

ADDENDUM NO.: 5
 DATE OF CMR ADDENDUM: 1/4/13

**Notice of Construction Manager-at-Risk (CMR)
 Addendum
 on behalf of the
 CT Department of Construction Services (CT DCS)**

Project Name:	JM Wright Tech High School
Project Location:	Stamford CT
Project Description:	Additions & Renovations
Project Construction Budget:	50,000,000.00
CT DCS Project Number:	BI-RT-842-CMR

The Construction Manager-at-Risk (CMR) is issuing a **Notice of CMR Addendum** for this State of CT Department of Construction Services (CT DCS) Project. Specific Addendum Information is available as noted below. If you have any questions, please contact the CMR as noted below.

CMR Information:

CMR Firm:	KBE Building Corp
Address:	30 Batterson Park Rd
Contact Name:	Ryan Bentz
Contact Phone Number:	Office: 860-284-7467 Cell: 860-250-1552
Contact Email Address:	rbentz@comcast.net

Addendum Information is available as follows:

CMR Website and/or FTP Site:	Address: ftp.kbebuilding.com User: JMWrightHS Pass: 6w6dwi
Printing Company:	BL Graphics 203-630-2671

Note to CMR Firm: This Form must be completed and emailed to the DCS personnel listed below. DCS will post the form to the State Contracting Portal as "Addendum No. #". **Delete this "Note" prior to emailing the document to DCS.**

- Copies: DCS Project Manager ([insert email address](#)) DCS Process Management (randy.daigle@ct.gov)
 DCS Process Management (peter.babey@ct.gov) DCS Website Management (rebecca.cutler@ct.gov)



**JM Wright Technical High School
Stamford, CT
State Project # BI-RT-842-CMR**

**ADDENDUM #5
January 4, 2013**

Contents of Addendum #5

- 1) Construction Managers RFI's 1, 5, 6 & 7.
- 2) Metal Panel Substitution Form 7001
- 3) Construction Preliminary Early Start & Overall Project Schedule 11/9/12
- 4) Phasing Plan dated 4/2/12
- 5) JM Wright Construction Phase Commissioning Plan December 2012
- 6) Final Bid Packages including Bid Forms and Division 00 documents.
 - a) Please note these Packages can be found on the FTP site and supercede all previously issued scopes of work.
- 7) Invitation to Bid for 3.01 Demolition & Abatement Package (to be bid on 1/16/12)
 - a) Please note bid package 3.01 Demolition & Abatement supersedes the previous 1.02 Demolition & Abatement Package.

FTP Log in is as follows,

Address: <ftp.kbebuilding.com>

User: JMWrightHS

Pass: 6w6dwi

Request for Information

12026P-01 - J.M. Wright Regional Vo-Tech School Precon

RFI# 1

Date Created: 11/21/2012

Submitted To:	Submitted By:
John Scheib	Bob Smedley
Northeast Collaborative Architects LLC	KBE Building Corporation
500 Plaza Middlesex	30 Batterson Park Road
Middletown, CT 06457	Farmington, CT 06032
Phone: 860.344.9332	Phone:
Email: jscheib@ncarchitects.com	Email:

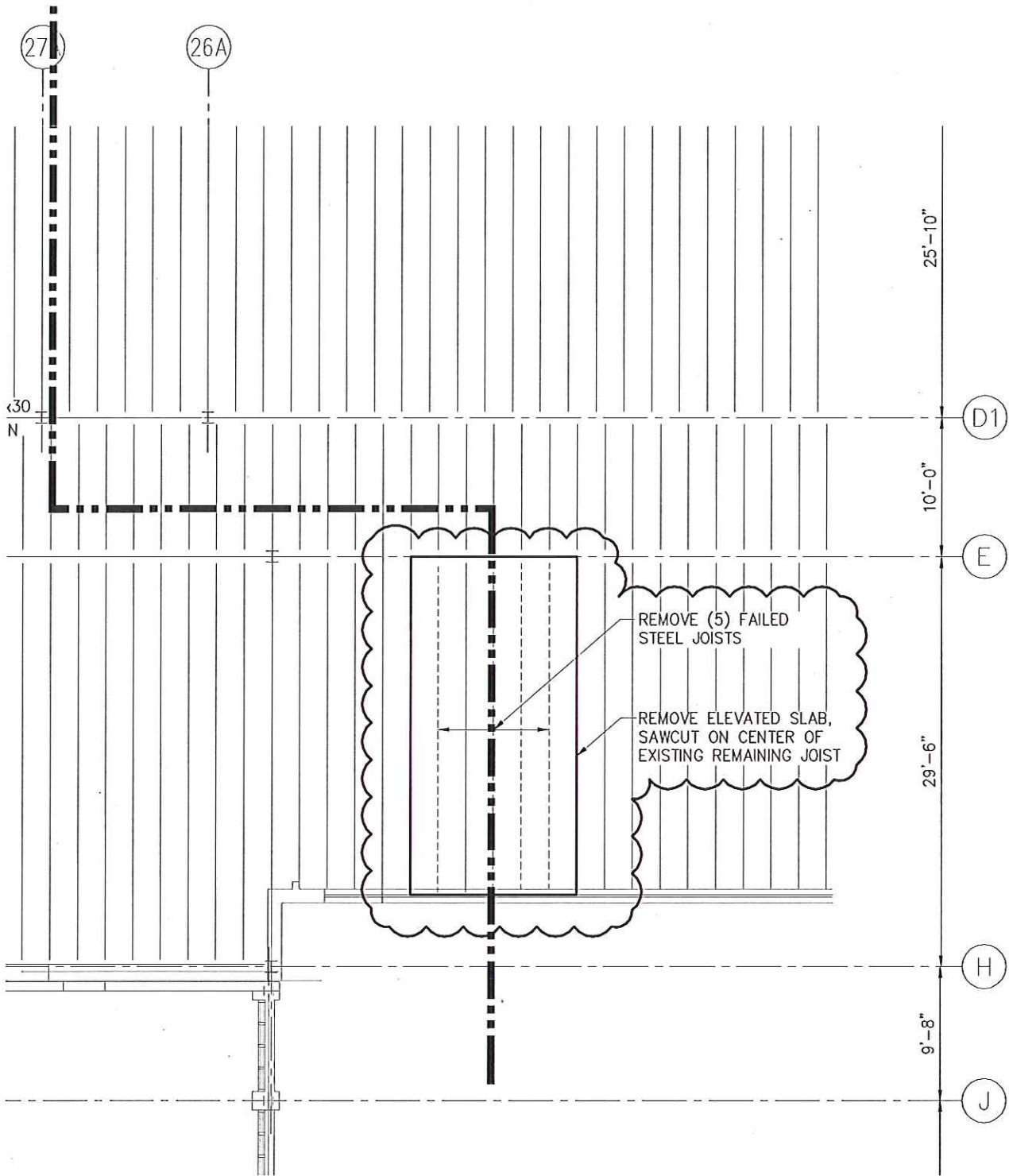
Subject:	Discipline:	Co-Author:
Failed Joist 2nd Floor Section A1	S	KBE Building Corporation


Submittal #:	Drawing #:	Addendum:	Spec Section:	Schedule #:
	D-121			

Distribution:

Information Requested:	Date Required: 11/28/2012
<p>See attached Photos showing failed Joist and damaged Slab Located Between Column Lines 24B to 26A & Column Line E to H Shown on Sheet D121 as Room # 189 Please review and Advise Should Joists and Slab be Demolished and then Replaced. Not shown on Demolition Drawings or Structural Demolition Drawings</p>	

Answer Received:	Date Received:
<p>- DEMO SHOWN ON SKETCH PART OF ADDENDUM #2 FOR DEMO CONTRACTORS.</p> <p>- REBUILD WILL BE ADDED TO STRUCTURAL DWGS. FOR FORTHCOMING BID.</p>	<p>12/5/12</p> <p><i>[Signature]</i> NCA</p>



drawing title			STATE OF CONNECTICUT		
SD-121 ADDENDUM			DEPARTMENT OF CONSTRUCTION SERVICES		
REVISIONS			drawings prepared by		
mark	date	description	NORTHEAST COLLABORATIVE ARCHITECTS 500 PLAZA MIDDLESEX MIDDLETOWN, CT 06457		date 11/30/12
			Drawing Copyright © 2012		scale AS NOTED
CAD no.					drawn by BAS
			project J.M. WRIGHT REGIONAL VOCATIONAL TECHNICAL SCHOOL		approved by DJD
			project no. BI-RT-842		drawing no. SK-S4

RFI Details



Project Name	J.M.Wright RVTS - Add & Renovations	Project Number	BI-RT-842
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RFI #	PC - 005	Lead Survey	11/26/2012
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Discipline:	Category:	Priority:	Normal
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To Company	Attention	Author Company	Authored By
Northeast Collaborative Architects	John Scheib	KBE Building Corporation	Ryan Bentz

Question	Due: 12/3/2012	Answer	12/5/2012
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Will the Hazardous Materials Survey Report for JM Wright Technical High School dated May 5, 2005 sent by Lisa Humble DCS be added to the Volume 3 of 3 of the Project Manual?
Please provide an up to date Lead Survey now that the Demolition has taken place throughout the building ensuing the next phase to involve more demolition and modifications to painted structural steel and joists, decking, walls, etc.

Fuss and O'Neil will be assisting DCS in providing the lead survey and testing documentation, per Lisa Humble 12/5/2012.

Proposed Solution

Impact: **Scope of Work** **Schedule** **Cost**

RFI Details



Project Name	J.M.Wright RVTS - Add & Renovations	Project Number	BI-RT-842
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RFI #	PC - 006	Exterior Brick Replacement	12/5/2012
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Discipline:	Category:	Architectural	Priority:	Normal
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To Company	Attention	Author Company	Authored By
Northeast Collaborative Architects	John Scheib	KBE Building Corporation	Ryan Bentz

Question	Due: 12/12/2012	Answer	12/5/2012
-----------------	------------------------	---------------	------------------

Under allowance 1, it indicates exterior brick replacement of 1000 brick. Is it the replacement of 100 brick or square feet of brick? Please clarify	1000 BRICK, per John Scheib, NCA 12/5/2012
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Proposed Solution

Impact: **Scope of Work** **Schedule** **Cost**

RFI Details



Project Name	J.M.Wright RVTS - Add & Renovations	Project Number	BI-RT-842
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RFI #	PC - 007	2/3/2013
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Discipline:	Category:	Architectural	Priority:	High
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To Company	Attention	Author Company	Authored By
		KBE Building Corporation	Ryan Bentz

Question	Due: 2/11/2013	Answer
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Presently the listed manufactures on this projects are: Subject to compliance with requirements, provide products by one of the

Following(casework)

1. Kewaunee Scientific Corporation; Laboratory Products Group.
2. Sheldon Laboratory Systems.
3. Thermo Fisher Scientific.
4. Wood-Metal Industries, Inc. Subject to compliance with requirements, provide products by one of the following(hoods)
 - a. Kewaunee Scientific Corporation.
 - b. Sheldon Laboratory Systems.
 - c. Thermo Fisher Scientific, Inc.

Can CIF be added to the list. We meet or exceed all aspects of this specification's on both the Casework and Fume Hood <http://www.cifsolutions.com/>

Some of our most recent installations in this area include:

Gateway Community College	1.4M	Perkins and Will
UCONN Pharmacy upgrade	345K	Svigals Architects
University of Bridgeport	158K	Cannon
Yale 300 George Street	410K	David Thompson
Norwalk Community College	1.18M	Mitchell Giurgola
Trinity College	130k`	Friar
Roberto Clemente	214K	Kagan
UMASS Amherst	4.7M	Wilson
Amistad Academy	196K	Boroson

Proposed Solution

Impact: **Scope of Work** **Schedule** **Cost**

We take no exception to CiF Lab Solutions LP, 53 Courtland Avenue, Vaughan, Ontario, Canada L4K 3T2 being added to the list of casework providers listed under Specification Section 123553.19 Wood Laboratory Casework, Paragraph 2.1.A, subject to the Project Specifications, including Section 012500, Substitution Procedures, which states Form 7001 Equal or Substitute Request be submitted for Consultant Review and DCS approval.



7001
**Equal or Substitute
 Product Request**
 Page 1 of 1

Request Phase Pre-Bid Post Bid (See Article 15 Materials: Standards, General Conditions)
 (If Pre-bid only) Current Bid Due Date: 01/09/13 Request No.: _____ Dated: 12/18/12

To: State of Connecticut GTPW Project No.: B1-RT-842
 Department of Public Works Project Name / Location: JM WRIGHT TECHNICAL HIGH SCHOOL
 STAMFORD, CT

References:	Specification(s):	Section(s): <u>074213.23</u>	Paragraph(s): <u>2</u>
	Drawing(s):	Drawing(s) No(s):	Detail(s) No(s):
Contractually Specified Product:	<u>Aluminum Composite Panels (ACM)</u>		
Contractor Proposed Product:	<u>layson by ALUCOII</u>		
Proposed Product Is:	Equal: <input checked="" type="checkbox"/>	Substitute: <input type="checkbox"/>	Model No.:
See attached data for both specified and proposed products as required by Article 15 General Conditions.			
Data attached:	Drawings: <input type="checkbox"/>	Product Data: <input checked="" type="checkbox"/>	Reports: <input checked="" type="checkbox"/>
	Tests: <input checked="" type="checkbox"/>	Other:	Samples: <input type="checkbox"/>
Reason(s) for not providing the Specified Product:			
Similar Installation: <u>see attached</u>			
Project:	Architect:	Owner:	Date Installed:
Address:			

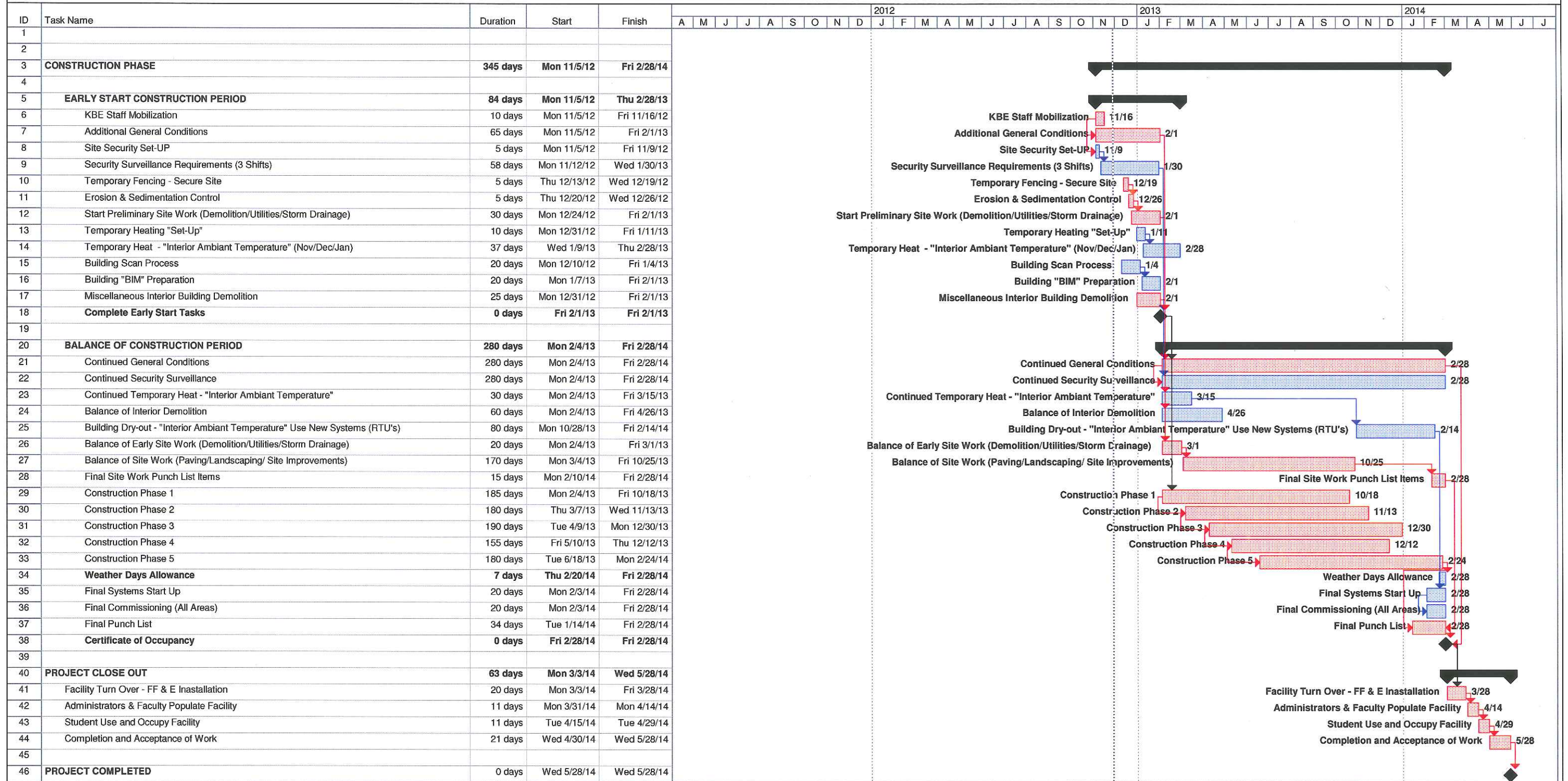
Will proposed substitution impact other parts of the Work? No Yes *if yes attach explanation.*
 Will proposed substitution increase Contract Time? No Yes *by number of Days* _____
 Actual Dollar Savings to the State of Connecticut if substitution is accepted: \$ _____
 The Undersigned Certifies that the proposed Request for an Equal or Substitute Product conforms to all of the requirements of Division 01 General Requirements, Section 01 25 00 Substitution Procedures.
 Request Submitted By General Contractor / CMR: ALUCOII NORTH AMERICA
 (Firm's Typed Name)
 By: CAMILLE KNEZEVICH Project Developer [Signature] 12/18/12
 (Typed Name) (Title) (Signature) (Date)
 CONTRACTOR / CMR Send copies to DPW PM: CA / OR:

Consultant's Review - This Substitution Request Is: Request Received on (Date): 12/18/12
 Approved: (Submittals in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)
 Approved as Noted: (Submittals in accordance with Div. 01 General Requirements, Section 01 33 00 Submittal Procedures.)
 Rejected: Use Specified Materials.
 Rejected: Request Not Received Within Specified Time Period - Use Specified Materials.
 Reviewed Issued By: JOHN SCHEIBS [Signature] 12/28/12
 (Typed Name) (Signature) (Date)
 CONSULTANT Send copies to: DPW PM: CA / OR: Chief Architect Chief Engineer

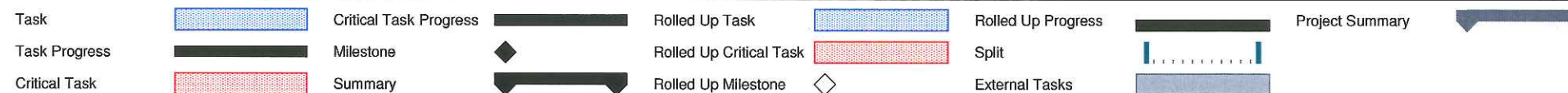
If Approved: As noted by Consultant,
 DPW Director of Project Management: _____ (Signature) _____ (Date)
 Copies: Project File Red R2

PRELIMINARY EARLY START & OVERALL PROJECT SCHEDULE

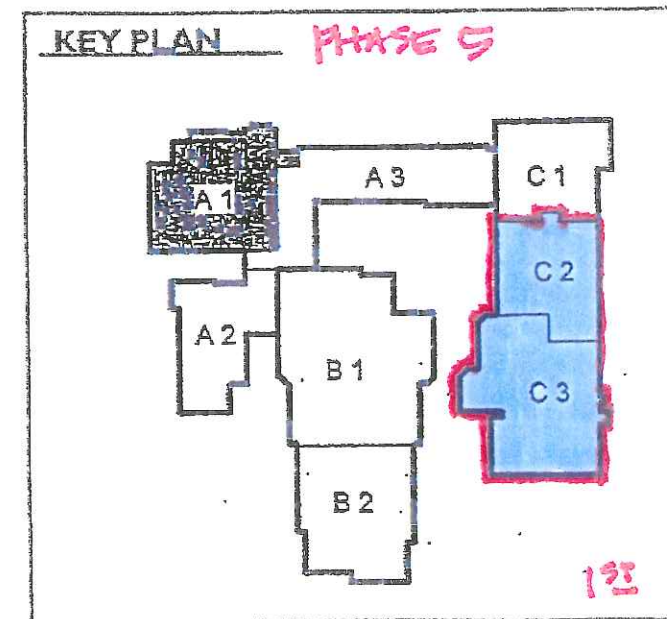
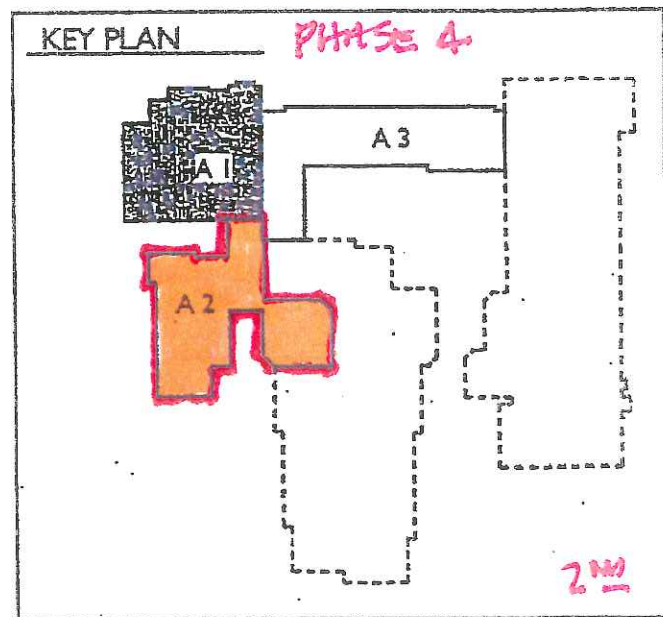
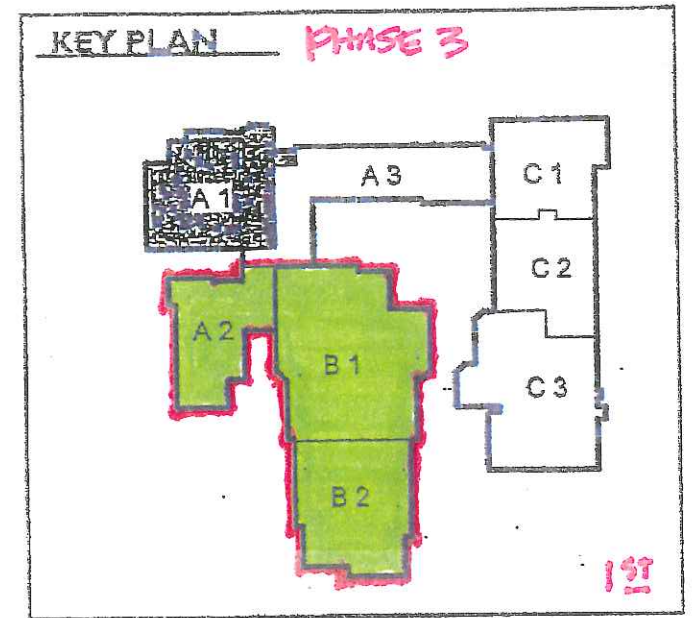
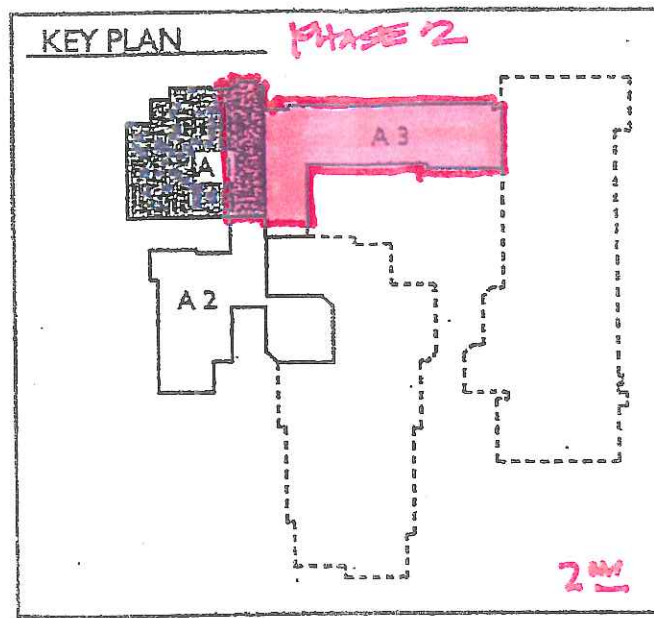
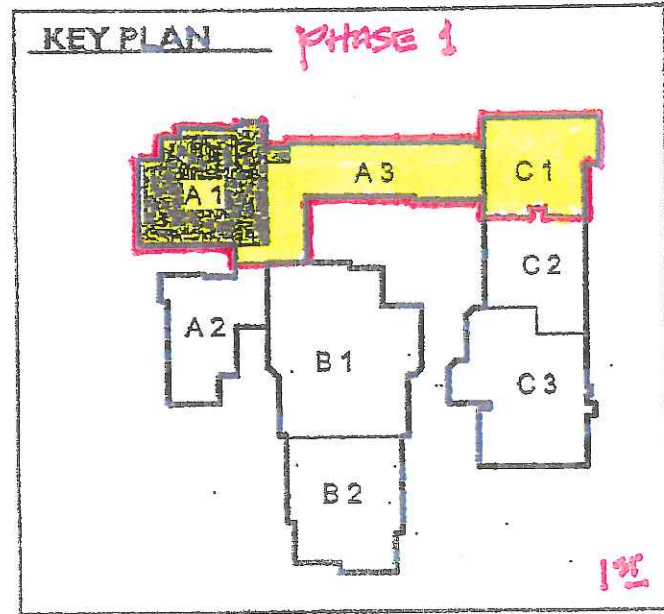
November 9, 2012



Project: J.M.Wright.Early.BidPackage.
Date: Wed 11/28/12



J. M. WRIGHT TECHNICAL HIGH SCHOOL
STAMFORD, CONNECTICUT
PROJ NO: BI-RT-842



PHASING PLAN
4/2/12

JM Wright High School
State of Connecticut
Stamford, Connecticut



Construction Phase Commissioning Plan

December 2012



BVH
integrated
services

50 Griffin Road South
Bloomfield, CT 06002
Tel: (860) 286-9171
Fax: (860) 242-0236
www.bvhis.com

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COMMISSIONING PLAN APPROVAL

This Commissioning Plan serves as a guide to the commissioning of facilities, utilities and equipment for the JM Wright High School. The purpose of this Commissioning Plan Approval page is to indicate that the members of the Commissioning Team have reviewed and accepted the information contained herein for use on the above mentioned project.

WRITTEN BY	DATE
Commissioning Agent, BVH Integrated Services, P.C.	
Printed Name	
David Lyons	
Signature	
APPROVED BY	DATE
Project Manager	
Printed Name	
Signature	
APPROVED BY	DATE
Facilities Manager	
Printed Name	
Signature	
APPROVED BY	DATE
Operations Manager	
Printed Name	
Signature	

REVISION HISTORY

Revision A will be released for use as a planning tool with open issues if necessary. As more information becomes available, interim revisions (B, C) will be issued as necessary. After all open issues have been resolved; revision 0 will be issued for approval. Following approval, revisions will be traced with the next sequential integer (1, 2). Following formal approval of Revision 0, each subsequent revision will require formal approval.

DOCUMENT REVISION HISTORY			
Revision	Date	Description	Prepared By
A			DEL

COMMISSIONING TEAM

The Commissioning Team will consist of committed representatives of the Owner, Design Team and individual trade Contractors. The following table identifies each member of the Commissioning Team as well as their affiliation with project and a brief overview of their responsibilities during the commissioning process. The cooperation and participation required of the individuals listed below is essential in order to successfully complete the commissioning process.

Team Member	Company	Role	E-Mail	Responsibility
Dave Lyons	BVH Integrated Services, P.C.	Commissioning Authority	davel@bvhis.com	Implement and direct commissioning process, functionally test building systems, provide summary report. Develop OPR.
Peter Zannis	Turner Construction	Owner - Project Management	pzannis@tcco.com	Develop OPR, including schedule.
	State of Connecticut	Owner - Maintenance and Operations		Develop OPR, including operational details.
Raymond Giolitto	Northeast Collaborative	Designer – Architect	rgiolitto@ncarchitects.com	Develop BOD based on OPR and existing conditions. Include all aspects of commissioning in contract docs.
John Schieb	Northeast Collaborative	Designer – Architect	jschieb@ncarchitects.com	Develop BOD based on OPR and existing conditions. Include all aspects of commissioning in contract docs.
Brian McKenna	Clough Harbor Associates Engineers	Designer - Engineer	bmckenna@chacompanies.com	Develop BOD based on OPR and existing conditions. Include all aspects of commissioning in contract docs.

Team Member	Company	Role	E-Mail	Responsibility
	KBE Construction	Construction Manager		Ensure commissioning is integrated into construction process, including schedule.
		Test and Balance Contractor		Assist in development of specific commissioning procedures.

OVERVIEW

The JM Wright High School project is a “renovate as new” project for the State of Connecticut. The project is anticipated as approximately 206,000 SF and will be renovated utilizing LEED standards. The project is slated to be submitted for basic LEED certification under the 2009 LEED for Schools Manual.

The project will be comprised of multiple phases with the planned construction of new mechanical spaces and systems. The first phase is projected to be comprised of the construction of a new main plant during the first phase, with the removal of existing mechanical and building systems occurring in the last phases of the project. The new and existing facility will be serviced by entirely new systems which will include: heating, ventilating and air conditioning (HVAC) systems and associated energy management control systems. The project shall comply with the State of Connecticut Department of Education Bureau of School Facilities Guidelines for school construction projects.

The intent of commissioning this project is to make every effort to insure that the environmental quality of the facility is acceptable and satisfies the design parameters, prior to its occupancy. Additional goals of commissioning are to provide documented confirmation that a facility fulfills the performance requirements of the building Owner, occupants, and operators. This is accomplished by providing quality assurance of the installation and functionality of the building systems and equipment. With this in mind, Turner Construction / The State of Connecticut has retained the services of BVH Integrated Services, P.C. to act as the Commissioning Authority (CxA) on this project.

The term commissioning refers to the comprehensive evaluation of a building project to ensure that the finished facility operates within the guidelines and parameters dictated by the Owner’s Project Requirements. The intended physical and architectural characteristics of a given space, the number of occupants and the types of activities that take place within it have a direct impact on how the control systems of that space operate. Modern buildings include various control systems capable of controlling environmental properties such as space conditioning, lighting, and noise level. The facility’s environmental quality is directly related to how well the aforementioned fields interact with one another.

As the CxA, BVH Integrated Services will supervise and oversee the commissioning process. This process is best described as a systematic verification to determine that each individual system functions as intended. In addition to this work, the CxA will develop and utilize functional test procedures that will be used to verify and document the performance of those systems being commissioned. If there are deficiencies identified within a particular system during the commissioning process, then the CxA will facilitate discussions with the Owner, Contractor, and the Design Team. Dependent on the outcome of these discussions, the Owner will finalize their decisions on how they will proceed in bringing the systems to an acceptable standard.

This commissioning plan has been developed by BVH Integrated Services, P.C. to act as an informational document to clarify how the commissioning process shall proceed. This plan will outline the responsibilities of the Commissioning Authority, Owner, Design Team, Contractor and Subcontractors.

This project has been designed under the Leadership in Energy and Environmental Design New Construction (LEED) 2009 version guidelines for environmental compliance and energy efficiency. The LEED program requires building commissioning as a prerequisite to the certification process. The requirements required to satisfy the prerequisite are listed in the LEED reference guide under EA Prerequisite 1, Fundamental Commissioning of the Building Energy Systems. The minimum commissioning-related requirements include reviewing and ensuring that fundamental building elements and systems are designed, installed and calibrated to operate as intended. The project Owner is required to execute or have a contract in place to implement the following fundamental best practice commissioning procedures.

- Engage a commissioning team that does not include individuals directly responsible for project design or construction management.
- Review the design intent and the basis of design documentation.
- Incorporate commissioning requirements into the construction documents.
- Develop and utilize a commissioning plan.
- Verify installation, functional performance, training and operation and maintenance documentation.
- Complete a commissioning report.

The Owner then needs to provide the LEED Letter Template, signed by the Owner or commissioning agent(s), confirming that the fundamental commissioning requirements have been successfully executed or will be provided under existing contract(s); engage a commissioning authority and adopt a commissioning plan; include commissioning requirements in bid documents and task the commissioning agent to produce a commissioning report once commissioning activities are completed.

To qualify for an additional commissioning credit towards LEED certification, as described in EA Credit 3, Enhanced Commissioning, the Owner must verify and ensure that the entire building is designed, constructed and calibrated to operate as intended. In addition to the Fundamental Building Commissioning prerequisite, the Owner must implement or have a contract in place to implement the following additional commissioning tasks:

- A commissioning authority independent of the design team shall conduct, at a minimum, one commissioning design review of the Owner's Project Requirements, Basis of Design, and design documents prior to mid-construction

documents phase and back-check the review comments in the subsequent design submissions.

- An independent commissioning authority shall review the contractor submittals relative to systems being commissioned.
- Develop a systems manual that will provide future operating staff the information needed to understand and optimally operate the commissioned systems.
- Verify that the requirements for training operating personnel and building occupants are completed.
- Conduct a review of the building systems / operations within 10 months after substantial completion with the O&M staff and occupants.

The Owner then needs to provide the LEED Letter Template, signed by the Owner or independent commissioning agent(s) as appropriate, confirming that the required additional commissioning tasks have been successfully executed or will be provided under existing contract(s).

PROCESS

The Commissioning Authority has developed this Construction-Phase Commissioning Plan which outlines the responsibilities and procedures that will be used throughout the duration of the commissioning process. The plan identifies which systems are to be commissioned and provides an overview of the methods of verification and documentation that will be utilized by the Commissioning Authority. Preliminary schedules for the functional testing of the systems will be outlined. This preliminary Commissioning Plan will be reviewed by the Owner. After the approval of the Commissioning Plan, the Commissioning Authority will be responsible for presenting and reviewing it with the Commissioning Team. This Commissioning Plan will be updated to more accurately reflect the specific requirements of this project as the job progresses. The members of the Commissioning Team will participate in the commissioning process as outlined below.

Design Reviews

The CxA will review the design documents. The established Owner's project requirements (OPR) and the basis of design (BOD) documents provide the basis for the CxA's design review. In addition to reviewing the design for compliance with the OPR and BOD, the CxA will assess the design for energy efficiency, proper function, ability to be commissioned and completeness.

The design document submission will include 99% complete control systems design, specifications and sequences of operation to enable a thorough and meaningful design review of the control systems which are critical to building performance and commissioning.

The CxA will provide the design review comments in a keyed note matrix format corresponding to specific drawing references where applicable. The design team will respond in the same format. A meeting will be scheduled with the Owner, design team and CxA to discuss the final disposition of the review comments. A timeframe for inclusion of all comments agreed to shall be established to ensure revisions are incorporated in following submissions. This process can be minimized with the completion of the OPR and BOD prior to the design review so all parties may have a clear understanding of the Owner's requirements and design criteria during the review. The Owner has the final design making authority over inclusion any review comments into the design.

Specifications

The CxA will develop the commissioning specifications for the project to accomplish two key objectives:

- Provide general commissioning specifications that detail project requirements.
- Provide specific requirements for special systems and equipment, early submissions of necessary O&M manuals and training plans and other key tasks.

The CxA will develop and provide the general commissioning specifications sections. They will then work with the design team to develop language regarding equipment or system specific commissioning requirements which will be incorporated into other sections. This specification section will be provided during the Construction Document phase to be included in other sections.

The specifications section will be developed and coordinated for the Bid Specification Section 019100 – Commissioning Requirements will be provided by the CxA for Bid Document submission.

Controls Review

The CxA will perform a review of the designed control systems strategy. The intent of the review is to verify that the strategy will meet the Owner’s project requirements and the needs of commissioning process, i.e., functional performance testing. The CxA will also review the controls specifications to assure that all necessary requirements for coordination with the Testing, Adjusting and Balancing subcontractor are included.

Controls Checkout Plan

The controls subcontractor will develop and submit a control checkout plan detailing the process they intend to use to verify the installation and functionality of the controls system including a step-by-step description of the process and forms they will use to document the controls checkout. The controls subcontractor will coordinate with the Testing, Adjusting and Balancing (TAB) subcontractor to ensure that appropriate control equipment is available for use and training has been provided to the TAB subcontractor for completion of the TAB work.

Testing, Adjusting and Balancing

The TAB subcontractor will develop and submit a TAB execution plan including a description of how the control system will be used during the TAB execution, for review and comment at least 8 weeks prior to commencement of TAB work. The CxA will review the plan for effectiveness and coordination and may provide comments on the plan. The CxA does not approve the plan. The controls subcontractor shall also review the plan for feasibility of use of controls system.

TAB work must be performed after the controls system has been completed and all checkout and startup documentation has been completed by the controls subcontractor to assure accurate testing, adjusting and balancing. The CxA will verify the air and water balancing by spot checking systems, reviewing completed balancing reports and through selected site observation.

Prefunctional Checklists

The Commissioning Authority will produce prefunctional checklists that can be used **by the installing contractors** prior to the start of functional testing. These checklists are tools to help the CM and subcontractors verify that the installation complies with the contract documents. Any deficiencies that are found can then be corrected early in the process when the contractors are fully mobilized on site. The prefunctional checklists will be created for all equipment included in the scope of the commissioning process, as defined later in this document.

The CxA still performs a full verification of the installation as part of the functional testing however, the prefunctional checklists shall be used by the installing contractors to verify systems and equipment are ready for the CxA to perform functional testing.

Functional Testing

The Commissioning Authority will coordinate, supervise and participate in the functional performance testing (FPT) of the building systems and equipment. This testing will be done in accordance with the approved functional test procedures and the results will be recorded on the functional test sheets provided by the Commissioning Authority. The Contractors will provide trained technicians that have participated in the installation of the systems and equipment being tested to assist in the functional testing process. The Owner will also provide operational staff to participate in the functional testing.

The CxA provides a master list of FPTs in the Appendix of the plan (to be completed in the construction phase commissioning plan) and develops FPT procedures in a sequential written form, coordinates, oversees and documents the actual testing. Conditional variations such as emergency modes and opposite seasonal testing are identified in the FPTs. Some FPTs may include DDC trend logging to confirm system operation.

When a piece of equipment or system has been verified by the Contractors as ready for testing, they will notify the Commissioning Authority and that piece of equipment and/or system will be examined for commissioning readiness. Once deemed complete, the functional testing will commence.

If the system appears not ready for testing or fails during the testing process, the Commissioning Authority will update the BVH Commissioning Portal and notify the contractors and Owner that the Commissioning Portal has been updated. This update

will describe any and all deficiencies and what the recommended action is to correct any problems. If assistance is needed from the Design Team, a request will be incorporated into the Commissioning Portal asking for such recommendations and/or comments from the Design Team. Any review comments should be provided via the Commissioning Portal. After review and approval, this notice shall be given to the respective Contractors. Once the Contractors have made any necessary corrections, they will update the BVH Commissioning Portal stating that the corrective action was taken. Once a corrective item has been completed, the Commissioning Authority shall resume testing this outstanding item.

The Commissioning Authority will keep the Owner, Design team and Contractors informed of the process of this testing by providing a bi-weekly update on the Commissioning Portal. If the test results do not comply with the test standards, the Commissioning Authority will facilitate a meeting between the Owner, Design Team and Contractors to resolve the issue. The Commissioning Authority will provide recommendations of what actions should be taken and moderate discussions concerning any outstanding issues. The Owner and the Design Team will provide the final decision of what approach will be taken and direct the responsible parties to take corrective action.

If the test fails more than one re-test due to the lack of appropriate action by the Contractors, the Commissioning Authority will call a meeting to discuss appropriate resolutions and procedures. The final testing results for each test will be included in the Commissioning Authority's Commissioning Report which will be submitted to the Owner upon completion of the Commissioning Process.

SCHEDULE

Incorporation of commissioning into the project schedule requires coordination among the commissioning team members. During the Construction Phase, time must be allowed for development, review and revision of the OPR and BOD. In addition, design review response and revision should be incorporated into the schedule.

During construction, it is essential that the flow of information and materials include the CxA and that time for CxA review and any required revisions be allowed. The CxA will work with the lead individuals on overall project scheduling, typically the architect and CM to ensure that the commissioning milestones are included.

Detailed testing and training schedules will be developed by the CxA and CM as construction progresses establishing sequential priorities to ensure work progresses in a logical manner that supports the commissioning process. Examples of the sequential priorities that will be required for the project include:

- Equipment may not be temporarily started until proper construction startup checkout and documentation has been performed.
- Functional testing does not begin until construction and startup check-out and TAB have been completed for any given system (this does not preclude a phased approach).
- The controls system and the equipment it controls are not functionally tested until all control points have been calibrated and all related control testing completed.

RESPONSIBILITIES

Commissioning Authority

The CxA will prepare a preliminary Commissioning Plan and submit this plan to the Owner for review. The Commissioning Authority will adjust the document based on the Owner's assessment and related comments and submit it for final approval. The Commissioning Authority and the Owner will review the final Commissioning Plan with the Contractors involved. Specific responsibilities vary with the management scenario and the CxA's specific scope of services. Ideally, the same party or firm acts as CxA through all project phases, as detailed below:

Pre-Construction

During pre-construction, the CxA is in charge of the commissioning process and makes the final recommendations to the Owner about functional performance of commissioned building systems and assemblies. The CxA is an advocate for the Owner, acting as independently and objectively as possible. The core commissioning activities during pre-construction are to:

- Perform a PEER Review of the construction documents.
- Development of full commissioning specifications for all commissioned equipment. Coordinate with and integrate into the specifications of the Architect and Engineers. The commissioning specifications will include a detailed description of the responsibilities of all parties; details of the commissioning process; reporting and documentation requirements including formats; alerts to coordination issues; deficiency resolution; construction checklist and startup requirements; the functional testing process; specific functional testing requirements including testing conditions and acceptance criteria for each piece of equipment being commissioned.
- Update the commissioning issues and tracking for log review.
- Attend and participate in design meetings as needed to verify inclusion of commissioning requirements.

Bid Phase

During the bid phase, the CxA is an advocate for the Owner, acting as independently and objectively as possible. The core commissioning activities during the bid phase are to:

- Attend the pre-bid meetings to answer any questions regarding commissioning activities.
- Participate in the review process of qualifications and proposals that relate to commissioning activities from subcontractors, including RFIs.

Construction

During construction, the CxA is in charge of the commissioning process and makes the final recommendations to the Owner about functional performance of commissioned building systems and assemblies. The CxA is an advocate for the Owner, acting as independently and objectively as possible. The core commissioning activities during construction are to:

- Coordinate and direct the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
- Update and execute a commission plan after review and comment by the Owner and Design engineers.
- Plan and conduct commission scope meetings with all involved parties followed up with meeting minutes.
- Request and review additional information required to perform commissioning tasks, including an equipment checkout plan, contractor startup and checkout procedures.
- Review and comment on construction submittals concurrent with A/E reviews.
- Before startup, gather and review the current control sequences and interlocks and work with the contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
- Develop and distribute pre-functional equipment checklists and enhanced startup and initial systems checkout plan with subcontractors for commissioned equipment.
- Perform site visits, monthly once equipment and systems are available to observe component and system installations and startup. Provide observation reports.
- Document construction checklist completion by reviewing completed construction checklists and through selected site observations.
- Review testing, adjusting, and balancing (TAB) execution plan prior to the start of air and water balancing.
- Verify air and water systems balancing by reviewing completed startup reports and by selected site observation.
- Write detailed functional performance test procedures for the equipment and systems. This will include manual functional testing, energy management control system trending and may include stand-alone data logger monitoring. Submit to CM for review and approval if required.
- Oversee and approve the training of the Owner's operating personnel. BVH will use our spreadsheet to help develop Owner Training schedules with all the participants. Training of the faculty personnel will be conducted by the installing

contractors and documented by the commissioning agent and verified to meet contract documentation.

- Verify air and water systems balancing by reviewing completed reports and by selected site observation. Mock ups of critical areas will be coordinated and commissioned before both the TAB and temperature controls contractors proceed with the entire project.
- Perform functional testing of equipment. Facility personnel are invited to attend for training purposes. Sampling rate of terminal equipment will be 30%.
- Maintain master deficiency and resolution log and separate testing records. Report all issues as they occur to the CM. Provide CM with written record of progress and test results with recommended actions.
- Track all deficiencies and retest when corrections have been made.
- Analyze any functional trending logs and monitoring data to verify performance.
- Issue a commissioning progress report.

Post Occupancy

During occupancy and operations, the CxA helps resolve commissioning issues and directs opposites season testing. The CxA will participate in a near-warranty-end review of system and assembly performance.

- Review operating and maintenance manuals (O&Ms) from contractor provided documentation for each piece of equipment listing all maintenance procedures, manufacturer, vendor and installing contractor information.
- Review record drawings for accuracy with respect to the installed systems.
- Verify that the requirements for training operating personnel are completed.
- Compile a commissioning record, which shall include:
 - A brief summary report that includes a list of participants and roles, brief building description, and an overview of commissioning and testing scope.
 - All outstanding non-compliance items shall be specifically listed. Recommendations for improvement to equipment or operations, future actions, commissioning process changes, etc. shall also be listed.
 - Also included in the Commissioning Record, shall be the issues log, commissioning plan, progress reports, submittal and O&M manual reviews, training record, construction checklists, startup reports, functional testing and trend log analysis.
- Develop a “Systems Manual” that shall be used by the Facility personnel for training purposes. Manual to include record of HVAC sequencing and setpoints, Performance Metrics, space and use descriptions, and single line diagrams.
- Supervise any seasonal or deferred testing and deficiency corrections required by the installed systems and / or deemed from the functional testing of equipment.

- Return to the site 9 months into the 12-month warranty period and review with facility staff the current building operation and the condition of the outstanding issues related to the original and seasonal commissioning. Also, through an interview process, identify any problems and / or concerns they have with operating the building as originally intended. Make suggestions for improvements and for recording these changes in the O&M manuals. Identify any areas that may come under warranty or under the original construction contract. Assist facility in the development of reports and documents and requests for services to remedy outstanding problems.

Owner

The Owner will review the preliminary Commissioning Plan and provide comments to the Commissioning Authority. As required, they will meet with the Commissioning Authority to clarify any changes to the document. The Owner will approve the final document. With the Commissioning Agent, they will review the final Commissioning Plan with the Contractors involved.

Owner's Project Management Staff

The Owner's Project Management staff's ultimate responsibility is to see that the commissioning plan is executed. The Owner should include commissioning responsibilities in all commissioning team members' scopes of services, make sure there is sufficient time for commissioning in the project schedule, ensure the CxA is receiving cooperation from other team members, and ensure that other Owner responsibilities (developing the OPR, having O&M staff participate during construction) are fulfilled. The Owner ensures that all design review and construction-phase issues identified through commissioning are resolved in a timely manner.

Owner's Operations Staff

Design

During design, this staff contributes to reviews of the designer's BOD, plans, and specifications.

Review and approve the Design Development Phase Completion report as developed by the Design Team prior to submission to the Commission of Construction Services, Bureau of School Facilities, and State of Connecticut.

Construction

During construction, this staff may:

- Assist in reviewing selected submittals.
- Assist in construction observation, verifying completion of construction checklists and observing start-up.
- Participate in or witness testing.
- Review O&M and systems manual.
- Participate in training.
- Review and approve the Construction Document Phase Completion report as developed by the Design Team prior to submission to the Commission of Construction Services, Bureau of School Facilities, and State of Connecticut.

Post Occupancy

The Owner's O&M staff's role and responsibilities are:

- Participate in a post occupancy/near end of warranty review with the CM, designer and CxA.
- Share any warranty or construction related items and cooperating with CxA in executing the post occupancy commissioning activities.
- Assist in resolving issues identified during the review sessions.

Design Team

The Design Team will understand the commissioning process as outlined in the Commissioning Plan and provide participation as detailed in the plan or as requested by the Owner.

In addition, the Design Team shall provide a letter to the DCS PM to be submitted to both the Secretary of OPM and the Commissioner of DCS. The letter shall include:

- The project timeline.
- Members of the Design team.
- Affirmation that the Design team understands the requirements of the HPBG regulations and will design the project in accordance with them.

Design

The design professionals should develop a complete basis-of-design (BOD) documentation, including design narratives, rationale, and criteria, according to their scopes of services, and update this document with each new design submission. They provide input to the commissioning plan, respond to questions and concerns by the CxA and others, respond to design review comments, and incorporate commissioning requirements in construction contract documents.

In addition to the services provided in the development and design of the project listed in the above documents, the Design Team must write a report documenting that the design conforms to meet a minimum of twenty-eight (28) of the fifty-nine measures listed in the HPBG. If the Design Team opts to utilize the alternative compliance option, the report shall document how the Design Team will meet this path of compliance.

Construction

During construction, designer's responsibilities include:

- Review the commissioning plan.
- Attend selected commissioning meetings.
- Answer questions about system design and intended operation.
- Update design narratives in the BOD to reflect as-built conditions.
- Respond to or incorporate CxA comments on construction submittals and O&M manuals.
- Help resolve design-related issues raised during commissioning.
- Submit required portions of the systems manual.
- Submit report to the DCS PM to be submitted to the Secretary of OPM and the Commissioner of DCS which will include energy modeling for the State of Connecticut Building Code requirements versus the proposed building project and cost differentials and operational savings for the project.
- Working with the CxA in the review of the building envelope system including roofing, walls, curtain walls, windows and door assemblies.
- Review and approve the Construction Document Phase Completion report as developed by the Design Team prior to submission to the Commission of Construction Services, Bureau of School Facilities, and State of Connecticut.

Post Occupancy

The design team's role and responsibilities are:

- Participate in a post occupancy/near end of warranty review with the CM, Owner, and CxA.
- Assist in providing any corrective solutions to warranty or construction related issues identified cooperating with CxA in executing the post occupancy commissioning activities.

Additional tasks sometimes required are to present system description overviews for primary systems during O&M staff training, review and approve testing plans and procedures, review completed test forms, or witness selected tests.

Construction Managers

The Construction Manager's (CM) role shall be to ensure the contractors are executing their commissioning responsibilities according to the commissioning plan and help resolve issues. Throughout the commissioning process, the CxA will generate documents containing deficient or outstanding items and share them with the commissioning team. It is important that the CM obtain all necessary information back from the subcontractors for communication back to the CxA via the on-line tracking database (***BVH Commissioning Portal***). This is necessary to assure proper issue tracking and proper close-out of any outstanding items identified throughout the commissioning process.

Design

The CM reviews commissioning requirements and performance criteria for coordination, schedule, and cost implications.

Construction

The CM role and responsibilities are:

- Ensuring subcontractors' commissioning work is completed and cooperating with CxA in executing the commissioning plan.
- Providing input into the commissioning plan.
- Integrating the commissioning schedule into the overall project schedule.
- Participating in commissioning meetings.
- Responding to questions and issues raised by the CxA.
- Resolving issues identified during commissioning and coordinating correction of identified deficiencies.
- Providing equipment, system and assembly data and information needed by the CxA.
- Performing specified training.
- Submitting required portions of the systems manual.

Post Occupancy

The CM role and responsibilities are:

- Post occupancy/near end of warranty review with the Owner, designer, CxA.
- Ensuring subcontractors' are responding to warranty items and cooperating with CxA in executing the post occupancy commissioning activities.
- Resolving issues identified during commissioning and coordinating correction of identified deficiencies.

Trade Contractors

Design

Trade contractors of specialty or complex systems or designs should review commissioning requirements and performance criteria of their systems for coordination, schedule, and cost implications.

Construction

The responsibilities of the installing trade contractors (and vendors, as appropriate) include:

- Cooperating with the CxA (and the contractor's commissioning manager, when applicable) in executing the commissioning plan.
- Providing input into the commissioning plan.
- Coordinating with other trades as necessary to facilitate a smooth and complete commissioning process.
- Participating in commissioning meetings.
- Responding to questions and issues raised by the CxA.
- Executing and documenting tasks in the construction checklist and start-up process.
- Assist CxA with the Functional Testing of equipment and systems.
- Participating in resolving issues identified during commissioning.
- Correcting identified deficiencies and responding to deficiency notices via the on-line tracking database (***BVH Commissioning Portal***).

Post Occupancy

The responsibilities of the installing trade contractors (and vendors, as appropriate) include:

- Post occupancy/near end of warranty review with the Owner, designer, CxA.
- Ensuring proper response to warranty items and cooperating with CxA in executing the post occupancy commissioning activities.
- Resolving issues identified during commissioning and correction of identified deficiencies.

Commissioning-related activities of trade contractors are to prepare O&M manuals and submissions to the systems manual and provide training on commissioned systems and assemblies.

COMMISSIONING DOCUMENTS

In order to gain a complete understanding of the design intent and desired functionality of the systems and equipment to be commissioned, the Commissioning Authority requires several documents from the Owner, Design Team and the Contractors. It should be noted that the Commissioning Authority will view the contract documents (plan drawings, specifications, etc.) as taking precedence over any other forms of project documentation.

The documents utilized by the Commissioning Authority (CxA) include but are not limited to:

Owner's Project Requirements (OPR)

- Also referred to as the design intent, the OPR is documentation of a project's functional requirements and expectations of how it will be used and operated. This includes project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.

Basis of Design (BOD)

- The basis of design is the documented primary decision-making process and assumptions behind design decisions made to meet the OPR. It describes the systems, assemblies, conditions and methods chosen to meet these requirements.

Contract Documents

- Contract Documents include all addenda, trade plan drawings, specifications, sequences of operations, etc. as produced by the Architect and / or Engineer of Record and their consultants to obtain construction bids.

Construction Checklists

- Construction checklists are detailed sheets used by the CxA to ensure all equipment is installed per the contract documents. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Submittals

- Equipment Submittals and shop drawings are detailed specification sheets and assembly details of the exact equipment to be installed as part of the project. Submittals and shop drawings are produced by the manufacturer, supplier or fabricator of the equipment for review and approval by the Architect or Engineer of Record. The CxA also reviews applicable submittals to ensure conformance with the commissioning plan.

Change Orders

- Change Orders are changes to the contract documents that occur after a project price has been bid or negotiated. Regardless of the cause, Change Orders can change the scope of the project or affect the commissioning requirements of the project or specific systems.

Manufacturer Approved Equipment Start-Up Reports

- Equipment manufacturers possess the most detailed knowledge regarding the equipment they provide. All applicable information provided by manufacturers will be incorporated in the commissioning process.

O & M Manuals and Associated Equipment Manufacturer's Documentation

- Operation and Maintenance (O&M) manuals and Associated Equipment Manufacturers Documentation will be used to generate the construction checklists and is a key component of the training of operations and maintenance personnel.

Commissioning Plan

- This is an overall plan, developed before bidding (Construction Phase Commissioning Plan) or after bidding (Construction Phase Commissioning Plan), that provides the structure, schedule, and coordination planning for commissioning. The Commissioning Plan is updated as the project progresses from pre-design, through design and construction.

Prefunctional Checklists

- Prefunctional checklists are detailed sheets created by the CxA and used by the installing contractors to ensure all important equipment details are included in the installation. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Functional Performance Test Sheets

- Functional Performance Test Sheets are detailed sheets used by the CxA to ensure all important equipment parameters are verified during the initial operation of the equipment for the commissioning process. These sheets are customized by the CxA for the specific piece of equipment or specific system being commissioned.

Indoor Air Quality (IAQ) Assessments

- The acceptance tests and the functional performance tests, together with the documentation requirements of the commissioning process, will allow factors that affect IAQ such as outdoor air ventilation rate, ventilation effectiveness, and contaminant removal and control to be documented and verified.

System Training Manual

- The Systems Training Manual will provide the information needed to understand, operate, and maintain the systems and/or to inform others about the systems. It is to be the repository of all updates and corrections as they occur.

BVH Commissioning Portal

- The BVH Commissioning Portal is an on-line tracking database. The portal is used by the CxA to track issues and assign responsibility for corrective action. All members of the design / construction / commissioning team will be given access to the Commissioning Portal as required to respond to issues or deficiencies.

Commissioning Notices

- The Commissioning Notice is a bi-weekly report generated by the CxA that identifies the project progress as it relates to building commissioning. The Commissioning Notice is a summary of current issues from the on-line tracking database (***BVH Commissioning Portal***). The Commissioning Notice is distributed to the Owner, design team, and responsible contractors, when applicable, at commissioning progress meetings. The Commissioning Notice identifies and tracks the corrective action of deficiencies identified by the CxA.

Commissioning Reports

- The CxA will write and submit a final commissioning report detailing, for each piece of commissioned equipment or assembly, the adequacy of equipment or assemblies meeting contract documents. The following components are typically included:
 - Description of the OPR
 - Description of the project specifications
 - Verification of installation (commissioning notices)
 - Functional performance tests sheets
 - O&M documentation evaluation
 - Training program evaluation
 - Value of the commissioning process
 - Outstanding issues
 - Systems manual
 - Post occupancy review

Noncompliance items will be specifically listed. A brief description of the verification method used (manual testing, trend logs, data loggers, etc.) and observations and conclusions from the testing will be included. The final commissioning report is updated after occupancy / operations-phase commissioning.

SYSTEMS TO BE COMMISSIONED

The following list gives a description of the types of systems to be commissioned. The system description is meant to include all support equipment, components and controls. This list was generated based on the Basis of Design documentation; the commissioning process includes but is not limited to the following systems:

Equipment

- **HVAC Systems** – Includes 30% of sampling rate for terminal equipment such as VAV boxes, fan coil units, cabinet unit heaters, radiation, etc. All other type of equipment is tested at 100%.
- **All direct digital controls (DDC)** shall be verified for proper operation as they relate to the above equipment including interfaces for remote monitoring. All security and system interlocks associated with the control system shall be commissioned.
- Spot checking of air and water balancing readings, including space pressurization.
- Building domestic hot water heating systems.
- Any water booster pumps.
- Backflow preventing devices.
- Fire protection systems includes the fire pump and alarm check valves.
- Building envelope.
- Day lighting controls.
- Occupancy Sensors.
- Fire alarm system.
- Any energy efficient systems such as geo-thermal, photovoltaic, ice storage, fuel cells.

COMMISSIONING PHASE PROCESS OVERVIEW

COMMISSIONING DURING PREDESIGN

Objectives

The primary activities and objectives of commissioning during predesign are the following:

- Develop the OPR.
- Identify the scope for the commissioning process.
- Develop the initial commissioning plan.
- Accept the predesign-phase commissioning process activities.

COMMISSIONING DURING DESIGN

Objectives

Design-phase commissioning objectives include the following:

- Update the design-phase commissioning plan developed during predesign.
- Update the OPR.
- Verify the BOD document against the OPR.
- Verify plans and specifications against the BOD and OPR.
- Develop the commissioning plan for the construction and occupancy / operations phases.
- Develop and incorporate commissioning requirements into project specifications.
- Define training requirements for O&M personnel.
- Perform commissioning-focused design reviews.
- Accept the design-phase commissioning.

Additional Commissioning Team Tasks

Additional Construction Phase responsibilities of the commissioning team (led by the CxA, who is frequently responsible for these requirements) include the following:

- Build and maintain cohesiveness and cooperation among the project team.
- Assist Owner in preparing requests for project services that outline commissioning roles and responsibilities developed in the commissioning plan.
- Ensure that commissioning activities are clearly stated in all project scopes of work.
- Develop scope and budget for project-specific commissioning process activities.

- Identify specialists who will be responsible for commissioning specific systems and assemblies.
- Conduct and document commissioning team meetings.
- Inform all commissioning team members of decisions that result in modifications to the OPR.
- Integrate commissioning into the project schedule.
- Track and document issues and deviations relating to the OPR and document resolutions.
- Write and review commissioning reports.

COMMISSIONING DURING CONSTRUCTION

Objectives

Commissioning during construction (also known as the ***acceptance phase***) should document and verify that:

- All systems and assemblies are provided and installed as specified.
- All systems and assemblies are started and function properly.
- The systems manual is updated and provided to facility staff.
- Facility staff and occupants receive specified training and orientation.

Additional Commissioning Team Tasks

Pre-Functional Verification

A detailed schedule for all commissioning activities, with specific dates consistent with overall project construction schedule will be developed, with the assistance of the Owner's operations and maintenance personnel, to assist the Construction Manager in scheduling the responsible subcontractor to assist where necessary.

Functional testing of all applicable systems and subsystems cannot begin until:

- HVAC systems and associated subsystems have been completed, calibrated, and started up and are believed to be operating in accordance with contract documents.
- Automatic control systems have been completed and calibrated and are believed to be operating in accordance with contract documents.
- Testing, adjusting, and balancing procedures have been completed, and all TAB reports have been submitted and reviewed and discrepancies corrected and accepted.
- A statement shall be issued certifying that all work has been completed and equipment and systems are operational in accordance with contract documents.

Before the functional testing can start, a list of all equipment and systems involved in the commissioning process shall be developed. This list will be compiled based on construction document reviews, shop drawing submittals, and input from the design team and Owner.

Based on this list of equipment to be commissioned, pre-start / start-up documentation for all equipment and systems involved in the commissioning process must be provided by the contractors prior to any functional testing. This documentation must include detailed, step-by-step procedures used in the start-up of the equipment and must clearly indicate all manufactures required checkout procedures and evidence that such procedures have been thoroughly completed. This documentation shall also clearly state that such equipment has been put through the appropriate season startup process, conducting the functional performance tests on each piece of equipment and system. Provisions for verifying all relevant data, recording the results obtained, and listing the parties involved in each start-up and checkout must be included in the documentation.

Functional Testing

The Commissioning Authority will direct the performance of all functional test procedures. The Commissioning Authority will provide a bi-weekly report or Commissioning Notice of the progress of the functional testing via the BVH Commissioning Portal. The Commissioning Authority will provide recommendations and moderate meetings with all parties to discuss solutions to any problems identified during the testing. The final testing results for all tests will be included in the Commissioning Authority's Commissioning Report which will be submitted to the Owner upon completion of the Commissioning Process.

The Owner is recommended to provide time for their operations staff to participate in the functional testing under the supervision of the Commissioning Authority. The Owner will review all weekly reports and Commissioning Notices. When required they will review the functional test reports with the Design Team and direct the Contractors to take corrective action where deemed necessary. As required, the Owner will review with all parties any problems identified during the functional testing process. With the Design Team, the Owner will direct appropriate parties to take corrective action to solve problems identified during the testing process.

If so desired by the Owner, the Design Team will assist the Owner in reviewing the Commissioning Authority's reports. As required, they will review with all parties any issues identified during the functional testing process. With the Owner, the Design Team will direct appropriate parties to take corrective action to solve problems identified during the testing process.

The Contractors will assist the Commissioning Authority in the functional testing by providing the correct personnel when requested by the Commissioning Authority. The

Contractors will act in a timely manner to correct any problems described in any of the commissioning reports. The Contractors will document all corrective actions taken as noted on the commissioning reports. The Contractors will participate in discussions with all parties to determine possible solutions to any problems encountered during the functional testing. As directed by the Owner and Design Team, the Contractors will take required actions to correct problems identified during the functional testing process.

POST OCCUPANCY COMMISSIONING

The commissioning team shall perform a post occupancy or near-end-of-warranty review of the project. The CxA shall return to the site in 9 months into the 12 month warranty period. The CxA will review with the current building operation with the facility staff and address the condition of outstanding issues related to the Owner's project. The CxA will also interview the facility staff to identify problems or concerns they have in operating the building as originally intended. The CxA will provide suggestions for improvements and record these changes in the systems manual. The CxA will identify any problems covered under the warranty or under the original construction contract. The documented warranty or construction related problems will be shared with the commissioning team. The construction manager or general contractor shall be responsible for organizing the respective subcontractors to perform any corrective actions required to resolve these problems identified.

APPENDIX

Appendix A - Pre-Functional Test Sheets

Appendix B - Sample Functional Test Sheet

Appendix C - BVH Commissioning Portal User's Manual

Appendix D - Commissioning Process Chart



APPENDIX A
Pre-Functional Check Sheets



**J.M. Wright Technical High School
 Stamford, Connecticut**

Glycol Feed System

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J. M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Glycol System			
Verify 50 gallon tank capacity			
Verify 30% glycol mixture in tank			
Verify tank level and anchored			
Verify chemical agitator in tank			
Verify valved cold water line w/ back flow preventer to tank			
Verify power available to pumps			
Verify pressure switches			
Verify strainers before pumps			
Verify high and low level switches			
Verify Alarm monitoring by ATC			
Verify H-O-A pump controls			
Positive displacement flow meter installed.			
Hose end and drain valve installed at the bottom of the tank			
Supply shut off valves installed.			
Discharge check valves installed			
Pressure gauges installed			
Automatic Air Vent installed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Unit Heater

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Unit Heater			
Verify fan guard installed			
Fan rotates freely			
Electrical connections complete			
Disconnect switch installed			
Thermostat installed / wired and calibrated			
Seismic restraints installed			
Hot water coil clean piping complete			
Supply and return line isolation shut off valves installed.			
Return water strainer installed.			
Two-way control valve installed			
Balancing valve installed			
Automatic air vent installed			
P.T. ports installed			
Drain valve installed			
Pipe identification installed			
Pipe insulation complete			
Valve tagging is complete			
Water balancing is complete			



PROJECT: J.M. Wright		SYSTEM I.D.#	
LOCATION: Stamford, CT		EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Propylene glycol solution in system			
Test ports installed			
Expansion tank has been insulated			
Expansion tank mounting is complete			
Cold Water backflow preventer installed.			
Make up PRV installed.			
Make up isolation valves			
Make up pressure gauges installed.			
By-pass line around make-up fill line w isolation valve installed.			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Base-Mounted Pumps

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	<u>N/A</u> Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
		HP / GPM / Head	
ITEM	OK	COMMENT	
Base Mounted Pump			
System flush / clean compete			
Propylene glycol solution in system			
Pumps factory started / aligned			
Coupler guard in place			
Disconnect switch installed			
VFD powered / factory started			
Overloads properly set			
4" housekeeping pad installed			
Inertia pad/vibration isolation installed			
Pump base grouted to inertia pad			
Vibration isolation installed / set			
Spring hangers inst on piping (1 st 3 on S&R)			
S&R Isolation valves			
Piping flex installed (S&R)			



PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
		HP / GPM / Head	
ITEM		OK	COMMENT
P gauge with valved 3-point manifold			
Suction Diffuser w/ strainer installed			
Strainer start-up screen in place			
Low point drain with valve and hose end			
Supply Check valve			
Supply flow meter / balancing valve installed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Chiller

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Chiller(s)			
System flushed / chemical Treatment added			
Mounting / support system			
Primary pumps powered / balanced			
Chiller control panel mounted / powered			
Maintenance clearance has been maintained			
Pressurization and leak testing completed			
Shimmed and grouted to concrete pad			
Mounted with min 4 @ 1/2 bolts to concrete pad			
Disconnect switch installed			
Flow switches installed on Chilled water side			
Local piping verified			
Seismic restraints / anchors in place			
2-way control valves installed on outlet side of chilled water systems			



PROJECT:	J.M. Wright	SYSTEM I.D.#
LOCATION:	Stamford, CT	EQUIPMENT I.D.#
ITEM	OK	COMMENT
Flex couplings installed on Supply and Returns of the Chilled Water lines		
Temperature and Pressure gauges installed		
Relief Valve installed on supply side of the Chilled water line		
Chiller Piping & Specialties		
Expansion tanks installed		
Air separator installed		
End of main balancing valves installed		
Pressure relief valve installed		
Make-up water connection made with BFP		
Pressure gauge installed at fill line		
Test ports installed		
Chiller butterfly isolation valves installed		
Differential pressure switches installed across supply and return lines of Chilled water lines		
Install 2-way head pressure control valve on the chilled water lines		
Temperature and pressure gauges installed at chillers		
Flexible piping connections installed		
Flanged Unions		
Drain valves with hose bib connection & cap @ low point of systems lines		
Piping insulation complete		
Pipe Identification complete		
Valve tagging complete		
Water balancing complete		
Rupture disc / relief valve installed and piped to the exterior		



PROJECT: J.M. Wright		SYSTEM I.D.#	
LOCATION: Stamford, CT		EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Manufacturer's start-up completed			
Refrigerant Detection system installed and operational			
ATC Controls			
CHWS & R temperature sensors installed and calibrated.			
Chiller supply and return water temperature sensors installed and calibrated			
Chilled water low limit switch			
Chilled water differential pressure sensor installed and calibrated.			
Pressure differential control valve installed			
COMMENTS:			
PRE-START BY:		DATE:	
START-UP BY:		DATE:	



**J.M. Wright Technical High School
 Stamford, Connecticut**

Fin Tube Radiation

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
<u>N/A</u>		<u>N/A</u>	
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Pressure testing complete			
Supply isolation / union valve			
Balancing valve			
Two-way Control valve			
Union			
Manual air vent			
Drain Valve with cap and chain			
Hot water coil clean and clear-piping complete			
All components accessible			
Unit labeled			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Inline Pump

PRE-FUNCTIONAL SYSTEM CHECKLIST

 Mechanical Contractor Date Controls Contractor Date

 Electrical Contractor Date Sheet Metal Contractor Date

 TAB Contractor Date General Contractor Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Inline Pump			
Pump start-up completed and report submitted			
System flushing completed			
Piping insulation completed			
All piping, valve tagging and equipment labeling complete			
All piping supports installed so no weight is place on pump			
Vibration isolation installed			
Discharge isolation valve installed			
Combination balance, isolation and check valve installed			
Increasers and reducers installed (if required)			
Pressure gauges installed on trumpet valve			
Suction strainer installed with ball valve and blow down to nearest floor drain			
Suction side isolation valve installed			
ATC point-to-point checkout completed			
Water balancing completed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Air Terminal / VAV Box w/Reheat

PRE-FUNCTIONAL SYSTEM CHECKLIST

 Mechanical Contractor Date Controls Contractor Date

 Electrical Contractor Date Sheet Metal Contractor Date

 TAB Contractor Date General Contractor Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Floor:	EQUIPMENT I.D.#	
	Room:	EQUIPMENT Model / Size	
ITEM		OK	COMMENT
VAV Box			
Electrical connections complete			
Disconnect switch installed			
Tee caps installed on flow sensing tubes			
Duct insulated – all “sweat points” covered			
Hot water coil piping complete			
Hot water piping (including coil) fully insulated			
Access doors installed and accessible			
Sound Attenuator Installed			
Appropriate runouts maintained on primary inlet per details (see detail for curved versus straight inlets)			
VAV Box Hot Water Coil – Detail 15 H403			
Supply & Return shut off valves installed.			
Supply and return unions installed			
Low point drain and manual air vent installed			
Control valve installed			
Balancing valve installed			
ATC controls complete (point to point checkout complete)			
P.T. installed			



PROJECT:	J.M. Wright		SYSTEM I.D.#
LOCATION:	Floor:		EQUIPMENT I.D.#
	Room:		EQUIPMENT Model / Size
ITEM		OK	COMMENT
Thermostat installed and wired			
Balancing Dampers installed and operable			
Control damper operation verified			
Control valve operation verified			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Air Handling Unit

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Air Handling Unit			
Start-up completed and report submitted on unit and associated VFDs			
VFDs installed and powered			
Electrical connections complete			
Disconnect switch installed			
Construction filter installed (Replace with new filters post-construction)			
Pulleys aligned and belt tension correct			
Fan(s) rotates freely			
Check supply and return fans for proper rotation			
All motorized dampers installed and operating correctly			
HW coil clean and piping complete			
Vibration isolators installed			
Flexible duct connections installed			
Ductwork clean and sealed			



PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Ductwork insulated per contract documents			
CHW/HW Coil Piping Arrangement			
Ball valves installed on supply and return lines			
Union connections used			
Strainer installed			
(2) Way modulating control valve installed			
Balancing valve installed			
Pressure and temperature ports installed			
Manual air vents installed			
Drain valve installed w/ hose end and capped			
Thermometers installed			
Pressure Gauges installed			
Condensate drain pan with trap installed			
Piping insulation completed			
Piping identification completed			
Airflow stations installed and calibrated			
DP sensors installed and calibrated			
All temperature sensors installed and calibrated			
Static pressure sensor installed and unit controlling to setpoint			
All safeties installed and tested for operation			
Controls point-to-point checkout completed			
Heat recovery wheels started			
Smoke detectors installed and operating			
Air and water balancing completed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Boiler

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM			
OK		COMMENT	
Boiler			
Start-up of Burner completed and report submitted			
System flush-out competed			
Equipment identification installed			
Housekeeping pad installed			
Combustion air intake installation complete			
Flue vent piping completed			
Verify vent is 40" min height above roof line			
Vent rain cap has been installed			
Collar and flashing is secure and properly sealed at roof line with 12" roof curb			
Boiler Piping Connections			
Boiler Circulation pump installed and operating			
Pressure and temperature fittings installed			
Pressure and temperature gauge installed			
Flow switch installed			



PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Drain valve installed			
Low temperature mixing valve installed			
Triple duty valve installed			
Isolation valves installed			
HWS & HWR headers installed no more than 12" apart			
HWS & HWR thermometers are installed			
Cold water make-up line with backflow preventer			
Pressure relief valve installed with Blow-down piped to floor drain			
Emergency shut-off(s) installed			
Burner mounted control panel with alarm bell and lights to indicate low water and flame			
Low water cut-off			
High limit reset installed			
Disconnect switch installed			
Expansion Tank with isolation valve installed			
Verify that tank has been properly charged			
Gas train installed to state and local codes			
All piping insulation completed			
All piping identification completed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Fan Coil Unit

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
FCU-			
Electrical connections complete			
Disconnect switch installed			
3 speed switch installed			
Construction filter installed (Replace with new filter post-construction)			
Pulleys aligned and belt tension correct			
Fan(s) rotates freely			
Motorized damper installed and operating correctly			
CHW/HW coils clean and piping complete			
Vibration isolators installed			
Seismic restraints installed (where applicable)			
Ductwork clean and sealed			
Ductwork insulated per contract documents			
CHW/HW Coil Piping Arrangement			
Ball valves installed on supply and return lines			
Strainer installed			



PROJECT: J.M. Wright		SYSTEM I.D.#	
LOCATION: Stamford, CT		EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
(2) Way modulating control valve installed			
Automatic Flow Control valve installed			
Drain Pan installed and drain line installation completed			
Auxiliary drain pan installed (where required)			
Manual air vents installed at top of coil			
Automatic air vents installed at top of risers with access door installed			
Drain valve installed			
Controls point-to-point checkout completed			
Room temperature sensor installed and calibrated			
Piping insulation completed			
Piping identification completed			
Air and Water Balancing Completed			
COMMENTS:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

**Kitchen Exhaust and Make-Up Air System
 PRE-FUNCTIONAL SYSTEM CHECKLIST**

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Kitchen Exhaust Fan			
Start-up completed and report submitted			
Fan Identification has been installed			
Air Balance Complete & Preliminary Report available			
Electrical connections complete			
Manual fan on/off switch installed			
Motor disconnect switch installed			
Fan has been bumped for proper rotation			
Ductwork is sealed			
Equipment guards installed			
Pulleys aligned and belt tension correct			
Grease trap installed with drain			
14" high roof curb installed			
Gasket installed between curb and flashing			
Bird screen installed			



PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM		OK	COMMENT
Verify 10' minimum distance between exhaust and make up air			
ATC point-to-point check-out is complete			
Make-Up Air Fan			
Start-up completed and report submitted			
Unit identification has been installed			
Electrical connections complete			
Motor disconnect switch installed			
Fan has been bumped for proper rotation			
Vibration isolators installed			
Pulleys aligned and belt tension correct			
Ductwork insulation completed			
Ductwork is sealed			
Equipment guards installed			
Motorized dampers installed and operating			
Aluminum pre-filter and 4"final filter installed			
14" Minimum roof curb installed			
Gasket installed between curb and flashing			
Gas burner heater and gas train installed			
All safeties installed and operating			
Smoke detectors installed and operating			
Space and duct temperature sensors installed and calibrated			
ATC point-to-point check-out is complete			
Comments:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Roof Mounted General Exhaust Fan

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Roof Mounted General Exhaust Fan			
Fan Identification has been installed			
Air Balance Complete & Preliminary Report available			
Electrical connections complete			
Speed control switch on direct drive			
Motor disconnect switch installed			
Fan has been bumped for proper rotation			
Ductwork is sealed			
Equipment guards installed			
Pulleys aligned and belt tension correct			
Motorized damper installed and operating			
12" roof curb installed (8" on sloped roofs)			
Gasket installed between curb and flashing			
Bird screen installed			
ATC point-to-point check-out is complete			
Comments:			



**J.M. Wright Technical High School
 Stamford, Connecticut**

Split System AC Unit

PRE-FUNCTIONAL SYSTEM CHECKLIST

Mechanical Contractor	Date	Controls Contractor	Date
Electrical Contractor	Date	Sheet Metal Contractor	Date
TAB Contractor	Date	General Contractor	Date

PROJECT:	J.M. Wright	SYSTEM I.D.#	
LOCATION:	Stamford, CT	EQUIPMENT I.D.#	
ITEM	OK	COMMENT	
Split System AC Unit			
Unit identification installed			
Seismic restraint and vibration isolators installed			
All electrical connections complete			
All pipe identification and valve tagging completed			
Refrigerant piping insulated (and jacketed)			
Condensate drain installed and piped to pump (where applicable)			
Condensate pump powered (if applicable)			
Disconnect for evaporator and condenser installed			
Filter installed			
Thermostat installed and calibrated			
Condenser is installed and securely fastened to water tight deck and curb			
Fans rotate freely			
ATC point to point check out complete			
COMMENTS:			



APPENDIX B
Sample Functional Test Sheet

**J.M. Wright Technical
 Stamford, CT
 Date:**

Variable Air Volume Air Handling Unit

AHU-
 (Serves)

FUNCTIONAL PERFORMANCE TEST – RECORD SHEET

A. Documentation Requirements

Prior to the functional performance test and verification process, the Commissioning Agent requires the following documentation:

1. Air and Water Balancing Report
2. Operations and Maintenance Data
3. Verification of Warranty Periods on Equipment
4. Verify Owner Training is Complete

B. System Components

Prior to the functional performance and verification process, the Commissioning Agent shall verify all major system components, capacities, configurations and support functions are consistent with the design or documentation received. The following shall be verified:

- | | |
|---------------------------|---------------------|
| 1. Unit Identification | Manufacturer: _____ |
| | Model: _____ |
| Supply Fan Identification | Manufacturer: _____ |
| | Model: _____ |

HP	Voltage	FLA (Amps)	Phase
N/A	N/A	N/A	N/A

2. Supply Fan Motor Performance:
 Return Fan Motor Performance:
3. Verify exterior duct insulation is applied in accordance with the specification section.

Compliance:	_____
Non-compliance:	_____

Remarks:

4. Verify unit is installed with ample clearance for maintenance and repair of all components. Compliance: _____
Non-compliance: _____

Remarks:

5. Verify fan rotation, lubrication and belt alignment for both supply fans and the return fan. Compliance: _____
Non-compliance: _____

Remarks:

6. Verify fans have been statically and dynamically balanced. Compliance: _____
Non-compliance: _____

Remarks:

7. Verify installation of premium efficiency motors. Compliance: _____
Non-compliance: _____

Remarks:

8. Verify construction start-up filters were removed and changed with new filters. Compliance: _____
Non-compliance: _____

- Verify filter pressure differential sensor across MERV 7 filter.
- Verify filter pressure differential sensor across MERV 13 filter.

Remarks:

9. Verify unit installation:			
	Yes		No
Return Air Section			
Return Airflow Measuring Station			
Return Air Damper w/Actuator			
Outside Air Section			
Outside Airflow Measuring Station			
Outdoor Air Volu-trol Damper w/ Actuator			
Outside Air Isolation Damper			
Filter Sections			
2" Pleated Filter – MERV 7			
Electronically Enhanced Filter			
Filter Rack Blank-off Plates			
Supply Fan Section			
Extended Lube Lines			

Fan Spring Isolators			
Supply Airflow Measuring Station			
Heating Coil Section			
Two way control Valve			
Hot Water Coil			
Cooling Coil Section			
Two way Control Valve			
Cooling Coil			
Stainless Steel Condensate Drain Pan			
Condensate Drain Line			

Remarks:

10. Verify unit and sections are labeled.

Compliance: _____
 Non-compliance: _____

Remarks:

11. Verify installation of supply fan variable speed drive(s) w/ HOA switch.

Compliance: _____
 Non-compliance: _____

- Record make and model.
- Record minimum drive speed.

Remarks: ***Supply Fan:***
 Model
 Minimum speed:

12. Verify hot water heating coil piping arrangement per Detail-			
	<i>Yes</i>		<i>No</i>
HWS Isolation Valve			
HWS Strainer			
HWS Thermometers			
HWS Pressure Gauges			
HWS PT Ports			
HWS Butterfly Valves			
HWS Drain Off Valves			
HW Coil Drains			
HW Coil(s)			
HWR Pressure Gauges			
HWR Thermometers			
HWR Manual Air Vent			
HWR 2-Way Modulating Control Valve			
HWR Calibrated Balancing Valve			

HWR Calibrated Balancing Valves per Coil			
HWR Isolation Valve			
Union Connections			
Piping Insulation Complete			
Piping Identification Installed			
Valve Tagging Complete			

Remarks:

13. Verify chilled water coil piping arrangement per Detail-			
	Yes		No
CHWS Isolation Valve			
CHWS Strainer			
CHWS Thermometers			
CHWS Pressure Gauges			
CHWS PT Ports			
CHWS Butterfly Valves			
CHWS Drain Off Valves			
CHW Coil Drains			
CHW Coil			
CHWS Pressure Gauges			
CHWR Thermometer			
CHWR Manual Air Vent			
CHWR 2-Way Modulating Control Valve			
CHWR Calibrated Balancing Valve			
CHWR Calibrated Balancing Valves per Coil			
CHWR Isolation Valve			
CHWR Union Connections			
Piping Insulation Complete			
Piping Identification Installed			
Valve Tagging Complete			

Remarks:

14. Verify installation of discharge air temperature sensor:
➤ Verify calibration.

Compliance: _____
Non-compliance: _____

BMS Reading	•F	Notes:
Field Reading	•F	

15. Verify installation of space thermostat:
- Verify calibration.
 - Verify setpoint range adjustment.
 - Verify operation of occupancy override capability (if applicable).

Compliance: _____

Non-compliance: _____

<i>Display Reading</i>	<i>XX°F</i>	<i>Notes:</i>
<i>BMS Reading</i>	<i>•F</i>	
<i>Field Reading</i>	<i>•F</i>	

16. Verify installation of vibration isolation and seismic restraint as required per specification section
- Compare with vibration/seismic submittal.
 - Verify compliance with vibration/seismic engineer final report as required per specifications.

Compliance: _____

Non-compliance: _____

Remarks:

17. Verify installation of service disconnect switch.

Compliance: _____

Non-compliance: _____

Remarks:

18. Verify installation of convenience outlet and sectional marine lights.

Compliance: _____

Non-compliance: _____

Remarks:

19. Verify variable speed drives have been labeled.

Compliance: _____

Non-compliance: _____

Remarks:

20. Verify installation of chilled water piping.

Compliance: _____

Non-compliance: _____

Remarks:

21. Verify chilled water piping has been properly insulated and supported. Compliance: _____
Non-compliance: _____

Remarks:

22. Verify installation of one supply duct smoke detectors. Compliance: _____
Non-compliance: _____
➤ Verify detectors are hard-wire interlock with the unit.
➤ Record location(s).

Remarks:

23. Verify installation of fire dampers at floor penetrations where indicated on drawings. Compliance: _____
Non-compliance: _____

Remarks:

C. Functional Performance Testing

1. Verify start/stop capability and occupancy schedule operation. Compliance: _____
Non-compliance: _____
➤ Record occupancy schedule parameters.

Remarks:

2. Verify installation and calibration of the **outdoor air temperature and humidity** sensor. Compliance: _____
Non-compliance: _____
➤ Record location.

Remarks: *ATC Reading – degrees F*
Field Reading – degrees F

3. Verify installation calibration of **mixed** air temperature sensor. Compliance: _____
Non-compliance: _____
➤ Verify calibration.

Remarks: *ATC Reading – degrees F*
Field Reading – degrees F

4. Verify installation calibration of **HW Coil** air temperature sensor. Compliance: _____
➤ Verify calibration. Non-compliance: _____

Remarks: *ATC Reading – degrees F*
Field Reading – degrees F

5. Verify installation calibration of **CHW Coil** air temperature sensor. Compliance: _____
➤ Verify calibration. Non-compliance: _____

Remarks: *ATC Reading – degrees F*
Field Reading – degrees F

6. Verify installation calibration of **discharge** air duct static pressure sensor(s). Compliance: _____
➤ Verify calibration. Non-compliance: _____

Remarks: *Discharge static pressure = ”*
Downstream static pressure control point = ”

7. Verify installation of **supply** airflow station: Compliance: _____
➤ Record location. Non-compliance: _____

Remarks: *Supply air flow sensor is located in*
Field Reading – cfm
BMS Reading – cfm @ CF

8. Verify installation of **outside air** airflow station: Compliance: _____
➤ Verify calibration. Non-compliance: _____

Remarks: *Min. OA air flow sensor is located in the*
Field Reading –cfm
BMS Reading cfm

9. Verify installation of **return** airflow station:
 ➤ Verify calibration.
 ➤ Record location.

Compliance: _____
 Non-compliance: _____

Remarks:

10. Record fan performance at full flow (60 hz.):

- a. Supply Fan
 b. Return Fan

Airflow (cfm)	Pressure (inches)	
	Suction	Discharge
N/A	N/A	N/A

Remarks:

11. Record fan motor performance at full flow:

- a. Supply Fan
 b. Return Fan

Voltage (volts)	Amperage (amps)	Frequency (Hz.)
N/A	N/A	N/A

Remarks:

12. Verify supply fan status.

Compliance: _____
 Non-compliance: _____

Remarks:

13. Verify outdoor air damper status.

Compliance: _____
 Non-compliance: _____

Remarks:

14. Verify when an off-line fan is commanded to start:

- The VFD shall be enabled.
- The OA dampers and smoke dampers are commanded open.
- The dampers are proven open by their end switches.
- The exhaust air terminal unit shall go to the occupied position when the AHU is commanded on.
- When the unit is commanded off, the fans shut down, the isolation dampers close and the exhaust air terminal unit shall close.

Compliance: _____
 Non-compliance: _____

Remarks:

Discharge Air Control

15. Verify the return air damper shall go to the occupied position, the outside air Volu-trol shall control to maintain proper airflow and the outside air isolation damper shall open.
- The cooling coil control valves shall modulate to maintain 37 degrees off the cooling coil.
 - The reheat coil control valve shall modulate to maintain 52 degrees off the air handling unit.

Compliance: _____
Non-compliance: _____

Remarks: *Cooling:*
Design HW= gpm
B&G C.S.
Top coil: setting // gpm
Bottom coil: setting // gpm

Heating:
Design HW= gpm
B&G C.S.
Top coil: setting // gpm
Bottom coil: setting // gpm

Volume Control

16. The unit shall control to maintain the supply duct static pressure.
- The Volu-trol shall control the outside air cfm to both the occupied and unoccupied modes.
 - The Volu-trol shall control the exhaust air cfm to both the occupied and unoccupied modes.

Compliance: _____
Non-compliance: _____

Remarks:

Alarms and Safeties

17. The following safeties, each with its own manual reset button, shall shut down its respective unit and initiate an alarm:

Compliance: _____
Non-compliance: _____

- If the smoke detector senses smoke in the supply air. Dry contacts initiate the shutdown of the AHU via the DDC system. A second dry contact will notify the building alarm system which shall initiate an appropriate response by the fire alarm contractor.
- The discharge static pressure sensor reading is at or above +3.0”.
- The inlet static pressure sensor reading is at or above -2.0”.

Remarks:

18. The DDC system shall initiate an alarm for a unit describing the alarm if any of the following conditions are met:

Compliance: _____
Non-compliance: _____

- The temperature sensor after the heating coil goes below 45 degrees or above 60 degrees for 5 minutes when the AHU status is on.
- The end switches do not indicate damper in the appropriate position after 90 seconds.
- The High/Low limit alarm shall be initiated if the field pressure sensors indicate a pressure greater than 0.5” above or below setpoint.
- A general alarm from the fan wall control package.
- The outside air flow rates drop below 50% of the maximum design

Remarks:

19. Verify the following information is available and accurate at the facilities workstation:			
	Yes	No	
1. System Occupied/Unoccupied Status			
2. AHU Fan Start/Stop/Status			
3. OA Damper Position and Status			
4. RA Damper Position and Status			
5. Outdoor Air RH			
6. Outdoor Air Temperature			
7. Cooling Coil Leaving Air Temperature			

8. Mixed Air Temperature			
9. Supply Air CFM			
10. Outdoor Air CFM			
11. Return Air CFM			
12. Graphic Display			

Remarks:

Notes:

SAMPLE



APPENDIX C

Commissioning Portal

Appendix C – BVH Commissioning Portal

BVH Integrated Services utilizes a web-based Portal to track discovered issues during the Functional Testing portion of the project. This portal tracks issues based on system and allows for individuals to respond by issue. It is managed by the commissioning agent.

The enclosed User's Manual will outline the actual operations of the Portal for issue tracking purposes. Assignments for access will take place during the construction phase of this project, as Functional Testing nears implementation.

2011

Commissioning Portal User Manual

Version 4.0 March 2011

The BVH Commissioning Portal is an online tracking database. The portal is used by the commissioning Agent to track issues and assign responsibility for corrective action. All members of the commissioning team will be given access to the Commissioning Portal as required to respond to issues or deficiencies.



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Connecting to the Commissioning Portal

Connect to the Internet and open the web browser of your choice, in the address bar type the address of the commissioning portal below or click on the link

<http://cx.bvhis.com>

Note: There is no "www" at the beginning of the site address.

Sign on and Sign off

Once the site has finished loading, you will see the login screen show in Figure 1 below. If you have already been provided with a username and password by BVH then enter it in the proper fields and click the Sign In link.

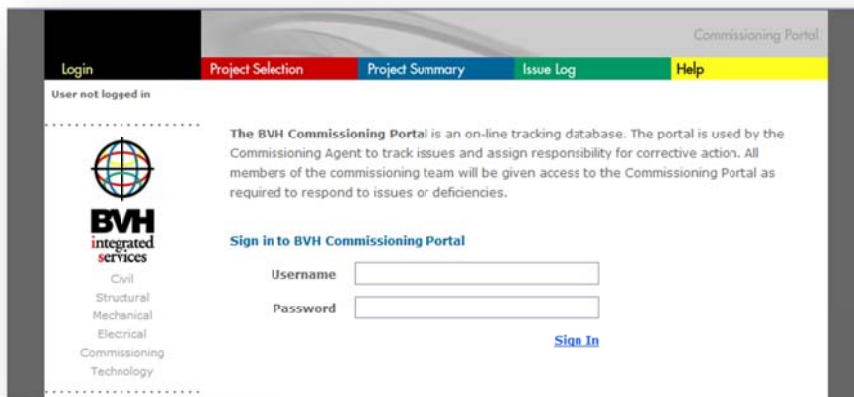


Figure 1

*Note:
Your username is typically your full email address. Please ensure the Commissioning Provider has your most up to date email address.*

Navigating the Commissioning Portal

When navigating between sections of the portal please use the Tabs at the top of each page.



When responding to issues please use the provided links, such as **'Back to Issues'**, to return to your previous page.



Using the portal's links ensures all of the information you see will be the most up to date and include any items just entered from another page. Using your browser's back button will only return you to the instance of page you previously viewed including any old data. In some instances it can even generate an error that will require you to sign out of the Commissioning Portal, close your browser, then return to the page and sign in again to continue working.

Project Selection

After you have signed onto the Commissioning Portal the project selection screen shown in Figure 2 below will appear. Select the project you are working with via the drop down menu, typing in this field will filter the choices by the letters you type. Once you have chosen the project click on the **'Enter Project'** link.



Figure 2

Note:

If you are involved with multiple commissioning projects, they should all be listed in this pull down menu. You are only given access to projects that you are involved in and been assigned to by BVH.

Project Summary

Once you have selected and entered a project from the Project Selection page you will be taken to the project summary screen shown in Figure 3 below.

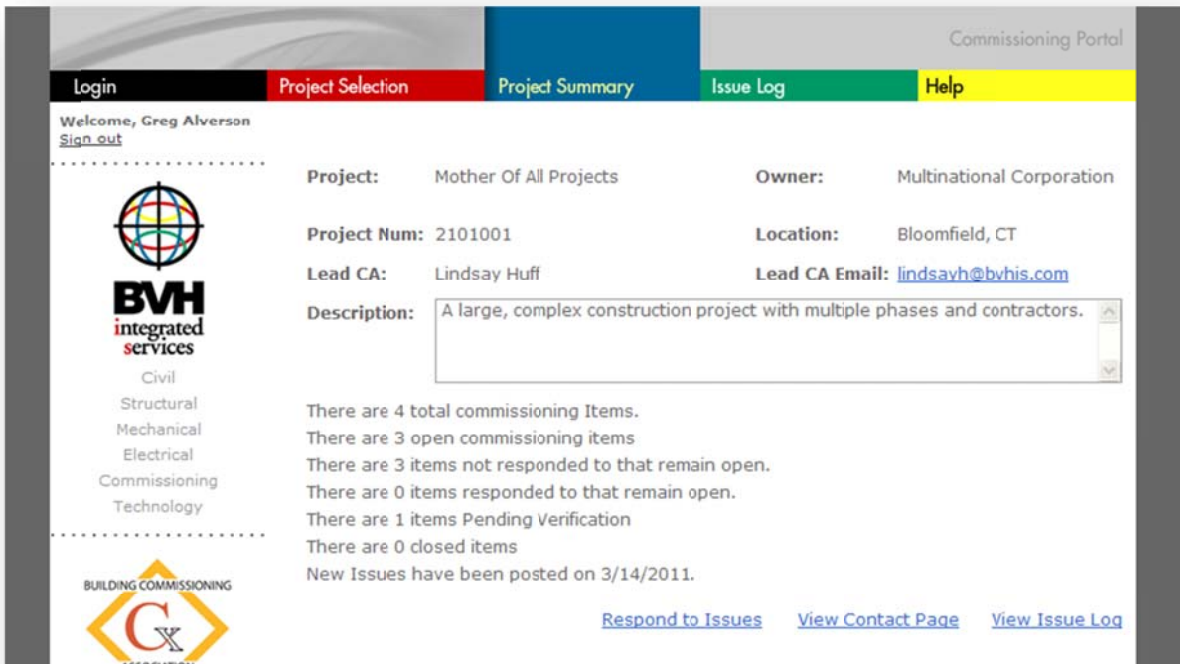


Figure 3

This screen indicates the name of the project, the owner, the lead Commissioning Provider (Lead CA), and other information about the project along with a brief description of the project itself. To contact the lead Commissioning Provider via email click on the email address listed and a new message will open in your default email program already addressed to the Lead Commissioning Provider.

Additionally, there is a list of the statistics regarding the issues or deficiencies documented to date on the project such as the total number of issues identified and the number of outstanding issues not yet responded to.

An important statistic to note is the line that indicates when new issues have been last posted. This will be useful when responding to outstanding items. As an example, if the "New Issues Posted On" date has not changed since the last time you responded to new items, there are no new items for you to respond to.

Note: This does not mean that the responsibility of items has not changed from one party to another since that date. You should still review the issues log for any items assigned to you.

Respond to Issues

See instructions under the [Responding to Issues](#) section of the Issue Log for more detailed information.

View Contact Page

To Display a list of all of the current commissioning projects Contacts click on the **'View Contact Page'** link located in at the bottom of the Project Summary page. This will create a report containing a listing of all the contacts for this job, including their trades, phone numbers, and email addresses. You can then **search**, **print** or **save** this list to a file (*use the pulldown to select file type*) on your computer.

The screenshot shows a web browser window displaying the 'BVH Commissioning Project Contacts' page. The browser's address bar shows the URL 'http://cx.bvhis.com/Private/ContactRPT.aspx'. The page content includes a table of contacts and the BVH logo. The table lists two contractors: 'Air & Water Balancing Contractor' and 'ATC Contractor'. The 'Air & Water Balancing Contractor' section lists 'Joe Balancer' as a 'Drive-By Balancing' contractor with the email 'joe@dbb.com'. The 'ATC Contractor' section lists 'Vinny Controls' as an 'Almost Automatic Temperature Co' contractor with the email 'vinny@AATC.com'. The BVH logo is located in the top right corner of the page content.

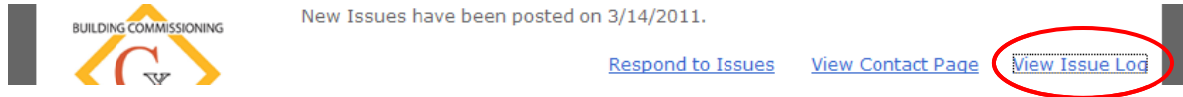
BVH Commissioning Project Contacts		
Project Name	Mother Of All Projects	
Project Number	2101001	
Air & Water Balancing Contractor		
Joe Balancer	Drive-By Balancing	() - joe@dbb.com
ATC Contractor		
Vinny Controls	Almost Automatic Temperature Co	() - vinny@AATC.com

Once you have completed viewing the Contact list you must use the **Browser's Back button** to return to the project summary screen.

The screenshot shows a web browser window displaying the 'http://cx.bvhis.com/Private/ContactRPT.aspx' page. The browser's address bar shows the URL 'http://cx.bvhis.com/Private/ContactRPT.aspx'. The browser's navigation buttons (Back, Forward, Stop, Refresh) are visible, with the Back button circled in red.

View Issue Log

The **'View Issue Log'** link Located in the bottom right of the Project Summary page will direct you to a table of all the documented Issues for the project. For more detailed instructions see the **Issue Log** Section of this Manual.



Issue Log

After clicking on the View Issue Log link from the Summary Page you will be taken to the Issue Log page for the current project shown in Figure 4. This Issue Log displays a table of all the documented Issues and deficiencies for the commissioning project.

Note: It may take a few moments for the table to finish loading and display all of the issues for a project, as the table may contain many items. Please be patient and do not click on the page until it has finished loading.

The screenshot shows the 'Issue Log' page in the Commissioning Portal. The page has a navigation bar with 'Login', 'Project Selection', 'Project Summary', 'Issue Log', and 'Help'. Below the navigation bar, there is a welcome message for Greg Alverson and a 'Sign out' link. The main content is a table with the following data:

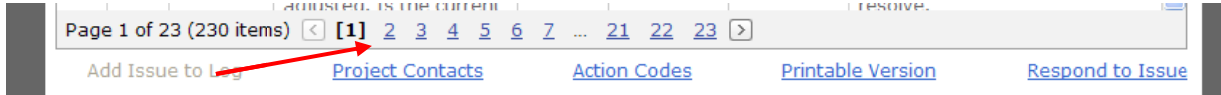
No.	Tag	Item Description	Action By	Posted	Status	Response
1	Steam PRV	Per drawing M-501, the final steam pressure to the heat exchanger should be maintained at 12 psi. The PRV station is currently maintaining 25 psi at the HX. See attached photo. Mechanical contractor to correct.	TMC	2011/03/14	Open	
2	AHU-1 HW Flow	Per the scheduled values on M-700 of the contract documents, the total hot water flow to the AHU-1 preheat coil should be 65 GPM. HW flow was measured to be 49 GPM. Balancing contractor to correct.	DBB	2011/03/14	Open	
3	AHU-1 Air Flow Station	The supply air flow station for AHU-1 is not reading the correct airflow value. ATC contractor to correct airflow calibration to agree with TAB	AATC	2011/03/14	Pending Verification	2011/03/14 BVH/CX - BVH will verify with balancing contractor when on site next. 2011/03/14 AATC - Pressure sensing tube found disconnected. This has been corrected and flow station is

At the bottom of the table, there are several links: 'Add Issue to Log', 'Project Contacts', 'Action Codes', 'Printable Version', and 'Respond to Issue'.

Figure 4

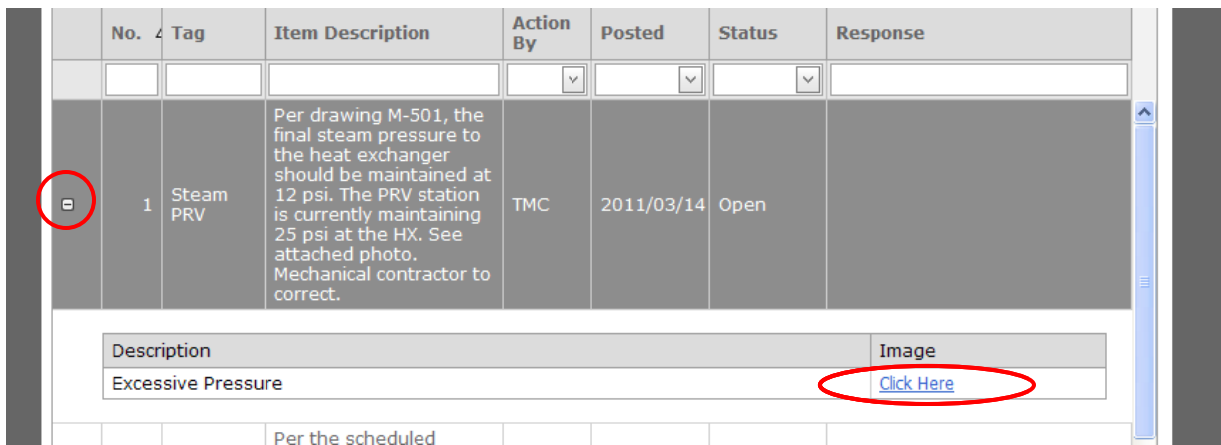
The Issue Log may consist of multiple pages depending on the number of items. Each page of the Table can contain up to 50 items. The scroll bar on the right of the table will allow you to scroll to the bottom

of the grid and view all 50 items on that page. If there are more than 50 items then you will need to continue on to the next page of the grid to view additional items. You can change the page of the table you are viewing by clicking on the **Page buttons** at the bottom of the table, or selected the page number you wish to view.



Viewing Images

Some issues may have images attached to them to help describe the items. Each description should say if there is an attached photo. To view the attached photos click the plus symbol on the left side of the item to expand the row and display the image descriptions and links.



Then click on the link for the image you want view and a new window will appear that displays the image.

Filtering and Sorting the Issue Log

The Issue Log may be filtered by using the fields at the top of each column, via typing in the fields or using the pull down menus show in Figure 5 below.

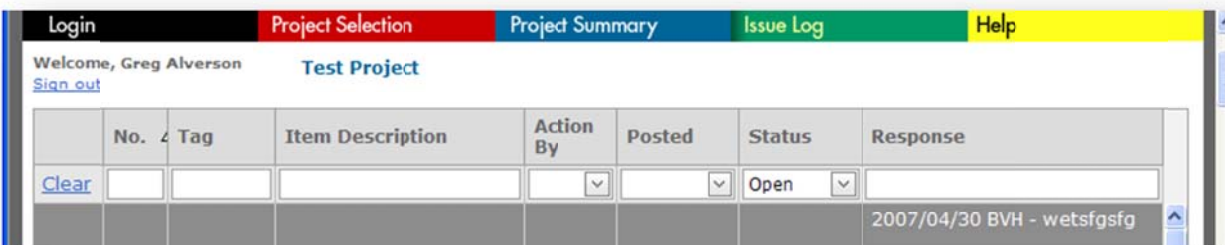


Figure 5

The Issue Log table may be filtered by any of the columns by beginning to type into the field at the top of each column, this will actively narrow the results based on what you type. Filtering the Issue Table will allow you to review only the items which meet the criteria entered into each filter field. You can

filter the grid so that it only displays those items assigned to your company and those which are open in this way, reducing the number of items to sort through. To clear all filters simply click the Clear button in the top left corner of the grid.

Note: Please be aware that when you choose open and pending from the Status filter pull down, only the word open will appear in the field after it is selected, the grid is still filtering to display both open and pending items, the field is simply not big enough to display both words.

The Issue Table may also be sorted by any of the columns displayed in either ascending or descending order. To sort the table by one of the columns click on the header of that column. A small arrow will appear to the right of the column title pointing either up or down depending on if the column is sorted in ascending order or descending order. To change the direction the table is sorted click on the same column header again. To return to the default sorting order of the table, sort by the No. column.

Add Issues to Log

The 'Add Issues to Log' link, shown in Figure 6, may be disabled depending on your permissions. Only the commissioning provider can add new issues to the Issue Log.

Project Contacts

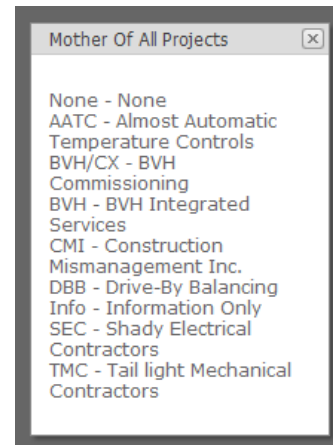
See detailed instructions under the [View Contact Page Section of the Manual](#).



Figure 6

Action Codes

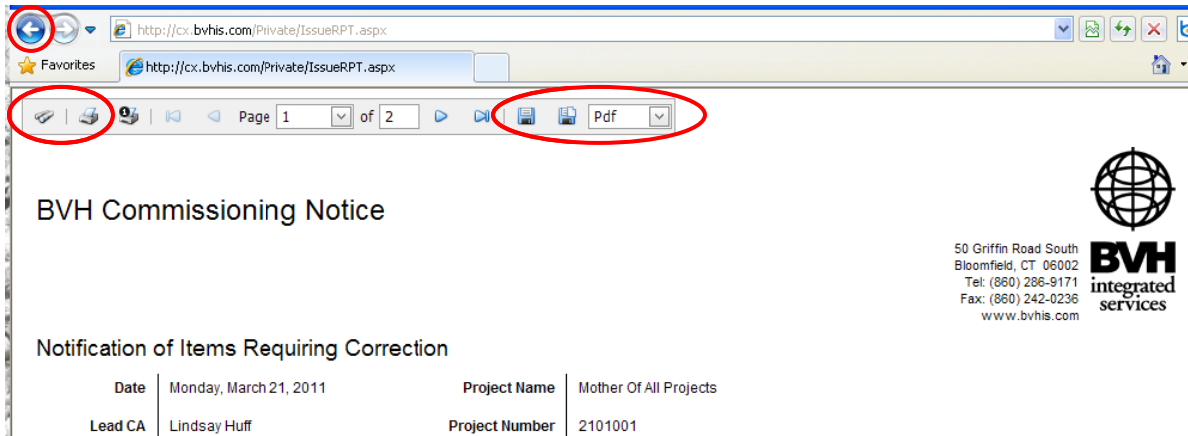
To display a key for the Action by column click on the **Action Codes** link at the bottom of the page, shown in Figure 6. This will create a dialog box displaying each abbreviation used in the Action by column and their corresponding company names, as shown in the image to the right. To close the Action codes Window simply click on the X in the upper right hand corner of the Action code window.



Printable Version

To display a printable version of the Issue Log click on the **Printable Version** link located at the bottom of the page, shown in Figure 6. This will create a report that can be easily searched, printed or saved to a file, in one of several formats, your computer. The report will take into account the filters you have selected for the grid, only showing the items that meet those criteria. Once you are finished with the printable report you must use the **Browser's Back button** to return to the Issue log page. (See Image Below)

Note: It may take a moment for the Printable version to be generated and open please be patient and wait for it to complete.



Responding to Issues

To respond to Issue in the Issue log first **select the row of an issue you would like to respond to** then click the **Respond to Issues** Link found in the bottom right of the Issue Log page. This will direct you to a new page to enter in your response shown in **Figure 7**. You can also get to this page using the link found on the Summary Page.

Commissioning Portal

Login Project Selection Project Summary **Issue Log** Help

Welcome, Greg Alverson
[Sign out](#)

BVH
integrated
services

Civil
Structural
Mechanical
Electrical
Commissioning
Technology

BUILDING COMMISSIONING
ASSOCIATION

BVH is a Corporate Member of the [Building Commissioning Association](#). Learn how a Certified Commissioning Professional can benefit your project.

Add Response

Project Name: Mother Of All Projects Item No. 5

Item Tag: Economizer Control

Action By: BVH Integrated Services Status: Open

Description: The approved sequence of operations does not address the control of the economizer function for the air handling units. BVH Cx recommends using differential enthalpy control since the OA and RA both have temperature and RH sensors installed. Please review and

Previous Response:

New Response:

[Add Response](#) [Back to Issue Log](#)

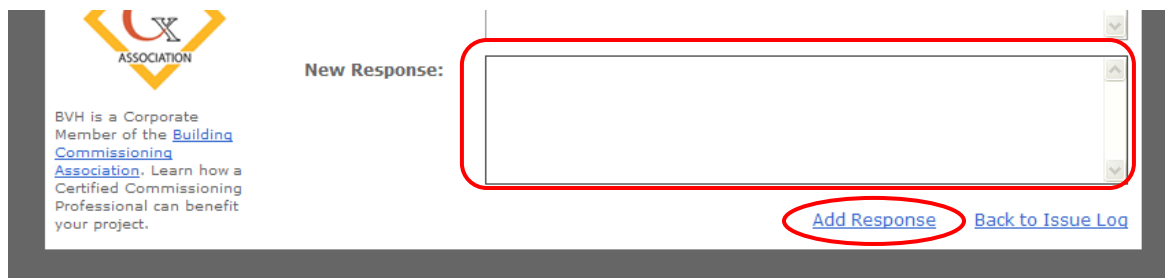
Figure 7

There are fields to display the Project Name, Item Number, Item Tag, Item Status, Item Description, who is responsible for the item, and all previous responses. These fields are for reference only and can only be editing by the Commissioning Agent. The New Response field is where you will add your response to the current issue. You will only be able to respond to items in which your company is listed in the "Action By" column and have a status of "Open".

The Item number pull down allows you to switch easily between item rows simply by changing the number; the other fields on the page will change accordingly with the information for the new item. This can be extremely useful when you have many items to respond to.

Adding your Response

To begin adding your response ensure that the proper item number is displayed in the pull down at the top right of the page and that the items is assigned to your company and has a status of open. Once the proper Item has been selected begin typing your response in the **New Response** field. When you have completed the contents of your response, click the **'Add Response'** Link to post your response to the issue log.



The screenshot shows a web interface for adding a response. On the left, there is a logo for 'BVH ASSOCIATION' and a block of text: 'BVH is a Corporate Member of the [Building Commissioning Association](#). Learn how a Certified Commissioning Professional can benefit your project.' To the right of the logo is the label 'New Response:' followed by a large text input field. Below the input field are two buttons: 'Add Response' and 'Back to Issue Log'. The 'Add Response' button is circled in red.

The date and name of your company will be automatically added to the beginning of your response, Please do not type them manually. You should see the **Previous Response** field update with your new response once the issue is updated; new responses appear above the older responses.

Once you have completed your response you may continue to respond to additional items by switching the Item number pull down in the upper right to another number, or return to the Issue Log by clicking the **Back to Issue Log** Link in the bottom right of the page.

If an item has been incorrectly assigned to your company, please respond to the item accordingly and the Commissioning Agent will correct the issue and assign it to the proper party.

Tip: To quickly respond to many items it is suggested that you print a report of the Issue log filtered by your company prior to beginning your responses. (See Filtering and Sorting section of the manual for instructions on filtering the grid this way.) This will allow you to know the numbers of all the items you are responsible for and quickly switch between them without retuning to the Issue Log page and waiting for it to load.

Troubleshooting

Frequently Asked Questions

- How do I get a Username and Password?
- I have a Username and Password, How do I Sign in?
- I signed in, why do I get logged off automatically?
- I forgot my username and/or password.

How do I get a Username and Password?

To create an account you will need to speak to the commissioning Agent in charge of your project. He will require you to give him details such as your email address, company, and roll in the project. A login and password will be emailed to you after speaking with the Commissioning Agent.

[above](#)

I have a Username and Password, How do I Sign in?

You should have received a username and password from your Commissioning Agent. You can then visit the login page and enter your username and password to login. Please remember that your password is case sensitive so capital or lower case letters make a difference.

[above](#)

I signed in, why do I get logged off automatically?

You will be automatically logged off after an administrator-defined length of inactivity, usually 2 hours. This is a security precaution to prevent anyone else from using your login on a computer you used previous.

[above](#)

I forgot my username and/or password.

If you forgot your username and/or password you should contact your commissioning agent and he can supply you with your password and ensure your login works correctly. Once you receive your username and password you can login.

[above](#)

Common Errors

The following section describes common problems you may encounter while using the Commissioning Portal. Listed here are solutions to the most common problems that may arise, if your problem is not solved here then please contact BVH for further support.

Pop-Up Blocking: If you are experiencing problems with not seeing additional windows that pop up as part of the portal, your explorer pop-up blocker may be active or third party internet security software maybe blocking those windows.

To correct windows explorer from blocking the pop-up windows associated with the portal, you will need to go to the tools drop down menu in explorer. Access the pop-up blocker, then pop-up blocker settings.

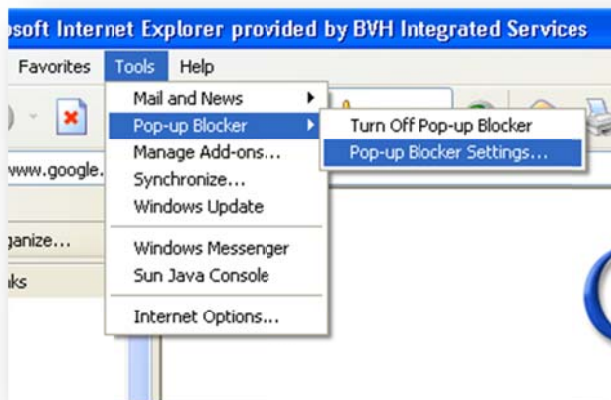


Figure 8

In the pop-up blocker settings window, you must add the BVH portal website address to allow pop-ups when visiting this site. Enter the following address, cx.bvhis.com, then click add and close the window when finished.



Figure 9

If other third party internet security software is blocking the pop-up windows, you will have to consult your user's information for that software to allow the pop-ups when logged onto the commissioning website.

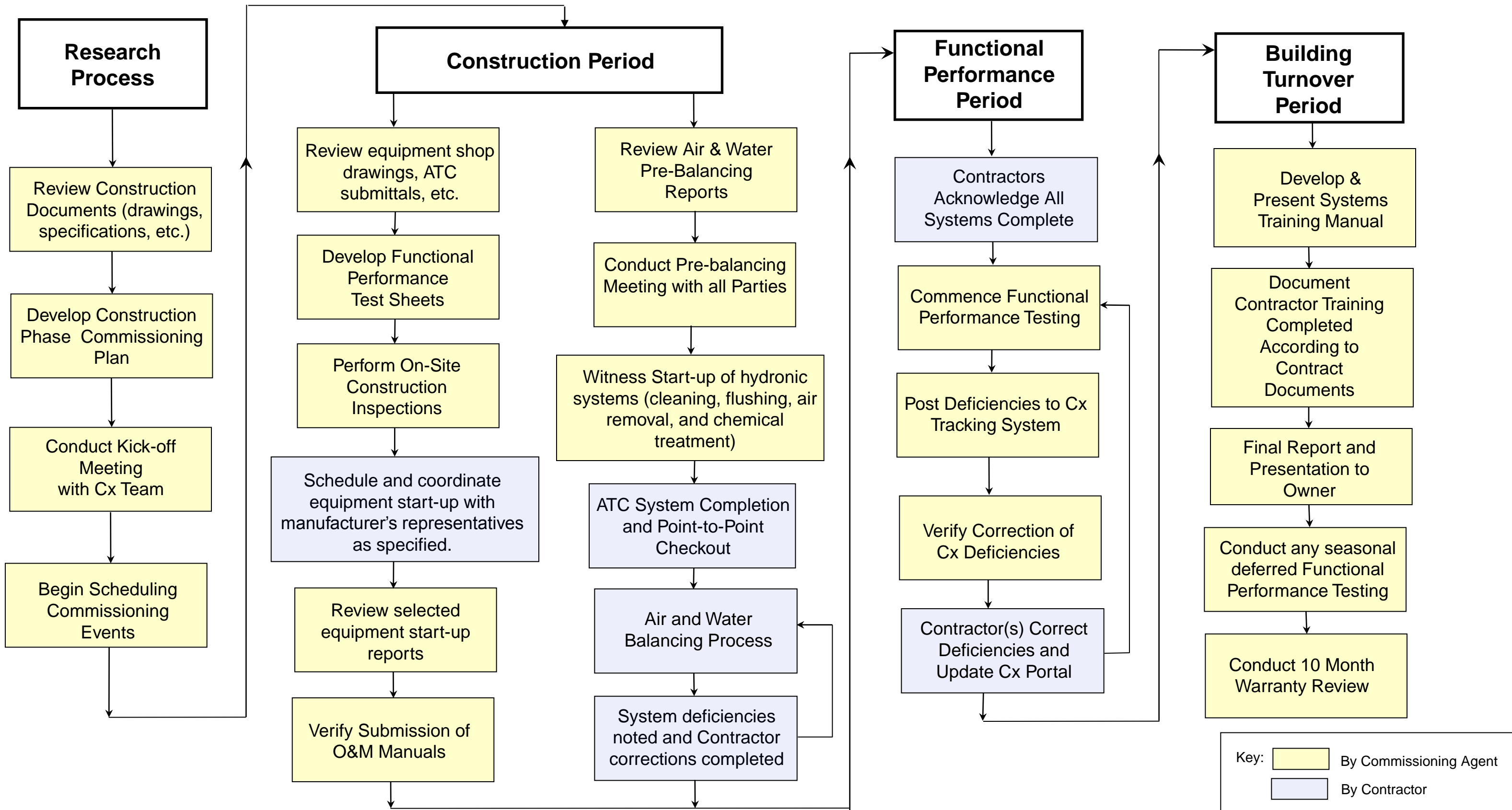
Contact Support

If the information in this manual does not help you to resolve your issue, Please contact the support staff by calling BVH at (860) 286-9171 and speaking to Greg Alverson (ex. 7478) or Tom Kazmierczak (ex. 7452)



APPENDIX D
Commissioning Process Chart

Commissioning (Cx) Process Flow Chart





Invitation to Bid

Project Title: **RENOVATIONS and ADDITIONS to
J.M. WRIGHT TECHNICAL HIGH SCHOOL
120 BRIDGE STREET, STAMFORD, CT**

Project Number: **State Project No. BI-RT-842**

1. Sealed bids for the bid packages listed below addressed to Craig R. Ortola, Project Manager, KBE Building Corporation, 30 Batterson Park Road, Farmington, CT 06032 will be received until 2:00 pm local time on **Wednesday, January 16, 2013**. All bids will be opened publicly and read aloud shortly thereafter. Specific questions regarding bidding procedures, project scope and site visits may be directed in writing to Craig R. Ortola at jmwbid@kbebuilding.com

Bid Package Number and Name:

Bid Package

BP-003.1 Demolition and Abatement

DAS Prequalification required: **Yes – for all bid packages**

Set-Aside Requirements:

- a. Bidders shall be responsible to award not less than 30% of the cost of construction to subcontractors that are certified and eligible to participate under the State of Connecticut Set Aside Program for small, minority and women owned business enterprises including 10% that must be awarded to certified and eligible minority/women owned enterprises, in accordance with Connecticut General Statutes section 4a-60g through 4a-60j. This requirement must be met even if Bidder s certified and eligible to participate in the Small Business Set-Aside Program. Subcontractors shall draft and submit for approval an affirmative action plan in accordance with the rules and regulations of the Connecticut Human Rights and Opportunities Commission ("CHRO"). The affirmative action plan must be approved by the CHRO as a condition precedent to approval of the subcontractor's contract.
- b. **S/MBE Resources**
 - i. **The Business Resource Center (BRC) – <http://www.brcct.com>**



The BRC is a comprehensive, ONE-STOP Services Center that provides quick and easy access to professional consultation, resource materials, and, action-oriented training (OSHA, certified payrolls, schedules, billings, estimating, etc.), in the skills/techniques needed to grow business in the Greater Hartford area. The Business Resource Center, in addition to its focus on developing small businesses, operates a Minority Business Enterprise Assistance Program which has a specific focus on the development of minority construction firms in Connecticut, including assistance with the capacity to qualify for bonding (bid, performance and payment). For additional information please contact Kim Hawkins, Director, Business Resource Center at (860) 527-1100 or email her at khawkins@brct.com

ii. **The Hartford Economic Development Corporation & The Greater Hartford Business Development Center, Inc. (HEDCo & GHbdc) –**

<http://www.hedco-ghbdc.com>

HEDCo is a 501 (c 3) Community Development Financial Institution (CDFI) and a Small Business Administration Certified Micro Lender. The agency has been in operation since 1975 and serves the 169 cities and towns in Connecticut, especially small business within the City of Hartford, to help them develop business plans, acquire financing and achieve sustained successful growth. .

- c. Bidders are to take note of the CHRO form (see attached "Set-Aside Plan Format") that is a requirement to be completed by the successful qualified bidder. Bidders shall note that if they are not familiar with the preparation and submission of this form, they should retain the services of a Consultant to help them through the preparation and submission process.

2. Bidder Prequalification and Security

- a. For work to be performed with an estimated value in excess of Five Hundred Thousand Dollars (\$500,000.00), the subcontractor shall be prequalified in the State of Connecticut Department of Administrative Services classification noted on the pertinent Invitation to Bid on or before the date that the bid is awarded;
- b. The bid shall be accompanied by a bid bond or certified check in an amount which shall be Ten Percent (10%) of any bid for work with an amount value of at least Fifty Thousand Dollars (\$50,000.00). If the bidder is a small contractor or minority business enterprise pursuant to Connecticut General Statutes Section 4a-60g and further described in Appendix I to this agreement "Administrative and Statutory Requirements" ("Appendix I"), it may provide in lieu of a bid bond, a letter of credit in an amount equal to Ten Percent (10%) of the bid amount if the estimated value is less than one hundred thousand dollars and in an amount equal to Twenty-Five Percent (25%) of the bid amount, if the estimated value is one hundred thousand dollars or greater, and



- c. The bidder shall possess experience with projects of a similar nature and scope.
 3. There will be a NON-MANDATORY Pre-bid Meeting for all bid packages listed above at 10:00 am on Wednesday, **January 9, 2013**, for all bidders that have not attended the previous Pre-bid meetings. This meeting that will be held at the North Lobby adjacent to the Gymnasium at J.M. Wright Technical High School. A job site walk will be conducted following the meeting. Proper attire, including hard hat and proper footwear is required. Those bidders that attended the previous Pre-bid meetings are welcomed.
 3. Bid packages will be available on Wednesday, December 12, 2012.
 4. Bid documents will be available for electronic viewing and download on iSqFt - a web-based virtual plan room provided by and will be available by request only. Interested participants may request bid packages by email to jmwbid@kbebuilding.com, by fax to (860) 284-7836 or by telephone to (860) 284-7436 (project specific voice message & Fax lines). Bid documents will also be available via the following ftp website: [ftp.kbebuilding.com](ftp://kbebuilding.com) Username: **JMWrightHS** and Password: **6w6dwi**. To secure hard copies of bid documents at bidder's expense, contact BL Graphics at (203) 630-2671 or email tgallagher@blcompanies.com Documents will also be available for review at KBE's office located at 30 Batterson Park Road, Farmington, CT 06032.
- All document clarification requests or Bid questions (RFI's) must be submitted in writing to the **CONSTRUCTION MANAGER ONLY** via fax (860) 284-7836 or email (jmwbid@kbebuilding.com), Attention: Craig R. Ortola. **Telephone inquiries will not be acknowledged during the bidding process. Bidders are to communicate solely with Construction Manager in relation to the Project and the bidding process.** Answers received directly from Owner, Architect or Engineers will not be binding on Construction Manager. **All questions must be submitted no later than December 28, 2012.**
5. **All Bidders are to note that DAS certification date MUST run through the duration of the project.**
 6. This project is being performed under the Construction Management at Risk (CMR) form of construction. Each Trade Contractor's contract shall be with the Construction Manager. The Owner has contracted with KBE Building Corporation to serve as the CMR
 7. No oral, telephone or telegraphic proposals will be considered. All bids shall stand available for acceptance for a period of ninety (90) days from the date proposals are received.
 8. No bid shall be accepted from any person/company who is in arrears to the Owner and/or Construction Manager upon debt, or contract, or who is a defaulter as surety or otherwise upon obligations to the Owner and/or Construction Manager.
 9. The Construction Manager reserves the right to reject any or all bids, without stating reasons therefore, including without limitation the right to reject any or all nonconforming, non-responsive, unbalanced, or conditional bids and to reject the bid of any bidder if the Construction Manager believes that it would not be in the best interest of the Owner or the



project to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Construction Manager. The Construction Manager reserves the right to waive informalities and to negotiate contract terms with one or more bidders without reopening the bidding process in so far such negotiations are not violative of applicable competitive bidders statutes or law. In evaluating bids, the Construction Manager will consider the qualifications of the bidder, whether or not the bids comply with the prescribed requirements, and such alternates, unit prices, and other data, as may be requested in the Form of Bid or prior to Notice of Award. The Construction Manager may consider the qualification and experience of subcontractors and other persons and organizations proposed for those portions of the work as to which the identity of subcontractors and other persons and organizations must be submitted as provided by the bid documents. The Construction Manager reserves the right to require, prior to Notice of Award , a statement of facts in detail of the business and technical organization and plant of the bidder available for the contemplated work, including financial resources, present commitments, and experience of the bidder in performance of comparable work. Construction Manager recommended trade contractors are subject to DCS approval.

10. KBE Building Corporation is an Affirmative Action Equal Opportunity Employer M/F/H/V.

END OF DOCUMENT