
State of New Mexico Public School Facilities Authority

Performance Assurance Program Manual for PAC



For Facility Design, Construction and Renovation

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1.0 PROGRAM DESCRIPTION

1.1 Overview

The New Mexico Public School Facilities Authority (PSFA) HVAC and Controls Performance Assurance Program was first launched in 2007 and has been successfully used in numerous school construction and renovation projects. The Program is designed to be integrated into all phases of a school construction or renovation project. It is to be used in conjunction with the New Mexico Public School Facilities Authority Request for Authorization of School Construction (RASC) process through the Program Statement, Schematic Design, Design Development, and Construction Documents phases. The HVAC and Controls Performance Assurance Program then continues through the Construction Phase and the 11-Month Correction Period.

The Performance Assurance Program shall be included in all school construction or renovation projects per PSFA policy unless an exception is specifically requested with justification by the responsible PSFA Regional Manager and approved by PSFA management. The program requirements are expected to be included in bid and construction documents to provide a defined process for assurance and documented verification that the HVAC and control systems for a school facility meet PSFA standards for acceptability, are installed and operating properly, and fulfill the functional and performance requirements of the design intent.

The Program utilizes the services of an independent third-party **Performance Assurance Contractor (PAC)** that holds a Price Agreement with the PSFA. The Program requires the professional services of an independent company or individual, who along with his subcontractors, is not contractually associated with business entities that sell, install or repair HVAC and control systems, which is experienced in the field of evaluation of HVAC and control systems design, installation, testing and balancing and is capable of maintaining an unbiased third-party position. The PAC is employed by the Owner to provide the Performance Assurance functions described for the program including the testing, adjusting, and balancing required for individual projects.

It also provides for collaboration on the part of the PSFA/District project team, the Design Team, and the independent PAC in the Design Stage to increase communication between all parties. Further, it defines roles and provides accountability for performance and is intended to ensure cooperation of all parties towards the solution of issues.

The services and costs of the PAC are divided into distinct Design and Construction Stages. The program also provides for involvement of the PAC as required during the Opposite Season and 11-Month Correction Period. Engagement of the PAC will generally begin early in the Design Development Phase. It is the intent of the PSFA Performance Assurance Program to use the same PAC for all stages of an individual project.



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Because the nature of this Program is dynamic, it may be revised periodically based upon ongoing evaluations and lessons learned. The most recent revision should be used for the design of school building construction and renovation projects.

1.2 PSFA Objectives for the Program

The design, installation, and proper operation of HVAC and control systems in public school facilities is critical to providing a comfortable learning environment for students and teachers. These systems also represent a major investment during building construction or renovation and incur continuing life cycle costs for maintenance, repair, and energy use over the service life of the building. It is therefore highly important that HVAC and control systems meet PSFA standards for functionality, maintenance/life cycle costs, community/district suitability, and energy costs.

To accomplish this, one of the PSFA's major objectives for the Program is to increase communication between all parties throughout the phases of a typical project. Further, it must be seamlessly integrated with the PSFA design and construction process to avoid additional steps and decisions that may introduce unacceptable delays.

The Performance Assurance Program shall be used to supplement the PSFA adequacy planning guide and other construction requirements and is available on the PSFA web site (www.nmpsfa.org) so the program can be incorporated into PSFA projects.

The Program is designed to provide clear direction and accountability for all participants in the design, construction, and maintenance for PSFA projects by:

- Defining roles and scopes of services.
- Formalizing process steps, equipment/systems checklists, performance verification reports, and other documentation.
- Including checklists and program requirements in bid and construction documents.
- Ensuring the approach of all parties is to be part of a solution to issues.

The Performance Assurance Program is intended for use by Public School Facilities Authority Regional Facilities Managers, project design teams, and individual School Districts and is therefore meant to be clear, concise, and user-friendly. It is expandable to incorporate other building systems in the future, scalable to various-sized projects, and has the potential for incorporation in future efforts by the PSFA with regard to high performance school building programs.



1.3 Assurance Program vs. Commissioning

1.3.1 Performance Assurance Activities

While the Performance Assurance Program contains several elements normally found in the building systems commissioning process, the full services of a commissioning agent are not anticipated by the PSFA nor should they be proposed by the PAC for the performance assurance activities in the Program. The performance assurance services provided under this Program are specifically those described within this Program Manual for the following:

- Heating, Ventilating and Air Conditioning (HVAC) equipment and systems and auxiliary components.
- Control Systems including Direct Digital Controls (DDC) and Building Management Systems (BMS), connectivity, and communication of alarms and events from ancillary building subsystems to those systems when required for the Project.

To avoid confusion, Performance Assurance Program activities shall not be referred to as “commissioning”. The term “commissioning” relates to additional activities on projects beyond the scope of this Program that are discussed in section 1.3.2 below and shall not be acceptable in the Performance Assurance context.

Table 1-1 below illustrates the systems and major activities included with the program and performed by the PAC.

DESIGN STAGE	
1	Schematic Design Review and Comments
2	Design Issues Log Started and maintained throughout Design and into Pre-Construction (Living Document)
3	60% Design Review and Submit Comments to DP and RFM
4	95% Design Review and Submit Comments to DP and RFM
5	100% Design Review and Submit Comments to DP and RFM
6	100% Design Issued for Bid (CD's) Final Review. (All Design Issues Resolved)
7	Sequence Of Operations (SOO) Review and Comments
8	Draft Performance Assurance Plan (Living Document)
CONSTRUCTION DOCUMENT AND CONSTRUCTION STAGE	
1	Attend Design Professional's Pre-Construction Meeting
2	Installation Issues Log Started and Maintained throughout Construction. (Living Document)
3	Performance Assurance Milestone Schedule submitted for inclusion into the Project Schedule (Living Document)
4	Site Observation Reports (SOR's) submitted for each visit



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5	Develop Pre-Functional Checklist for Equipment & Systems Start-Ups (PFC's)
6	Develop detailed Functional Performance Test (FPT) Scripts
7	Attend Project Kick-Off Meeting / Chair PAC Kick-Off Meeting
8	Attend Project Progress Meetings as required (OAC)
9	Deliver PFC Binder to General Contractor (GC) with schedule and expectations
10	Equipment Submittal Review and Comments (PAC related)
11	MCR and RFI Reviews and Comments (PAC related)
12	Witness and report on First Of A Kind (FOAK) equipment installs
13	Witness and report on Factory Equipment Start-Ups
14	Make and Document periodic site visits pertaining to PAC activities
15	Witness, Verify, and Document the first day of Test, Adjust, and Balance (TAB).
16	Review and submit the TAB Final Report
17	Schedule and Conduct Functional Performance Testing (FPT) of all equipment and systems under the PAC responsibilities.
18	Review, comment, and submit O&M Manuals
19	Assure and document Facility Personnel Training on new Equipment and Systems
20	Develop Opposite Season Functional Performance Test Scripts (An Opposite Season repeat of item #17)
21	Schedule a Lessons Learned Meeting with the Project Team
22	Assure the Design and Installation Issues Logs contain no open items and submit
23	Update the Performance Assurance Final Report
OPPOSITE SEASON FUNCTIONAL TESTING	
1	Schedule and Conduct Opposite Season Functional Performance Testing (FPT) of all equipment and systems under the PAC responsibilities.
11 MONTH WARRANTY CORRECTION AND INSPECTION	
1	Attend and Comment on 11 Month Warranty Inspection
2	Deliver final Performance Assurance Final Report
3	Assure all completed PAC Design, Construction, and Testing Documents are present and have been submitted to Owners

1.3.2 Additional Services Not Included in Program



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Although many of the activities of the PAC under the Performance Assurance Program are similar to commissioning, the PAC's scope does not include activities, systems or components other than those described in this Program Manual.

The PAC may be contracted separately by a District to provide additional services when required by the District and these additional services will be paid for entirely by the District.

1.4 Process Summary

The Performance Assurance Program encompasses three distinct stages of a project: Design, Construction, and Close-Out. Details of the processes, responsibilities and deliverables for each of these stages are contained in the appropriate sections within this Program Manual. The following provides a brief description of key elements.

The PACs are selected from a competitive Request for Proposals that is managed by the PSFA. This process results in execution of a PSFA Price Agreement(s) with one or more firms to provide PAC services on PSFA projects. These firms may be assigned to provide services in separate geographical areas in the state.

1.4.1 Design Stage

At the start of the **Schematic Design Phase**, the PSFA RFM will notify Procurement to solicit proposals for Design Stage services from a PAC that holds a Price Agreement with the PSFA using the guidelines included in Appendix A of this Program Manual. The District and NMPSFA then arranges a Purchase Order with the PAC early in the **Design Development Phase** so that the PAC is engaged in time to provide review of system options and comment on the complexity and maintainability of proposed systems.

The PAC participates in reviews of designs and narratives prior to the 60% Design Development Phase submittal, providing comments relative to HVAC and controls systems proposed based upon The Schematic Design Phase Design Narrative, experience, and specialized knowledge.

In the **Construction Documents Phase** the PAC participates in reviews of designs and specifications and provides comments related to serviceability, maintainability, clearances for operation and service, and the testing and verification process. Based upon these reviews the PAC creates and maintains a log of issues in the design that may have an impact on performance assurance activities during the Construction Phase. This **Design Issues Log** shall also indicate when identified issues are resolved and detail the action(s) taken for resolution.

The PAC also reviews and will utilize NMPSFA's Approved Pre-Functional Checklists posted on the NMPSFA Website and assists the design team with



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incorporating the Performance Assurance Program requirements into the Contract Documents. Should the PAC Contractor desire to utilize their own Pre-Functional Checklists, these will meet or exceed the expected outcome of those of NMPSFA's, and approved for use by NMPSFA.

During this phase the PSFA RFM will notify Procurement to solicit PAC Contractors for a Construction Stage price proposal using the guidelines included in Appendix A of this Program Manual.

1.4.2 Construction Stage

Performance Assurance activities during the **Construction Phase** provide verification that these HVAC and Control systems operate as designed to assure that requirements of the contract are met and document system installation, start-up and testing, including verifying Test and Balance (TAB) of air and water systems. The PSFA RFM must ensure a signed and approved Purchase Order with the PAC for Construction Stage services is in place at the beginning of this Phase. A follow-on Purchase Order or amendment to the Design Stage services Purchase Order with the current PAC will generally be used for Construction Stage services.

The PAC will develop and maintain an Installation Issues Log capturing deficiencies noted during site visits that may have an impact on performance assurance activities, including a record of when deficiencies are resolved and detail the action(s) taken for resolution. The PAC will also continue to maintain the Design Issues Log to closure for items related to the design that may affect performance assurance for the HVAC and controls systems.

The Major objectives of the Performance Assurance Program during the **Opposite Season Testing Phase** are to assure opposite seasonal demands are Functionally Tested to the specifications the season dictates from the previous Functional Tests.

This phase includes to resolve any remaining open Punch List items, which shall include the PAC's Design and Installation Issues Logs. In addition, the PAC will be requested by the PSFA RFM to assist with resolving any remaining performance problems, help address warranty issues that may arise, or provide other project-related services.

During the **11-Month Correction Period Phase**, follow up testing and verification is completed; systems are adjusted and optimized to meet specifications; and any remaining open Punch List including items from the PAC's Design and Installation Issues Logs, and any remaining performance problems, are resolved. The PSFA RFM will request services from the PAC to assist with warranty issues that may



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arise, or provide other project-related services, as described in the PAC's Purchase Order.

1.5 Role of the PSFA Regional Facilities Manager

The role of the PSFA RFM is critical to the successful implementation of the Performance Assurance Program on a school construction or renovation project. The PSFA RFM helps to ensure completion of all related activities within the timeframes established in the Contract Documents. Due to the difficulties associated with attempting centralized management of the performance assurance process over many diversified projects statewide, the responsibility for driving the process and ensuring its successful completion rests with the PSFA RFM for each project.

Application of the Program's requirements needs to be consistent across the entire PSFA RFM staff state-wide, therefore each PSFA RFM shall become familiar with and execute the responsibilities described this Program Manual. To assist with this, a checklist that identifies activities, deliverables and milestones for each phase of the Project is included in Appendix B. This checklist shall be used by the PSFA RFM to verify completion of required elements before approval is granted for the next phase and prior to approval of payments.

The PSFA RFM assures the timely engagement of the PAC in order for the Program's review and comment functions to be fully utilized. To facilitate review, the PSFA RFM must ensure that designs, specifications and other materials are delivered to the PAC by the Design Team with adequate time for the PAC to provide a meaningful review.

The PSFA RFM ensures inclusion of the PAC's Design Issues Log, Installation Issues Log and any RFIs created by the PAC into the Agency's CIMS and Project Documents. The PSFA RFM also shall identify and forward particular issues to the appropriate Design Team member(s) for resolution. Timely resolution of issues and deficiencies is crucial to maintaining the Project Schedule and the PSFA RFM shall be responsible for follow up with the Design Team to ensure these are properly addressed.

To avoid potential for delays in Substantial Completion the PSFA RFM must ensure that the PAC's milestones, critical paths and time requirements, including Test and Balance testing, are included in the Project Schedule. The PSFA RFM shall also monitor updates to the Project Schedule to ensure PAC and TAB activities are included and properly coordinated.

Finally, PSFA's Commissioning and Close-Out Manager and PSFA's Central Coordinator will be resources for the PSFA RFM, as required.



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1.6 Role of the Design Team

The Performance Assurance Program includes a number of tasks and deliverables for each phase of a school construction or renovation project that are the responsibility of the Design (Architect/Engineer) Team. The Scope of Work for each phase described in this Program Manual is required as part of the Basic Services to be provided by the Design Team and is included in the Owner's contract with the Design Professional.

A key element in avoiding delays in performance of the performance assurance requirements and completion of the project is prompt attention to, and resolution of deficiencies that impact performance assurance activities as identified by the PAC and recorded in the PACs' Design Issues Log and Installation Issues Log. It is the responsibility of the Design Professional to perform a weekly review of these Issues Logs and ensure deficiencies are corrected by the contractor and issues related to the design are resolved. Resolution of issues and RFIs is a prerequisite for certifying Substantial Completion.

The PSFA's use of a PAC on any project does not relieve the Design Professional of responsibility for the design, engineering coordination and management of the construction project including site visits and observation reports associated with the Design Professional Contract.

1.7 Role of the Performance Assurance Contractor

The PAC is an independent firm that holds a Price Agreement with the PSFA. As part of the overall team for design and construction of school construction or renovation projects, the PAC is responsible for providing the specific performance assurance activities described in this Program Manual by providing due diligence and a pro-active approach.

The PAC will create and maintain a **Design Issues Log** for items noted that may have an impact on the PAC's performance assurance activities with regard to HVAC and Control Systems. The PAC is not responsible for review, comment or recommendations on designs outside of those contracted PAC activities. It is the responsibility of the Design Professional to ensure issues related to the design are resolved.

During the Construction Stage the PAC will perform and document periodic site visits related to Performance Assurance on the HVAC equipment and related systems and create and maintain an **Installation Issues Log** in order to address impacts construction deficiencies may have on the PAC's performance assurance activities. The PAC is not responsible for identifying or maintaining a log of deficiencies beyond those related to performance assurance, but will be responsible to ensure the tracking and updates to resolution. It is the responsibility of the Design Professional and the contractor to ensure construction deficiencies related to performance assurance are resolved.

On completion of all of the required performance assurance activities the PAC shall prepare and submit a Final PAC Report for the Project. This report shall be concise and relate only



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to the performance assurance requirements of the project. In order for reports to be consistent between the PAC's and across varied projects statewide to provide ready reference for review, the organization and content of the PAC Final Report shall be as follows:

1. **Cover Page:** Date of report, Name and Address of Project.
2. **Table of Contents.**
3. **Executive Summary:** A summary of information at the project level including project background, contract dates, dates for construction, acceptance date, summary of performance assurance activities, recap of unresolved issues, project highlights and milestones, and changes in the project's scope that had an impact on performance assurance. A clear description of any issues that require follow up on the part of the Design Professional must also be included in this section.
4. **Performance Assurance Plan:** A detailed description of the performance assurance plan implemented for the Project.
5. **Design Review:** Copies of comments previously provided for the review of the Design Development, 60%, 95%, and 100% submittal reviews.
6. **Design Issues Log:** A final copy of the PAC's Design Issues Log, as updated, tracked, and maintained throughout the Design and Construction stages, shall be included in this section..
7. **Field Observation Reports:** Copies of PAC Field Observation Reports (SOR's) from site visits related to performance assurance activities.
8. **Pre-Functional and Equipment Factory Start-Up Checklists:** The PAC will utilize NMPSFA's Approved Pre-Functional Checklists posted on the NMPSFA Website and assists the design team with incorporating the HVAC and Controls Performance Assurance Program requirements into the Contract Documents. Should the PAC Contractor desire to utilize their own Pre-Functional Checklists, these will meet or exceed the expected outcome of those of NMPSFA's, and approved for use by NMPSFA. Binder to GC. Completed PFC's reviewed by the RFM.
9. **Installation Issues Log:** A copy of the final version of this log, maintained and updated throughout the Construction Stage, including all issues identified, date resolved, and actions taken for resolution, Unresolved Installation Issues Log items shall be highlighted with details provided.
10. **Functional Performance Test Results:** Copies of test procedures actually performed and the results of those tests. Functional Performance Tests shall document the expected and actual results of the test and what was done to correct failures and discrepancies.
11. **Controls Sequences of Operation:** The final verified sequences of operations for HVAC equipment controls and programming of Building Management Systems. This shall also include verification of connectivity and communication of alarms and events from ancillary building subsystems when required for the Project.



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- 12. District Facilities Personnel Training:** Include all records of training including the Equipment and Systems trained, training outline, attendance sheet, and comment sheet from those trained.
- 13. Final Test and Balance Report:** Include any updates from seasonal or follow up testing.
- 14. Test and Balance Floor Plans:** Electronic copies in pdf format.

The Final PAC Report shall be submitted to the PSFA RFM in a three-ring loose leaf binder with tabs for each of the sections above. In addition an electronic (pdf) copy shall be provided on disk and the Report shall be uploaded to the PSFA's CIMS.

The Final PAC Report shall contain information on only those Performance Assurance Program activities performed and reference to these activities as "commissioning" shall not be acceptable. In cases where the PAC was issued a Purchase Order by the District for additional services such as a commissioning effort, the resultant "commissioning report" may be included in the same binder as the Final PAC Report; however it shall be clearly segregated with regard those additional activities on projects beyond the scope of this Program.

The PAC shall meet with the PSFA RFM to review final PAC Report in person to the maximum extent possible to ensure report is understood and any questions or need for clarifications are resolved.

1.8 *Role of the General Contractor*

There are several responsibilities of the General Contractor for the Performance Assurance Program that are described in this Program Manual and required as part of the contract documents. The following paragraphs summarize some of the responsibilities that are of critical importance for completing all of the requirements of the contract.

Completion of TAB is a prerequisite for certifying Substantial Completion of the project and Construction Phase payment to the General Contractor for that milestone. To avoid potential for delays in Substantial Completion and payment and the possibility of assessment of liquidated damages the General Contractor must consult with the PAC to determine milestones, critical paths, including requirements to complete Test and Balance, and performance verification testing prior to Owner's occupancy. These activities shall then be inserted in the Project Schedule.

It is also the General Contractor's responsibility to ensure that appropriate NMPSFA's approved Pre-Functional Checklists are accurately completed, and that the equipment has been Started Up per Factory Authorized Technicians, and is ready for TAB, prior to submitting the NMPSFA's approved Pre-Functional Checklists and completed Factory Start-Up Sheets. The General Contractor shall coordinate test, balance and other performance assurance activities with PAC and PSFA's RFM to ensure completion



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according to contract documents and schedule subcontractors to assist with the test and verification responsibilities.

1.9 Communications Protocols

The PSFA's Performance Assurance Program is intended to increase and improve communication between all parties in a school construction or renovation project. In the Design Stage, the PAC will begin to communicate with the Design Team with regard to the design and will identify issues from the performance assurance perspective. This communication continues through the Construction Stage, Opposite Season Functional Testing, and 11-Month Correction Period where with the General Contractor and subcontractors, such as the Mechanical, Electrical, and Controls Contractors, are added.

The PSFA RFM is required to coordinate communication and ensure appropriate parties are engaged or included. For the Performance Assurance Program this is especially important with regard to the Design Issues Log, Requests for Information, the Project Schedule and any impacts on it, the Installation Issues Log, and the completion of performance assurance activities. All of these shall be routed through the PSFA RFM so the responsible party can be identified and the issue(s) can be forwarded for that party to address or correct issues.

The PSFA's CIMS (eBuilder) is an important tool for ensuring communication throughout the design and construction process. Issues logs along with updates, the Project Schedule with changes, Requests for Information and responses, Change Order Requests and approvals, and all relevant correspondence shall be uploaded to the CIMS on a regular and continuing basis. The notification feature in the CIMS shall be used to alert appropriate parties that the information has been uploaded. All parties are expected to review and take appropriate action in areas for which they are responsible.

The PAC firm shall utilize the PSFA-CIMS for project and document management during development of the Contract Documents and for project administration during construction of a Project. For PSFA-CIMS information or installation and use of the PSFA-CIMS or for scheduling training contact PSFA-Training at (505) 468-0293 or e-mail questions to training@nmpsfa.org and include PSFA-CIMS Support in the subject line.



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2.0 DEFINITIONS

Throughout this Program Manual a number of terms and abbreviations are commonly used. For consistency throughout the Performance Assurance Program, the following terms and abbreviations along with their definitions shall be used.

Building Subsystems:	Ancillary systems for which communication of alarms and events to the Building Management System is required
CIMS:	The PSFA's Construction Information Management System.
Commissioning & Close-Out Manager	Edward (Edd) Schuller, QCxP Commissioning & Close-Out Manager Direct: 505-468-0276 X1023 Cell: 505-414-7518 Email: eschuller@nmpsfa.org
Common System Interface:	The ability of ancillary Building Subsystems to communicate messages to the Building Management System via the BACnet [®] protocol.
Contract:	Any agreement for the procurement of items of tangible personal property, services or construction.
Control Systems:	All devices and systems (pneumatic, electric, electronic, Direct Digital Control, etc.) associated with control of HVAC equipment and systems from simple unit controls to sophisticated Building Management Systems
Design Issues Log:	A log created and maintained by the PAC of issues noted in the design that may have an impact on performance assurance activities, including record of when identified issues are resolved and the action taken for resolution.
Design Professional:	The Project's architect or engineer
Design Team :	The team selected by the owner responsible for providing Professional Services for project design and implementation, generally consisting of Architects, Engineers, and other professionals as required
District / Owner:	The individual School District involved in a particular project. This may also include a charter school residing in a particular District, or a charter school that is funded directly by the state of NM.
eBuilder:	The Public School Facilities Authority CIMS System.
General Contractor:	The contractor responsible for constructing the individual Project and/or subcontractors working under the General Contractor.
HVAC:	Heating, Ventilating, and Air Conditioning equipment and systems including all major components and auxiliary equipment.



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Installation Issues Log:	A log created and maintained by the PAC capturing construction deficiencies that have an impact on performance assurance activities including record of when deficiencies are resolved and the action taken for resolution.
Lighting Controls:	All devices and systems associated with electronic control of lighting systems that may be integrated with a Building Management System
MACC:	The maximum allowable construction cost as defined by the Public School Facilities Authority.
MCR:	Modification Change Request. Documentation that affects or alters Design or SOW that may, or may not, effect schedule, material(s), or budget.
MOU:	Memorandum Of Understanding. A document to define the Scope Of Work (SOW) and work to be performed.
OAC:	Owner, Architect, and Contractor.
Opposite Season:	When the facility is Functionally Tested during one Season (ie: Summer), a repeat of Functional Testing will be conducted at the Opposite Season (ie: Winter).
PAC:	Performance Assurance Contractor: The independent third-party agency that holds a Price Agreement with the PSFA to provide services under this program including the HVAC and control system testing, adjusting, and balancing required for individual projects.
Price Agreement:	A definite quantity contract or indefinite quantity contract which requires the contractor to furnish items of tangible personal property, services or construction to a state agency or a local public body which issues a purchase order, if the purchase order is within the limitations of the contract. See also " Contract ".
Procurement Officer:	Mr. Shatona M. Martin Contracts Administrator/Chief Procurement Officer E-mail: smartin@nmopsfa.org Phone: 505-468-0286
Project Issues Log:	A log created and maintained by the General Contractor to document and resolve Construction Issues outside the scope of the PAC.
Project Requirements:	Guidance for the project Design Team, developed by the Project Team, for HVAC and control systems that form the basis for all decisions made with respect to design, construction, and operation.
Project Team:	The Owner's team responsible for project development and implementation, generally consisting of PSFA and School District personnel



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PSFA:	The State of New Mexico Public School Facilities Authority is the agency, under the Public School Capital Outlay Council (PSCOC) charged with responsibility for overseeing projects and shall serve as the owner's representative for work performed under this.
PSFA RFM:	The Public School Facilities Authority Regional Facilities Manager is PSFA's Project Manager who monitors PAC activities and ensures that they are included in the project and completed prior to final payment to PAC, General Contractor, and Design Professional
RASC:	The Request for Approval of School Construction form required by the PSFA for construction or renovation projects.
RFI:	A Request for Information submitted by the PAC to the Design Professional through the PSFA RFM for questions and comments related to the design of the HVAC and Control systems other than those that affect performance assurance activities.
TAB:	TAB Agency: The agency performing HVAC and control system testing, adjusting, and balancing required for individual projects.

3.0 RELATED DOCUMENTS

There are a number of standard contract documents used in the PSFA contracting and construction processes that address or mention the HVAC and Controls Performance Assurance Program. Examples of these documents are available on the PSFA web site (www.nmpsfa.org). The latest versions, as modified for the specific Project, shall be used.



4.0 PROGRAM STATEMENT / PRE-DESIGN PHASE

4.1 Description

The Pre-Design Phase is the first phase in the PSFA Request for Authorization of School Construction (RASC) process for school construction or renovation projects. The Program Statement submitted affirms the overall project budget and establishes the goals, facts, regulations, conditions, and concepts that bound the project; clearly stating how the project serves the needs of the district. This Phase will draft the Owner's Project Requirements (OPR) and Design Intent Documents. These requirements are defined in the RASC process.

Primary objectives for this phase are to develop the Project Requirements and establish the Performance Assurance Program as part of overall delivery process.

4.2 Responsibilities, and Deliverables

The Pre-Design Statement is generally completed by the individual District and the Design Professional with the support and assistance of the PSFA. Project Requirements are to be defined in this phase. The PSFA Design Guidelines for HVAC and Controls should be reviewed in developing the Program Statement. The Project Requirements will provide guidance for the project Design Team and will form the basis from which all decisions are made with respect to design, construction, and operation.

The PSFA, District, and the Design Team must work in collaboration to ensure that the resultant schematic designs and narratives are consistent with requirements. To achieve the goals of the Performance Assurance Program, it is also necessary to develop the Project Requirements for HVAC and Control Systems early in this phase

The PAC that will be responsible for performance assurance activities will generally not be engaged at this point in the process.

For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited, to those described in the paragraphs that follow.

4.2.1 PSFA Regional Facilities Manager

- a. Participate in the Design Team's Project Kickoff Meeting to review Project Requirements, roles of team members, integration of the Performance Assurance Program into the project, expectations for submittals, etc.



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- b. Review the PSFA Design Guidelines for HVAC and Controls and ensure they are utilized as required in developing the Program Statement.
- c. Verify performance assurance requirements have been met in the Program Statement Phase RASC submittal to the PSFA.

4.2.2 Design Team

- a. Conduct a Pre-Design Kickoff Meeting to discuss Project Requirements, roles of team members, integration of the Performance Assurance Program into the project, expectations for submittals, etc.
- b. Incorporate the Performance Assurance Program into the overall delivery process for the project.
- c. Review the PSFA Design Guidelines for HVAC and Controls and utilize as required in developing the Program Statement.
- d. Develop initial overall project budget.
- e. Assist the District with verifying that RASC requirements have been met in Program Statement submittal to the PSFA.

Table 4-1 lists the interactions, responsibilities and deliverables for this phase. They are designated “**L**ead” for the entity with primary responsibility for the activity; “**A**pprove” to indicate the entity with final approval authority where appropriate; “**S**upport” for other team members who are to provide technical and other assistance to the lead team member; and “**P**articipate” for others who are part of the process and participate in the activity.

KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	PAC
1	Conduct Design Kickoff Meeting.	P	P	L	NA
2	Review/Incorporate Design Guidelines for HVAC/ Controls.	A	S	L	NA
3	Develop initial overall project budget.	S	S	L	NA
4	Verify RASC requirements have been met in Program Statement submittal to PSFA.	A	S	L	NA

Table 4-1 Program Statement Phase Responsibilities



5.0 SCHEMATIC PHASE

5.1 Description

This phase follows the Program Statement phase in the PSFA process for school construction and renovation. Primary objectives for this phase are to develop the initial schematic design, include the Performance Assurance Program as part of the overall delivery process, and initiate the process for issuing a Purchase Order to the PAC.

The Project Requirements for HVAC and control systems are further developed in this phase. The PSFA Design Guidelines for HVAC and Controls should be reviewed and considered as required.

As decisions are made during subsequent phases, the Project Requirements may evolve based upon budgetary or other considerations. While these ideally should be minor, any impact on the performance assurance process caused by changes from initial development will need to be addressed.

This phase of the project continues the collaborative team effort between the District, the PSFA, and the Design Team. Design Stage pricing shall be requested from the PAC by the PSFA Regional Manager and the process for issuing a Purchase Order to the PAC shall begin in this phase.

5.2 Responsibilities, and Deliverables

For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

5.2.1 PSFA Regional Facilities Manager

- a. Request Design Stage pricing from PSFA's Procurement Officer for the the PAC(s) using the guidelines included in Appendix A of this Program Manual.
- b. Refine Project Requirements with respect to HVAC and Control Systems.
- c. Review Basis of Design, Design Narrative, and Schematic designs.
- d. Verify performance assurance requirements have been met in Schematic Phase RASC submittal to PSFA.



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5.2.2 Design Team

- a. Assist with refinement of Project Requirements.
- b. Incorporate PSFA Design Guidelines for HVAC and Controls as required in the Schematic Design.
- c. Develop Basis of Design and Design Narrative with Life Cycle Cost Analysis (LCCA).
- d. Develop Schematic designs.
- e. Refine initial Construction Phase cost estimate.
- f. Verify performance assurance requirements have been met in Schematic Phase RASC submittal to PSFA.

5.2.3 Performance Assurance Contractor

- a. Prepare and submit Design Stage Price Proposal in accordance with Appendix A of this Program Manual when requested by the PSFA Procurement Officer.

Table 5-1 lists the interactions, responsibilities and deliverables for this phase. Some of these responsibilities are part of the normal PSFA process and they are listed here due to their relevance to performance assurance. Responsibilities are designated “**L**ead” for the entity with primary responsibility for the activity; “**A**pprove” to indicate the entity with final approval authority where appropriate; “**S**upport” for other team members who are to provide technical and other assistance to the lead team member; and “**P**articipate” for others who are part of the process and participate in the activity.

KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	PAC
1	Refine project requirements.	A	L	S	
2	Request Design Stage price proposal from PAC.	L			P
3	Develop Basis of Design and Design Narrative with LCCA.			L	
4	Review Basis of Design and Design Narrative.	A	A	L	P
5	Develop initial Construction cost estimate.	A	A		L
6	Verify performance assurance requirements have been met and included in RASC Schematic Phase submittal to PSFA.	L	S	L	

Table 5-1 Schematic Phase Responsibilities



6.0 DESIGN DEVELOPMENT PHASE

6.1 Description

Following the Schematic Phase, the Design Development Phase creates documents that begin to finalize and describe the size, scope, and character of the entire project. Included in this phase are development of the Project Manual and specifications/drawings for the HVAC and control systems. At the end of this phase it is anticipated that the project design should be approximately 60% complete, although requirements may vary by individual project as defined during the Program Statement Phase Kickoff Meeting described under that phase.

From the performance assurance perspective, this phase requires good communication and interaction between all parties to ensure designs are consistent with the Project Requirements and potential issues are addressed in Design Development documents. The PAC participates in reviews of designs and narratives prior to 60% Design Development Phase, providing comments relative to HVAC and Controls Systems proposed based upon their experience and specialized knowledge.

In this phase, the project PAC participates in reviews of system options and provides comments on the complexity and maintainability of proposed systems when the Design Narrative is complete. **Therefore the Purchase Order with the selected PAC for Design Stage Services must be executed early in this phase.**

6.2 Responsibilities, and Deliverables

For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

6.2.1 PSFA Regional Manager

- a. Assure signed and approved Purchase Order with PAC for Design Stage Services is in place.
- b. Coordinate Owner and PAC review of designs prior to Design Development Phase submittal (60% or as otherwise defined in the Project Requirements).
- c. Ensure questions, comments and recommendations of PAC during design reviews are addressed by the Design Team.
- d. Verify Performance Assurance Program requirements have been met in Design Development Phase RASC submittal to PSFA.



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6.2.2 Design Team

- a. Develop and update designs and design narrative with Life Cycle Cost Analysis (LCCA).
- b. Provide updated designs and design narrative to PAC in advance as part of the Owner Design Development Phase review.
- c. Respond to questions and comments related to the design of the HVAC and Control systems submitted by the PAC.
- d. Address comments and recommendations of PAC from design reviews.
- e. Develop project budget.
- f. Verify Performance Assurance Program requirements have been met in Design Development Phase RASC submittal to PSFA.

6.2.3 Performance Assurance Contractor

- a. Review HVAC & Control Systems Design Narrative and provide comments on the complexity and maintainability of proposed HVAC systems and required controls as part of Owner review prior to Design Development RASC submittal.
- b. Submit questions and comments related to the design of the HVAC and Control systems through the PSFA RFM.
- c. Review Basis of Design, Design Narrative, and Schematic designs.

Table 6-1 lists the interactions, responsibilities and deliverables for this phase. Some of these responsibilities are part of the normal PSFA process and they are listed here due to their relevance to performance assurance. Responsibilities are designated “**L**ead” for the entity with primary responsibility for the activity; “**A**pprove” to indicate the entity with final approval authority where appropriate; “**S**upport” for other team members who are to provide technical and other assistance to the lead team member; and “**P**articipate” for others who are part of the process and participate in the activity.



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KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	PAC
1	Assure Purchase Order with PAC for Design Stage Services.	L	L		P
2	Develop and update designs and design narrative with LCCA.			L	P
3	Review designs prior to RASC DD submittal (60% or as otherwise prescribed for project). Set expectations for the next phase.	A	L	S	P
4	Address questions, comments and recommendations of PAC from design reviews.	S	S	L	P
5	Review Basis of Design, Design Narrative, and Schematic designs.	P	P	L	L
6	Develop project budget.	A	A	L	
7	Verify performance assurance requirements have been met in Design Development Phase and included in RASC submittal to PSFA.	A	S	L	L

Table 6-1 Design Development Phase Responsibilities



7.0 CONSTRUCTION DOCUMENTS PHASE

7.1 Description

Following Design Development, and prior to Construction Phase, the Construction Documents Phase creates final documents for Approval of School Construction and Permit Review. Construction Documents are finalized by the Design Team including, but not limited to, plans, specifications, drawings, and any other State or local government forms and information as required by the PSFA. The Performance Assurance Program requirements specific to the project are also finalized in this phase.

A high level of communication and interaction is needed between all parties to assure project requirements are accurately reflected in contract documents. The Design Team is responsible for incorporating performance assurance requirements into the contract documents and for communication of the performance assurance requirements to contractors submitting bids for the project. This includes the contractor's responsibilities, the PSFA's Test, Adjust, and Balance Guide Specification Section 23 0593, The PAC shall complete project-specific NMPSFA Approved Pre-Functional Checklists and other information that is appropriate for a particular project.

The PAC participates in reviews of HVAC and control systems designs, specifications, drawings and equipment/systems, providing comments related to serviceability, maintainability, clearances for operation and service, and the testing and verification process. The PAC also assists the Design Professional with incorporating the Performance Assurance Program requirements into the Contract Documents and, if appropriate, with the review of contractor bids on items relative to performance assurance.

This phase includes a review by the PAC when the design is developed to the point that the PAC can see the design and orientation of piping and air distribution systems with, at a minimum, main duct and pipe sizing; balancing dampers and valves; an indication of where diffusers are located; the mechanical equipment schedule; and the control sequences of operation.

Periodic meetings between the PAC and the Mechanical Engineer may continue with the purpose of incorporating the PAC's comments prior to the 95% Construction Document Phase submittal.

The PAC will provide a review of the 95% Construction Document package and submit comments with regard to balanceability, maintainability, clearances for operation and service, and the testing and verification process. The PAC will also perform a review of the 100% Construction Documents prior to them being issued for contractor bids.

Based upon these reviews, the PAC shall create and maintain a log of issues noted in the design that may have an impact on performance assurance activities during the



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Construction Phase. This Design Issues Log shall also detail when identified issues are resolved and the action taken for resolution. For questions and comments related to the design of the HVAC and Control systems beyond those that affect performance assurance activities, the PAC shall create and submit Requests for Information (RFI) through the PSFA's established process.

The PAC shall route the Design Issues Log and updates along with Requests for Information through the PSFA RFM and upload them to the PSFA CIMS. The PSFA RFM shall ensure particular issues are forwarded to the appropriate Design Team member(s) for resolution. It is the responsibility of the Design Professional to ensure that issues related to the design are resolved prior to the 95% submittal.

The PAC shall prepare an initial test and verification plan including a list of the equipment and systems to be tested, the process to be followed; communications and documentation protocols; and the estimated schedule with milestones. The PAC shall complete project-specific NMPSFA Approved Pre-Functional Checklists and other information that is appropriate for a particular project, for inclusion in the package provided to contractors bidding the project.

Examples of typical Pre-Functional Checklists are provided in the PSFA's Website (<http://nmopsfa.org/>). The PAC may use its own format for checklists, however they must be approved by PSFA and specific to the project and the equipment or systems specified for installation and contain the requirements of the typical Pre-Functional Checklists on PSFA's Website

A sampling process may be used when developing and implementing the performance assurance plan for components or systems that are repetitive or duplicated. The sampling process and percentage shall be reviewed and approved by the PSFA RFM during this phase once system types are known.

During this phase the PSFA RFM shall request and the PAC shall submit Construction Stage pricing to the PSFA Procurement Officer using the guidelines included in Appendix A of this Program Manual.

During the bid process the PAC may be asked to attend the Pre-Bid conference to address any questions relative to the Performance Assurance Program.



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7.2 Responsibilities, and Deliverables

For the purposes of integrating the Performance Assurance Program, specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

7.2.1 PSFA Regional Facilities Manager

- a. Participate in review of designs at 95% Construction Document Phase submittal and final review of 100% Construction Document Phase submittal prior to publication for contractor bidding.
- b. Review the PAC's Initial Construction Phase test and verification plan, test procedure requirements, performance verification documentation, and performance assurance specifications.
- c. Follow-up on Design Issues Log items and Requests for Information submitted by the PAC to ensure resolution by the Design Team.
- d. Ensure performance assurance requirements are communicated at pre-bid conference.
- e. Verify Performance Assurance Program requirements have been met in the Construction Documents Phase RASC submittal to PSFA including verification the PAC has performed final review and PAC's comments have been incorporated.
- f. Request Construction Stage pricing from the PAC using the guidelines included in Appendix A of this Program Manual.
- g. Review contractor bids on items relative to performance assurance.

7.2.2 Design Team

- a. Meet periodically with the PAC on a mutually determined schedule to discuss and address PAC's comments and recommendations prior to the 95% Construction Document Phase submittal. This is a responsibility of the Mechanical Engineer.
- b. Provide a set of 95% Construction Document submittal to the PAC with a minimum of three (3) weeks time allowed for review and comment on constructability, balanceability, maintainability, and the testing and verification process.
- c. Respond to questions and comments related to the design of the HVAC and Control systems submitted by the PAC through the PSFA's established process for Requests for Information (RFI).
- d. Resolve Design Issues Log items identified by the PAC.
- e. Finalize designs, specifications and other project documentation.
- f. Incorporate the Performance Assurance Program requirements, including the Test, Adjust, and Balance Guide Specification Section 23



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- 0593, and project-specific Construction Checklists for the project into the Contract Documents.
- g. Coordinate Specifications to ensure support from contractors in other Divisions is defined as related to functional performance testing of HVAC and Controls.
 - h. Develop overall project budget.
 - i. Provide a set of 100% Construction Document submittal to the PAC for final review before they are issued for bidding.
 - j. Communicate performance assurance requirements, especially the need to include PAC and TAB activities, milestones, critical paths and time requirements to complete Test and Balance and performance verification testing in the Project Schedule at pre-bid conference.
 - k. Review contractor bids on items relative to performance assurance.

7.2.3 Performance Assurance Contractor

- a. Create and maintain a Design Issues Log capturing items noted in the design that may have an impact on performance assurance activities, when those issues are resolved and the action taken for resolution.
- b. Meet periodically with the Mechanical Engineer on a mutually determined schedule to discuss and address comments and recommendations prior to the 95% Construction Document Phase submittal. Track any unresolved issues in the Design Issues Log.
- c. Create and submit Requests for Information (RFI) through the PSFA's established process for questions and comments related to the design of the HVAC and Control systems beyond those that affect performance assurance activities.
- d. Route the Design Issues Log and updates along with Requests for Information through the PSFA RFM and upload them to the CIMS.
- e. Develop initial test and verification plan to list specific equipment/systems; process to be followed; communications and documentation protocols; and estimated schedule.
- f. Prepare PSFA approved project-specific Pre-Functional Checklists for inclusion in the Construction Documents.
- g. Ensure the incorporation of the Performance Assurance Program requirements and PSFA approved Pre-Functional Checklists into the Contract Documents.
- h. Ensure the coordination of project specifications to ensure support from contractors in other Divisions is defined as related to functional performance testing of HVAC and Controls.
- i. Review HVAC and controls designs prior to the 95% Construction Document Phase submittal and provide comments related to serviceability, maintainability, clearances for operation and service, and the testing and verification process.



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- j. Provide final review of 100% Bid Documents related to HVAC and controls before they are issued for bids to ensure comments and issues noted in the 95% review have been addressed.
- k. Prepare and submit Construction Stage Price Proposal in accordance with Appendix A of this Program Manual to the PSFA Procurement Officer when requested by the PSFA RFM.

Table 7-1 lists the interactions, responsibilities and deliverables for this phase. Some of these responsibilities are part of the normal PSFA process and they are listed here due to their relevance to performance assurance.

Responsibilities are designated “**L**ead” for the entity with primary responsibility for the activity; “**A**pprove” to indicate the entity with final approval authority where appropriate; “**S**upport” for other team members who are to provide technical and other assistance to the lead team member; and “**P**articipate” for others who are part of the process and participate in the activity.



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KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	GC	PAC
1	Periodic meetings between PAC & Mechanical Engineer prior to 95% CD submittal.	P		L	P	L
2	Create & maintain Design Issues Log including resolutions.					L
3	Develop test and verification plan.	A				L
4	Prepare project-specific Pre-Functional Checklists.	A		S		L
5	Finalize designs, specifications and other project documentation including project-specific Pre-Functional Checklists.	A	A	L	S	A
6	Develop overall project budget.	A	A	L		
8	Resolve Design Issues Log items & respond to PAC RFIs.	A		L		A
9	Coordinate Specifications to ensure support from contractors in other Divisions is defined as related to functional performance testing of HVAC and Controls.	A	S	L		A
10	Review designs at 95% Construction Document Phase submittal.	A	L	S		S
11	Address comments by PAC from Design Review.	S		L		S
12	Review designs at 100% Construction Document Phase submittal.	A	L	S		S
13	Develop performance assurance price proposal for Construction Stage.	A				L
14	Verify performance assurance requirements have been met in Construction Documents and included in RASC submittal.	A	S	L		A
15	Communicate performance assurance requirements at pre-bid conference.	S	S	L		P

Table 7-1 Construction Documents Phase Responsibilities



8.0 CONSTRUCTION PHASE

8.1 Description

The overall goal of the Performance Assurance Program during the Construction Phase is that performance verification activities of the PAC are integrated into the construction process and schedule to document that the HVAC and control systems are installed and operating properly and that they fulfill the functional and performance requirements of the design intent prior to certifying Substantial Completion of the Project.

Performance Assurance activities during this phase provide verification that these systems perform as designed to assure that requirements of the contract are met, and document system installation, start-up and testing. The Purchase Order with the PAC for Construction Phase services shall be arranged through NMPSFA's Procurement Manager through the PSFA RFM and executed with the PAC no later than the date of contract execution with the Construction General Contractor.

Of critical importance during this phase is ensuring that the work to be performed by the PAC, is included in the project schedule. Completion of TAB is a prerequisite for certifying Substantial Completion of the project and Construction Phase payment to the contractors for that milestone. To avoid potential for delays in Substantial Completion and payment and the possibility of assessment of liquidated damages, the contractors must consult with the PSFA RFM to determine milestones and critical paths are incorporated and met prior to Owner's occupancy. The PAC activities shall then be inserted in the Project Schedule.

This scheduling activity should begin with the General Contractor providing a copy of the initial draft of the Project Schedule prior to submittal to the Design Professional for approval. The PAC will then insert PAC Milestone activities, due dates for Construction Checklists, performance assurance meetings, and site visits as line items. The PSFA RFM shall ensure that this step is completed and that the approved Project Schedule is uploaded to the PSFA CIMS by the responsible party. The PSFA RFM shall also be notified that subsequent revisions to the Project Schedule are uploaded to the PSFA CIMS with notification to the PA. The PAC shall review revisions on a continuing basis.

The PAC will perform and document periodic site visits and provide Site Observation Reports (NMPSFA approved SOR templates located in the NMPSFA Website) related to Performance Assurance on the equipment, systems and activities covered under the contract for each visit. The PAC shall make a site visit when the first of a kind (FOAK) equipment is installed. This is particularly important in the case of components or systems that are repetitive or duplicated to identify and advise the Design Professional and General Contractor of any issues that impact installation of the Factory Start-Up of those components or systems. These site visits shall not relieve the Design Team of responsibility for site visits, observation reports or other requirements contained in the General Conditions of the PSFA Design Professional Contract.



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The PAC will develop and maintain an **Installation Issues Log** capturing issues noted during site visits that may have an impact on performance assurance activities. This log will also detail when issues are resolved and the action taken for resolution. For questions and comments related to the design of the HVAC and Control systems, the PAC will submit Requests for Information (RFI) through the PSFA's established process.

The PAC's Installation Issues Log and any RFIs will be submitted by the PAC to the PSFA RFM and uploaded by the PAC to the CIMS. The PAC will continue to maintain the **Design Issues Log** for items related to the design that may affect performance assurance for the HVAC and controls systems.

A key element in avoiding delays in performance of the performance assurance requirements and completion of the project is prompt attention to, and resolution of deficiencies that impact performance assurance activities as identified by the PAC and recorded in the PACs' **Design and Installation Issues Logs**.

The PSFA RFM shall be made aware of and ensure particular issues are forwarded to the appropriate Design Team member(s) for resolution. It is the responsibility of the Design Professional to ensure deficiencies are corrected by the contractor and issues related to the design are resolved. PSFA Maintenance shall review the PAC's **Installation Issues Log** and verify that corrections have been made for each item listed prior to the PAC closing out that item in the log. Resolution of deficiencies and RFIs is a prerequisite for certifying Substantial Completion.

The Test, Adjust, and Balance (TAB) work witnessed, verified, and documented by the PAC requires that systems are installed, complete and operable before the commencement of TAB work. The General Contractor shall verify systems are ready for TAB by submitting completed Project-specific, PSFA approved, Pre-Functional Checklist (PFC) forms to the PAC and reviewed by the PSFA RFM via the responsible Design Professional. The actual Pre-Functional Checklist forms used for a project shall be those posted on the NMPSFA Website, or NMPSFA approved PAC Pre-Functional Checklists.

It is the General Contractor's responsibility to ensure that appropriate Pre-Functional Checklists are accurately completed, and that the equipment is actually ready for Startup, prior to submitting these Pre-Functional Checklists. The General Contractor shall have personnel with direct knowledge complete the individual checklists to verify that systems are installed, complete and operable ***prior to the commencement of Startup***. These Pre-Functional Checklists do not replace any manufacturer-recommended procedures. The PAC will review and confirm that the Manufacturer's Start-Up Checklist and Procedures are conducted by a Factory Technician, or a Factory Authorized Technician. PAC costs incurred due to equipment or systems that are not ready as stated in the Pre-Functional Checklists shall be the responsibility of the General Contractor.



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The PAC shall develop detailed Mechanical and Control Systems Functional Performance Test (FPT) procedures and provide access to the PSFA RFM, PSFA Commissioning and Close-Out Manager, Design team, and General Contractor for review and comment. FPTs shall document the designed, expected, and actual results of the test and what was done to correct failures and discrepancies.

The PAC shall witness, verify, and document Test and Balance. The General Contractor is responsible to coordinate test, balance and other performance assurance activities with the PAC to ensure completion according to contract documents and schedule and direct subcontractors to execute their test and verification responsibilities.

8.2 Responsibilities, and Deliverables

The Construction Stage process will include all those elements and responsibilities normally associated with building or renovating school facilities. Further, construction will be consistent with requirements already established by the PSFA and published elsewhere. For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

8.2.1 PSFA Regional Facilities Manager

- a. Review updated Construction Phase test and verification plan.
- b. Ensure that the Performance Assurance requirements are communicated at pre-bid conference.
- c. Verify that the Performance Assurance requirements, schedule, time estimates, and milestones provided by the PAC are included in the master Project Schedule are uploaded to the PSFA CIMS.
- d. Verify that subsequent revisions to the Project Schedule are uploaded to the PSFA CIMS with notifications to the PSFA Project Team and PAC.
- e. Work with Design Team and General Contractor to alleviate potential impacts on PAC due to changes in the Project Schedule.
- f. Verify PAC receives all Submittals, RFIs, Change Orders, and other project documentation.
- g. Follow-up on PAC's Design and Installation Issues Logs items and Requests for Information submitted by the PAC to ensure resolution by the Design Team and General Contractor.
- h. Provide PSFA Maintenance with the PAC's Installation Issues Log to review and verify that corrections have been made for each item listed.
- i. Assure Owner's facilities personnel participate in performance assurance activities with the PAC as OJT training.
- j. Verify initial acceptance of system operation.



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- k. Verify Performance Assurance Program requirements have been met for this phase.

8.2.2 Design Team

- a. Schedule, coordinate and conduct a pre-construction conference ensuring PAC is present.
- b. Ensure Performance Assurance requirements, schedule, time estimates and milestones provided by the PAC are included in the master Project Schedule.
- c. Work with PSFA RFM and General Contractor to alleviate potential impacts on PAC due to changes in the Project Schedule.
- d. Review updated Construction Phase test and verification plan, Functional Testing Checklists, test procedure requirements, and performance verification documentation provided by the PAC.
- e. Provide copies of Change Orders critical to performance assurance process to the PAC for review and comments as appropriate.
- f. Provide copies of those General Contractor submittals that are critical to the performance verification process to the PAC for review and comment.
- g. Attend test and verification meetings as needed.
- h. Review Pre-Functional Checklists submitted by the General Contractor and verify equipment is ready for testing.
- i. Ensure items in the PAC's Installation Issues Log are corrected and issues related to the design are resolved prior to substantial completion.
- j. Verify performance assurance program requirements have been met.

8.2.3 Performance Assurance Contractor

- a. Update initial Construction Phase test and verification plan, PSFA approved Pre-Functional Checklists, testing procedure requirements, and performance verification documentation as required for actual project conditions and distribute to Design Team and the General Contractor through the PSFA RFM.
- b. Upload the updated plan, etc. to the PSFA's CIMS.
- c. Organize and conduct a PAC Coordination Meeting with the General Contractor, and applicable subcontractors, to review Performance Assurance requirements, schedule, time estimates and milestones.
- d. Provide line items for PAC activities, due dates for Pre-Functional Checklists, performance assurance meetings, and site



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- visits to the General Contractor for insertion into the Project Schedule.
- e. Review revisions to the Project Schedule on a regular continuing basis for potential impacts on PAC activities and communicate with PSFA RFM to mitigate.
 - f. Perform and document periodic site visits and provide Site Observation Reports for each visit related to witness, test, and verification of equipment, systems and PAC activities. And to document and update any issues that might affect serviceability, maintainability, clearances for operation and service, and verification activities.
 - g. Perform required site visit when the first equipment (FOAK) is installed and ready for inspection and Factory Start-Up.
 - h. Create and maintain an Installation Issues Log capturing issues noted during site visits that may have an impact on performance assurance activities, when issues are resolved, and detail the action(s) taken for resolution.
 - i. Maintain the Design Issues Log for items related to the design that may affect performance assurance for the HVAC and controls systems including when issues are resolved, and detail the action(s) taken for resolution.
 - j. Submit Requests for Information (RFI) through the PSFA's established process for questions and comments related to the design of the HVAC and Control systems.
 - k. Route the Design and Installation Issues Logs and updates along with Requests for Information through the PSFA RFM and upload them to the CIMS on a continual basis.
 - l. Review those contractor submittals that are critical to the performance verification process with special attention to substitutions or proposed deviations.
 - m. Review any Change Order Requests that may impact the performance verification process and provide comments as appropriate.
 - n. Review any factory start-up procedures, equipment performance data, and control drawings and provide comments.
 - o. Participate in First Of A Kind (FOAK) Equipment Manufacturer's Start-Up. Be prepared for additional participation should issues arise from the FOAK.
 - p. Provide Construction (Pre-Functional) Checklists to the General Contractor with timelines and expectations for completion.
 - q. Attend General Construction Progress meetings as needed.
 - r. Write detailed mechanical and control systems functional performance test (FPT) procedures and submit to Design Engineers, PSFA RFM, PSFA Project Team, and the General Contractor for review and comments.



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- s. Witness, Verify, and document test and balance of systems in accordance with the Specifications.
- t. Manage, conduct, and document Functional Performance Testing and verification.
- u. Engage Owner maintenance personnel in testing and verification activities to assist with training.

8.2.4 General Contractor

- a. Ensure performance assurance activities and the time required to perform them are included in the Project Schedule for completion prior to Substantial Completion of the Project.
- b. Provide copies of all construction documentation, related to performance assurance, are delivered to the PAC Contractor.
- c. Correct items on the PAC's Installation Issues Log
- d. Submit completed PSFA approved Pre-Functional Checklists when equipment and systems are installed and operational ready. Update Issues Log items corrected, Notify PAC, PSFA RFM, and TAB Contractor of equipment / Systems ready for Factory Start-Up.
- e. Coordinate TAB activities with PAC, PSFA RFM, and installation subcontractors, and complete according to contract documents and schedule.
- f. Ensure subcontractors execute their test and verification responsibilities.
- g. Attend test and verification meetings when scheduled.
- h. Prepare and submit O&M Manuals and equipment inventory in format specified by the PSFA.

Table 8-1 summarizes the interactions, responsibilities and deliverables for this phase. Many of these responsibilities are part of the normal PSFA construction process; Responsibilities are designated "**L**ead" for the entity with primary responsibility for the activity; "**A**pprove" to indicate the entity with final approval authority where appropriate; "**S**upport" for other team members who are to provide technical and other assistance to the lead team member; and "**P**articipate" for others who are part of the process and participate in the activity.

KEY: L = Lead; A = Approve; S = Support; P = Participate



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	Task/Deliverable	PSFA RFM	District	Design Team	PAC	General Contractor
1	Arrange Purchase Order with PAC for Construction Stage Services.	L	L		P	
2	Schedule, coordinate and conduct a pre-construction conference ensuring PAC is present.	S	S	L	P	P
3	Include performance assurance activities and time to perform in Project Schedule.	A		A	S	L
4	Update Construction Phase test and verification plan, test procedure requirements, checklists, and performance verification documentation as required.	A			L	L
5	Conduct PAC Coordination Meeting with General Contractor, subs, etc.	P	P	P	L	P
6	Provide Change Modification Requests that may impact the performance verification process and testing/balancing to PAC for review.	S	S	L		L
7	Review Change Modification Requests that may impact the performance verification process and testing/balancing.				L	
8	Perform periodic site visits to note conditions that might affect test, balance and performance verification & provide observation reports.				L	
9	Maintain and Update Design Issues Log for HVAC & Controls.				L	
10	Create & Maintain Installation Issues Log for HVAC & Controls.				L	
11	Resolve issues in Design and Installation Issues Logs.	S	S	L	S	L
12	Review any factory start-up procedures, equipment performance data and control drawings.				L	
13	Write detailed mechanical & control systems functional test procedures.				L	
14	Complete and submit PSFA approved Pre-Functional checklists for installed equipment to the PAC.				A	L
15	Review construction checklists to verify equipment ready for verification testing.			A		
17	Verify performance assurance requirements have been met.	A	S	L		
18	Confirm Owner acceptance of system operation.	S	A	L	S	

Table 8-1 – Construction Phase Responsibilities



9. OPPOSITE SEASON TESTING

9.1 Description

The Major objectives of the Performance Assurance Program during the Opposite Season Testing Phase are to assure opposite seasonal demands are Functionally Tested to the specifications the season dictates from the previous Functional Tests.

This phase includes to resolve any remaining open Punch List items, which shall include the PAC's Design and Installation Issues Logs. In addition, the PAC will be requested by the PSFA RFM to assist with resolving any remaining performance problems, help address warranty issues that may arise, or provide other project-related services.

It is the responsibility of the General Contractor, and verified by the Design Professional, to ensure deficiencies in the Project Issues Log are corrected and documented. Open items in the PAC's Design Issues Log and Installation Issues Log, or performance problems, are the responsibility of the PAC to confirm and document are resolved.

PSFA Maintenance shall review the PAC's Installation Issues Log and verify that corrections have been made for each item listed prior to the PAC closing out that item in the log.

Pricing for performance assurance activities that may be carried over from the PAC's Construction Stage price. Other services will be requested by the PSFA RFM during this period on an "as-needed" basis with the PAC Purchase Order adjusted accordingly in advance of such work being performed. The hourly rate and allowable expense items included in the PAC's price proposal and for performing other work during this period may be used for pre-authorized additional services.

9.2 Responsibilities, and Deliverables

The Opposite Season Testing Phase will include all those elements and responsibilities normally associated with Functional Testing and TAB, will be consistent with requirements that may have already been established by the PSFA and published elsewhere. For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

9.2.1 PSFA Regional Facilities Manager

- a. Ensure deficiencies identified in the PAC's Design and Installation Issues Logs, warranty issues and performance problems are resolved by the General Contractor and design team and documented in the PSFA CIMS.



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- b. Attend Opposite Season Functional Testing and Verification.
- c. Verify Performance Assurance Program requirements have been met for this phase.

9.2.2 Design Team

- a. Ensure issues listed in the PAC's Design and Installation Issues Logs, warranty issues, and performance problems are resolved and document resolutions in the PSFA CIMS.
- b. Request, through the PSFA RFM, the assistance of the PAC with resolving issues or performance problems related to the HVAC and control systems installed.
- c. Attend Opposite Season Functional Testing

9.2.3 Performance Assurance Contractor

- a. Supervise, conduct, and document Opposite Season Functional Testing and/or any follow-up testing.
- b. Assist in resolving outstanding issues, warranty issues, or performance problems when requested by the PSFA RFM.

9.2.4 General Contractor

- a. Support and assure subcontractor's participation in Opposite Season Functional Testing and/or any follow-up testing.
- b. Ensure, with Design, that issues listed in the PAC's Installation and Design Issues Logs are addressed and corrected.
- c. Provide "As-operated" sequence from controls contractor.
- d. Make adjustments to O&M Manuals as-built drawings, etc. to document system modifications or component replacement, changes to operating procedures, updated equipment data, calibration, and other revisions.

Table 9-1 summarizes the interactions, responsibilities and deliverables for this phase. Many of these responsibilities are part of the normal PSFA post-construction and warranty period requirements; however, they are listed here due to their relevance to performance assurance.

Responsibilities are designated "Lead" for the entity with primary responsibility for the activity; "Approve" to indicate the entity with final approval authority where appropriate; "Support" for other team members who are to provide technical and other assistance to the lead team member; and "Participate" for others who are part of the process and participate in the activity.



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KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	PAC	General Contractor
1	Correct operational deficiencies identified by Owner.	A	S	P	S	L
2	Complete any Opposite Season or follow-up testing and verification.	S	S		L	S
3	Resolve all open issues in PAC's Design and Installation Issues Logs.	A	S	L	P	S
4	Resolve outstanding warranty issues or performance problems.	A	S	L	S	L
5	Record system modifications, component replacement, changes to operating procedures, updated equipment data, calibration, and other revisions.			A		L
6	Provide "As-operated" sequence from controls contractor.			A		L
7	Schedule 11 Month Correction Period Inspection	P	P	L	P	P

Table 9-1 Opposite Season Testing Phase Responsibilities

10.0 11-MONTH CORRECTION PERIOD PHASE

10.1 Description

The major objectives of the Performance Assurance Program during the 11-Month Correction Period Phase are to complete any follow up testing and verification; adjust and optimize systems to meet specifications; inspect equipment for any maintenance deficiencies; and resolve any remaining, non-critical, open Punch List items, which shall include the PAC's Design and Installation Issues Logs. In addition, the PAC will be requested by the PSFA RFM to assist with resolving any remaining performance problems, help address warranty issues that may arise, or provide other project-related services.

It is the responsibility of the Design Professional to ensure deficiencies are corrected by the General Contractor and that open items in the PAC's Design Issues Log and Installation Issues Log, the 11-Month Correction Punch List, and any warranty or performance problems are resolved.

PSFA Maintenance shall review the PAC's Installation Issues Log and verify that corrections have been made for each item listed prior to the PAC closing out that item in the log. Resolution of the PAC's Design Issues Log, open items in the PAC's Installation Issues Log and the 11-Month Correction Punch Lists, along with any warranty or



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performance problems is a prerequisite for certifying Project Completion and final payment.

Pricing for performance assurance activities that may be carried over from the Construction Phase, including test and balance, seasonal or follow up testing or verification, adjusting systems to meet specifications, and resolving any remaining performance problems, shall be included in the PAC's Construction Stage price. Other services will be requested by the PSFA RFM during this period on an "as-needed" basis with the PAC Purchase Order adjusted accordingly in advance of such work being performed. The hourly rate and allowable expense items included in the PAC's price proposal and for performing other work during this period may be used for pre-authorized additional services.

10.2 Responsibilities, and Deliverables

The 11-Month Correction Period Phase will include all those elements and responsibilities normally associated with the 11-month correction period following construction or renovation of school facilities and will be consistent with requirements that may have already been established by the PSFA and published elsewhere. For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

10.2.1 PSFA Regional Facilities Manager

- a. Ensure deficiencies identified in the 11-Month Correction Period Punch List, including the PAC's Design and Installation Issues Logs, warranty issues and performance problems are resolved by the General Contractor and design team and documented in the PSFA CIMS.
- b. Participate in near end-of-correction period review.
- c. Verify Performance Assurance Program requirements have been met for this phase.
- d. Review and approve Final PAC Report.
- e. Distribute Final PAC Report to appropriate parties.

10.2.2 Design Team

- a. Ensure issues listed in the PAC's Design and Installation Issues Logs and the 11-Month Correction Punch List, warranty issues and performance problems are resolved and document resolutions in the PSFA CIMS.
- b. Request, through the PSFA RFM, the assistance of the PAC with resolving issues or performance problems related to the HVAC and control systems installed.



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- c. Perform near end-of-correction period review as part of 11-month walkthrough by Architect.
- d. Review and approve Final PAC Report.

10.2.3 Performance Assurance Contractor

- a. Participate in 11-month walkthrough with Design Professional.
- b. Assist in resolving outstanding 11-Month Correction Period Punch List items, warranty issues, or performance problems when requested by the PSFA RFM.
- c. Prepare Final PAC Report conforming to the specific requirements for format, organization and content described in the Performance Assurance Program Manual and submit to the PSFA RFM
- d. Meet with the PSFA RFM to review the Final PAC Report.

10.2.4 General Contractor

- a. Execute seasonal or follow-up testing.
- b. Correct issues listed in the PAC's Installation Issues Log and included in the 11-Month Correction Punch List.
- c. Provide "As-operated" sequence from controls contractor.
- d. Make adjustments to O&M Manuals as-built drawings, etc. to document system modifications or component replacement, changes to operating procedures, updated equipment data, calibration, and other revisions.
- e. Assist with near end-of-correction period review.

Table **9-1** summarizes the interactions, responsibilities and deliverables for this phase. Many of these responsibilities are part of the normal PSFA post-construction and warranty period requirements; however, they are listed here due to their relevance to performance assurance.

Responsibilities are designated "**L**ead" for the entity with primary responsibility for the activity; "**A**pprove" to indicate the entity with final approval authority where appropriate; "**S**upport" for other team members who are to provide technical and other assistance to the lead team member; and "**P**articipate" for others who are part of the process and participate in the activity.



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KEY: L = Lead; A = Approve; S = Support; P = Participate

	Task/Deliverable	PSFA RFM	District	Design Team	PAC	General Contractor
1	Correct operational deficiencies identified by Owner.	A	S	P	S	L
2	Complete any follow-up testing and verification.	S	S		L	S
3	Resolve all open issues in PAC's Design and Installation Issues Logs.	A	S	L	P	S
4	Resolve outstanding 11-Month Correction Period Punch List items, warranty issues, or performance problems.	A	S	L	S	L
4	Record system modifications, component replacement, changes to operating procedures, updated equipment data, calibration, and other revisions.			A		L
5	Provide "As-operated" sequence from controls contractor.			A		L
6	Perform near end-of correction period review to identify performance problems or warranty issues as part of 11-month walkthrough.	S	S	L	P	P
7	Prepare and deliver final PAC Report.				L	
8	Review/Approve final PAC Report.	L	S	S		

Table 9-1 11-Month Correction Period Phase Responsibilities

11.0 PROJECT CLOSE-OUT

11.1 Description

The major objectives of the Performance Assurance Program for Close-Out is to finalize all deliverables and to assure all follow up testing and verification; adjust and optimize systems have met specifications; all contracted equipment and systems are free from all maintenance deficiencies; and all Punch List items are resolved, which shall include the PAC's Design and Installation Issues Logs.

It is the responsibility of the Design Professional to deliver the final As-Built Drawings.

PSFA Maintenance Personnel have received specific training to the systems and equipment installed for the project.



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11.2 Responsibilities, and Deliverables

The Close-Out will include all those elements and responsibilities normally associated with the Project Close-Out following construction or renovation of school facilities and will be consistent with requirements that may have already been established by the PSFA and published elsewhere. For the purposes of integrating the Performance Assurance Program specific responsibilities and deliverables for individual team members include, but are not necessarily limited to, those described in the paragraphs that follow.

11.2.1 PSFA Regional Facilities Manager

- a. Ensure deficiencies identified in the 11-Month Correction Period Punch List, including the PAC's Design and Installation Issues Logs, warranty issues and performance problems are resolved by the General Contractor and design team and documented in the PSFA CIMS.
- b. Verify Performance Assurance Program requirements have been met for this phase.
- c. Review submittal of the O&M Manuals from GC.
- d. Review and approve Final PAC Report.
- e. Distribute Final PAC Report to appropriate parties.

11.2.2 Design Team

- a. Ensure issues listed in the PAC's Design and Installation Issues Logs and the 11-Month Correction Punch List, warranty issues and performance problems are resolved and document resolutions in the PSFA CIMS.
- b. Request, through the PSFA RFM, the assistance of the PAC with resolving issues or performance problems related to the HVAC and control systems installed.
- c. Submit final As-Built Drawings to RFM and PAC for review and approval.

11.2.3 Performance Assurance Contractor

- a. Assist in resolving any outstanding 11-Month Correction Period Punch List items, warranty issues, or performance problems when requested by the PSFA RFM.
- b. Review, comment, and approve submitted O&M Manuals.
- c. Submit Final PAC Report conforming to the specific requirements for format, organization and content described in the Performance Assurance Program Manual and submit to the PSFA RFM
- d. Meet with the PSFA RFM to review the Final PAC Report.



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11.2.4 General Contractor

- f. Provide all contractual deliverables requested by Design, PAC, and RFM.

Table **10-1** summarizes the interactions, responsibilities and deliverables for this phase. Many of these responsibilities are part of the normal PSFA post-construction and warranty period requirements; however, they are listed here due to their relevance to performance assurance.

Responsibilities are designated “**L**ead” for the entity with primary responsibility for the activity; “**A**pprove” to indicate the entity with final approval authority where appropriate; “**S**upport” for other team members who are to provide technical and other assistance to the lead team member; and “**P**articipate” for others who are part of the process and participate in the activity.

	Task/Deliverable	PSFA RFM	District	Design Team	PAC	General Contractor
1	Assure all operational deficiencies identified by Owner and PAC are resolved.	A	S	S	S	L
2	Assure all follow-up testing and verification is completed.	S	S		L	S
3	Assure all open issues in PAC’s Design and Installation Issues Logs are resolved.	A	S	L	P	S
4	Review and verify Equipment and Systems training of District’s Maintenance Personnel. Submit Training Completed forms and audio/video content to RFM	A	A	P	L	L
4	Document any system modifications, component replacement, changes to operating procedures, updated equipment data, calibration, and other revisions.	P	P	L	P	L
5	Submit all Warranty Documents to District and RFM.	A	A	S	S	L
5	Provide “As-operated” sequence from controls contractor.			A		L
6	Perform near end-of correction period review to identify performance problems or warranty issues as part of 11-month walkthrough.	S	S	L	P	P
7	Prepare and deliver final PAC Report.				L	



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8	Review/Approve final PAC Report.	A			L	
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KEY: L = Lead; A = Approve; S = Support; P = Participate

Table 10-1 Close-Out Responsibilities