to perform the laboratory analysis. A copy of the original laboratory report is included as Appendix A to this report. The samples were analyzed utilizing SW 846 3050B/7000B method for lead analysis.

Table 1, Results of Lead Based Paint Testing

Sample ID	Material Tested	Location	Results
WES-251017-001L	Interior White Paint	Walls Throughout	<0.0080 % wt
WES-251017-002L	Interior Light Gray Paint	Rooms B106 & D135	<0.0090 % wt
WES-251017-003L	Interior Brown Paint	Room A113	<0.030 % wt
WES-251017-004L	Interior Beige Paint	Various Walls & Ceilings Throughout	<0.026 % wt
WES-251017-005L	Exterior Yellow Paint	Bollards & Curbs	<0.0080 % wt
WES-251017-006L	Exterior Red Paint	Curbs	<0.0080 % wt

In reviewing the results of the lead based paint sampling, all of the samples are less than the HUD/EPA standard of paint equal to or greater than 0.5% by weight. Lead base paint is not a hazard in the facility.

Should you or your staff have any questions regarding the content of this report, please do not hesitate to contact our office at your convenience.

Sincerely,

Tracy Bramlett, CIH, CSP
President

Appendix A – Laboratory Report

Appendix A – Laboratory Report

EMSL Analytical, Inc.
200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (856) 303-2500 / (856) 786-5974
http://www.EMSL.com cinnaminsonleadlab@emsl.com

EMSL Order:	201711113
CustomerID:	INDU60
CustomerPO:	
ProjectID:	

Attn: **Michael Gange**
Industrial Hygiene & Safety Technology
2235 Keller Way
Carrollton, TX 75006

Phone:	(972) 478-7415
Fax:	(972) 478-7615
Received:	10/30/17 9:40 AM
Collected:	10/25/2017

Project: **Weslaco Readiness Center / 21816**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

Client Sample Description	*Lab ID*	*Collected*	*Analyzed*	*Lead Concentration*
WES-251017-001L	*201711113-0001*	10/25/2017	11/3/2017	<0.0080 % wt
	Site: Interior White Paint			
WES-251017-002L	*201711113-0002*	10/25/2017	11/3/2017	<0.0090 % wt
	Site: Interior Light Grey Paint			
WES-251017-003L	*201711113-0003*	10/25/2017	11/3/2017	<0.030 % wt
	Site: Interior Brown Paint			
WES-251017-004L	*201711113-0004*	10/25/2017	11/3/2017	<0.026 % wt
	Site: Interior Beige Paint			
WES-251017-005L	*201711113-0005*	10/25/2017	11/3/2017	<0.0080 % wt
	Site: Exterior Yellow Paint			
WES-251017-006L	*201711113-0006*	10/25/2017	11/3/2017	<0.0080 % wt
	Site: Exterior Red Paint			

Phillip Worby, Lead Laboratory Manager
or other approved signatory

*Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008 % wt based on the minimum sample weight per our SOP. Unless noted, results in this report are not blank corrected. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities. Samples received in good condition unless otherwise noted. "<" (less than) result signifies that the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. The QC data associated with the sample results included in this report meet the recovery and precision requirements unless specifically indicated otherwise. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA-LAP, LLC ELLAP 100194, A2LA 2845.01

Initial report from 11/06/2017 10:23:58

OrderID: 201711113

LEAD

EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Lead (Pb) Chain of Custody
EMSL Order ID *(Lab Use Only)*: 201711113

EMSL Analytical, Inc.
200 Route 130 North
Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
FAX: (856) 786-5974

Company : IHST, Inc.	**EMSL-Bill to:** Same Different If Bill to is Different note instructions in Comments** *Third Party Billing requires written authorization from third party*
Street: 2235 Keller Way	
City: Carrollton **State/Province:** TX	**Zip/Postal Code:** 75006 **Country:** USA
Report To (Name): Michael Gange	**Telephone #:** 972-478-7415
Email Address: labresults@ihst.com	**Fax #:** 972-478-7615 **Purchase Order:**
Project Name/Number: Weslaco Readiness Center/21816	**Please Provide Results:** Fax (Email)
U.S. State Samples Taken: TX	**CT Samples:** Commercial/Taxable Residential/Tax Exempt

Turnaround Time (TAT) Options* - Please Check

3 Hour	6 Hour	24 Hour	48 Hour	72 Hour	96 Hour	(1 Week)	2 Week

*Analysis completed in accordance with EMSL's Terms and Conditions located in the Price Guide

Matrix	Method	Instrument	Reporting Limit	Check
Chips % by wt.	SW846-7000B	Flame Atomic Absorption	0.01%	

Name of Sampler: Jose Reyes **Signature of Sampler:** [signature]

Sample ID	Sample Description	Date Sampled
WES-251017-		10-25-17
001L	Interior White Paint	
002L	Interior Light Gray Paint	
003L	Interior Brown Paint	
004L	Interior Beige Paint	
005L	Exterior Yellow Paint	
006L	Exterior Red Paint	

Client Sample #'s **Total # of Samples:** 6

Relinquished (Client):	[signature]	**Date:**	10/27/17	**Time:**	
Received (Lab):	[signature]	**Date:**	10/30/17	**Time:**	940 AM EST

Comments:

STAR Weslaco RC – Qualified Contractor's Questions

Questions to A/E:

Civil

- CLEARING OF DRAINAGE SWALE: A note on Sheet C-1 states: "Existing drainage swale to be cleaned of silt & debris". During the Pre-Bid Meeting it was noted the swale actually needs to be re-shaped to allow for positive drainage toward the existing culvert pipe. Will this area need to be seeded after the swale has been re-shaped and the surface grass is hauled away?
    - Response: Yes, refer to sheet C-3

- Sheet C2 Bid option 6, what are the parking improvements, please define type of improvements
    - Response: Refer to sheet C-2

- Sheet C2 note 6, are all curbs repainted and will all parking spaces be restriped?
    - Response: Refer to sheet C-2

- Please provide proposed grades for existing swale, need existing elevations for swale.
    - Response: Refer to sheet C-3

- Sheet C3, missing grades on 6-in drain line, how is storm water to flow into swale (missing inlets?) need more information on how to move storm water out of area also need elevations for this work such as flow line at outfall of 6-inch (what type of headwall for 6-inch line)
    - Response: Refer to sheets C-2 & C-3

Architecture

- TERMITE PRE-TREATMENT: Is termite pre-treatment required? If so, would it only be required at the new slab area, or, would it also be required beneath and around the portable restroom building and shower building?
    - Response: Termite pre-treatment is not required.

- MODULAR BUILDINGS: A) Section Q on 13 34 23-6 states to furnish stairs & landings at the Portable Restroom and Shower Buildings. Will temporary ramps meeting ADA requirements also be required? B) Will the Fire Alarm System need to be tied to the portable buildings? C) Will the Intrusion Detection System need to be tied to the Portable Buildings?
    - Response: A) Refer to updated Specification Section 13 34 23 "Modular Restroom and Shower Building" B) No C) No

- The lockers & benches in the portable shower make it a custom-built unit, very expensive. No vendor has had something like that to rent. Can the requirements be relaxed? Can the requirements be broken up into multiple trailers?

  - Response: Refer to updated Specification Section 13 34 23 "Modular Restroom and Shower Building"

- PORTABLE BUILDINGS: During the Pre-Bid Meeting, someone in the audience said they tried pricing the portable restroom building and portable shower building with several rental companies and none of them were able to provide a quotation because of the strict specifications. Do you know of a source where these units can be rented? Or, can the specifications be modified where standard rental units would be acceptable as long as they meet the basic criteria? If we also are unable to find a rental company capable of meeting the specifications, we'll need to custom make the 2 units. Please advise.
  - Response: Refer to updated Specification Section 13 34 23 "Modular Restroom and Shower Building".

- FENCING: Notes 6, 7 & 13 on Sheet A-3 call for new fencing and new gates to meet AFTP requirements. Is the existing fence to be removed and given to the Owner?
  - Response: Revised notes 6,7 & 13 on Sheet A-3

- Bid Option 9 is described as "Site security fencing to meet ATFP standoff regulations". After reviewing the fencing specifications, the following was noticed: Fencing spec does not make any reference to ATFP nor does it provide the standoff distance. Are we to assume the specified products meet the ATFP standoff regulations? Fencing specification appears to be for the San Marcos Readiness Center. Please clarify if this is a typo or if a new fencing spec will be issued. The steel post schedule on sheet A-5 does not appear to match the specified products in the spec. being the fabric width is 72" (6') per the spec. The sliding gate requirements per paragraph 2.06 of the spec does not match the drawings. For example, the drawings call for the total sliding gate height to be 8', however the spec calls for the fabric height to be 6', the gate opening specified is 24', and the drawings call for 30'.
  - Response: The new fencing does meet ATFP standard refer to Specification Section 32 31 13.53 ; in some instances it does not meet standoff distance
    Footer updated in specification. Revised Sheet A-5 Steel Post Schedule. Revised Detail 2/A-4

- The electrical site plan E-1 does not make reference of the fence grounding requirements. After reviewing the fencing spec, paragraph 2.1 calls out the material types and sizes to be used. This paragraph does not match the detail provided on sheet A-5, for example: the ground rod on the drawings is ¾" dia x 10' long in lieu of 5/8" x 8' long, there are also differences in wire sizes and other components.
  - Response: Specification Section 32 32 13.53 revised

- The fencing specifications call for bonding across openings, with and without gates in paragraph 3.06 which would require burying a wire 18" below finish grade. Since all openings for swing

gates and sliding gates appear to be in paved areas, would the engineer consider perhaps allowing an additional ground rod at each post in lieu of the buried #2 wire across the opening?
    - Response: Specification Section 32 32 13.53 revised

- WIRE MESH PARTITIONS: A) Is there a drawing showing dimensions of the wire mesh partitions in Room D121 on Sheet A-20? B) Do the wire mesh cubicles have wire mesh ceilings or do they go to the deck above?
    - Response: A) Added dimensions for layout B) Go to Deck. Need to frame each and every penetration going through WMP.

- LOCKERS: Are the lockers in Room D125 completely individual lockers or are they sharing common side panels?
    - Response: Individual lockers - BOD for the Standard locker. Yellow for both standard and TA-50 needs to be added to spec possibly custom color.

- PORTABLE BUILDING CUSTODIAL SERVICE: A) Will the owner be responsible for the daily cleaning of the portable restroom building and the portable shower building? B) Will the owner be responsible for consumables such as toilet paper, soap, paper towels, shower curtains etc.
    - Response: Yes, Owner responsible for daily cleaning and consumable items, soap etc.

- Keynote 5 on sheet A-6 states the existing metal lockers, benches and wire caging is to be demolished. Pe the site visit, it is our understanding the owner is seeking to salvage these items and will require the contractor to turn these over, and not necessarily demolish the items. Please confirm if this is correct, and if so, please advise us on the following: Will these items be required to be palletized of simply staged on site for the owner to pick up? Will the contractor be required to transport and deliver these items off site? If so, how far from the facility, and will the contractor be required to unload and stage these materials?
    - Response: Revised Sheet A-6 and A-10

- The plans call for replacing the inside and outside window sealants. Please clarify if the intent is the remove the interior drywall jamb and head in order to seal the window system or if we are only to replace the caulk on the inside.
    - Response: Only replace the caulk on the inside - Refer to revised sheet A-32, note #10

- Plans reference fire coating (intumescent coating), room finish schedule shows location of fire coating, but on partition types (G & H) shows additional areas. Provide clarification on areas for fire coating.
    - Response: Refer Sheet A-26 - Room Finish Schedule, Note #3 for rooms that will receive sprayed insulation and intumescent coating.

Structural

STAR Weslaco RC – Qualified Contractor's Questions

- Section 01 22 00 Unit Prices states the unit of measurement for the repair of concrete cracking and concrete spalling is cubic yard, however both the schedule of values and section 01 23 10 Bid Options and Allowances Paragraph 1.04 states Cubic Feet. Please confirm it is cubic feet.
    - Response: Spec section 01 22 00 has been modified to cubic feet. 01 22 00-2 - Unit of measure is cubic foot for spalled concrete.

Mechanical

- AIR FILTERING SYSTEM: Demolition will be producing dust particles. Of special concern is silica particles that are known to affect the lungs. Silica particles are released during demolition of concrete. Since the facility will be occupied by the Owner, will the contractor be required to use HEPA filters and have negative air flow to the outdoors?
    - Response: Technical Specification 01 31 00 Section 1.05C compels the contractor to "Comply with latest provisions of the Occupational Health and Safety Administration and other regulatory agencies in performing work." OSHA dictates allowable levels of respirable silica dust

- OPTION 5 (ALTERNATE 5): Option 5 is for a restroom and conference room renovation. A list of trades are listed however HVAC is not. A) Will HVAC need to relocate anything? B) Will the Testing & Balancing company need to rebalance the diffusers in this room?
    - Response: HVAC should be included. The Exhaust fan will be rebalanced and a return grill relocated as indicated in the addendum.

Plumbing

- FIRE SPRINKLER SYSTEM: There's no specification section for Fire Sprinkler Work. Is it anticipated at this point that there will be no work required to be performed on the existing system?
    - Response: There are no existing fire sprinklers and none are required.

Electrical

- EMERGENCY GENERATOR: Section 1.06.D.1 on 01 11 00-2 states the Owner will provide the emergency generator. Will the Owner also be arranging to have the generator delivered, unloaded and set in place?
    - Response: The scope of work was only to provide a connection for a portable generator. Temp Generator is not part of GC scope. Owner to furnish and install.

- The electrical site plan E-1 does not make reference of the fence grounding requirements.
    - Response: Grounding is not required.

- Mechanical notes call for roof receptacles within 25' of all equipment, however we could not find these on the electrical drawings. Please advise the locations, circuits and panels.

- Response: Locations of the receptacles can be found on sheets E-20 (note by symbol 14) and E-21 (note by symbol 2) of the package that was signed/sealed on 4/20/18.

Technology

- TELECOMM & IT SYSTEM: Section 1.06.A.1 on 01 11 00-2 states Telecomm & IT System components are by the Owner. However, on the Bid Cost Breakdown Sheet they are listed as a Base Bid Item and as Bid Option (Alternate) 3. Please clarify.
  - Response: IT Systems equipment will be by owner.

- INTRUSION DETECTION SYSTEM: Section 1.06.B.1 on 01 11 00-2 states the Owner will install the Intrusion Detection System only in the Weapons Vaults and the contractor is to employ the IDS contractor for the remainder of the project. Is this correct?
  - Response: There is no IDS work in this project, specification will be updated.

- IT SYSTEM: Option #3 is for furnishing a "Full" IT System including Upgrades. Paragraph 1.06.A on 01 11 00-2 states the Telecomm and IT Systems will be contracted separately by the Owner. Is there a possibility of a double-up in scope of work?
  - Response: Base Bid refers to only room C111 and a new cable to A134 and is not duplicated in Option 3.

<u>Questions to Owner:</u>

- ATTACHMENT A- COST BREAKDOWN FORM: A) Can you re-issue Attachment A in an Excel format? We receive bids from subcontractors nearly right up to bid time and they sometimes are the low bids. Having Attachment A in Excel would help expedite being able to review the last minute bids and enter the dollar amounts on the form. Also, having the figures typed in lieu of hand written would make for a more legible form. B) Several columns on the form are blacked out. Are we to only fill in the column labeled "Total"?
  A) Response: No, the form will not be re-issued in Excel. B) Yes, if blacked out then only total is to be filled

- 3rd PARTY INSPECTORS: The 2nd last line above Project Total on the Cost Breakdown Sheet is for retaining a 3rd Party Inspector. Section 1.01.A "Special Inspector" and 1.01.C "Testing Agent" on 01 40 00-1 are both referred to as 3rd Party Inspectors. Is the cost for both of them to be entered on the line reading "3rd Party Inspector Cost Total"?
  - Response: The 3rd party inspector is not Section 1.01.A "Special Inspector" and 1.01.C "Testing Agent" on 01 40 00-1, these costs are separate from the 3rd party inspector. The cost of the 3rd party inspector is referenced in the 3rd party Guidelines and the Uniform General Conditions.

- HUB DOCUMENTS, SUB LIST & CONSTRUCTION SCHEDULE: Can we submit the HUB Documents, List of Subcontractors and Construction Schedule via e-mail within 24 hours after bid time? This

would allow us to focus more on properly completing the Bid Cost Breakdown Worksheet with last minute bids we receive.

- Response: No. All documents required must be submitted by the due date and time listed in the solicitation document.

- BUILDING OCCUPANCY DURING CONSTRUCTION: Paragraph 1.05.B on 01 11 00-2 states the facility (meaning entire building) will be unoccupied during construction. During the Pre-Bid Meeting today (7/11/18) it was noted activities will be taking place inside the facility throughout construction. Please clarify as to whether or not the facility will be occupied.
  - Response: The facility will be occupied during the duration of construction.

- COST OF TEMPORARY UTILITIES FOR BUILDING: Paragraph 1.01.B states the contractor is to pay for all utilities during construction. The contractor will be working in various areas throughout the facility while at the same time the Owner will be actively occupying various areas adjacent to construction areas throughout the facility. Please advise if it would be more beneficial for the contractor to use the Owner's utilities during construction.
  - Response: Contractor will be using owner's utilities during construction.

- COST FOR TEMPORARY UTILITIES FOR PORTABLES: If cost of Temporary Utilities is by the Owner, will the Owner also pay for Temporary Utilities for the Portable Restroom Building and the Portable Shower Building?
  - Response: Utility costs for portable (showers/restrooms) will be covered by the owner.

- SUBMISSION OF RFIs: Paragraph 3.A on Page 2 of the Invitation to Bid states all RFIs are to go to Jennifer Escamilla and Paragraph 3.D states contact with personnel other than contact listed above will be grounds for bid response disqualification. During the Pre-Bid Meeting today, it was noted all RFIs are to go to the attention of Van Cashen with the firm Freese and Nichols. Please clarify.
  - Response: Clarification: all questions are to be submitted to OED Contracting POC during bidding. All instances of Jennifer Escamilla should be replaced with Lanette Thaler.

- WORKING HOURS: Due to the noise level of demolishing concrete, will the contractor be restricted from demolishing concrete during any certain hours of the day?
  - Response: No.

- WASTE MANAGEMENT: During the Pre-Bid Meeting it was noted a Waste Management Plan might not be required. Paragraph 1.06 on page 01 74 19-2 calls for a Waste Management Plan, and personnel to oversee the plan. Please clarify if this specification section pertains to this project.
  - Response: Yes, a Waste Management Plan is required for this project

STAR Weslaco RC – Qualified Contractor's Questions

- CONSTRUCTION TIME: During the Pre-Bid Meeting, someone in the audience said the contract time is 330 calendar days. Paragraph 15.C on Page 8 of 1386 has a blank line to be filled in with the number of days we think it will take. Is the later correct?
    - Response: In Section 15.C of the IFB, the Bidder is to write in the number of days they estimate it will take for the project to be substantially completed unless delayed by inclement weather.

- BUILDING PERMIT: During the Pre-Bid Meeting, someone in the audience said this project will not require a building permit because it's a Federal Project. Is this correct?
    - Response: Yes, it does not require a building permit because it is a State facility.

- SAW CUTTING vs. DEMO HAMMER DURING DEMOLITION: The facility will be actively occupied by the Owner throughout construction while a large area of concrete foundation will be removed. In an effort to lessen the noise level, will there be any requirement to sawcut the concrete slab into 18" x 18" slabs that can be removed by hand and only use the demo hammer at the grade beams?
    - Response: Means and methods are the responsibility of the contractor.

- BID EVALUATION: Paragraph 1 on Page 2 of 1386 refers to Bid Evaluations. What will be the grading criteria be to determine the best value to the State of Texas and TMD?
    - Response: Section 12 (Award) of the IFB states: "Award will be based on the most qualified, responsive, responsible Bidder and lowest price based on base bid and all alternates. TMD will consider best value for the state as directed by Texas Government Code 2155.074 when awarding a Contract."

- PRE-BID ATTENDANCE SHEETS: We would appreciate if you would be able to issue copies of the attendance sheets from the two days of Pre-Bid Meetings.
    - Response: The sign in sheets are provided in the addendum.
- JOBSITE SECURITY: Are we to furnish security personnel for the duration of the project or will the security the National Guard has in place suffice?
    - Response: The General Contractor (GC) is responsible for the security of materials, work-in-progress, and finished product.

- PORTABLE BUILDING SEWER CONNECTION: A) Paragraph 1.05.A on 13 34 23-3 states the Owner will extend utilities to the portable buildings. Does this include sanitary sewer or just water and electric.
    - Response: The contractor will be responsible for connecting all utilities to portable buildings

- Can we please receive a digital copy of the schedule of values sent to us via email?
    - Response: Answer: It is issued in email format, but not in Excel.

STAR Weslaco RC – Qualified Contractor's Questions

- If work is taking place within an occupied space, who will be responsible for removing the user's furniture and equipment?
    - Response: It will be the Unit's responsibility to move furniture/equipment.

- How many original and copies do we need to turn in of our bid proposal?
    - Response: For the purposes of this IFB, please submit one original and one copy of the bid response.

- How is the proposal package need to be turned in? In person, mail, email?
    - Response: Per the IFB Cover Page: RETURN SEALED BIDS TO:

      Texas Military Department
      P. O. Box 5218
      Austin, TX 78763-5218
      OR HAND DELIVER TO:
      2200 W. 35th St..
      Building 11, 2nd Floor (8:00AM - 5:00PM)
      OR OVERNIGHT/EXPRESS MAIL TO:
      2200W. 35th St.
      Camp Mabry Mail Room (7:30AM - 4:00PM)
      ATTN: Lanette Thaler
      Austin, TX 78703

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting **Date:** 11 JUL 2018	**Weslaco TXARNG Readiness Center** **at SM Readiness Center**		**Weslaco, TX**	TIME(S) 2:00 pm	
Name & E-mail Address	**Role**	**Mailing Address**	**Physical Address** **if different from mailing**	**Phone** **Fax** **Mobile**	
Rj Vargas Rj Vargas rogelio.vargas6.mil@cfmo.mil.texas.gov rogelio.vargas6.mil@mail.mil	Project Manager (PM)	Camp Mabry; Bldg. #37 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #37 2200 W. 35th St. Austin, TX 78703	(512) 782-6071	Office Mobile
	Business Manager	Camp Mabry; Bldg. #37 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #37 2200 W. 35th St. Austin, TX 78703	(512) 782-5715	Office Mobile
		Camp Mabry; Bldg. #11 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #11 2200 W. 35th St. Austin, TX 78703		Office Mobile
	Unit Point of Contact (POC)				Office Mobile
Brian Hoot bryan.r.hoot.nfg@mail.mil	Maintenance Manager	Camp Mabry; Bldg. #35	Camp Mabry; Bldg. #35	(512) 496-8049 (512) 496-8049	Office Mobile
Michael Torres mtorres@Intertechflooring.com	Estimator	1301 Business Park Dr Mission TX 78547		956-483-0356	Office Mobile
Frank Mera frankm@taberaholdings.com	Tabera Holdings	4121 N. 10th St McAllen TX 78504		956 739 8201	Office Mobile
Roy Sustaita royS@taberaholdings.com	TH	" "		956 569 2384	Office Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting Date: 11 Jul 2018	Weslaco TXARNG Readiness Center at SM Readiness Center		Weslaco, TX	2:00 pm	
Please Print (or initial next to name to indicate attendance) **Name & E-mail Address**	**Role**	**Mailing Address**	**Physical Address if different from mailing**	**Phone Fax Mobile**	
Michael Montalvo che@holchemont.com	PM	900 N. Main St. McAllen TX 78501	W: 956.686-2901	C: 956.212.4915 956.686.2925	Phone Fax
Ramiro Pecina r.pecina@superiorglass.com	Estimator	600 Ash Ave McAllen Texas 78501		682-6005 793-9771	Mobile
Jarrod Neck econgroup3025@gmail.com	Intern	3025 S. Sugar Edinburg TX 78539		 956-289-8005	Phone Fax Mobile
JAIME ENRIQUEZ, PE jenriquez@econgroup.us	PROJECT ENGINEER	3025 S. SUGAR RD EDINBURG TX 78539		956.259.8005 259.8009	Phone Fax Mobile
Eddie Johnson ejohnson@agd-us.com		4412 N 23rd Suite B McAllen TX 78504		232-2863 331-9550	Phone Fax Mobile
Claudio Marroquin claudio@vintageflooring.net	Estimator	2020 W Nolana McAllen, TX		956 631 8528	Phone Fax Mobile
Cesar Ortez Vintage Tile + Stone	Proj. Mng.	2020 W Nolana McAllen, TX			Phone Fax Mobile
Van Cashen vance freese.com	A/E	4055 International Plaza, ste 200 Ft Worth, TX 76109		817-734-7816	Phone Fax Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting	**Weslaco TXARNG Readiness Center**		
Date: 11 Jul 2018	**at SM Readiness Center**	**Weslaco, TX**	2:00 pm

Please Print (or initial next to name to indicate attendance) **Name & E-mail Address**	**Role**	**Mailing Address**	**Physical Address** **if different from mailing**	**Phone** **Fax** **Mobile**	
Henry Herrera henry@smrconstructioninc.com SMR Construction	Project Manager	411 Industrial dr. suite109 Richardson, texas 75081		972-231-7272	Phone Fax Mobile
Samar Bashir samar@smrconstructioninc.com SMR Construction	President	"		972-231-7272	Phone Fax Mobile
ARTURO TREVIZO atrevizo@falkenbergconstruction.com FALKENBERG	PROJECT MANAGER	4850 SAMUELL BLVD. MESQUITE, TX. 75149	SAME	214-324-4779 214-324-9667 817-602-0264	Phone Fax Mobile
Jaime Tijerina jtijerina@ccc-inc.com	Proj mgr	3QR. mccoll McAllen TX 78501		956-905-5180 956-254-3009	Phone Fax Mobile
Romeo Rojas TELE PRO Communications romeo@Teleprocom...		12005 N Bryan Rd Mission TX 78573		956-618-2360	Phone Fax Mobile
Sara A. Orta trigensara@gmail.com Tri-Gen Construction	P. M	2900 N Texas Blvd Suite 201 Weslaco TX 78599		956 447 1048 956 447 2003 956 292 1765	Phone Fax Mobile
Jorge Gonzalez trigen24@gmail.com		2900 N Texas Blvd Suite 201 Weslaco TX 78599		956447 1048 956 533 1919	Phone Fax Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting Date: 11 JUL 2018	Weslaco TXARNG Readiness Center at SM Readiness Center		Weslaco, TX	TIME(S) 2:00 pm	
Name & E-mail Address	**Role**	**Mailing Address**	**Physical Address if different from mailing**	**Phone Fax Mobile**	
Rj Vargas rogelio.vargas6.mil@cfmo.mil.texas.gov rogelio.vargas6.mil@mail.mil	Project Manager (PM)	Camp Mabry; Bldg. #37 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #37 2200 W. 35th St. Austin, TX 78703	(512) 782-6071	Office Mobile
	Business Manager	Camp Mabry; Bldg. #37 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #37 2200 W. 35th St. Austin, TX 78703	(512) 782-5715	Office Mobile
		Camp Mabry; Bldg. #11 P.O. Box 5218 Austin, TX 78763-5218	Camp Mabry; Bldg. #11 2200 W. 35th St. Austin, TX 78703		Office Mobile
	Unit Point of Contact (POC)				Office Mobile
Brian Hoot BHoot bryan.r.hoot.nfg@mail.mil	Maintenance Manager	Camp Mabry; Bldg. #35	Camp Mabry; Bldg. #35	(512) 496-8049 (512) 496-8049	Office Mobile
Bill Scoggins Scoggins Const. Co, Inc bill@scogginsconstruction.com	Owner/President	17862 Graham Rd Harlingen, TX 78550		956-421-3550 956-421-3154 956-778-0421	Office Mobile
Edward Delagarza edelagarza@gd-us.com Gonzalez.Delagarza	COO/GC	4112 N. McAllen, TX 78504		956-232-2863 210-296-4872	Office Mobile
Rolando Rodriguez Facilities Mng. TXARNG					Office Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting	**Weslaco TXARNG Readiness Center**		
Date: 11 JUL 2018	**at SM Readiness Center**	**Weslaco, TX**	2:00 PM

Please Print (or initial next to name to indicate attendance) **Name & E-mail Address**	**Role**	**Mailing Address**	**Physical Address** **if different from mailing**	**Phone** **Fax** **Mobile**	
Charlie Flores cflores@alamoconcrete.com	Sales Manager	2020 Industrial Blvd Harlingen, TX 78550		956-739-4732	Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Conference — **WESLACO TXARNG Readiness Center**

2:00PM 11 July, 2018

Name & E-mail Address	Role	Mailing Address	Physical Address if different from mailing	Phone / Fax / Mobile	
Al Kupkowski	Estimator	SpawGlass		956-412-9880	Office
Al Kupkowski		4909 E. Grimes #116			
al.kupkowski@spawglass.com		Harlingen, Tx. 78550		956-238-0733	Mobile
Dan Cameron	Project Manager	Spawglass		956 412 9880	Office
Dan.cameron@spawglass.com		4909 E GRIMES #116			
		Harlingen TX 78550		956 245 4573	Mobile
					Office
					Mobile
					Office
					Mobile
					Office
					Mobile
					Office
					Mobile
					Office
					Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting	**Weslaco TXARNG Readiness Center**		
Date: 12 JUL 2018	**at SM Readiness Center**	**Weslaco, TX**	10:00 AM

Please Print (or initial next to name to indicate attendance) **Name & E-mail Address**	**Role**	**Mailing Address**	**Physical Address** **if different from mailing**	**Phone** **Fax** **Mobile**	
R. VARGAS rogelio.vargas6.mil@cfmo.mil.texas.gov	PM- TMD	2200 W. 35th St Austin TX		512 782 5149	Phone Fax Mobile
Van Cashen vmc@freese.com	A/E PM	4055 International plaza Suite 200 Ft. Worth, TX 76109		817-734-7816	Phone Fax Mobile
BRYAN HOOT BRYAN.R.HOOT.NFG@Mail.mil	CFMO Maintenance			512.496.8049	Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile
					Phone Fax Mobile

Please Print (or initial next to name to indicate attendance)

Pre-Bid Meeting	**Weslaco TXARNG Readiness Center**		
Date: 12 - JUL - 2018	**at SM Readiness Center**	**Weslaco, TX**	10:00 AM

Please Print (or initial next to name to indicate attendance) **Name & E-mail Address**	**Role**	**Mailing Address**	**Physical Address** **if different from mailing**	**Phone** **Fax** **Mobile**	
Michael Dodson Mikedodson@marshallcompanyinc.com	General Contr. Bidder	P.O. Box 4995 Corpus Christi, Texas 78469	1001 Second St. Corpus Christi, Texas 78403	(361)883-4369 (361)883-6265 (361)438-1975	Phone Fax Mobile
Jaime Tijerina jtijerina@ccc-inc.com	Proj. Mgr	301 N. McColl Suite 301 McAllen TX 78501		956-905-5180 956-254-3009	Phone Fax Mobile
Emmanuel Arias earias@teleprocommunications.com	Manager	12605 N Bryan Rd Mission TX, 78573	← same	956-618-2360	Phone Fax Mobile
Joe Garcia JGARCIA@trevinogroup.com	Division Manager + Partner	302 W Rhapsody Dr. San Antonio TX 78216	same	210-568-1547	Phone Fax Mobile
Atanacio Carrisal atanacio@amstarinegc.com	Project Manager	1211 Pleasanton Rd San Antonio, TX 78214		210-927-5705 210-557-7228	Phone Fax Mobile
Eli Javier Lopez eli@amstarinegc.com	Superintendent	522 S. Texas Blvd weslaco Tx.	same	210-748-5825	Phone Fax Mobile
Jessica Garcia jagarcia@trevinogroup.com	Office Manager/ PA	302 W. Rhapsody, San Antonio, TX 78216	"	210-568-1547 210-568-1576	Phone Fax Mobile