



## &lt;Addendum #4&gt;

NJSDA  
1 West State Street  
Trenton, NJ 08625  
Phone: 609-292-8775  
**Fax: 609-656-4642**

**Date: September 14, 2012**

**PROJECT #: EL-0006-C01**

**DESCRIPTION: Elizabeth Academic High School**

This addendum shall be considered part of the Bid Documents issued in connection with the referenced project. Should information conflict with the Bid Documents, this Addendum shall supercede the relevant information in the Bid Documents.

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**A. RFI QUESTIONS & NJSDA ANSWERS**

**A.1 Question:** Drawing A-102A, Music Ensemble – 261: The prefabricated sound conditioned practice rooms are not sized. Please provide dimensions (length, width, height)

**Answer:** See specification Section 13034. System shown in drawings is Wenger Corporation's VReady Sound Module. Dimensions are shown on attached sketch ASK-159 (Attachment #1). Typical internal ceiling height per manufacturer is 7'-6".

**A.2 Question:** The window types are missing on most of the exterior elevation drawings.  
a. Drawing A-202, Elevation 2 – all of the windows with metal panel system.  
b. Drawing A-203, Elevations 1 & 2 – all of the windows with metal panel system.  
c. Drawing A-204, Elevations 1, 2 & 3 – all of the windows with metal panel system.  
d. Drawing A-205, Elevations 1, 2, 3, 4, 5, 6, 7 & 8 – all of the windows within the curtain wall system.  
e. Drawing A-206, Elevations 3, 5, 6, 8, 9, 10 & 11

**Answer:** Curtain wall system is not a window system; no window types provided. Windows in metal panel wall system as noted to match metal panel type 'A.'

**A.3 Question:** Specification Section 10270 – Access Flooring is included with the bid documents. This item cannot be found on the drawings. Please clarify if Access Flooring is required, and if so – where.

**Answer:** Access flooring has been deleted from the project.

**A.4 Question:** Specification Section 10615 – ‘Metal & Glass Partitions’ is included with the bid documents. This item cannot be found on the drawings. Please clarify if Metal & Glass Partitions are required, and if so – where.

**Answer:** Section 10615 is not necessary and will be omitted. For interior glass, see section 08110.

**A.5 Question:** The overhead doors and overhead shutters are not referenced on the door schedule. Please clarify. Also from reviewing the drawings we have found an OH door or shutter tagged as ‘OD04’ on Drawing A624, but this type of door is not listed in the specification. Please provide an OH door and shutter schedule and clarify what ‘OD04’ represents? If we do not obtain the clarification for OD04 we will figure this opening as and OD01

**Answer:** Overhead door specification section 08330 indicates three types (OD01-OD03). OD04 in this instance is changed to OD01.

**A.6 Question:** The following doors were shown in plan but were not on the door schedule. Please provide details on these openings:

- a. 166A Auditorium to Exterior
- b. 175D Vestibule to Gym
- c. 183C Boys Locker Room to Gym
- d. 187AA Gym Storage
- e. 190C Girls Locker Room to Gym
- f. 175C Vestibule to Gym
- g. 176D Vestibule to Auxiliary Gym
- h. 129BF Storage Closet
- i. 366A Law + Forensic Storage
- j. 270B Dark Room

**Answer:** Door Schedule will be revised in next addendum to include the missing doors with the details indicated for similar doors.

- a. Door 166A similar to 172B
- b. Door 175D similar to 175A
- c. Door 183C similar to 190B
- d. Door A87AA similar to 190A
- e. Door 190C similar to 190B
- f. Door 175C similar to 175B
- g. Door 176D similar to 176A
- h. Door 129BF is to be access door type ADR01, 1’-6”wX4’-0”h. provide flush key lock cylinder.
- i. Door 366A similar to 380A
- j. Door 270B is specified in section 11470 Photography Equipment.

- A.7 Question:** The following doors were scheduled but not shown in plan. Please verify if these doors are required and the wall type they are in.
- a. 198A
  - b. 210AA
  - c. 228A

**Answer:** Door Schedule will be revised in next addendum to include the following:

- a. Door 198-A to be deleted from schedule.
- b. Door 210A-A to be deleted from schedule.
- c. Door 228-A to be deleted from schedule.

- A.8 Question:** On Drawing 1/A312 walls around Girls/Boys Locker Rooms 184 &191 show walls to be M6 masonry. Looking at room elevations 9, 10, 11 on A601, show Abuse Resistant GWB on walls. Also Locker Room 190 Elevations 6, 7, 8 on A601, show Abuse Resistant GWB on walls. Are these masonry walls or GWB walls?

**Answer:** Locker Room walls to be painted M6 masonry.

- A.9 Question:** The following openings are on the plan, but not the door schedule. Kindly provide all information: 129B-F, 166-A, 175-C, 175-D, 176-D, 183-C, 187A-A, 190-C and 366-A..

**Answer:** See Answer for Question A.6 in this Addendum #4. Door 175-D should have the same details as 175-A. Door Schedule will be updated accordingly for the next addendum.

- A.10 Question:** The following openings are on the door schedule, but not found on the plan. Are these required? (120-A, 198-A, 210-A, 228-A, 365-A, windows M-10 through M-16 and M-35)

**Answer:** For doors 166-A, 175-C, and 175-D, see Answer for Question A.7 in this Addendum #4. Door 365-A can be found on the plan at gridlines D.1 and 13.5. Window M-10 appears on 6/A-608. Windows M-11 to M-16 appear on 3/A-602. Door 120-A is located east of door 120-B (see Attachment #2 - sketch ASK-158) and is to match door 120-B.

- A.11 Question:** Openings 190-B and 378-A are singles on the plan, but pairs in the door schedule. Which is correct? 373-A is a pair on the plan, but a single in the door schedule. Which is correct?

**Answer:** Plan is correct. Door Schedule will be updated accordingly for the next addendum.

- A.12 Question:** Openings 368-A and 454-A are four leaf sliders on the plan, but six leaf in the schedule. Which is correct?

**Answer:** Plan is correct. Door Schedule will be updated accordingly for the next addendum.

- A.13 Question:** Interior windows M-28, M-37, M-38 and M-39 have details that show hollow metal frames, but they occur at doors 319-A and 455-A which are aluminum doors and frames. Please confirm these are aluminum frames and not hollow metal.

**Answer:** All interior doors and frames are hollow metal frame.

**A.14 Question:** On the east wall of room 264, elevation 3/A-605 calls the window off as type M-29. Elevation 3/A-624 calls this window off as a type M-34. Which is correct?

**Answer:** Window type M-29 is correct.

**A.15 Question:** On the south wall of room 255, elevation 18/A-601 calls these windows off as type M-02. Elevation 6/A-608 calls them off as type M-10. Which is correct?

**Answer:** Window type M-10 is correct.

**A.16 Question:** On the east wall of room 255, we need the window types for these windows.

**Answer:** See 3/A-602 for window types.

**A.17 Question:** On the wall between rooms 201 and 203, we need the window type for this window.

**Answer:** This will be window type M-02.

**A.18 Question:** The following exterior openings show on the door schedule as HM/GL door with HM frame. The details for these openings, however, show aluminum doors and frames. Please clarify if these are aluminum or hollow metal. Opening numbers 101-A, B, C, D & E, 123-B, 128-B, 130-A & B, 132A-A, 159-C & D, 162-A & B, 172-B, 179-B and 180-B.

**Answer:** For doors 101-D, E, 123-B, 128-B, 130-A & B, 132A-A, 159-C & D, 172-B, 179-B and 180-B the answer is: All exterior windows are aluminum. All interior windows and doors are hollow metal. All exterior entrance doors are aluminum and glass. All exterior auxiliary doors are hollow metal.

Doors 101-A & B are to be HM.

Door 101-C is to be hollow metal.

Doors 162A & B do not exist and will be removed from the door schedule.

**A.19 Question:** 101-A and 101-B are adjacent to window M-05, which shows hollow metal details. Please clarify whether M-05 is aluminum or hollow metal.

**Answer:** These are to be HM.

**A.20 Question:** The drawings do not show any sizes for the Fire Shutters (10) in the 3rd and 4th Floor Science Rooms and the Exterior Rolling Steel Door on the south side of the 1st Floor. Please provide.

**Answer:** Shutters at Science rooms to be coordinated with fume hood per details A8 7 D8 / A-520. For the Exterior Rolling Steel Door on the south side of the 1st Floor, the MO is to be 7'-4 3/8" w X 8'-10 3/8" h.

**A.21 Question:** Please provide the size and specifications for the door type in the Cafeteria labeled OD04.

**Answer:** See interior and exterior elevations for overhead door types, locations & details (example, 3/A-204). Also see Answer to Question A.5 of this Addendum #4.

**A.22 Question:** Drawing L-101B shows landscaping for a parking lot located on east side of the Morrell Street and refers to Civil Drawings for its details. There are no civil drawings for the same. Please provide the Civil Drawings for the parking lot.

**Answer:** Work at the east parking lot has been removed from the project.

**A.23 Question:** Windows frame mark W-02 through W-09 are indicated as glass type GL09, which is laminated glass, yet the details show 1" insulated glass. Which is correct?

**Answer:** The details are typical, specific glass types noted should be followed.

**A.24 Question:** Reference is made to General Conditions Article 19.2 which differs from specification section 01850 in terms of their stated warranty periods. Please confirm whether the warranty period for this project is for one or two years.

**Answer:** One year. See Addendum #3 - B.3 issued 9/11/12.

**A.25 Question:** Please advise/clarify that only ceiling areas designated "I" PT 05 and "K" PT 08 require intumescent paint.

**Answer:** Intumescent paint is also required at areas as indicated by Fireproofing notes 3 & 5 on G-003.

**A.26 Question:** Please clarify if the unsuitable soils have to be removed and replaced for the entire identified area per legend and general note #1 on S1-101 or for the areas only below foundations within identified area as shown in "Typical Foundation" detail on S1-101.

**Answer:** Refer to revised Specification Section 02200 – Earthwork dated August 3, 2012, issued in Addendum #2, dated August 29, 2012.

**A.27 Question:** Please be advised that the frames that occur in the Courtyard Areas are utilizing fire rated glazing type GL04 (60 minute fire rating) within an aluminum curtain wall system. This will mean that a fire rated curtain wall system must be used (system may be steel in lieu of aluminum) and dimensionally may vary; also the doors will differ from the bid documents as well. Is this acceptable?

**Answer:** Where exterior wall is required to be 1-hour rated, the rating only applies to the solid portion of the wall. Windows and doors are considered protected openings and not required to be of rated construction.

**A.28 Question:** With reference to the Courtyard curtain wall frames, it has been mentioned that the sizes of the daylight opening heights for the glass may have to be reduced to meet testing and specified requirements. Please advise how we are to proceed.

**Answer:** If required, mullion and glass thickness to be increased to meet performance requirements.

**A.29 Question:** We have been advised that operable casement windows cannot be used in this application when employing a 60 minute fire rated curtain wall system and fire rated glazing. Please advise how we are to proceed.

**Answer:** See Answer to Question A.27 above in this Addendum #4.

**A.30 Question:** Due to the architectural drawings being printed very light, many suppliers have asked to clarify the quantity of all operable casement vent windows. Are all openings to be operable, if not please advise where the fix units are located.

**Answer:** Drawings A-202 through A-206 were issued in pdf format (electronically) in Addendum #3, dated 9/11/12 as "Attachment #2".

**A.31 Question:** The following rooms show or indicate casework but elevations or details cannot be found. Please provide the following Drawings:

- a. Drawing A-101A – Room #167
- b. Drawing A-101B – Room #111
- c. Drawing A-102A – Room #217, #231, #260A
- d. Drawing A-103A – Room #352
- e. Drawing A-103B – Room #311
- f. Drawing A-104A – Room #451
- g. Drawing A-104B – Room #411

**Answer:** As per General Note #2, see typical elevations on 19/A-603. Tag in plans will indicate which of the four elevations applies to that particular millwork: 2-19A through 2-19D.

- a. Room #167: 2-19B.
- b. Room #111: 2-19B.
- c. Room # 217: 2-19B. Room #231: 2-19A. Room #260A: 2-19A.
- d. Room #352: 2-19A.
- e. Room #311: 2-19A.
- f. Room #451: 2-19A.
- g. Room #411: 2-19A.

**A.32 Question:** Typical for all Science Labs. Please provide information and details of the cabinets required under teacher's instructor's desk and student tables.

**Answer:** Provide the following for the Teachers Work Station (revised spec to be issued):

Kewaunee model #T31W363096 96" Instructor's Demonstration Bench & #T35W313048 Instructor's Bench Desk with Keyboard Tray, consisting of:

#T31W363096

Sink:

- (1) 1003-00 Kemresin Sink – 11" H x 15" W x 18" L I.D.
- (1) 0482-BP 11/2" I.P.S. Sink Outlet

Electric Fixtures:

- (1) 0656-01 120 VAC GFI Duplex Receptacle

Fittings:

- (2) W-0337-0V Cold Water w/VB Gooseneck
- (1) W-0263-00 Double Outlet Service Fitting
- (2) 0548-00 Rod Sockets (1) 4740-00 Upright Rod Assembly

#T35W313048

(1) D90W302218- 3-Drawer Cabinet w/Pull Board

(1) A80W002220-00\_0 Frame with Keyboard Tray– 29" L

(1) G70W240647-00\_0 Book Shelf 6" D x 26" H x 47" L

**A.33 Question:** Reference Typical Cabinet Elevations which show separate cabinets. Can combined cabinets be used to achieve the same visual elevation in lieu of individual cabinets?

**Answer:** Substitutions cannot be made during the bid process as there isn't adequate time to review and distribute them.

**A.34 Question:** On the plan A102A 2nd FL there are 372 fixed seats and 61 removable seats marked with "R". In Section 12620 specifications there does not seem to be any specification for these seats. Please provide.

**Answer:** All seating is to be of the same system – both the fixed and removable "R" seats.

## **B ADDENDUM TO SPECIFICATIONS AND DRAWINGS**

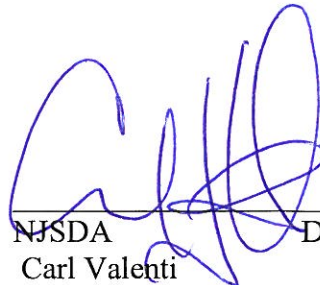
### **B.1 Specification Section 18100 – General Commissioning Requirements**

In Volume 3 of 3 of the Project Manual, replace Section 18100 – General Commissioning Requirements, dated July 13, 2012 Issued for Bid with:

Attachment #3 – Section 18100 – Commissioning Requirements, dated September 13, 2012 – Issued for Addendum #4

### **End of Addendum No. #4**

Any bidder attempting to contact government officials (elected or appointed), including NJSDA Board members, NJSDA Staff, and Selection Committee members in an effort to influence the selection process may be immediately disqualified.

  
\_\_\_\_\_  
NJSDA Date  
Carl Valenti 9.13.12

<Addendum #4>

NJSDA  
1 West State Street  
Trenton, NJ 08625  
Phone: 609-292-8775  
**Fax: 609-656-4642**

**Date:** September 14, 2012

**PROJECT #:** EL-0006-C01

**DESCRIPTION:** Elizabeth Academic High School

Addendum No. 4

**Acknowledgement of Receipt of Addendum**

Contractor must acknowledge the receipt of the Addendum by signing in the space provided below and returning via fax to 609-656-4642, or in an attachment via E-mail to [djohnson@njsda.gov](mailto:djohnson@njsda.gov). Signed acknowledgement must be received prior to the Technical Proposal and Price Proposal Due Date. Acknowledgement of the Addendum must also be made in the Technical Proposal Submission.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Company Name

\_\_\_\_\_  
Date





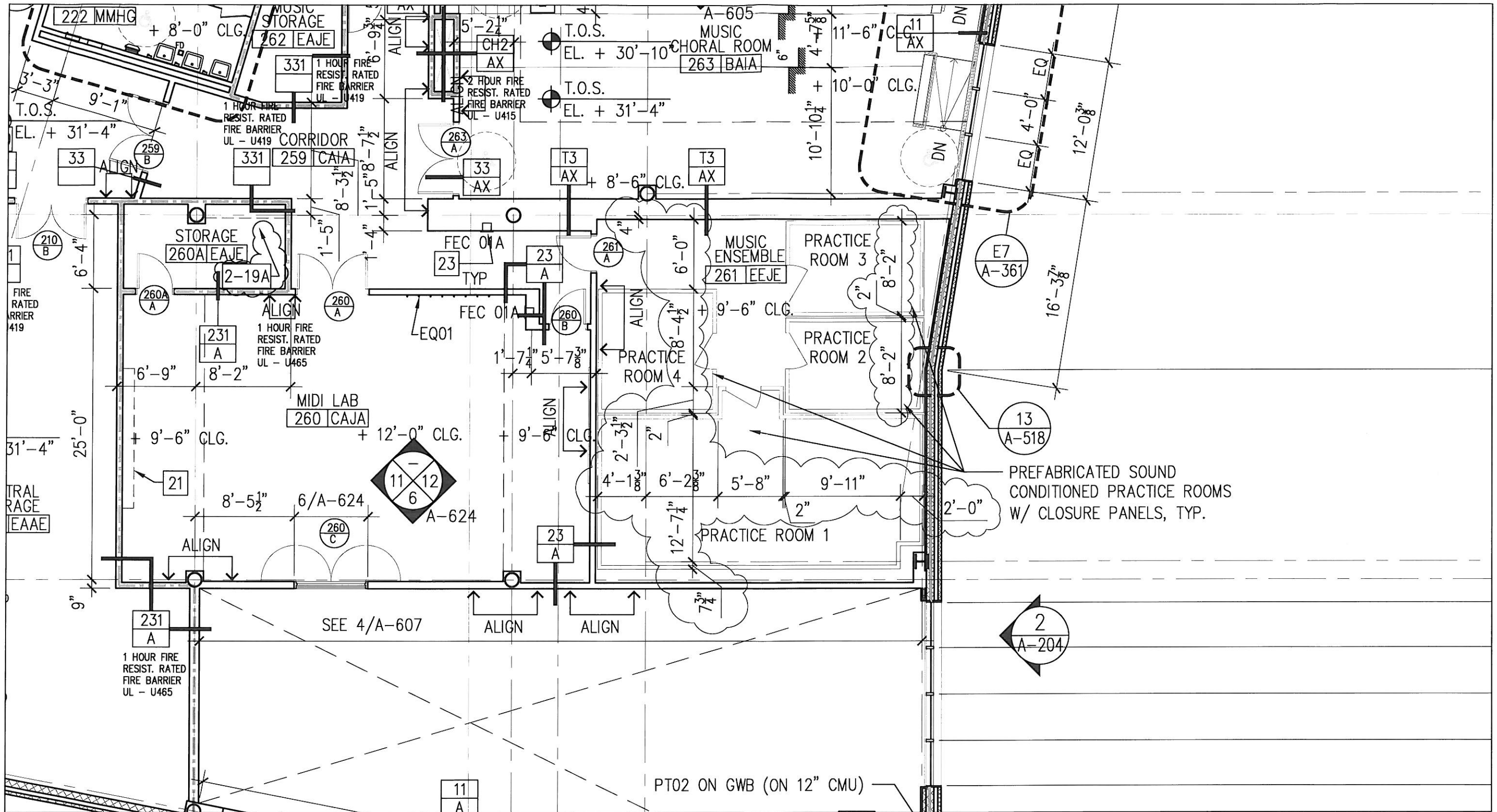
**Elizabeth Academic High School**  
Elizabeth School District

EL-0006-C01

Addendum #4

Attachment #1 – Sketch ASK-159

9/14/12



PROJECT:  
**ELIZABETH ACADEMIC HIGH SCHOOL**  
**SOM**  
 Skidmore, Owings & Merrill LLP  
 14 Wall Street, New York, New York 10005

TITLE:  
 MUSIC PRACTICE ROOMS DIMENSIONED

SCALE: 1/8" = 1'-0"	SKETCH NO.:
DATE: 9/10/2012	ASK-159
DRAWN BY: YB	REF DWG: A-102A



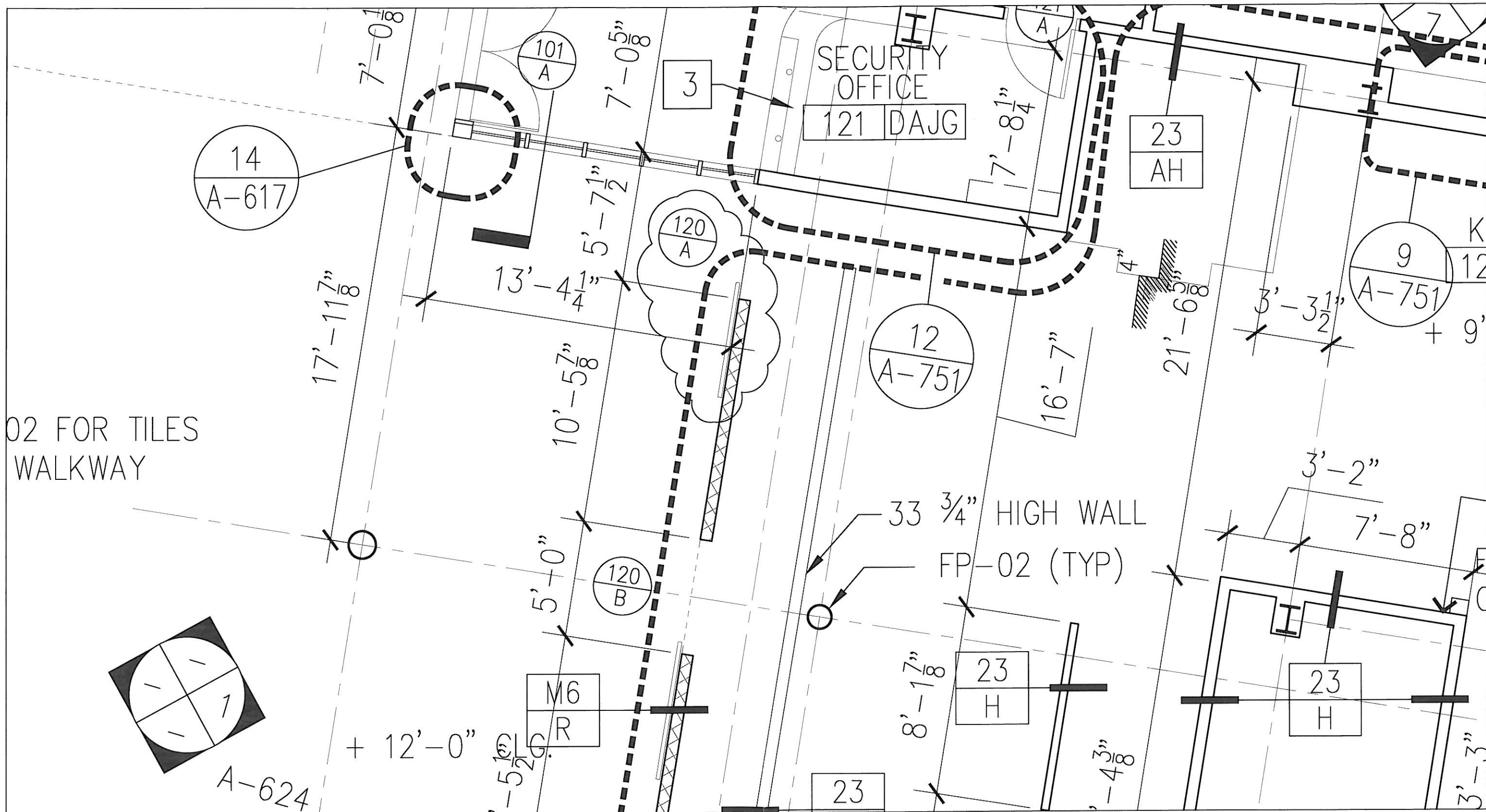
**Elizabeth Academic High School**  
Elizabeth School District

EL-0006-C01

Addendum #4

Attachment #2 – Sketch ASK-158

9/14/12



PROJECT:  
**ELIZABETH ACADEMIC HIGH SCHOOL**

**SOM**  
 Skidmore, Owings & Merrill LLP  
 14 Wall Street, New York, New York 10005

TITLE:  
 MISSING SLIDING DOOR SHOWN: 120-A

SCALE: 1/4" = 1'-0"	SKETCH NO.:
DATE: 9/10/2012	ASK-158
DRAWN BY: YB	REF DWG: A-101B



**Elizabeth Academic High School**  
Elizabeth School District

EL-0006-C01

Addendum #4

Attachment #3 – Revised Specification  
Section 18100

9/14/12

## SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS

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### PART 1 - GENERAL

#### 1.1. DESCRIPTION

- A. Summary. Commissioning (Cx) is a systematic process of ensuring that all building systems perform interactively according to the design intent included in the contract documents and the owner's operational needs. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.
- B. Purpose. Commissioning during the construction phase is intended to achieve the following specific objective according to the Contract Documents:
1. Verify that applicable equipment, components, and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards, requirements in the contract documents and that they receive adequate operational checkout by installing contractors and approval by the Commissioning Authority (CxA).
  2. Verify and document proper performance of equipment, components, and systems.
  3. Verify that the Owner's operating personnel are adequately trained in compliance with the Training Plan.
  4. Verify that O&M documentation is complete, properly assembled, and incorporated into the Systems Manual.

#### 1.2. COORDINATION

- A. Commissioning Team. The members of the commissioning team consist of the designated representative of the NJSDA, the Construction Manager (CM), the Commissioning Authority (CxA), the Design Consultant and their respective design subconsultants, the Contractor and their related Subcontractors and related vendors.
- B. Coordination In concert with the Contractor, the CxA oversees and coordinates the commissioning activities. It is the responsibility of all members of the Commissioning Team to work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents and the Commissioning, Test, and Training Plans.
- C. Scheduling. The CxA will work with the Cx team according to established protocols to schedule the commissioning activities. The CxA will provide sufficient notice to the Cx team for scheduling commissioning activities. The Contractor will integrate all commissioning activities into the construction schedule and assist the CxA in assuring all Cx activities occur as scheduled. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process.

#### 1.3. COMMISSIONING PROCESS

- A. Guidelines and Quality Assurance
1. The Scope of Services for Building Commissioning is located at the end of this specification section and includes Parts 1, (2 is not applicable) and 3 in their entirety. Integrated building commissioning services and associated documentation

## SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS

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shall be performed as per the procedures, methods, requirements and documentation described by the following:

- a. ASHRAE Guideline 0 - 2005
- b. ASHRAE Guideline 1.1 - 2007
- c. ASHRAE Guideline 4 - 2008
- d. USGBC-LEED Version 2.0 EA Prerequisite 1: Fundamental Building Systems Commissioning

B. Commissioning Process: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.

1. Commissioning for the Commissioning Team during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
2. Additional meetings will be required throughout construction, scheduled by the CxA and Contractor with necessary parties attending, to plan, scope, coordinate, schedule future activities and resolve problems.
3. Equipment shop drawings and other documentation is submitted to the CxA during normal submittals, including detailed start-up procedures defined by the CxA and the Commissioning Plan.
4. The CxA works with the Contractor and their subcontractors/equipment suppliers in developing startup plans and startup documentation formats.
5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with installation and pre-functional checklists being completed before functional and performance testing.
6. The Contractor and their subcontractors, under their own direction, execute, and document the pre-functional checklists and perform startup and initial checkout. The CxA reviews, verifies, and documents that the checklists and startup were completed according to the approved plans. This will include the CxA witnessing start-up of selected equipment.
7. The CxA applies appropriate sampling techniques to verify that start-up and initial checkout of all Commissioned equipment is successfully completed.
8. The CxA develops specific equipment and system functional and performance test procedures. The Contractor and their subcontractors review and comply with the agreed upon procedures.
9. The procedures are executed and documented by the Contractor and their subcontractors, under the direction of the CxA. The CxA reviews all related documentation for acceptable content and approval.
10. Items of non-compliance in material, installation, function, performance, or setup are to be corrected at the Contractor and their subcontractors' expense and they must

## **SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS**

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bear the cost of system retesting until accepted by the CxA and other responsible parties.

11. The CxA reviews the O&M documentation for completeness and consistency with the Training Plan.
12. The CxA reviews, pre-approves and coordinates the training provided by the Contractor and their subcontractors and verifies that it is consistent with the Training Plan and contract documents and was properly completed.
13. Deferred testing is conducted, as specified or required.
14. Commissioning is not complete until the completion of the Post Occupancy Phase and the CxA has recommended final building component, system, equipment acceptance in the Final Commissioning Report and not until the CxA has provided a signed letter of certification confirming that the Commissioning Plan has been successfully executed and the design intent of the building has been achieved.

### 1.4. RELATED WORK

- A. Specific Commissioning (Cx) requirements are given in the following sections of these specifications. All of the following sections apply to the Work of this section:

15996 Plumbing Cx	Describes the Cx responsibilities of the Plumbing Contractor and the installation, pre-functional, startup and performance testing responsibilities.
15995 HVAC Cx	Describes the Cx responsibilities of the Mechanical Contactor, Controls and TAB Contractors the installation, pre-functional, startup and performance testing responsibilities of each.
16995 Electrical Cx	Describes the Cx responsibilities of the Electrical Contractor and the installation, pre-functional, startup and performance testing responsibilities.

### 1.5. RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this section. It is noted that the services for the CM, Design Consultant, and Commissioning Authority are not provided for in this contract. That is, the Contractor is not responsible for providing their services. Definition of the role of the CM, CxA, Design Consultant and their respective design subconsultants are provided for information purposes only. Their responsibilities include but are not limited to those listed here to clarify the commissioning process.

B. All Parties

1. Follow the Commissioning (Cx) Plan.
2. Attend commissioning scoping meeting and additional Cx meetings, as necessary.



## **SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS**

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### C. Contractor, Subcontractors, and Equipment Suppliers

1. Provide all requested submittal data as defined herein, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in and or provide all equipment testing required in the Commissioning Plan, Commissioning Test Log, Training Plan, and the contract documents.
3. Include and utilize all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base bid price to the Contractor. Through the contractor, supply products to, analyze specified products, and verify that the designer has specified the newest most updated equipment reasonable for this project's scope.
4. Provide information requested by CxA regarding equipment sequence of operation and all checklists and testing procedures.
5. Review test procedures for equipment installed by authorized factory representatives.

### D. Construction Manager (CM)

1. Manage and coordinate the services of the CxA.

### E. Design Consultant and subconsultants

1. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. One site observation should be completed just prior to system startup.
2. Provide any design narrative and sequences documentation requested by the CxA. The Design Consultant shall assist (along with the Contractor and their subcontractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
3. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
4. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
5. Edit and update one-line diagrams developed as part of the design narrative documentation and those provided by the vendor as shop drawings for the various HVAC, Electrical, and Plumbing systems.

### F. Commissioning Authority (CxA)

The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the Contractor and the Design Consultant Firm. The primary role of the CxA is to develop and coordinate the execution of the Commissioning Plan, testing plan, and to observe and document performance. The Contractors will provide all

## **SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS**

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tools or the use of tools to start, check-out and functionally test equipment, their components, and systems.

1. Create a detailed and complete Project Specific Commissioning Plan defining the Cx Process during all phases of the project. Update the Cx Plan as the project progresses. The Commissioning Plan shall follow the ASHRAE Standards listed above as well as the NJSDA “Initial Commissioning Plan” document.
2. Plan, conduct, and attend Commissioning Kick-off meeting, and periodic Cx Meetings. The purpose of the Cx meetings with the Commissioning Team is to review the schedule, issues identified, review the Test / Issues Log, and track status of outstanding issues. Distribute checklists and report on their completion by contractors. The CxA will prepare Cx Process Project Reports.
3. Perform site visits, as necessary, to observe component, systems, and assemblies installation for quality control. Attend selected planning and job-site meetings to obtain information on construction progress.
4. Facilitate a controls integration meeting where all pertinent Design Consultants (specifically including representatives of the mechanical, electrical, plumbing, life-safety, and information technology disciplines) and subcontractors are present to review and discuss integration issues between equipment, systems and trades to ensure that integration issues during the various sequences of operation are compatible and responsibilities for associated work are clearly described in the specifications. This meeting shall occur prior to finalization of the Commissioning Plan.
5. Periodically review the Cx schedule and coordinate the commissioning work and, with the Commissioning Team, ensure that commissioning activities are being included into the project schedule.
6. Review submittals (shop drawings, product submittals, etc.) on systems, components, and assemblies to be commissioned concurrent with the Design Consultant’s review for compliance with project requirements and contract documents. Request and review additional information required to perform commissioning tasks, including O&M materials, control sequences, contractor start-up and checkout procedures.
7. Oversee, develop format for, witness, and review of Pre- Functional Testing and checklists. Verify and document that the Contractor and their subcontractors have completed pre-functional installation checklists.
8. Oversee, develop format for, witness, and review Start up and Checkout testing procedures. Review associated checklists and documentation start-up plans and by site observation.
9. Oversee, develop format for, witness, and review results of Installation, Functional, and Performance Testing using specific procedural forms and checklists developed for that purpose:
  - a. Installation Checks: Verification that equipment, components, and assemblies are installed properly.

## **SECTION 18100 – GENERAL COMMISSIONING REQUIREMENTS**

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- b. Functional Testing: Witness demonstrations for verification that equipment and systems have been set-up and started properly, and are all operating in accordance with the design documents, the contract documents, and Owner's needs. Functional checks include both normal and abnormal operating parameters.
  - c. Witness Testing procedures and collect, review, and verify related data (Pipe flushing and testing, duct testing, etc.)
  - d. Performance Tests: document, observe, and verify that equipment, assemblies, and systems are capable of providing rated performance in the installed condition and in the installed ambient environment.
  - e. Witness Efficiency and Capacity Testing, collect, review, and verify related data.
10. Equipment / Assemblies Sampling:
- a. The CxA applies appropriate sampling techniques to verify that start-up and initial checkout of all Commissioned equipment is successfully completed.
  - b. Components and/or systems identified in preliminary sampling by the Contractor and their Sub-Contractors as deficient shall be tested and retested until approved by the CxA as 100% complete and compliant.
  - c. All equipment is to be tested to 100% compliance, using the procedures and forms, and checklists developed by the CxA, by the Contractor and their Sub-Contractors.
11. Develop format for and maintain the Commissioning Test Log including the Issues Tracking Log and Database. Update / populate the issues database and issues database reports. Prepare periodic deficiencies reports. Review and approve Test Log and Issues Log content. Provide a report on a regular basis identifying new issues, unresolved issues and closed issues. Give written direction to the Contractor regarding corrective action that should that taken.
12. Observe, review, and verify the correct configuration of building automation system trend logs that will be used to track building performance during occupancy. Verify building automation trends utilizing independent data loggers.
13. Observe, review, and verify opposite season performance testing of the systems commissioned. Seasonal testing shall consist of executing the system's performance test.
14. Determine Training Requirements and populate Training Plan based upon information available from submittals and other sources. Review and approve the preparation and scope of the O&M manuals, warranties, tests, certifications, etc. Coordinate and verify all training is performed in conformance with the Training Plan and the contract documents.
15. During the first year of occupancy (twelve months from the date of substantial completion), return to the site at 10 months, prior to the Design Consultant's visit, into the twelve-month warranty period and review the current building operation

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with staff and the condition of outstanding issues related to the original and seasonal commissioning. Also interview facility staff and identify problems or concerns they have with operating the building as originally intended. Identify deficiencies that may come under warranty or under the original construction contract.

16. Maintain, update, and complete the Systems Manual. This process should take occur until the Final summary Cx Report is completed.
17. Provide a Final Summary Commissioning Report.
18. Recommend final building component, system, and equipment acceptance.
  - a. USGBC LEED Version 2.0 Requirement: Provide a signed letter of certification by the CxA confirming that the Commissioning Plan has been successfully executed and the design intent of the building has been achieved.

### **G. Design Consultant**

1. Facilitate the coordination of the commissioning work by the CxA, and, with the CxA and CM, ensure that commissioning activities are being included into the schedule.
2. Review and approve the final *Commissioning Plan*.
3. Attend a commissioning scoping meeting and other commissioning team meetings as needed.
4. When necessary, observe and witness pre-functional checklists, startup, functional, and performance testing of selected equipment
5. Review commissioning progress and deficiency reports.
6. Assist the CxA in resolving Test/ Issues Log and other deficiencies.

### **1.6. SYSTEMS AND ASSEMBLIES TO BE COMMISSIONED**

- A. The following list identifies systems and assemblies that must be included in the Commissioning process if applicable to this Project. Not all of the listed systems and assemblies may be required for this Project. Other project requirements, including presiding codes, regulations, and USGBC LEED Version 2.0-related requirements, may identify additional systems and assemblies that must be included in the Commissioning process for this Project.
- B. Heating, Ventilation and Air Conditioning
  1. Boilers
  2. Hot Water Heaters
  3. Exhaust Fans
  4. Energy Recovery Units

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5. Heating Ventilating Units
6. Chilled Water Pumps
7. Circulation Pumps
8. Hot Water Pumps
9. Rooftop DX Units
10. Kitchen Air Handling Equipment
11. Independent Split Systems
12. Thermostats
13. Unit Heaters
14. VAV Air Terminal Units
15. Ductwork and Pipe Insulation
16. Variable Frequency Drives (VFDs)
17. Gas leak detection systems
18. Building Automation Control System (BAS) / Energy Management Systems

### **C. Plumbing**

1. Domestic Hot Water Pumps
2. Domestic Cold Water Pumps
3. Domestic Back Flow Preventers
4. Domestic Hot Water Heaters
5. Kitchen Water Heaters
6. Domestic Water Booster Pumps
7. Fire and Jockey Pumps
8. Sump Pumps
9. Tempering Valves
10. Natural Gas System
11. Pipe Flushing and Testing

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- D. Electrical
  - 1. Lighting Control and Daylighting Systems.
  - 2. Electric Distribution
  - 3. Emergency Distribution Systems

### PART 2 – PRODUCTS – (NOT APPLICABLE)

### PART 3 - EXECUTION

#### 3.1. REPORTING

- A. The CxA will provide regular field reports, to the Commissioning Team as construction and commissioning progresses.
- B. The CxA will regularly communicate with all members of the Commissioning Team, keeping them apprised of commissioning progress and scheduling changes through memos and Cx Process Progress reports including the Issues Log.
- C. A Final Summary Commissioning Report by the CxA will be provided to the CM and SDA. All acquired documentation, logs, minutes, reports, deficiency lists, communications, findings, unresolved issues, etc., will be compiled in appendices and provided with the summary report. All completed and approved Pre-functional checklists, installation, functional, performance tests, and monitoring reports will be part of the final report.

#### 3.2. START-UP, PREFUNCTIONAL CHECKLISTS AND INITIAL CHECKOUT

- A. The following procedures apply to all equipment to be commissioned, according to Section 1.6, "Systems to be Commissioned". The CxA shall either accept the content listed below, require use of an acceptable mutually agreed upon format or checklist, or implement a format or checklist for the same content based upon their expertise.
  - 1. Installation check sheets / lists
  - 2. Pre-functional checklist.
  - 3. Start-up: The start-up plan shall consist of:
    - a. The CxA's prefunctional checklist.
    - b. The manufacturer's standard start-up procedure
    - c. The manufacturer's standard field checkout sheets.
- B. Execution of Pre-functional Checklists and Startup.
  - 1. The Contractor, their subcontractors, and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed start-up and pre-functional tests and checklists
  - 2. The CxA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are multiple units. In no case will the number of units witnessed be less than 25% of the total number of identical or very similar units.

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3. For lower-level components of equipment, (e.g., unit heaters, sensors, controllers), the CxA shall observe a sampling of the pre-functional and start-up procedures. The sampling procedures are identified in the commissioning plan.

### **C. Deficiencies, Non-Conformance and Approval in Checklists and Startup.**

1. The Contractor and their subcontractors shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Commissioning Team.
3. The CxA, CM, and Design Consultant shall work with the Contractor, their subcontractors, and vendors to correct and retest deficiencies or uncompleted items.
4. The installing Contractor, their subcontractors, or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner.
5. Contractor and their subcontractors shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated start-up report and a Statement of Correction on the original non-compliance report.
6. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system.

### **3.3. FUNCTIONAL AND PERFORMANCE TESTING**

- A. This sub-section applies to all commissioning functional and performance testing for all divisions.
- B. The general list of equipment to be commissioned is found in Section 1.6 of this specification
- C. Objectives and Scope.
  1. The objective of functional and performance testing is to demonstrate that each system is operating according to the documented design intent and the construction documents.
  2. In general, functional testing is conducted after pre-functional testing and startup has been satisfactorily completed. The control system is sufficiently tested and approved by the CxA before it is used for testing and balancing (TAB) or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to Subcontractor systems to integrated systems.
  3. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
  4. Functional and performance testing facilitates bringing the systems from a state of Substantial Completion to full dynamic operation. Additionally, during the testing

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process, areas of deficient performance are identified and corrected, improving the operation, performance, and functioning of the systems.

5. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required.

### **D. Development of Test Procedures.**

1. Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters.
2. The CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system.
3. Each Subcontractor or vendor responsible to execute a test shall provide assistance to the CxA in developing the review procedures.
4. Prior to execution, the CxA shall provide a copy of the test procedures to the Subcontractor(s) who shall review the tests for feasibility, safety, equipment and warranty protection.
5. The CxA shall review owner-contracted, factory testing, or required owner acceptance tests which the CxA is not responsible to oversee, including documentation format.
6. The CxA shall determine what further testing or format changes may be required to comply with the *Specifications, Test Plan, and the Commissioning Plan*. Redundancy of testing shall be minimized.

### **E. Coordination and Scheduling**

1. The Contractor and their subcontractors shall provide sufficient notice to the rest of the Commissioning Team regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems.
2. The CxA will coordinate schedules for functional and performance tests through the Design Consultant, Contractor, and affected Subcontractors.
3. The CxA shall direct, witness and document the functional and performance testing of selected equipment and systems.
4. The Contractor and their subcontractors shall execute the tests.

## **3.4. DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS**

### **A. Documentation.**

1. The CxA shall oversee, develop format for, witness, and review results of Installation, Functional and Performance Testing using specific procedural forms and checklists developed for that purpose.



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2. Prior to testing, these forms are provided by the CxA to the Contractor and their subcontractors for review.
- B. Non-Conformance.
  1. The CxA will record the results of the functional test on the procedure or test form and in the Test / Issues Log. All deficiencies or non-conformance issues shall be noted and reported to the CM and the Test / Issues log shall be reviewed at each commissioning meeting.
  2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA.
  3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owner.
- C. Approval.
  1. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA.

### 3.5. SYSTEMS MANUAL AND FINAL SUMMARY COMMISSIONING REPORT

- A. Commissioning Record in the Systems Manual and the Final Summary Commissioning Report.
  1. The CxA is responsible to compile, organize and index the Systems Manual in compliance with the Training Plan and the Final Summary Commissioning Report data by equipment into labeled, indexed and tabbed, three-ring binders and deliver it to the Owner. Three copies of the manuals will be provided.
  2. Final Summary Commissioning Report Details. In addition to above the Final Summary Commissioning Report shall include an executive summary, list of participants and roles, brief building description, overview of commissioning and testing scope and a general description of testing and verification methods. For each piece of commissioned equipment, the report should contain the disposition of the commissioning authority regarding the adequacy of the equipment, documentation and training meeting the contract documents in the following areas:
    - a. Equipment meeting the equipment specifications,
    - b. Equipment installation,
    - c. Functional performance and efficiency,
    - d. Equipment documentation and design intent, and
    - e. Operator training.

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- f. All outstanding non-compliance items shall be specifically listed. Each non-compliance issue shall be referenced to the specific functional test, inspection, trend log, etc. where the deficiency is documented.
- g. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed.

### **3.6 TRAINING OF OWNER PERSONNEL**

- A. The Contractor shall be responsible for training coordination and scheduling, and ultimately for ensuring that training is completed according to the Training Plan.
- B. The CxA shall be responsible for approving the content and adequacy of the training of owner personnel for commissioned equipment and that it is in conformance with the Training Plan and the contract documents.

### **3.7 DEFERRED TESTING**

- A. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner. These tests will be conducted in the same manner as the seasonal tests as soon as possible.
- B. Seasonal Testing. During the warranty period, seasonal testing shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subcontractors, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and as-built drawings due to the testing will be made.

**END OF SECTION 18100**