



DEBRA J. DOCKERY, ARCHITECT, P.C.

**EMAIL TRANSMITTAL**

February 3, 2015

CITY OF SAN ANTONIO

**DISTRICT 3 COMMUNITY CENTER**

**ADDENDUM NO. 2: February 2, 2015 41 pages (not including this cover).**

Please sign below to acknowledge receipt of Addendum No. 2 and return a signed copy to this office by facsimile or email. Unless specifically requested no other copy of these addenda will be sent.

Acknowledgement

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Signature

Date

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Printed Name

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Company Name



DEBRA J. DOCKERY, ARCHITECT, P.C.

CITY OF SAN ANTONIO  
DISTRICT 3 COMMUNITY CENTER

PROJECT NAME: **CITY OF SAN ANTONIO DISTRICT 3 COMMUNITY CENTER**  
DATE: February 3, 2015

ADDENDUM NO.: **TWO (2)**

This addendum shall be included in and be considered part of the plans and specifications for the above named project. The Contractor shall be required to sign an acknowledgment of the receipt of this addendum at the time he receives it.

Addendum No. 2 consists of 2 pages with 8-1/2" x 11" attachments: 28 pages of specifications, 11 pages of drawings.

#### GENERAL NOTE

1. The Owner will engage a testing agency to conduct special test and inspections required on sheet S1.03. This statement will supersede all statements in the specifications indicating otherwise.
2. Add the Owner's third party Commissioning Agent's specifications and index:
  - 019100 Add "General Commissioning Requirements"
  - 220800 Add "Commissioning of Plumbing Systems"
  - 230800 Add "Commissioning of HVAC Systems"
  - 260800 Add "Commissioning of Electrical Systems"

#### SPECIFICATIONS

1. 230593 Testing, Adjusting & Balancing for HVAC will be conducted by Owner. This specification section is for information only.

118 Broadway, Suite #516, San Antonio, Texas Phone: 210-225-6130 Fax 210-225-7588

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PROJECT NAME: **CITY OF SAN ANTONIO DISTRICT 3 COMMUNITY CENTER**  
DATE: February 3, 2015  
ADDENDUM NO.: **TWO (2) Page 2 of 2**

DRAWINGS

1. Sheet A3.01 Addendum 2 (1 of 2 sheets) See attached 8.5 X 11 sheet revising door swing to ADA stall in Women's Rm 123.
2. Sheet A3.01 Addendum 2 (2 of 2 sheets) See attached 8.5 X 11 sheet adding a new ADA counter sink.
3. Sheet A3.01 Provide open knee space at the sink in the Health Screening Room 105. Refer to Detail 04/A8.04.
4. Sheet A3.01 Provide open knee space at the sink in the Dining/Multipurpose Rm 117. Refer to Detail 04/A8.04.
5. Sheet A8.04 Remove detail 01/A8.04.
6. Sheet M1.02A: Add relief louver (L-3) and associated damper.
7. Sheet M4.01A: Add relief louver (L-3) to "Louver Schedule" and add note 5 to "Louver Schedule".
8. Sheet P1.01A: Added 2" waste line to new counter sink.
9. Sheet P1.02A: Add SK-2 sink. Add key note 3.
10. Sheet S2.04(S1): Reference 8" fire line penetration detail.
11. Sheet S4.01(S2): See modification to Detail 02/S4.01, Typical Mechanical Sleeve Penetration
12. Sheet S4.01(S3): See modification to Detail 07/S4.01, Typical Floor Detail.
13. Sheet S4.01(S4): Add Detail 10/S4.01, 8" Dia. Fire Line Penetration in Fire Riser Room.



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END OF ADDENDUM NO.2

**COMMISSIONING AGENT SPECIFICATIONS**  
PREPARED BY JASMINE ENGINEERING, INC.  
Certified Commissioning Agent (CxA) Certificate #0213-1160, AGC

DISTRICT 3 COMMUNITY CENTER  
CITY OF SAN ANTONIO  
TECHNICAL SPECIFICATIONS

COMMISSIONING AGENT SPECIFICATIONS TABLE OF CONTENTS

**DIVISION 1 – GENERAL REQUIREMENTS**

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019100      GENERAL COMMISSIONING REQUIREMENTS (for information only)

**DIVISION 22 – PLUMBING**

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220800      COMMISSIONING OF PLUMBING (for information only)

**DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

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230800      COMMISSIONING OF HVAC (for information only)

**DIVISION 26 – ELECTRICAL**

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260800      COMMISSIONING OF ELECTRICAL SYSTEMS (for information only)

## **SECTION 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.01 SUMMARY**

- A. This SECTION includes general requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.
- B. Commissioning is systematic process to provide documented confirmation that the building systems perform according to the criteria set forth in the design documents and satisfy the Owner's Project Requirements and the facility's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance.
- C. Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:
  - 1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
  - 2. Verify and document proper performance of equipment and systems.
  - 3. Verify that O&M documentation provided to the Owner and is complete.
  - 4. Verify that the Owner's operating personnel are adequately trained.
- D. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
- E. Owner's Project Requirements (OPR) and Basis of Design (BOD) documentation are included by reference for information only.

#### **1.02 RELATED SECTIONS:**

- A. SECTION 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS
- B. SECTION 23 08 00 - COMMISSIONING OF HVAC SYSTEMS
- C. SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

#### **1.03 DEFINITIONS**

- A. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in tested modes according to Contract Documents.
- B. Basis of Design: Documentation or presumed criteria of primary thought processes and assumptions behind design decisions that were made to meet design intent and satisfy applicable regulatory requirements, standards, and guidelines. Describes systems,

components, conditions, and methods chosen to meet intent. The document includes both narrative descriptions and lists of individual items that support the design process.

- C. Building Commissioning: A joint team effort to ensure that all mechanical equipment, controls, and systems function together properly to meet the design intent, to document system performance parameters and to ensure that personnel are adequately trained to operate systems.
- D. Commissioning Process (Cx): A process that coordinates the traditionally separate functions of system documentation, equipment start-up, control system calibration, testing and balancing, training and performance testing. Commissioning requirements do not supersede other requirements of the specifications, but may expand on some of them.
- E. Commissioning Agent (CxA) or (CA): Independent agent hired by Owner and not associated with Contractor, subcontractors, Architect, Consultants, or Construction Administrator or its staff or consultants. Under Owner's direction, and not Contractor's direction, CA will direct and coordinate day-to-day commissioning activities without assuming oversight responsibilities.
- F. Commissioning Team: Consists of Commissioning Agent, the Owner or Owner's Representative, Design Team, Contractors, Subcontractors, and Vendors.
- G. Owner's Project Requirements (OPR): A document or presumed criteria that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- H. Functional Performance Test (FPT): Test of the function of systems, as opposed to components, under full operation in various modes through all control system's sequences of operation using manual (direct observation) or monitoring methods following prescribed test procedures in sequential written form.
- I. Pre-Functional Checklist (PFC): Checklist provided by Commissioning Agent, of items to inspect and elementary component tests to conduct to verify proper installation of equipment prior to functional testing.
- J. Sampling: Functionally testing only a fraction of total number of identical or near identical pieces of equipment.
- K. Seasonal Testing: Testing of equipment, which can be done only during periods of peak heating or cooling, when HVAC equipment is operating at full-load or heavy-load conditions.
- L. Simulated Condition: Condition created for purpose of testing response of system.
- M. Trending: System monitoring using the Energy Management and Control System.

#### **1.04 RESPONSIBILITIES**

- A. The Commissioning Agent: Responsibilities of the CxA include, but are not limited to the following:
  - 1. Coordinate and direct each step of the Commissioning Process for systems being commissioned for this project. Coordinate commissioning work schedule with Project Manager and Contractor.

2. Attend planning and job-site meetings as required to obtain information relating to Commissioning Process.
  3. Plan and conduct commissioning scoping and coordination meetings. Provide notice to all Team members to attend scheduled commissioning meetings.
  4. Ensure all information required for Commissioning Process from manufacturers, Contractors, and A/E design team is available.
  5. Review A/E design documents to gain clear understanding of design intent.
  6. Review Contractor submittals for compliance with commissioning needs.
  7. Verify that systems and equipment have been installed and started in accordance with manufacturer's recommendations and with generally recognized construction standards and that documentation of such has been provided.
  8. Prepare Pre-Functional Checklists to ensure systems have been installed according to project specifications. Verify that Pre-Functional Checklists have been completed by Contractor and are accurate.
  9. Prepare Functional Performance Testing procedures to demonstrate performance of systems according to project specifications. Observe and document performance of systems, as per process detailed in Functional Test procedures.
  10. Review Testing and Balancing (TAB) reports, notify Cx Team of deficiencies.
  11. Recommend acceptance or non-acceptance of systems to Owner.
  12. Verify that Operations and Maintenance (O&M) documentation is acceptable. Operations and Maintenance manuals shall be submitted simultaneously to CxA and to Design Professionals for review.
  13. Verify that Owner training is completed for all systems to be commissioned.
  14. Compile and maintain commissioning record.
  15. Provide final Commissioning Report to Owner.
  16. Prepare and maintain commissioning "Issues Log".
- B. Contractor: Responsibilities of the Contractor as related to Commissioning Process include, but are not limited to the following:
1. Facilitate coordination of commissioning work by CxA.
  2. Attend Commissioning meetings or other meetings called by CxA to facilitate the Commissioning Process.
  3. Review Functional Testing procedures for feasibility, safety, and impact on warranty, and provide CxA with written comment on same.
  4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
  5. Provide Operations and Maintenance Data to CxA for preparation of checklists and training manuals.
  6. Provide testing and balancing report.

7. Assure and facilitate participation and cooperation of subcontractors (electrical, mechanical, controls, etc.) and equipment suppliers as required for the Commissioning Process.
8. Certify to CxA that installation work listed in Pre-functional Checklists has been completed.
9. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists, as prepared by CxA.
10. Provide data concerning performance, installation, and start-up of systems.
11. Provide copy of manufacturer's filled-out start-up forms for equipment and systems.
12. Ensure systems have been started and fully checked for proper operation prior to arranging for Functional Testing with CxA. Prepare and submit to CxA written certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
  - a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Functional Test procedures.
  - b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by CxA.
13. Coordinate with CxA to determine mutually acceptable date of Functional Performance Tests.
14. Provide test instruments and communications devices, as prescribed by CxA, required for carrying out Functional Testing of systems.
15. Ensure deficiencies found in the Commissioning Process are corrected within the time schedule shown in the CA report.
16. Provide CxA with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
17. Prepare and submit to CxA proposed Training Program outline for each system.
18. Coordinate and provide training of Owner's personnel.
19. Prepare Operation and Maintenance manuals and As-Built drawings in accordance with specifications; submit copy to CxA in addition to other contractually required submissions. Revise and resubmit manuals in accordance with A/E and CxA's comments.
20. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included in the scope of this contract.
21. Provide written response to resolution of items listed in "Issue Log".

- C. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Pre-Functional and Functional Performance Test procedures to demonstrate performance of systems according to these specifications and checklists prepared by Commissioning Agent.
- D. Owner's Representative: Responsibilities of the Owner's Representative as related to Commissioning Process include, but are not limited to the following:
  - 1. Manage contracts of Architect and Contractor.
  - 2. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions.
  - 3. Provide final approval for completion of commissioning Work.
  - 4. Warranty Period: Ensure that seasonal or deferred testing and deficiency issues are addressed.
- E. Architect: Responsibilities of the Architect as related to the Commissioning Process shall include, but are not limited to the following:
  - 1. Attend commissioning scoping meeting and other commissioning team meetings as requested by Commissioning Agent and as selected by Architect.
  - 2. Perform normal submittal review, construction observation, record drawing preparation, and operations and maintenance data preparation, as required by Contract Documents.
  - 3. Provide design narrative documentation requested by Commissioning Agent.
  - 4. Coordinate resolution of system deficiencies identified during commissioning, as required by Contract Documents.
  - 5. Prepare and submit final as-built design intent documentation for inclusion in Operation and Maintenance Data Manual, and review and approve Operation and Maintenance Data Manual.
  - 6. Warranty Period: Coordinate resolution of design non-conformance and design deficiencies identified during warranty period commissioning.
- F. Mechanical, Electrical, and Plumbing Engineers: Responsibilities of the Engineers as related to the Commissioning Process shall include, but are not limited to the following:
  - 1. Perform normal submittal review, construction observations, and record drawing preparation, as required by Contract Documents. Perform site observation immediately preceding system startup.
  - 2. Provide design narrative and sequence documentation requested by Commissioning Agent. Assist, along with Contractor, in clarifying operation and control of commissioned equipment in areas where specifications, control drawings, or equipment documentation are not sufficient for writing detailed testing procedures.
  - 3. Attend commissioning scoping meetings and other commissioning team meetings as requested by Commissioning Agent and as selected by Architect or responsible design professional.

4. Participate in resolution of system deficiencies identified during commissioning, as required by Contract Documents.
5. Prepare and submit final as-built design intent and operating parameters documentation for inclusion in Operation and Maintenance Manual, and review and approve Operation and Maintenance Manual.

## **PART 2 - PRODUCTS**

### **2.01 NO PRODUCTS SUPPLIED**

- A. PROVIDE TEST EQUIPMENT NECESSARY TO FULFILL FUNCTIONAL TESTING REQUIREMENTS, FOR THE DURATION OF THE TESTING PERIOD.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Contractor shall coordinate with sub-Contractors and equipment vendors/representatives to set aside adequate time to address Pre-Functional Testing, Functional Testing, Operations and Maintenance Training, and associated coordination meetings.
- B. CxA may also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

### **3.02 MEETINGS**

- A. A commissioning team scoping meeting shall be held at a time and place agreed upon shortly after the beginning of the construction phase of the project. Owner, Commissioning Agent, General Contractor, Architect, Mechanical Subcontractor, and Electrical Subcontractor shall be present at this meeting. The purpose of the meeting is to familiarize all parties with the requirements of the commissioning process, and to ensure that the responsibilities of each party are clearly understood.
- B. Separate meetings including individual equipment suppliers and subcontractors shall be held prior to commissioning of their systems at the discretion of CxA.
- C. Miscellaneous Meetings. The CxA shall plan and conduct other meetings as required as construction progresses. Meetings will cover coordination, deficiency resolution, and planning issues with particular subcontractors. CxA will plan meetings to minimize unnecessary time being spent by subcontractors.

### **3.03 SYSTEM START-UP**

- A. Contractor will arrange for start-up of operating equipment and systems prior to scheduling Functional Testing.
- B. Start-up of equipment and systems shall be performed only by a manufacturer's representative, or person(s) who are specifically manufacturer-approved. All start-up

personnel shall be trained and authorized, experienced and knowledgeable in the operations of such equipment and systems.

- C. Coordinate schedule for start-up of various equipment and systems so that subsystems required for major systems operation are tested first.
- D. Manufacturer's start-up reports must be submitted to CxA prior to scheduling Functional Testing.

### **3.04 PRE-FUNCTIONAL CHECKLISTS (PFC)**

#### **A. General**

1. Pre-Functional Checklists are important to ensure that equipment and systems are properly connected and operational, and installed in accordance with specifications, drawings, manufacturer's requirements, and all applicable codes.
2. Checklists ensure that functional performance testing (in-depth checkout) may proceed without unnecessary delays.
3. Completion of PFCs, startup, and checkout shall be directed and executed by subcontractor or vendor. Only individuals that have direct knowledge and who witnessed that line item task on pre-functional checklist was performed shall initial or check item off.
4. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used.
5. Pre-functional checkout for given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of given system.
6. Pre-functional performance tests shall be documented in a checklist format, as prepared and provided by CxA, for each piece of equipment. Each checklist shall be initialed by Contractor.
7. Commissioning Pre-functional checklists are not to preclude Contractor from applying his own construction inspection checklists.
8. All system elements shall be checked to verify that they have been installed, adjusted, and calibrated properly, that all connections have been made correctly, and that it is ready to function as specified. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, control sequence, and other conditions which may cause damage.
9. Verify that tests, meter readings and specific electrical characteristics agree with those required by equipment or system manufacturer.
10. All discrete elements and sub-systems shall be adjusted and shall be checked for proper operation. Verify wiring and support components for equipment are complete and tested.
11. Conduct start-up procedure recommended by equipment/system manufacturer.
12. Subcontractors shall clearly list outstanding items of initial start-up and pre-functional procedures that were not completed successfully at bottom of

procedures form or on separate sheet attached to form. Completed form and attached sheets shall be provided to Commissioning Agent within 2 days of test completion. Installing subcontractor or vendor shall correct deficient or incomplete areas in timely manner and shall submit updated pre-functional checklist and startup report with statement of correction on original non-compliance report.

### **3.05 FUNCTIONAL PERFORMANCE TESTING**

#### **A. General**

1. The objective of Functional Performance Testing is to demonstrate that each system is operating according to documented design intent and Contract Documents, through all possible modes of operation.
2. Contractors and sub-Contractors shall include in their bid proposal all costs associated with preparation and execution of Testing Procedures for all items listed in Part 4 of this specification.
3. Functional Testing is intended to begin upon completion of each system. Functional Testing may proceed prior to completion of systems or sub-systems at discretion of Commissioning Agent and Construction Administrator. Beginning system testing before completion, does not relieve Contractor from fully completing system, including pre-functional checklists as early as possible.
4. Contractor and sub-Contractors shall provide detailed Testing Procedures that will allow all items on checklists to be verified.
5. Testing shall be conducted under specified operating conditions as recommended or approved by Commissioning Agent.
6. A Functional Performance Test shall be performed on each complete system. Each function shall be demonstrated to the satisfaction of Commissioning Agent in accordance with proposed test procedures developed to demonstrate compliance with specifications.
7. Each Functional Test shall be witnessed and signed off by Owner's Representative and Commissioning Agent upon satisfactory completion.
8. All elements of system shall be tested to demonstrate that total systems satisfy all requirements of these specifications. Testing shall be accomplished on hierarchical basis. Test each piece of equipment for proper operation, followed by each subsystem, followed by the entire system, followed by any inter-ties to other major systems.
9. All major testing materials and equipment shall be provided by contractor.

#### **B. Notification, Scheduling Of Functional Testing and Re-Testing**

1. Notify CxA and Owner, in writing, of request for scheduling Functional Testing. Submit request no fewer than five (5) business days prior to desired day of testing.
  - a. Contractor must certify that systems and equipment are functioning satisfactorily, according to specifications and design intent, prior to

requesting Functional Testing. Upon receipt of such certification, CxA will schedule with Contractor a time for the particular system test.

- b. CxA will attempt to schedule Functional Testing when convenient for Contractor and his vendors, and to minimize lost time to Contractor.
- c. Contractor will resolve all deficiencies identified during initial test prior to submitting request, in writing, for re-testing. Such request for re-testing shall certify that Contractor has resolved all deficiencies, or list reason why any deficiencies remain which cannot be resolved.
- d. CxA will re-test to ensure that all deficiencies have been resolved.
- e. Deficiencies that were not detected in first Functional Test, but are discovered in subsequent re-testing, are to be resolved by Contractor as if they had been discovered in initial testing.

C. Functional Testing Requirements And Procedures

1. Contractor and Subcontractors shall perform tests in the presence of CxA. Tests not witnessed by CxA shall not be considered complete.
2. To facilitate Functional Testing, when requested by CxA, Contractor shall provide services of personnel to accompany CxA for the duration of Functional Testing, including any follow-up testing. Such personnel must be experienced, qualified, and intimately familiar with the system being tested.
  - a. Participation by representative(s) of the EMCS Contractor is of particular importance in Functional Testing. All systems which are controlled and / or monitored by the EMCS are to be thoroughly tested, point by point, through all modes of operation, with the assistance of the Contractor's representative. Graphics, setpoints, and programming are to be included as a part of Functional Testing as well.
  - b. Contractors must provide services of personnel to accompany CxA for equipment and systems which may pose particular health and safety concerns, such as boilers.
  - c. Should he fail to provide representative to accompany CxA during Functional Testing, Contractor continues to bear full responsibility for equipment warranty. Owner and CxA will not be held responsible for damage to equipment, or other actions which might impact warranty, when performing Functional Testing of systems where Contractor has not provided authorized accompanying representative to operate equipment.
3. Each system shall be operated through all modes of operation including, but not limited to seasonal, occupied, unoccupied, warm-up, cool-down, part-load, and full-load, where system response is specified.
  - a. For multiple units, sampling strategy established by Commissioning Agent and subject to approval of Construction Administrator may be used.
  - b. Verification of each sequence in sequences of operation is required.

- c. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, and the like, shall also be tested.
    4. Functional Testing is to be dedicated solely to testing of equipment and systems, and not to resolution of deficiencies. Deficiencies identified during testing process must be corrected by Contractor at a time other than during Functional Testing.
    5. CxA shall issue test reports with readings and checklists and a listing of any deficiencies that must be addressed by Contractor or sub-Contractors.
    6. Commissioning Agent shall submit a Final Report to Owner recommending acceptance or non-acceptance of individual system components as well as the systems as a whole.
  - D. Re-Testing And Failure To Remedy Deficiencies
    1. Despite Contractor's best efforts to ensure systems are problem-free, it is expected that some deficiencies will be found during initial inspection of Pre-functional Checklist, and during initial Functional Testing; such deficiencies are expected to be minimal.
    2. It is Contractor's responsibility to remedy identified deficiencies, both in Pre-functional Checklist and in Functional Testing phases of work, in a timely and thorough manner.
    3. It is Contractor's responsibility to ensure that all deficiencies are corrected prior to requesting a re-inspection or re-test of systems and equipment. Do not request re-inspection or re-test until deficiencies are corrected.
      - a. At his discretion, CxA may agree to re-testing systems or equipment where deficiencies remain which are beyond Contractor's control to resolve expeditiously.
      - b. Typically such re-testing of incomplete systems and equipment will take place only if remaining deficiencies are minor in scope and nature, and are of such nature that they cannot be resolved in a timely manner (such as those due to difficulties in obtaining parts, or where Owner has requested a change that has delayed work, etc.)
    4. CxA will carry out a second re-inspection or re-test of systems and equipment subsequent to receiving Contractor's request.
      - a. If CxA finds deficiencies identified in initial inspection or test have not been remedied (with exception of un-resolvable deficiencies in 3.b. above), and such remaining deficiencies are significant enough to require additional inspection or re-testing, Contractor will be back-charged for CxA's expenses, and time at a rate of \$150 per hour, for a third and any subsequent re-inspections and re-tests.

### **3.06 TRAINING**

#### **A. Scheduling**

1. Provide a proposed schedule and outline of training of Owner's personnel for Commissioning Agent's review approximately 30 days before project completion. The Commissioning Agent will review the submittal.
  2. Submit revised outline and fully developed training materials for review by Commissioning Agent, 10 business days prior to scheduled training sessions.
  3. Organize training to fit Owner's schedule and to optimize the learning experience. Limit continuous sessions to no more than three hours at a time, or otherwise only as approved by Owner and/or Architect/Engineer.
- B. Training Materials
1. Develop Training Manuals to meet requirements of individual equipment specification sections.
  2. Operating and Maintenance Manuals alone are NOT considered training manuals. O&M Manuals may be used as reference, but shall not be considered to meet requirements for training materials.
  3. Develop a detailed outline showing how training program will be organized, including classroom and hands-on training as required by individual specifications sections.
  4. Provide with training materials, a quick-reference "how-to" index which will allow operators to easily access information included in Training Manuals and/or O&M Manuals. This reference will include, as a minimum; routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions.
  5. Refer to individual equipment or system specifications for minimum material to be covered as part of the training program.

## **PART 4 - SYSTEMS TO BE COMMISSIONED**

### **4.01 GENERAL**

- A. The following outline of commissioning requirements by Division is provided as a guideline for Contractor, sub-Contractors, and CxA to understand the nature and extent of commissioning work, so that resources may be properly allocated.
- B. Commissioning specifications supplement requirements of individual specifications sections, but shall not be interpreted to replace or diminish the specified scope of any individual section.
- C. For all systems listed below, Contractor and Subcontractors shall comply with all commissioning requirements specified. Though listed as separate systems to commission, systems listed below may be commissioned as a part of another system, as opposed to being commissioned separately.

### **4.02 APPLICABLE SYSTEMS**

- A. Division 22 Plumbing Systems:

1. Domestic hot water Systems, refer to specification Section 22.
- B. Division 23 Mechanical Systems:
  1. Building heating, ventilation and air conditioning Systems, refer to specification Section 23.
- C. Division 26 Electrical Systems:
  1. Lighting controls, refer to specification Section 26.

**END OF SECTION 01 91 00**

## **SECTION 22 08 00 – COMMISSIONING OF PLUMBING SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this SECTION.

#### **1.02 RELATED SECTIONS:**

- A. SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS
- B. SECTION 23 08 00 - COMMISSIONING OF HVAC SYSTEMS
- C. SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

#### **1.03 DEFINITIONS**

- A. Refer to SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS listed in article Part 1.02

#### **1.04 RESPONSIBILITIES**

- A. Contractor: Responsibilities of the Contractor as relate to Commissioning Process include, but are not limited to the following:
  - 1. Facilitate coordination of Commissioning work by CxA.
  - 2. Attend Commissioning meetings or other meetings called by CxA to facilitate the Commissioning Process.
  - 3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide CxA with written comment on same.
  - 4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
  - 5. Provide Operations & Maintenance data to CxA for preparation of checklists and training manuals.
  - 6. Provide Testing and Balancing Report before Functional Testing begins.
  - 7. Provide As-built drawings and documentation to facilitate Testing.
  - 8. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
  - 9. Certify to CxA that installation work listed in Pre-Functional Checklists has been completed.
  - 10. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
  - 11. Provide data concerning performance, installation, and start-up of systems.

12. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
  13. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with CxA. Prepare and submit to CxA written certification that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.
    - a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
    - b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by CxA.
  14. Coordinate with CxA to determine mutually acceptable date of Functional Performance Tests.
  15. Provide qualified personnel to assist and participate in Commissioning.
  16. Provide test instruments and communications devices, as prescribed by CxA, required for carrying out Testing of systems.
  17. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Test Engineer in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
  18. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
  19. Provide CxA with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
  20. Prepare and submit to CxA proposed Training Program outline for each system.
  21. Coordinate and provide training of Owner's personnel.
  22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to CxA in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and CxA's comments.
  23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.
- B. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by CxA.

## **PART 2 - PRODUCTS**

### **2.01 NO PRODUCTS SUPPLIED**

- A. PROVIDE TEST EQUIPMENT NECESSARY TO FULFILL FUNCTIONAL TESTING REQUIREMENTS, FOR SYSTEMS IN THIS SECTION, FOR THE DURATION OF THE TESTING PERIOD.

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Follow startup and initial checkout procedures listed in article titled "RESPONSIBILITIES" in PART 1, and additional requirements specified in SECTION 01 91 00. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and Testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.
- B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.
- C. CxA will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

### **3.02 WORK PRIOR TO COMMISSIONING**

- A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.
- B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.
- C. Assist Commissioning Agent with all information pertaining to actual equipment and installation as required complete the full Commissioning scope.
- D. The Commissioning Plan will include Pre-Functional Checklists and Functional Performance Tests for all systems to be commissioned. Contractor shall prepare startup procedures to demonstrate compliance with Checklists, and coordinate scheduling for completion of these Checklists.
- E. A minimum of 7 days prior to date of system startup, submit to Commissioning Agent for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

### **3.03 PARTICIPATION IN COMMISSIONING**

- A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.

- B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.
- C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist CxA in commissioning process.

**3.04 WORK TO RESOLVE DEFICIENCIES**

- A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

**3.05 PRE-FUNCTIONAL CHECKLISTS (PFC)**

- A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.
- B. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- C. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.

**3.06 FUNCTIONAL PERFORMANCE TESTING (FPT)**

- A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.
- B. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.
- C. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- D. Assist CxA in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

**3.07 TRAINING**

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.
- C. Commissioning Agent shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Refer to SECTION 01 91 00 for further requirements. Provide Commissioning Agent with training plan two weeks before planned training.

**3.08 OPERATIONS & MAINTENANCE MANUALS**

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.

- C. Provide CxA with a single copy of Operation & Maintenance Manuals for review. CxAs copy of O&M manuals shall be submitted through Architect.

**PART 4 - SYSTEMS TO BE COMMISSIONED**

**4.01 APPLICABLE SYSTEMS**

- A. Domestic Hot Water System

**END OF SECTION 22 08 00**

## **SECTION 23 08 00 – COMMISSIONING OF HVAC SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this SECTION.

#### **1.02 RELATED SECTIONS:**

- A. SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS
- B. SECTION 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS
- C. SECTION 26 08 00 - COMMISSIONING OF ELECTRICAL SYSTEMS

#### **1.03 DEFINITIONS**

- A. Refer to SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS listed in article Part 1.02

#### **1.04 RESPONSIBILITIES**

- A. Contractor: Responsibilities of the Contractor as relate to Commissioning Process include, but are not limited to the following:
  - 1. Facilitate coordination of Commissioning work by CxA.
  - 2. Attend Commissioning meetings or other meetings called by CxA to facilitate the Commissioning Process.
  - 3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide CxA with written comment on same.
  - 4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
  - 5. Provide Operations & Maintenance data to CxA for preparation of checklists and training manuals.
  - 6. Provide Testing and Balancing Report before Functional Testing begins.
  - 7. Provide As-built drawings and documentation to facilitate Testing.
  - 8. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
  - 9. Certify to CxA that installation work listed in Pre-Functional Checklists has been completed.
  - 10. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
  - 11. Provide data concerning performance, installation, and start-up of systems.
  - 12. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
  - 13. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with CxA. Prepare and submit to CxA written certification

that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.

- a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
  - b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by CxA.
14. Coordinate with CxA to determine mutually acceptable date of Functional Performance Tests.
  15. Provide qualified personnel to assist and participate in Commissioning.
  16. Provide test instruments and communications devices, as prescribed by CxA, required for carrying out Testing of systems.
  17. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Test Engineer in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
  18. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
  19. Provide CxA with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
  20. Prepare and submit to CxA proposed Training Program outline for each system.
  21. Coordinate and provide training of Owner's personnel.
  22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to CxA in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and CxAs comments.
  23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.
- B. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by CxA.

## **PART 2 - PRODUCTS**

### **2.01 NO PRODUCTS SUPPLIED**

- A. PROVIDE TEST EQUIPMENT NECESSARY TO FULFILL FUNCTIONAL TESTING REQUIREMENTS, FOR SYSTEMS IN THIS SECTION, FOR THE DURATION OF THE TESTING PERIOD.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Follow startup and initial checkout procedures listed in article titled "RESPONSIBILITIES" in PART 1, and additional requirements specified in SECTION 01 91 00. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and Testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.
- B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.
- C. CxA will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

#### **3.02 WORK PRIOR TO COMMISSIONING**

- A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.
- B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.
- C. Assist Commissioning Agent with all information pertaining to actual equipment and installation as required complete the full Commissioning scope.
- D. The Commissioning Plan will include Pre-Functional Checklists and Functional Performance Tests for all systems to be commissioned. Contractor shall prepare startup procedures to demonstrate compliance with Checklists, and coordinate scheduling for completion of these Checklists.
- E. A minimum of 7 days prior to date of system startup, submit to Commissioning Agent for review, detailed description of equipment start-up procedures which contractor proposes to perform to demonstrate conformance of systems to specifications and Checklists.

#### **3.03 PARTICIPATION IN COMMISSIONING**

- A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.
- B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.
- C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist CxA in commissioning process.

### **3.04 WORK TO RESOLVE DEFICIENCIES**

- A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

### **3.05 PRE-FUNCTIONAL CHECKLISTS (PFC)**

- A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.
- B. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- C. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.

### **3.06 FUNCTIONAL PERFORMANCE TESTING (FPT)**

- A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.
- B. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.
- C. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- D. Assist CxA in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

### **3.07 TRAINING**

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.
- C. Commissioning Agent shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Refer to SECTION 01 91 00 for further requirements. Provide Commissioning Agent with training plan two weeks before planned training.

### **3.08 OPERATIONS & MAINTENANCE MANUALS**

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.
- C. Provide CxA with a single copy of Operation & Maintenance Manuals for review. CxAs copy of O&M manuals shall be submitted through Architect.

## **PART 4 - SYSTEMS TO BE COMMISSIONED**

**4.01 APPLICABLE SYSTEMS**

- A. Heating Systems
- B. Air Handling Systems
- C. VRF Systems
- D. Exhaust Air Systems
- E. BUILDING AUTOMATION SYSTEM:
  - 1. Graphical User Interface
  - 2. Network Supervisor Controllers
  - 3. Automation Software
  - 4. Field Level Controllers
  - 5. Field Level Devices
  - 6. Control Sequences

**END OF SECTION 23 08 00**

## **SECTION 26 08 00 – COMMISSIONING OF ELECTRICAL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract Documents, including General and Supplementary Conditions and Division 01 Specifications, apply to this SECTION.

#### **1.02 RELATED SECTIONS:**

- A. SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS
- B. SECTION 22 08 00 - COMMISSIONING OF PLUMBING SYSTEMS
- C. SECTION 23 08 00 - COMMISSIONING OF HVAC SYSTEMS

#### **1.03 DEFINITIONS**

- A. Refer to SECTION 01 91 00 - GENERAL COMMISSIONING REQUIREMENTS listed in article Part 1.02

#### **1.04 RESPONSIBILITIES**

- A. Contractor: Responsibilities of the Contractor as relate to Commissioning Process include, but are not limited to the following:
  - 1. Facilitate coordination of Commissioning work by CxA.
  - 2. Attend Commissioning meetings or other meetings called by CxA to facilitate the Commissioning Process.
  - 3. Review Functional Performance Test procedures for feasibility, safety, and impact on warranty, and provide CxA with written comment on same.
  - 4. Provide all documentation relating to manufacturer's recommended performance testing of equipment and systems.
  - 5. Provide Operations & Maintenance data to CxA for preparation of checklists and training manuals.
  - 6. Provide Testing and Balancing Report before Functional Testing begins.
  - 7. Provide As-built drawings and documentation to facilitate Testing.
  - 8. Assure and facilitate participation and cooperation of Sub Contractors and equipment suppliers as required for the Commissioning Process.
  - 9. Certify to CxA that installation work listed in Pre-Functional Checklists has been completed.
  - 10. Install systems and equipment in strict conformance with project specifications, manufacturer's recommended installation procedures, and Pre-Functional Checklists.
  - 11. Provide data concerning performance, installation, and start-up of systems.
  - 12. Provide copy of manufacturers filled-out start-up forms for equipment and systems.
  - 13. Ensure systems have been started and fully checked for proper operation prior to arranging for Testing with CxA. Prepare and submit to CxA written certification

that each piece of equipment and/or system has been started according to manufacturer's recommended procedure, and that system has been tested for compliance with operational requirements.

- a. Contractor shall carry out manufacturer's recommended start-up and testing procedures, regardless of whether or not they are specifically listed in Pre-Functional Checklists.
  - b. Contractor is not relieved of obligation for systems/equipment demonstration where performance testing is required by specifications, but a Functional Performance Test is not specifically designated by CxA.
14. Coordinate with CxA to determine mutually acceptable date of Functional Performance Tests.
  15. Provide qualified personnel to assist and participate in Commissioning.
  16. Provide test instruments and communications devices, as prescribed by CxA, required for carrying out Testing of systems.
  17. Proprietary test equipment required by the manufacturer, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist the Test Engineer in the commissioning process. Proprietary test equipment shall become the property of the Owner upon completion of commissioning.
  18. Ensure deficiencies found in the Commissioning Issues Log are corrected within the time schedule shown in the Commissioning Plan.
  19. Provide CxA with all submittals, start-up instructions manuals, operating parameters, and other pertinent information related to Commissioning Process. This information shall be routed through Architect.
  20. Prepare and submit to CxA proposed Training Program outline for each system.
  21. Coordinate and provide training of Owner's personnel.
  22. Prepare Operation & Maintenance Manuals and As-Built drawings in accordance with specifications; submit copy to CxA in addition to other contractually required submissions. Revise and resubmit manuals in accordance with Design Professionals and CxAs comments.
  23. Commissioning requires participation of this Division Subcontractors to ensure that systems are operating in manner consistent with Contract Documents. All costs associated with the participation of Contractor, Sub-Contractors, Design Professionals, and Equipment Vendors in the Commissioning Process shall be included as part of the Construction Contract.
- B. Subcontractors and vendors shall prepare and submit to Commissioning Agent proposed Startup procedures to demonstrate proper installation of systems, according to these specifications and checklists prepared by CxA.

## **PART 2 - PRODUCTS**

### **2.01 NO PRODUCTS SUPPLIED**

- A. PROVIDE TEST EQUIPMENT NECESSARY TO FULFILL FUNCTIONAL TESTING REQUIREMENTS, FOR SYSTEMS IN THIS SECTION, FOR THE DURATION OF THE TESTING PERIOD.

### **PART 3 - EXECUTION**

#### **3.01 GENERAL**

- A. Follow startup and initial checkout procedures listed in article titled "RESPONSIBILITIES" in PART 1, and additional requirements specified in SECTION 01 91 00. This Division has startup responsibilities and are required to complete sub-systems so COMPLETE SYSTEMS are fully functional. Insuring they meet design requirements of Contract Documents. Commissioning procedures and Testing do not relieve or lessen this responsibility or shift this responsibility, in whole or in part, to Commissioning Agent or Owner.
- B. Coordinate with other Sub-Contractors and equipment vendors to set aside adequate time to address Pre-Functional Checklists, Functional Performance Tests, Operations & Maintenance Manual creation, Owner Training, and associated coordination meetings.
- C. CxA will also conduct site inspections at critical times and issue Cx Field Reports with observations on installation deficiencies so that they may be issued by Architect as deemed appropriate.

#### **3.02 WORK PRIOR TO COMMISSIONING**

- A. Complete all phases of the work so the systems can be started, adjusted, balanced, tested, and otherwise tested.
- B. See pertinent specification sections in this Division, which outline responsibilities for start-up of equipment with obligations to complete systems, including all sub-systems so that they are fully functional.
- C. Assist Commissioning Agent with all information pertaining to actual equipment and installation as required complete the full Commissioning scope.
- D. The Commissioning Plan will include Pre-Functional Checklists and Functional Performance Tests for all systems to be commissioned. Contractor shall prepare startup procedures to demonstrate compliance with Checklists, and coordinate scheduling for completion of these Checklists.
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#### **3.03 PARTICIPATION IN COMMISSIONING**

- A. Attend meetings related to the Commissioning Process; arrange for attendance by personnel and vendors directly involved in the project, prior to testing of their systems.
- B. Provide skilled technicians to startup and test all systems, and place systems in complete and fully functioning service in accordance with Contract Documents.
- C. Provide skilled technicians, experienced and familiar with systems being commissioned, to assist CxA in commissioning process.

#### **3.04 WORK TO RESOLVE DEFICIENCIES**

- A. Complete corrective work in a timely manner to allow expeditious completion of Commissioning Process. If deadlines pass without resolution of identified problems, Owner reserves the right to obtain supplementary services and/or equipment to resolve the problem. Costs thus incurred will be Contractor's responsibility.

### **3.05 PRE-FUNCTIONAL CHECKLISTS (PFC)**

- A. Contractor shall complete Pre-Functional Checklists to validate compliance with Contract Documents installation and start-up requirements, for this Division's systems.
- B. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- C. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.

### **3.06 FUNCTIONAL PERFORMANCE TESTING (FPT)**

- A. Contractor, in cooperation with Commissioning Agent, shall conduct Functional Performance Testing to validate compliance with Contract Documents.
- B. Refer to SECTION 01 91 00 for specific details on non-conformance issues relating to Testing.
- C. Refer to PART 4 - SYSTEMS TO BE COMMISSIONED
- D. Assist CxA in Functional Testing by removing equipment covers, opening access panels, etc. Furnish ladders, flashlights, meters, gauges, or other inspection equipment as necessary.

### **3.07 TRAINING**

- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall be responsible for training coordination and scheduling, and ultimately to ensure that training is completed.
- C. Commissioning Agent shall be responsible for overseeing and approving content and adequacy of training of Owner personnel for all installed systems. Refer to SECTION 01 91 00 for further requirements. Provide Commissioning Agent with training plan two weeks before planned training.

### **3.08 OPERATIONS & MAINTENANCE MANUALS**

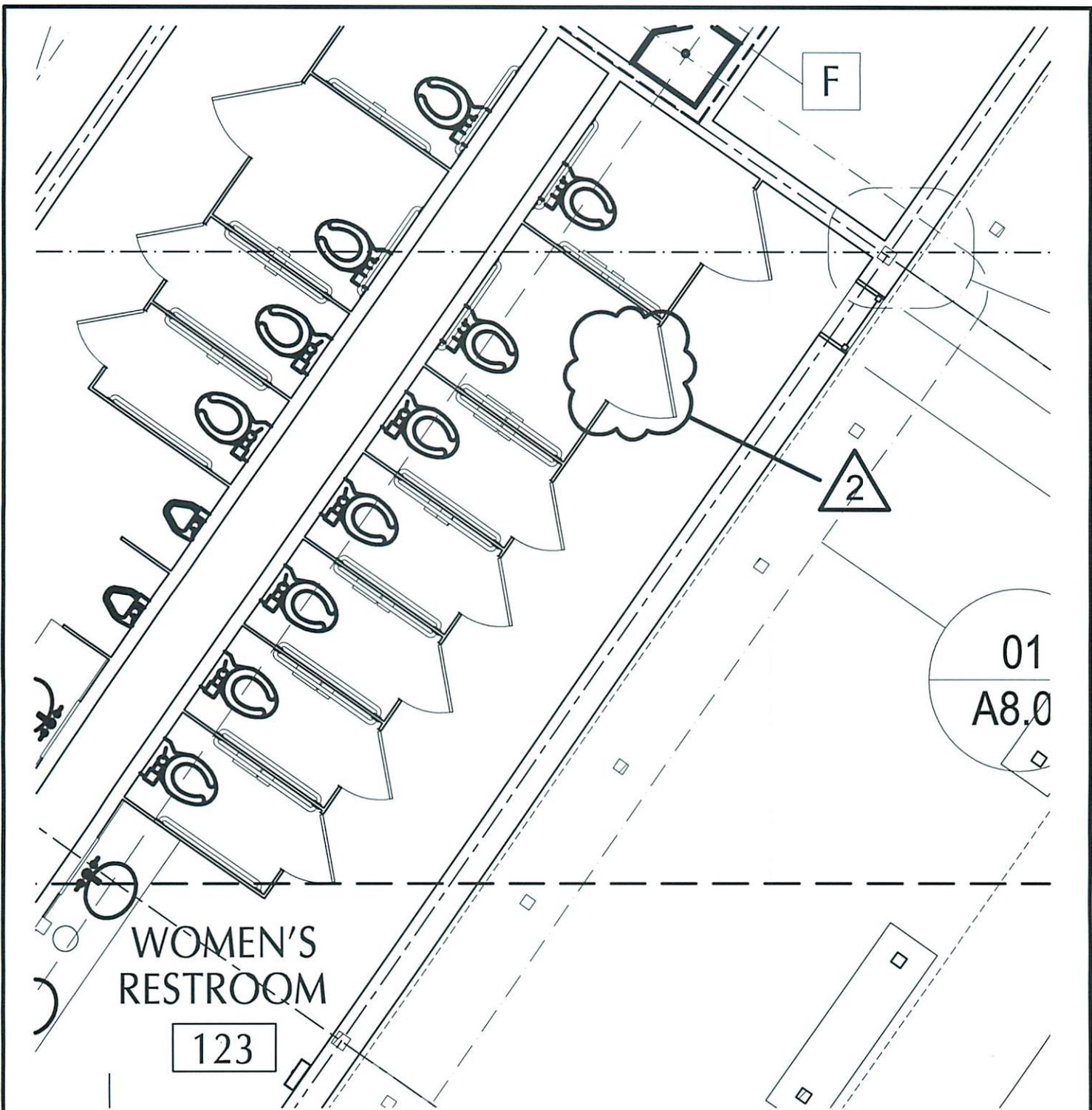
- A. The following requirements are in addition to Operations & Maintenance requirements specified elsewhere in this specifications manual.
- B. Contractor shall compile and prepare documentation for equipment and systems specified in this Division, and shall deliver documentation to Contractor for inclusion in Operation & Maintenance Manuals, in accordance with requirements of Division 01, prior to training Owner personnel.
- C. Provide CxA with a single copy of Operation & Maintenance Manuals for review. CxAs copy of O&M manuals shall be submitted through Architect.

## **PART 4 - SYSTEMS TO BE COMMISSIONED**

### **4.01 APPLICABLE SYSTEMS**

- A. Networked Lighting Controls
- B. Non-Networked Lighting Controls

**END OF SECTION 26 08 00**



**01 COMPARTMENT DOOR SWING**  
 SCALE 1/4"=1'-0"



**WOMEN'S RESTROOM 123**

TOILET COMPARTMENT DOOR

**ADD. #2**

SHEET 1 OF 2

REFERENCE SHEET: A3.01

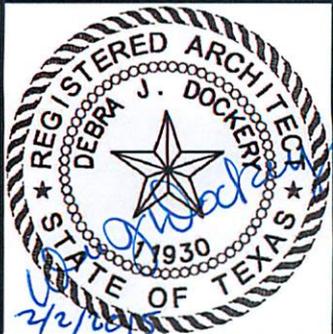
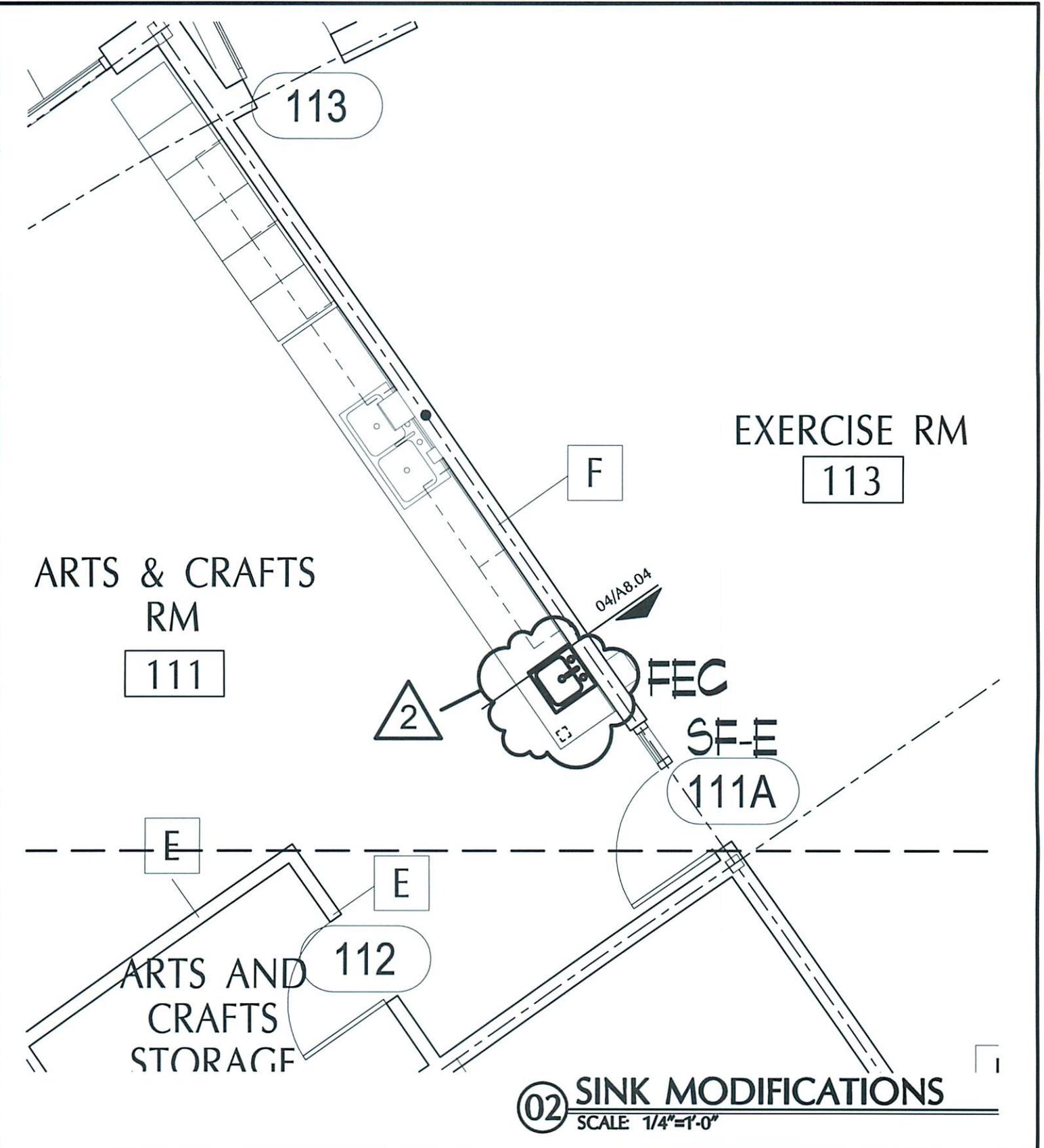
DATE: 1-30-15

CITY OF SAN ANTONIO  
 DISTRICT 3 COMMUNITY CENTER

PROJECT NO. 13-04

**DEBRA J. DOCKERY, ARCHITECT, P.C.**

118 BROADWAY, SUITE 516 SAN ANTONIO, TX 78205  
 PHONE (210) 225-6130 FAX (210) 225-7588



**ARTS AND CRAFTS RM 111**

SINK MODIFICATION AND ADDITION

**ADD. #2**

SHEET 2 OF 2

REFERENCE SHEET: A3.01

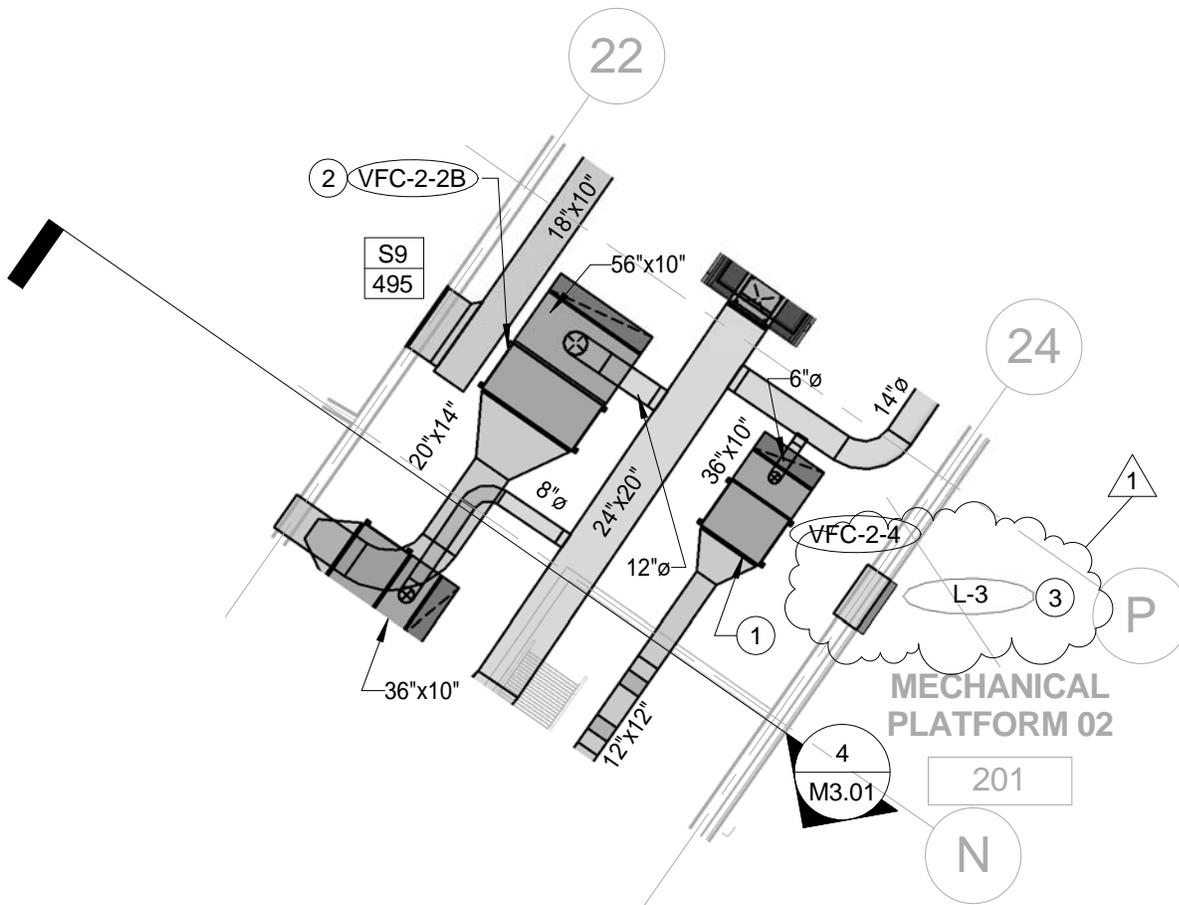
DATE: 2-2-15

CITY OF SAN ANTONIO  
DISTRICT 3 COMMUNITY CENTER

**DEBRA J. DOCKERY, ARCHITECT, P.C.**

PROJECT NO. 13-04

118 BROADWAY, SUITE 516 SAN ANTONIO, TX 78205  
PHONE (210) 225-6130 FAX (210) 225-7588



**1 PARTIAL MECHANICAL PLATFORM**  
 SCALE: 1/8" = 1'-0"

**KEYED NOTES**

(THIS SHEET ONLY) ○

- 1 SUSPEND FAN COIL UNIT FROM STRUCTURE. BOTTOM OF UNIT SHALL BE LOCATED AT 5'-0" AFF.
- 2 SUSPEND FAN COIL UNIT FROM STRUCTURE. BOTTOM OF UNIT SHALL BE LOCATED AT 4'-6" AFF.
- 3 LOCATE BOTTOM OF LOUVER AT 16'-0" AFF.



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 San Antonio, TX 78229  
 Telephone: 210.614.1110  
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**DISTRICT 3  
 COMMUNITY CENTER**

CITY OF SAN ANTONIO  
 3303 PECAN VALLEY DR.  
 SAN ANTONIO, TX 78210

DATE 2015-01-30  
 REVISION ADD #2  
 CHECKED BY DTA  
 SHEET M1.02A



1

LOUVER SCHEDULE			
MARK	L-1	L-2	L-3
SERVICE	O/A INTAKE	EXHAUST	RELIEF
AIRFLOW (CFM)	3,000	1,115	1,500
MIN. FREE AREA (SQFT)	4.05	1.66	2.54
MAX. PRESSURE LOSS (IN. WG)	0.10	0.07	0.06
SIZE (LxH - INCHES)	60x24	26x24	30x30
MANUFACTURER	RUSKIN	RUSKIN	RUSKIN
MODEL	EME520DD	EME520DD	EME520DD
NOTES	1,2,3,4	1,2,3,4	1,2,3,4,5

NOTES:

1. STATIONARY LOUVER WITH DRAINABLE BLADES.
2. LOUVER SHALL HAVE WATER PENETRATION OF LESS THAN 0.01 OUNCES/SQ. FT. OF FREE AREA, AS TESTED IN ACCORDANCE WITH AMCA STANDARD 500.
3. PROVIDE DRIP CAP AND EXTENDED SILL.
4. PROVIDE BIRD SCREEN.
5. PROVIDE BAROMETRIC DAMPER SET TO OPEN AT +0.05" BUILDING PRESSURE. TERMINATE DUCT JUST INSIDE OF WALL.

1



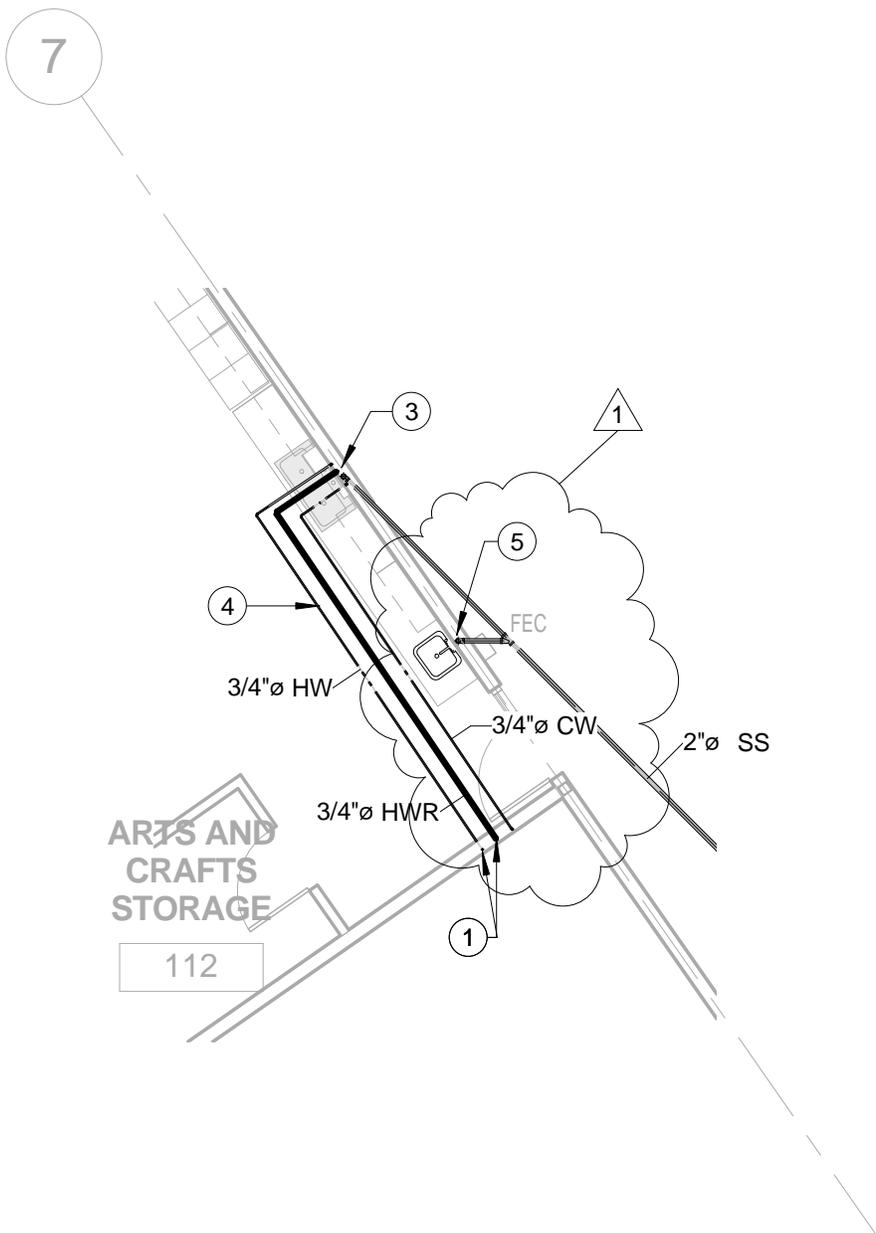
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 COMMUNITY CENTER

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 3303 PECAN VALLEY DR.  
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DATE 2015-01-30  
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 SHEET M4.01A



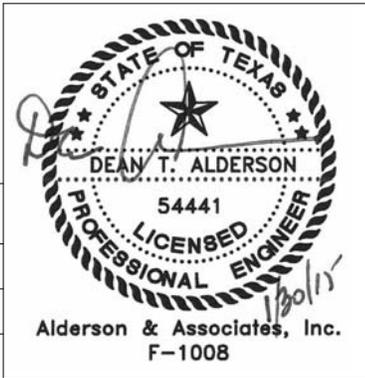


**1 PARTIAL PLUMBING - BELOW FLOOR**  
 SCALE: 1/8" = 1'-0"

**KEYED NOTES**

(THIS SHEET ONLY) ○

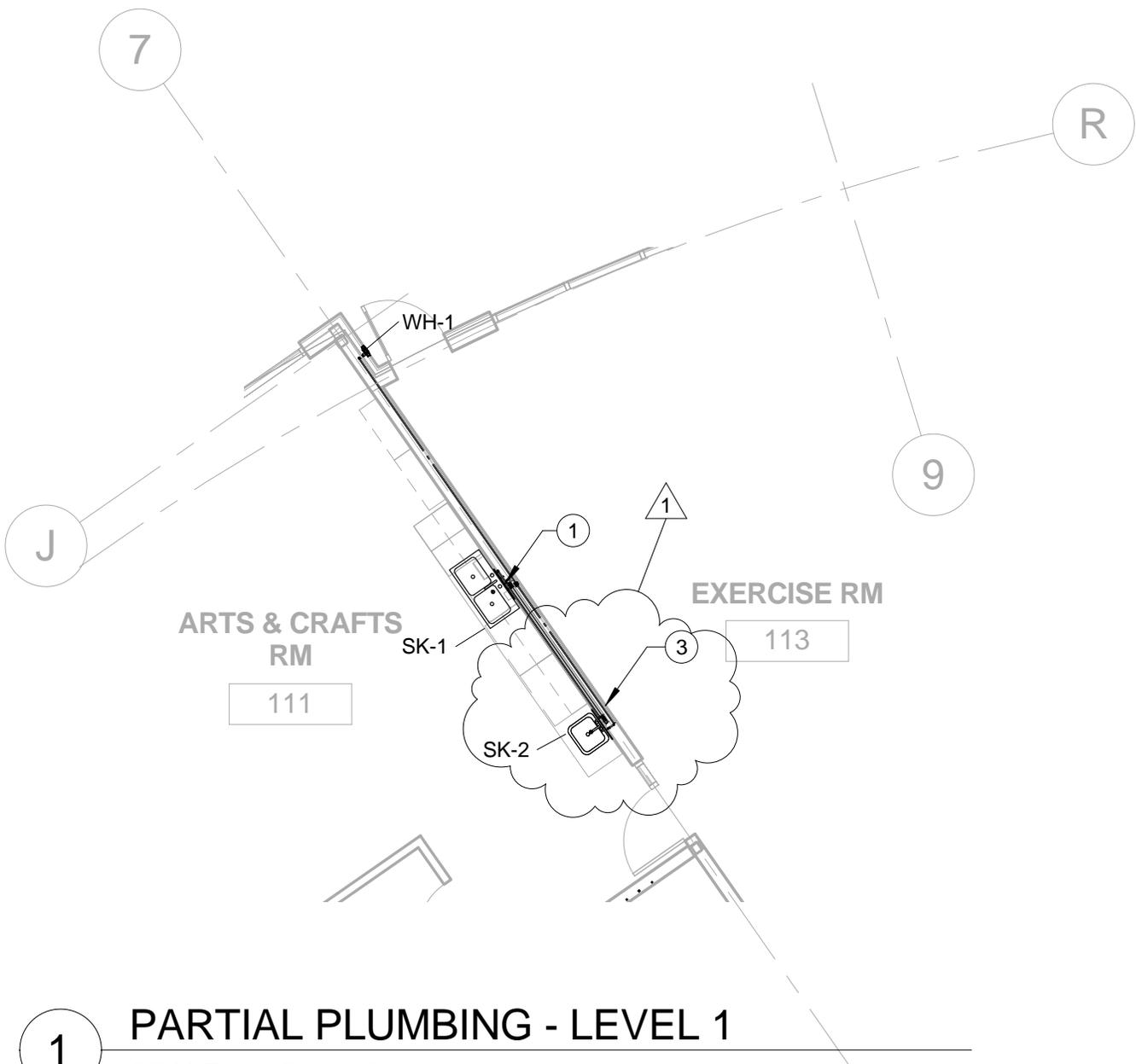
- 1 (2) 3/4" HOT WATER LINES, 3/4" COLD WATER LINEUP.
- 2 3/4" HOT AND COLD WATER LINE, 2" WASTE LINE UP.
- 3 3/4" HOT WATER, 3/4" HOT WATER RETURN , 3/4" COLD WATER LINES AND 2" WASTE LINE UP.
- 4 DOMESTIC WATER PIPING UNDER FLOOR SHALL BE TYPE K SOFT COPPER NO JOINTS BELOW SLAB.
- 5 2" WASTE LINE UP.



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DATE 2015-01-30  
 REVISION ADD #2  
 CHECKED BY DTA  
 SHEET P1.01A

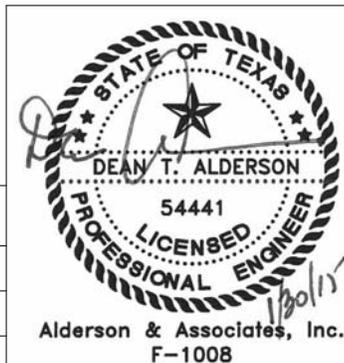


**1 PARTIAL PLUMBING - LEVEL 1**  
 SCALE: 1/8" = 1'-0"

**KEYED NOTES**

(THIS SHEET ONLY) ○

- 1 3/4" HOT WATER SUPPLY, 3/4" HOT WATER RETURN 3/4" COLD WATER LINES UP FROM BELOW FLOOR, RUN 3/4" COLD WATER LINE TO WALL HYDRANT AT 12" ABOVE FLOOR, 2" WASTE LINE DOWN TO BELOW FLOOR. 2" VENT LINE UP TO VTR. PROVIDE PVC DRUM TRAP.
- 2 3/4" HOT WATER RETURN, 3/4" HOT WATER SUPPLY AND 3/4" COLD WATER UP AND DOWN TO BELOW FLOOR.
- 3 RUN 3/4" HOT AND COLD WATER LINES, 2" VENT ABOVE FLOOR FROM SINK, DROP 2" WASTE LINE DOWN TO BELOW FLOOR.



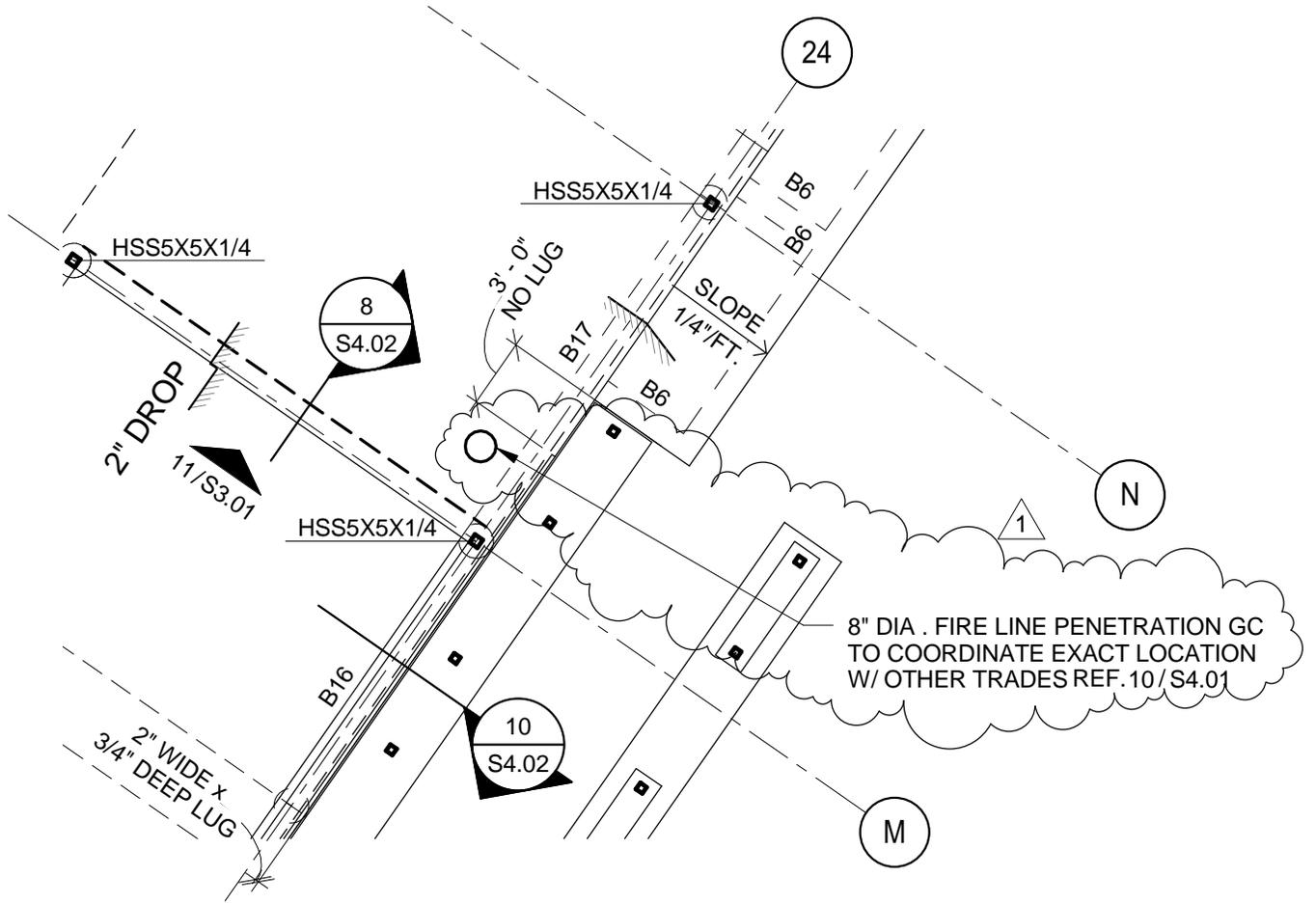
7700 Torino St, Suite 101  
 San Antonio, TX 78229  
 Telephone: 210.614.1110  
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 F-1008

DISTRICT 3  
 COMMUNITY CENTER

CITY OF SAN ANTONIO  
 3303 PECAN VALLEY DR.  
 SAN ANTONIO, TX 78210

DATE 2015-01-30  
 REVISION ADD #2  
 CHECKED BY DTA  
 SHEET P1.02A

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 F-1008



# PARTIAL FOUNDATION FRAMING AND BOTTOM REINFORCING PLAN - AREA 2

1

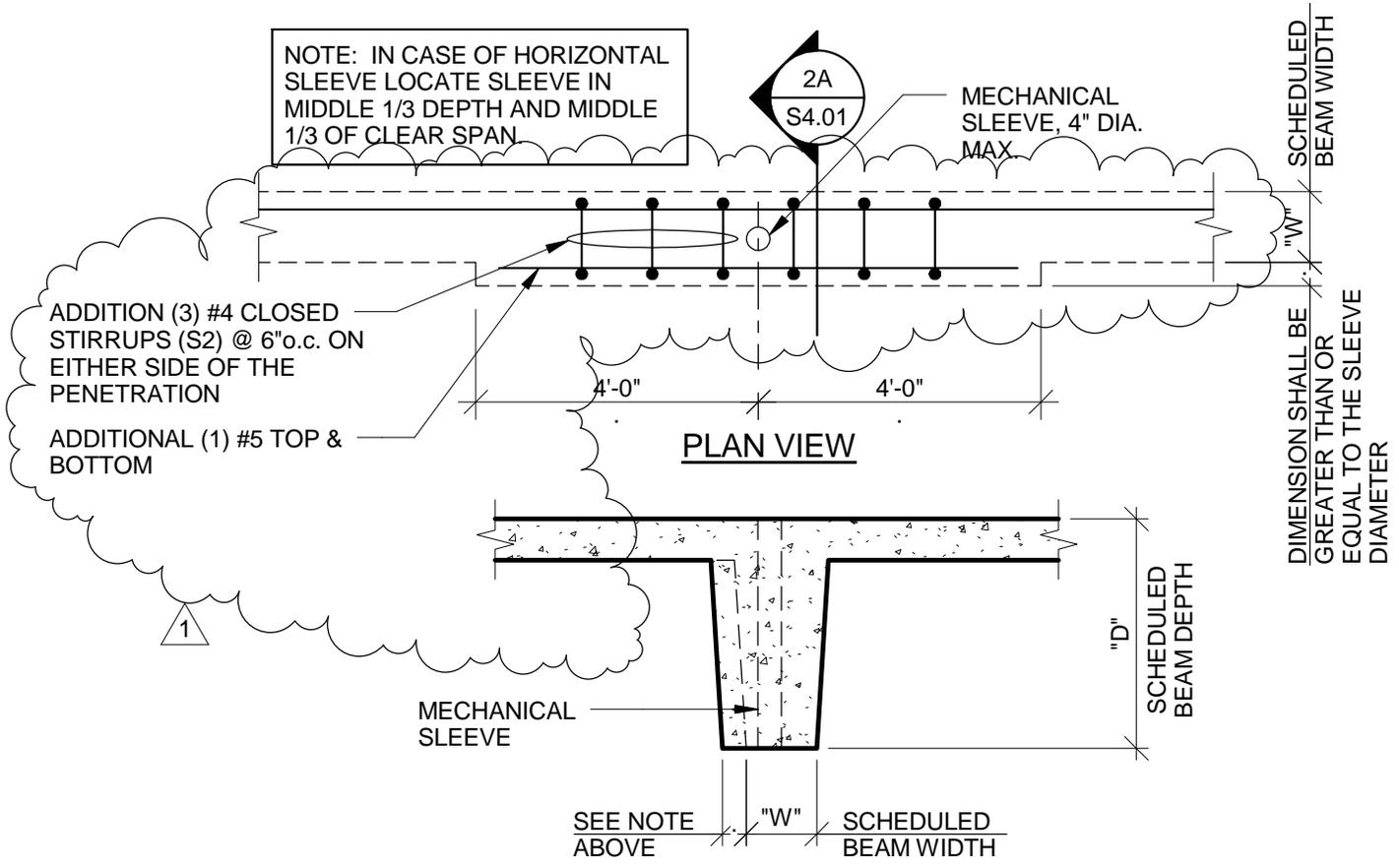
SCALE : 1/8" = 1'-0"

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1/30/15

 <b>ALPHA</b> Consulting Engineers, Inc. STRUCTURAL ENGINEERS 13300 OLD BLANCO ROAD, SUITE 326 SAN ANTONIO, TEXAS 78216 TEL: (210) 227-3647 www.alphaconsultingengineers.com	SUBJECT <u>PARTIAL FOUNDATION PLAN - REF. S2.04</u> PROJECT <u>DISTRICT 3 COMMUNITY CENTER</u> BY <u>AG</u> PROJECT No. <u>13-04</u> CHECK <u>ASK</u> DATE <u>01/30/15</u>	SHEET <b>ADD#2</b> <u>S1</u> OF



TYPICAL SECTION "2A"  
**MECH. SLEEVE PENETRATION DETAIL**

2 2A

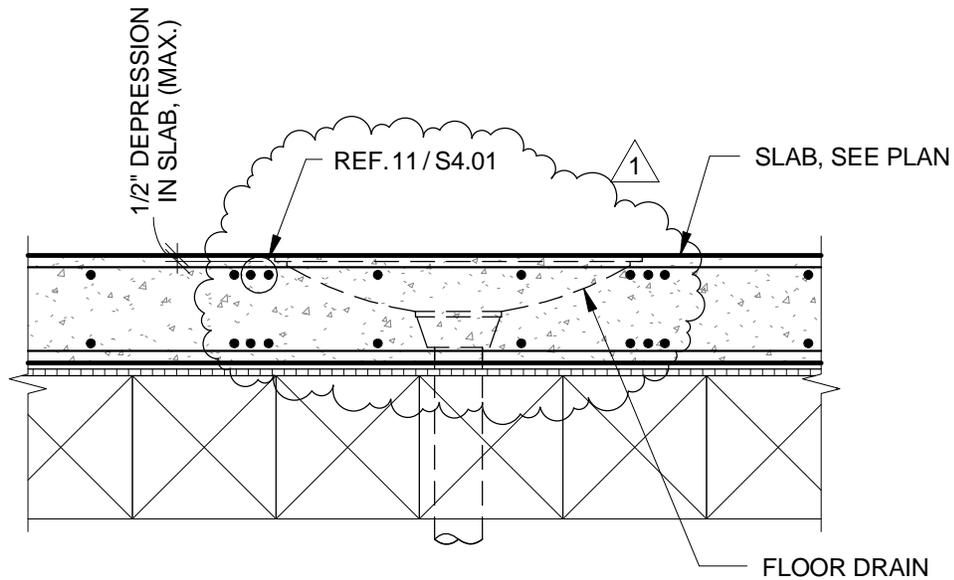
SCALE : 3/4" = 1'-0"

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	PROJECT <u>DISTRICT 3 COMMUNITY CENTER</u>	
BY <u>AG</u> PROJECT No. <u>13-04</u>	CHECK <u>ASK</u> DATE <u>01/30/15</u>	



**NOTE:**  
 1. REFER TO MEP/ARCH. DWGS. FOR FLOOR DRAIN SIZE AND LOCATION.  
 2. ALL FLOOR DRAINS TO BE CAST IN CONCRETE SLAB.

**7 TYP. FLOOR DRAIN DETAIL**  
 SCALE : 3/4" = 1'-0"

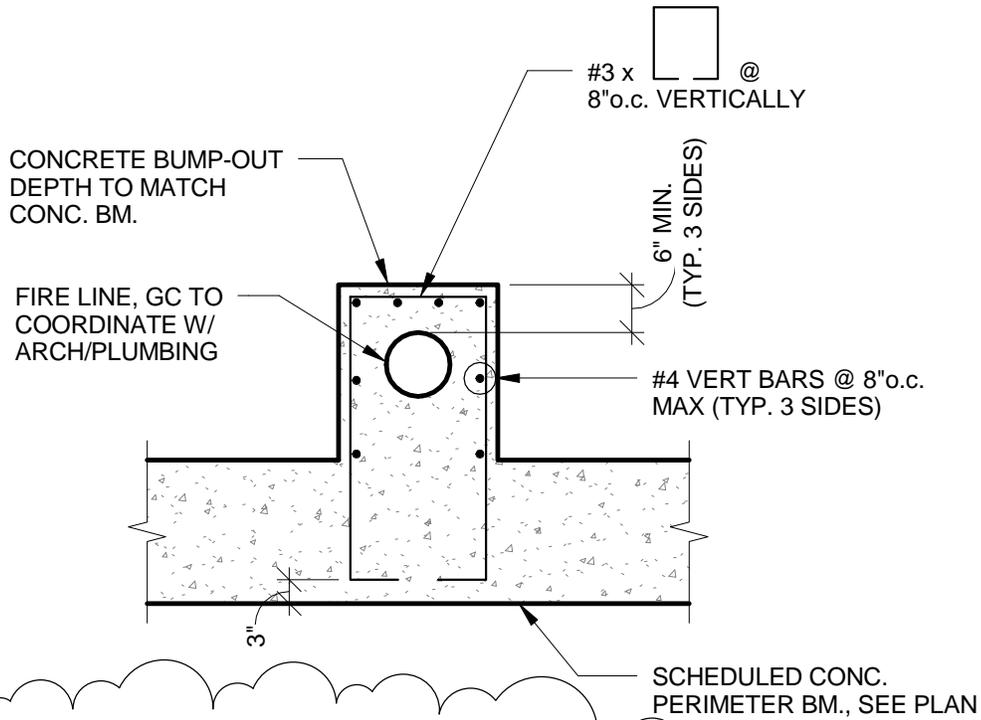
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AMOLPRASAD S. KULKARNI  
 114870  
 LICENSED PROFESSIONAL ENGINEER  
*A. Kulkarni*  
 1/30/15

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SUBJECT REVISED SECTION 7/S4.01  
 PROJECT DISTRICT 3 COMMUNITY CENTER  
 BY AG PROJECT No. 13-04  
 CHECK ASK DATE 01/30/15

SHEET  
**ADD#2**  
S3  
 OF



**10** **8" DIA. FIRE LINE  
PENTRATION IN FIRE RISER ROOM** 1

SCALE : 1/2" = 1'-0"

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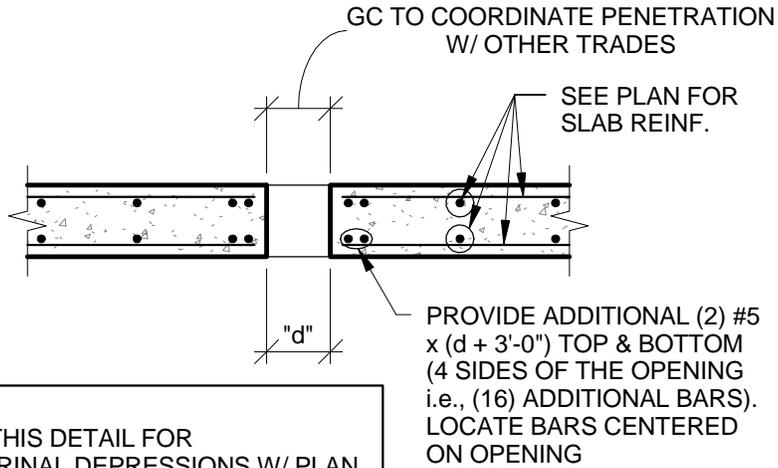
*A. Kulkarni*  
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SUBJECT NEW SECTION 10/S4.01  
PROJECT DISTRICT 3 COMMUNITY CENTER  
BY AG PROJECT No. 13-04  
CHECK ASK DATE 01/30/15

SHEET  
**ADD#2**  
**S4**  
OF



**NOTE:**  
 1. FOLLOW THIS DETAIL FOR OPENINGS/URINAL DEPRESSIONS W/ PLAN DIMENSION  $\geq 8"$

1

11

TYPICAL DETAIL

SCALE : 1/2" = 1'-0"

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1/30/15

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