



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Document	Prepared by:	Submitted to:	Copies to:	Comments
System Functional Testing Field Reports	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Construction Observations Field Reports	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Preliminary Commissioning Report	CxA	<ul style="list-style-type: none">QA	<ul style="list-style-type: none">PMCPM	
Commissioning Report Review Comments	QA	<ul style="list-style-type: none">CxA	<ul style="list-style-type: none">PMCPM	
Final Commissioning Report	CxA	<ul style="list-style-type: none">QA	<ul style="list-style-type: none">PMCPM	
Construction O/A/C Meeting minutes	CPM	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACxAAE Team	
Commissioning Status Reports	CxA	<ul style="list-style-type: none">QA	<ul style="list-style-type: none">PM	
Master Issues Log	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Change Orders, ASI, RFI	AE Team CPM	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACxACPMAE Team	
Deferred / Seasonal Testing Field Report	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Deferred / Seasonal Executed Functional Test Procedures	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	



Document	Prepared by:	Submitted to:	Copies to:	Comments
Warranty Checkup Field Report	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Master Issues Log	CxA	<ul style="list-style-type: none">SRE	<ul style="list-style-type: none">QACPM	
Commissioning Report Amendment	CxA	<ul style="list-style-type: none">QA	<ul style="list-style-type: none">PM	

VIII. Pre-Design Phase Commissioning

- A. Design Intent Document: During the Pre-Design Phase, the VA will solicit and award contracts for the Design Team Construction Manager and Commissioning Authority. Once these contracts are executed, the Design Team will begin developing the project design. The Design Team will prepare a Design Narrative to document the NCA project requirements. The mechanical, electrical, plumbing, controls, and other technical sections will provide a reference for all design and commissioning requirements. This document will be updated as needed during the design process to document changes in the NCA project requirements.
- B. Design Narrative: The Design Team will also prepare a Design Narrative that provides documentation on the design assumptions, design parameters, design calculations, and decisions made during design to implement the Design Intent Document. The Design Narrative is also submitted to the PM for review.
- C. The goal of the commissioning tasks in the Pre-Design Phase of the project include the following:
1. The CxA, PM, CPM and NCA representatives will review and provide written comments on the Design Intent Document.
 2. The CxA, PM, CPM and NCA representatives will review and provide written comments on the Design Narrative.



IX. Design Phase Commissioning

- A. Schematic Design Phase: The goals of the commissioning tasks in the Schematic Design Phase of the project include the following:
1. The CxA PM, and NCA representatives will review and provide written comments on the Schematic Design documents submitted by the Design Team. The focus of the CxA review will be on adherence to the Design Narrative. The review comments will be geared towards aligning the design and design narrative with the Design Intent Document and/or updating the Design Narrative with decisions approved by NCA during the Schematic Design Phase.
- B. Design Development Phase: The goals of the commissioning tasks in the Design Development Phase of the project include the following:
1. The CxA, PM, and NCA representatives will review and provide written comments on the Design Development documents submitted by the Design Team. The focus of the CxA review will be on adherence to the Design Narrative as updated after the Schematic Design Phase. The review comments will be geared towards aligning the design with the Design Narrative and/or updating the Design Narrative with decisions approved by NCA during the Design Development Phase.
 2. The CxA will prepare the Preliminary Commissioning Plan to provide an initial framework for commissioning activities that will follow. This Preliminary Commissioning Plan will be aligned with the project scope and schedule. It will be reviewed by the PM, NCA, CPM and other interested parties.
 3. The CxA will prepare Preliminary Commissioning Specifications to be included in the project manual. The preliminary specifications will include Section 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS as well as language to be included in other divisions including Division 3, Division 11, Division 28, and Division 32 specification sections. The Design Team will review the Preliminary Commissioning Specifications and provide written comments to the CxA. The CxA will revise the Preliminary Commissioning Specification and re-submit to the Design Team.
 4. A review conference is held with the Design Team, PM, NCA, CxA and CPM to coordinate review comments and responses.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

5. The CxA, CPM, Design Team, PM, and NCA will hold a meeting to review mechanical, electrical and plumbing system selections and to develop the preliminary control system Sequences of Operations for the project. Based on the results of this meeting, the Design Team will use these concepts as the basis for designing the final control system specifications and Sequences of Operations to be included in the construction documents. The Design Team will notify and coordinate and changes with the other parties involved in the control system.
 6. The CxA will update the Commissioning Plan to incorporate any changes resulting from the Design Development submission and review comments.
 7. The CxA will prepare the Commissioning Specifications Coordination Matrix. This document is based on the outline specifications provided by the Design Team. It provides recommended wording to be included in the technical specifications sections to identify commissioning, O&M manual and training requirements for the CPM and the installing contractors.
 8. The Design Narrative will be updated by the CxA to incorporate decisions approved during the Design Development phase.
- C. Construction Document Phase: The goals of the commissioning tasks in the Construction Document Phase of the project include the following:
1. The Design Team will prepare final construction documents that will be used to construct the facility. A progress set of drawings and specifications will be issued for review at approximately the 50% CD stage. The CxA, PM, CPM, and NCA will review the progress set to verify that the design is proceeding in accordance with the Design Narrative.
 2. The CxA will prepare a final, detailed list of systems and equipment to be commissioned.
 3. The CxA will prepare preliminary Pre-Functional Checklists and Systems Functional Performance Test procedures for each type of system to be commissioned. These will be published in the Preliminary Commissioning Plan to be included as an informational appendix to Specification Section 01 91 00 – GENERAL COMMISSIONING REQUIREMENTS that will be issued for bid.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

4. A review conference will be conducted to coordinate review comments and provide direction for adjustments in the design prior to issuing the final construction documents.
5. The CxA will update the Design Narrative to reflect changes approved during the review conference.
6. The Design Team will issue final Construction Documents, including drawings, and specifications. These will be reviewed by the CxA, PM and NCA. The CPM will also review the final construction documents and prepare the final estimates of construction costs.

X. Construction and Acceptance Phase Commissioning

- A. The CxA will prepare the Construction Commissioning Plan that incorporates any changes due to the Final Construction Documents or Design Narrative. This Commissioning Plan outlines the commissioning activities during the Construction and Acceptance Phase of the project.
- B. A Commissioning Kickoff Meeting will be held at the start of construction to describe the commissioning process for the Construction Team which includes the CPM, installing sub-contractors (Plumbing, Controls, Electrical, Security, Irrigation, TAB and others). Preliminary Pre-Functional Checklists and Functional Test Plans will be included to describe the level of involvement required of all parties.
- C. CxA will provide access for all AE Team and subcontractors for use of the CxA's online commissioning software. This software will be utilized by the Contractor and AE Team to manage the commissioning issues log, complete Pre-Functional Checklists and complete Functional Performance Tests.
- D. The CxA will provide preliminary Commissioning Milestones, predecessors, successors, and durations to the CPM. The CPM will be able to use these data to integrate commissioning activities into the project construction schedule. The CxA will align commissioning activities with the construction schedule for each construction phase.
- E. The CxA will attend periodic Owner/Architect/Contractor (O/A/C) meetings to discuss commissioning activities, field reports, issues log and responses to commissioning issues noted during construction.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

- F. Regular Commissioning Progress meetings will be held for each construction phase. These meetings are a forum to review progress and to discuss issues affecting installation, coordination, startup, and testing of the systems to be commissioned. Meeting attendees should include the Commissioning Agent, SRE, CPM, plumbing, security, controls and TAB subcontractors. Design team members, especially the AE Team are also encouraged to attend.
- G. It is anticipated these meetings will be held quarterly during the early stage of construction. Once the building has come out of the ground and the exterior shell is being constructed, the meetings will be held on a monthly basis. As the crypts, security and irrigation systems are being installed, it is likely the commissioning meetings will be held bi-weekly.
- H. The Commissioning Agent will witness selected equipment startups for security and irrigation system components. The purpose will be to observe any issues that may arise that would affect equipment or system operations.
- I. The Commissioning Agent will conduct periodic Field Observations to review construction progress, overall quality of workmanship, and to review maintenance access to equipment. The CxA will issue a Field Observation Report following each visit. The report will describe any specific observations that are found. The specific observations will be tracked on the Commissioning Master Issues Log.
- J. The SRE, CPM, installing sub-contractors, and the Design Team (as necessary) should review the Field Reports to determine the most appropriate resolution for the issue. The CxA will assist in determining the resolution as requested. The status of issue resolution will be a primary topic of discussion at the Commissioning Progress meetings and O/A/C meetings.
- K. The CxA will review selected submittals and shop drawings relative to the systems to be commissioned. The review will be to determine if sufficient information is provided to describe system installation, operation and the information necessary to commission the equipment and systems.
- L. The CxA will review the O&M data submitted by the installing contractor and the CPM. The Commissioning Specifications provide specific requirements for O&M Manuals that are more detailed for those systems to be commissioned. The O&M Manuals will be reviewed to determine compliance with these additional requirements.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

- M. The CxA will prepare systems narratives and other information to be added to the O&M data provided by the installing contractors and the CPM to become the Systems Operations and Maintenance Manual (SOMM). The SOMM will provide operations and maintenance staff with an overview of the system design parameters, intended operating conditions and sequences. It will also provide data necessary to maintain and troubleshoot the equipment and systems.
- N. The installing contractors and the CPM will prepare equipment training plans intended to provide basic equipment operating and maintenance procedures. The installing contractors and the CPM will prepare training plans that will outline the training to be provided and the intended outcome of the training. The CxA will review the training plans to determine that the training will meet the requirements of the specifications and the FMD staff.
- O. The Commissioning Agent will prepare Pre-Functional Checklists that the CPM installing sub-contractors will complete to document that equipment and systems are complete and ready for testing. Checklists will be required to be completed electronically on the Commissioning Agent's commissioning software.
- P. The Commissioning Agent will prepare detailed System Functional Performance Test plans that will provide detailed step-by-step procedures that will be used to verify system operations under all operating conditions. These test procedures will be issued to the SRE, CPM, installing Contractors, DDC, TAB and NCA for review and comment. The reviews should focus on the ability to implement the steps, especially the control systems adjustments, necessary to perform the test. The reviewers should note any procedures that would damage the equipment or system.
- Q. The installing sub-contractors are encouraged to use the System Functional Test Plans as a tool for pre-testing the equipment and systems prior to the "official" functional testing. This will allow for early detection and resolution of problems. The contractor, Design Team (Engineer of Record), and Commissioning Agent will complete functional tests electronically on the Commissioning Agent's commissioning software as indicated in the Cx Plan.
- R. The CxA will assist the CPM in scheduling equipment training. The CxA will review training plans prepared by the CPM and the installing sub-contractors.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

- S. The CxA will conduct enhanced systems training for NCA staff. This training will focus on the system operation, design criteria, and troubleshooting of systems level issues. It is anticipated that the enhanced systems training will be conducted prior to functional testing to facilitate participation of the FMD staff in the testing activities.
- T. It is the expectation that System Functional Testing will demonstrate that the systems perform in accordance with design criteria, construction documents and NCA requirements. Functional testing prerequisites are that the system components and equipment are completely installed, all required power connections are complete, all required control connections and control functions are operational, pre-functional checklists are completely filled out, and that required air and hydronic testing and balancing has been completed. When required by construction specifications, third-party testing must also be complete and required test reports have been submitted to the SRE and CxA for review.
- U. Functional testing of each system to be commissioned will be conducted by the CxA unless otherwise noted in the Systems to be Commissioned. Where indicated, the installing contractor will perform provided tests identified in the Systems to be Commissioned and the Engineer of record shall witness. Where indicated, the CxA will witness and document the testing; the installing sub-contractors, DDC contractor, and TAB contractor will conduct the testing by operating the equipment, adjusting the control system and performing measurements in accordance with the System Functional Test Plan. The NCA staff is encouraged to assist in the testing as an additional training opportunity.
- V. Issues and/or failures detected during the Functional Performance Testing will be documented on the test plan, on Field Observation reports and on the Master Issues Log which will be monitored on the Commissioning Agent's commissioning software. Installing sub-contractors, DDC contractor, and/or TAB contractor will be responsible for correcting each issue as directed by the SRE and reporting the corrective action to the SRE and CxA. The CxA will document the corrective action on the Master Issues Log. The need for re-testing will be determined by the SRE in consultation with the CxA.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

- W. Upon completion of all commissioning activities, including resolution of all issues on the Commissioning Master Issues Log, the CxA will prepare and issue the Final Commissioning Report. This report will include the final version of the Commissioning Plan, copies of all Commissioning Meeting Minutes, Commissioning Field Observation Reports, Pre-Functional Checklists, Functional Performance Test results, and the Commissioning Master Issues Log. The report will also include blank copies of the Functional Test Plans for use by NCA for future re-commissioning activities.

XI. Warranty Phase Commissioning

- A. The CxA will review operational data from the NCA DDC System to monitor system operations. Significant deviations from defined criteria will be noted and referred to NCA and Design Team for further investigation.
- B. Conduct any deferred or seasonal functional testing that was not completed during the Construction and Acceptance Phase. Issues identified during the deferred or seasonal testing will be documented on the Commissioning Issues Log. The CPM will be notified of the issue and will be responsible for resolution. The CPM will document the resolution and the CxA and FMD will verify the resolution. The SRE in consultation from the CxA, will determine the need for re-testing.
- C. Conduct a 10-month warranty review to identify any potential warranty issues prior to expiration of the warranty. The warranty review will include interviews with FMD staff and an on-site inspection of systems and equipment condition and operations.
- D. Warranty issues identified during the review will be documented on the Commissioning Issues Log. Written notice of potential warranty issues will be provided to the SRE. Upon direction by the SRE, the CPM will schedule appropriate sub-contractors to correct the issues within the balance of the warranty period. The CPM will provide written documentation that each warranty issue has been resolved. The CxA and NCA will spot-check selected issues to verify resolution.
- E. The CxA will prepare an amendment to the Final Commissioning Report to document the deferred or seasonal testing, any re-testing, and the results of the warranty review.



XII. Team Member Roles and Responsibilities

- A. The following is an outline of team member responsibilities in the Design, Construction and Acceptance, and Warranty phases of the commissioning process. These responsibilities are meant to be limited to those tasks related to the commissioning process and are not intended to be representative of each team member's contractual responsibilities for other aspects of this project.
- B. In the table that follows, the tasks identified for the "CxA" include the Commissioning Project Manager, Commissioning Technical Lead, or other Commissioning Specialists and sub-consultants as directed by the CxA.
- C. In the table that follows, the tasks identified for the "Design Team" include the design build Architect, MEP Engineer, Civil Engineer or other design consultants as directed by the SRE and Architect.
- D. In the table that follows, the tasks identified for "Contractor" include the design build Contractor team including the Construction Project Manager, as well as the commissioning representatives for the installing sub-contractors, as directed by the SRE and the Construction Project Manager.
- E. In the table that follows, the tasks identified for "DDC" include the Owner's DDC Vendor as directed by the SRE and CPM.
- F. In the table that follows, the tasks identified for "TAB" include the Owner's TAB Vendor as directed by the SRE or CPM.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Commissioning Team Roles and Responsibilities

Project Phase	Cx Task	Description	Team Member	Responsibility
Design	Review Design Narrative	Review the Design Narrative Document	PM	<ul style="list-style-type: none">Receive and distribute Basis of Design documents to Contractor, CxA, and other NCA agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Design Narrative document.Provide comment log to PM and Design Team.
			Design Team	<ul style="list-style-type: none">Prepare Phase 1 (Schematic Design) and Design Narrative to describe design approach.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None
Design	Design Development design	Review Design Development design for familiarization, general conformance with Owner's Project Requirements, Design	PM	<ul style="list-style-type: none">Receive and distribute Design Development package to Peer Reviewer, CxA, DDC and other NCA agencies as necessary.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		Narrative, and NCA Design Criteria.	CxA	<ul style="list-style-type: none">Review Design Development drawings and specs.Update Design NarrativeProvide comment log to PM and QA.
			Design Team	<ul style="list-style-type: none">Prepare Design Development drawings and specs.Provide responses to CxA review comments.Incorporate changes into design as directed by PM.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None.
Design	Commissioning Specifications	Prepare Commissioning Specification "Section 01 91 00 – General Commissioning Requirements" to be included in project manual.	PM	<ul style="list-style-type: none">Review, comment and approve Cx specifications as part of project manual review.
			CxA	<ul style="list-style-type: none">Prepare Cx Specification Section 01 91 13.Prepare systems commissioning specifications.

National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		Prepare Commissioning Specification for Division 3 – Pre-Cast Burial Crypts, Division 28 – Electronic Safety and Security, and Division 32 – Irrigation, to provide detailed commissioning, operations & maintenance and training requirements for individual technical specification sections.	Design Team	<ul style="list-style-type: none">Incorporate commissioning specifications into Project Manual.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None.
Design	Preliminary Commissioning Plan	Prepare Preliminary Commissioning Plan that describes the Commissioning Process, Commissioning Team with specific Roles and Responsibilities. The Commissioning Plan will include description of systems to be commissioned.	PM	<ul style="list-style-type: none">Review Cx PlanProvide comments to CxA.
			CxA	<ul style="list-style-type: none">Prepare Cx PlanSubmit to PM and QA
			Design Team	<ul style="list-style-type: none">Review Cx Plan relative to Design Team roles and responsibilities.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None.
Design	Focused Construction Document Review (Progress Set)	Perform a focused review of a Construction Document progress	PM	<ul style="list-style-type: none">Receive and distribute Progress Set drawings and specs to QA, CxA, DDC and other NCA agencies as necessary.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		submission (DD-1 and DD-2)	CxA	<ul style="list-style-type: none">Review Progress Set drawings and specs.Update Design NarrativeProvide comment log to PM and QA.
			Design Team	<ul style="list-style-type: none">Prepare Progress Set drawings and specs.Provide responses to CxA review comments.Incorporate changes into design as directed by PM.
			Contractor	<ul style="list-style-type: none">None
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">None
Design	Focused Construction Document Review	Perform a focused review of the final Construction Document submissions (CD-1 and CD-2). This review will include a back check of commissioning comments provided during previous reviews.	PM	<ul style="list-style-type: none">Receive and distribute Construction Documents package to QA, CxA, DDC and other NCA agencies as necessary.
			CxA	<ul style="list-style-type: none">Review Construction Document drawings and specs.Update Design NarrativeProvide comment log to PM and QA.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			Design Team	<ul style="list-style-type: none">• Prepare Construction Documents drawings and specs.• Provide responses to CxA review comments.
			Contractor	<ul style="list-style-type: none">• None.
			DDC	<ul style="list-style-type: none">• None
			TAB	<ul style="list-style-type: none">• None
Design	Design Phase Meetings	Participate in Design Phase meetings.	PM	<ul style="list-style-type: none">• Schedule, facilitate and attend meetings
			CxA	<ul style="list-style-type: none">• Attend approximately selected meetings to discuss Commissioning Issues.
			Design Team	<ul style="list-style-type: none">• Conduct meetings• Provide meeting minutes to PM, CxA and others as directed by PM.
			Contractor	<ul style="list-style-type: none">• None
			DDC	<ul style="list-style-type: none">• None
			TAB	<ul style="list-style-type: none">• None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
Design	Focused Design Review Meetings	Attend Design Review meetings to review the design and specific commissioning design review comments.	PM	<ul style="list-style-type: none"> Schedule, facilitate and attend meetings.
			CxA	<ul style="list-style-type: none"> Attend meetings to discuss commissioning review comments.
			Design Team	<ul style="list-style-type: none"> Attend meetings to discuss design and to respond to commissioning and DDC comments.
			Contractor	<ul style="list-style-type: none"> None.
			DDC	<ul style="list-style-type: none"> None
			TAB	<ul style="list-style-type: none"> None.
Construction	Final Commissioning Plan	Based on the final construction documents, update the preliminary Commissioning Plan to identify specific systems to be commissioned. The final Commissioning Plan will also include specific individual roles and responsibilities and preliminary Pre-Functional Checklists and Functional Test Plans for systems to be commissioned.	PM	<ul style="list-style-type: none"> Review and approve Commissioning Plan. Provide comments to CxA and QA.
			CxA	<ul style="list-style-type: none"> Prepare Final Commissioning Plan. Prepare preliminary Pre-Functional Checklists Prepare Preliminary Systems Functional Performance Test procedures. Issue to PM and QA. Incorporate comments into Cx Plan revisions as necessary.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			Design Team	<ul style="list-style-type: none">Review Cx Plan relative to Design Team roles and responsibilities.Provide comments to PM and CxA.
			Contractor	<ul style="list-style-type: none">Review Cx Plan relative to Contractor and installing sub-contractor's roles and responsibilities.Provide comments to PM and CxA.
			DDC	<ul style="list-style-type: none">Review Cx Plan relative to DDC roles and responsibilities.Provide comments to QA and CxA.
			TAB	<ul style="list-style-type: none">Review Cx Plan relative to DDC roles and responsibilities.Provide comments to QA and CxA.
Construction	Construction Commissioning Kick Off meeting	Conduct an initial commissioning meeting with all contractors and commissioning team members. The purpose of the meeting will be to establish the purpose and proposed process for commissioning this facility in the construction, acceptance and warranties phases of the project. Review the individual roles and responsibilities of	SRE	<ul style="list-style-type: none">Schedule, facilitate and attend meeting.
			CxA	<ul style="list-style-type: none">Conduct meeting.Prepare, present and discuss commissioning tasks, roles and responsibilities.Prepare meeting agenda and minutes.
			Design Team	<ul style="list-style-type: none">Attend meeting.
			Contractor	<ul style="list-style-type: none">Attend meeting.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		each participating commissioning team member as specified in the Construction Documents.	DDC	<ul style="list-style-type: none">Attend meeting
			TAB	<ul style="list-style-type: none">Attend meeting
Construction	Duration Schedule for Commissioning Activities	Based on the final Commissioning Plan, prepare a duration schedule to show the duration, predecessors and successors for commissioning activities. This duration schedule will be provided to the Construction Manager to include commissioning activities in the project construction schedule. This will allow commissioning activities to be smoothly integrated into the overall construction process.	SRE	<ul style="list-style-type: none">Review commissioning schedule data.Coordinate with Contractor to incorporate commissioning activities into project schedule.
			CxA	<ul style="list-style-type: none">Prepare and issue commissioning activities schedule, including durations and predecessors.Review project schedule prepared by Contractor.
			Design Team	<ul style="list-style-type: none">None.
			Contractor	<ul style="list-style-type: none">Incorporate commissioning activities into Master Construction Schedule.
			DDC	<ul style="list-style-type: none">Review project schedule prepared by Contractor.
			TAB	<ul style="list-style-type: none">Review project schedule prepared by Contractor.
Construction	Submittal and Shop Drawing Review List	Based on final construction documents, prepare a	SRE	<ul style="list-style-type: none">None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		list of selected submittals and shop drawings for review by the Commissioning Agent.	CxA	<ul style="list-style-type: none">Prepare list of submittals and shop drawings to be provided to the CxA.
			Design Team	<ul style="list-style-type: none">None.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Construction	Submittal and Shop Drawing Review	Review selected submittals and shop drawings to support the commissioning process. Review will be for the purpose of developing appropriate Pre-Functional Checklists and Functional Test Plans. Reviews will focus on the ability to commission the systems, maintainability and general conformance to owner's requirements. Commissioning review of submittals and shop	SRE	<ul style="list-style-type: none">Receive and distribute submittals and shop drawings.Distribute selected submittals and shop drawings to CxA.Review and approve submittals
			CxA	<ul style="list-style-type: none">Review selected submittals and shop drawings.Prepare issue comment log
			Design Team	<ul style="list-style-type: none">Review submittals and shop drawings.Provide comments and recommendations to SRE.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		drawings does not replace the Design Team responsibility for approval.	Contractor	<ul style="list-style-type: none">• Prepare and issue submittals and shop drawings.• Incorporate SRE comments into revised submittals and shop drawings.
			DDC	<ul style="list-style-type: none">• Prepare and issue DDC submittals and shop drawings.• Incorporate SRE comments into revised submittals and shop drawings.
			TAB	<ul style="list-style-type: none">• None
			TAB	<ul style="list-style-type: none">• None.
Construction	Pre-Functional Checklists	Prepare Pre-Functional Checklists for systems, components and/or equipment to be commissioned. These Pre-Functional Checklists will be used to document completion of system, component and/or equipment installation and to determine system readiness for functional testing.	SRE	<ul style="list-style-type: none">• Review checklists• Provide comments to CxA
			CxA	<ul style="list-style-type: none">• Prepare preliminary checklists.• Issue to SRE and Contractor for review• Incorporate changes into final checklists as necessary.
			Design Team	<ul style="list-style-type: none">• None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		<p>Pre-Functional Checklists should be completed by the installing contractors to document the installation process. Completed Pre-Functional Checklists are to be submitted to the Commissioning Agent a minimum of seven days prior to testing.</p> <p>Completed Pre-Functional Checklists will be spot checked by the Commissioning Agent to verify systems are ready for testing.</p>	Contractor	<ul style="list-style-type: none"> Provide copies of sub-contractor QC installation checklists to CxA for review. Review checklists prepared by CxA Provide comments to CxA
			DDC	<ul style="list-style-type: none"> Review checklists prepared by CxA Provide comments to CxA
			TAB	<ul style="list-style-type: none"> Review checklists prepared by CxA Provide comments to CxA
Construction	Review Contractor Equipment Startup Reports	<p>Commissioning Agent will review selected equipment Startup reports prepared by installing contractor.</p> <p>Commissioning Agent will witness selected equipment startup procedures. Seven days' prior notice is required to schedule commission authority witnessing the startup.</p>	SRE	<ul style="list-style-type: none"> Receive and distribute Contractor Startup Reports
			CxA	<ul style="list-style-type: none"> Witness selected contractor equipment startups. Review selected Contractor Startup Reports. Provide comment log to SRE and QA.
			Design Team	<ul style="list-style-type: none"> Review Contractor Startup Reports.
			Contractor	<ul style="list-style-type: none"> Complete Contractor Startup Reports Issue to SRE and CxA.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">Review selected Contractor Startup Reports.
			TAB	<ul style="list-style-type: none">Review selected Contractor Startup Reports.
Construction	Prepare Functional Test Procedures	Based on final construction documents (including applicable changes), and approved submittals, prepare Functional Test Procedures for systems to be commissioned. Draft Functional Test Procedures will be issued for review by owner, installing contractors and DDC Vendor.	SRE	<ul style="list-style-type: none">Review preliminary Functional Test Procedures.Provide comments to CxA
			CxA	<ul style="list-style-type: none">Prepare preliminary Functional Test Procedures.Issue to SRE, Contractor and DDC.Incorporate comments into final Functional Test Procedures as necessary.
		Final Functional Test Procedures will be prepared incorporating review comments received from owner, contractors or DDC Vendor.	Design Team	<ul style="list-style-type: none">None.
			Contractor	<ul style="list-style-type: none">Distribute preliminary Functional Test Procedures to MC, EC and other installing sub-contractors.Review preliminary Functional Test ProceduresProvide comments to CxA
			DDC	<ul style="list-style-type: none">Review preliminary Functional Test ProceduresProvide comments to CxA



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none"> Review preliminary Functional Test Procedures Provide comments to CxA
Construction	TAB Plan Review	Review Irrigation Systems Test and Balance Plan prepared by the TAB vendor. Review will be to determine general conformance with owner's requirements.	SRE	<ul style="list-style-type: none"> Distribute TAB Plan to CxA, QA, Contractor and Design Team.
			CxA	<ul style="list-style-type: none"> Review TAB Plan Provide comment log to PM and QA
			Design Team	<ul style="list-style-type: none"> Review and approve TAB Plan.
			Contractor	<ul style="list-style-type: none"> Review TAB Plan Provide comments to PM
			DDC	<ul style="list-style-type: none"> Review TAB Plan Provide comments to QA, CxA and PM
			TAB	<ul style="list-style-type: none"> Prepare preliminary TAB Plan Issue to PM and QA. Incorporate comments into Final TAB Plan as necessary.
Construction	TAB Report Review	Review TAB Report prepared by TAB vendor following system irrigation system balancing. Review will be focused on TAB results that affect system performance and/or commissioning. Specific attention will	SRE	<ul style="list-style-type: none"> Distribute TAB report to Design Team, and CxA. Approve TAB Report in consultation with Design Team and CxA.
			CxA	<ul style="list-style-type: none"> Review TAB report. Provide comments to SRE and Design Team.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		be given to equipment installation and operational issues identified by the TAB vendor.	Design Team	<ul style="list-style-type: none">Review and provide recommendations to SRE.
			Contractor	<ul style="list-style-type: none">Review and submit TAB Report.
			DDC	<ul style="list-style-type: none">None
			TAB	<ul style="list-style-type: none">Provide preliminary TAB data (daily worksheets) to CxA for preliminary review.Prepare TAB ReportIssue TAB report to SRE.
Construction	Review O & M Manuals	Review Operations and Maintenance Manuals submitted by contractors. Manuals will be reviewed for clarity, organization, usability and general conformance with specifications and owner's requirements.	SRE	<ul style="list-style-type: none">Distribute O&M Manuals to CxA and Design Team.Review and approve O&M Manuals.
			CxA	<ul style="list-style-type: none">Review O&M Manuals.Provide comment log to SRE and QA.
			Design Team	<ul style="list-style-type: none">Review O&M Manuals.
			Contractor	<ul style="list-style-type: none">Prepare and issue O&M Manuals to PM.
			DDC	<ul style="list-style-type: none">Prepare and issue DDC O&M Manuals to PM.
			TAB	<ul style="list-style-type: none">None



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
Construction	Prepare Systems Manuals for commissioned systems	Prepare detailed systems manuals for commissioned systems. The manuals will provide operating staff the information needed to understand and optimally operate the commissioned systems. The manuals will describe system design, components, capacity and sequences of operations. Manuals will include descriptions of interactions with other systems and common systems failure modes and responses.	SRE	<ul style="list-style-type: none"> Review and approve Systems Manuals. Distribute Systems Manuals to FMD.
			CxA	<ul style="list-style-type: none"> Using O&M Manuals, Basis of Design, and Construction Documents, prepare Systems Manual.
			Design Team	<ul style="list-style-type: none"> None.
			Contractor	<ul style="list-style-type: none"> None.
			DDC	<ul style="list-style-type: none"> None.
			TAB	<ul style="list-style-type: none"> None.
Construction	Review Training Plans	Review contractor and manufacturer training plans and agendas for general conformance with specifications and owner's requirements. Observe selected training for quality of training and for general conformance with the training plan and agenda.	SRE	<ul style="list-style-type: none"> Schedule and facilitate training sessions. FMD staff attends training sessions.
			CxA	<ul style="list-style-type: none"> Review Training Plans. Provide comment log Witness selected training sessions.
			Design Team	<ul style="list-style-type: none"> None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			Contractor	<ul style="list-style-type: none">In conjunction with installing sub-contractors and/or manufacturers' representatives, conduct training sessions.
			DDC	<ul style="list-style-type: none">Conduct DDC training sessions (as they relate to commissioned systems).
			TAB	<ul style="list-style-type: none">None
Construction	Warranty Review	Review contractor's and manufacturer's warranties for general conformance with specifications and owner's requirements.	SRE	<ul style="list-style-type: none">Distribute warranty documents to FMD and CxAReview and approve warranty documents
			CxA	<ul style="list-style-type: none">Review warranty documents.Provide comment log
			Design Team	<ul style="list-style-type: none">Review warranty documents and provide comments.
			Contractor	<ul style="list-style-type: none">Prepare and issue warranty documentsIncorporate comments into final warranty documents.
			DDC	<ul style="list-style-type: none">Prepare and issue warranty documents for DDC.Incorporate comments into final warranty documents.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none">None
Construction	Systems Functional Testing	Witness and document functional testing for systems to be commissioned. Testing will be conducted as detailed on the specific Functional Test Plan for each system to be commissioned. Functional testing will require support from the Contractor, PC, EC, DDC, TAB Vendor, and specialty systems contractors. Installing contractors should be available to respond to issues and problems identified during testing.	SRE	<ul style="list-style-type: none">Schedule, facilitate and witness systems functional testing.FMD staff should assist in functional testing as additional systems training opportunity.
			CxA	<ul style="list-style-type: none">Witness systems functional testing using previously prepared Functional Test Procedures.Document systems testing on Functional Test Procedures.Issue Field Reports to document deficiencies.Update Master Commissioning Issues Log to document and track deficiencies.
			Design Team	<ul style="list-style-type: none">Review test documentationEngineer of Record to witness tests conducted by Contractor



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			Contractor	<ul style="list-style-type: none">Contractor, MC and EC to conduct functional testing by operating systems in accordance with functional test procedures. For identified tests, conduct and fill out test forms in presence of Engineer of Record.Make corrections, repairs or adjustments to systems during testing as directed by the SRE.Correct outstanding deficiencies after testing as directed by the SRE.Report corrective actions to SRE and CxA upon completion.
			DDC	<ul style="list-style-type: none">Conduct functional testing by operating DDC in accordance with CxA directions and functional test procedures.Assist in troubleshooting and corrective action as necessary
			TAB	<ul style="list-style-type: none">Assist functional testing as directed by the SRE and functional test procedures.
Construction	Systems Functional Retesting	Retest systems with deficiencies as recommended by the	SRE	<ul style="list-style-type: none">Approve retesting as recommended by CxA.Schedule and coordinate retesting.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		CxA and directed by the PM (Note: Retesting is not included in the scope of commissioning services and is provided as an additional service. The costs associated with retesting may be recovered from the Construction Manager in accordance with appropriate contract provisions.)	CxA	<ul style="list-style-type: none">• Make recommendations for necessary retesting.• Coordinate with SRE to schedule retesting after deficiencies are corrected.
			Design Team	<ul style="list-style-type: none">• None
			Contractor	<ul style="list-style-type: none">• Make necessary system repairs, adjustments and/or corrections prior to retesting.• Coordinate retesting as directed and approved by the SRE.• Conduct systems retesting by operating systems as directed by SRE and functional test procedures.
			DDC	<ul style="list-style-type: none">• Assist in systems retesting by operating DDC as directed by SRE and functional test procedures.
			TAB	<ul style="list-style-type: none">• None.
Construction	Construction Observation	Conduct visits to the construction site to observe construction	SRE	<ul style="list-style-type: none">• None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		activities. Specific attention will be given to installation of electronic security and irrigation systems for general conformance with specifications and manufacturer's installation requirements. Specific attention will also be given to installation of site utilities and site improvements construction for general conformance with plans, specifications and manufacturer's installation requirements.	CxA	<ul style="list-style-type: none">• Conduct Construction Observation visits to observe construction progress, systems/equipment installation and general quality of construction.• Prepare Field Report to document general and specific observations and issues.• Update Master Issues Log to document and track specific issues reported on Field Report.• Monitor and verify corrective actions.• Update Master Issues Log to document corrective action progress and completion.
			Design Team	<ul style="list-style-type: none">• Review Master Issues Log
			Contractor	<ul style="list-style-type: none">• Review Field Reports• Review Master Issues Log• Provide corrective actions as directed by the SRE to resolve outstanding issues.
			DDC	<ul style="list-style-type: none">• Review Field Reports relative to DDC issues.• Review Master Issues Log relative to DDC issues.• Report progress of corrective actions relative to DDC issues.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none">Review Field Reports relative to DDC issues.Review Master Issues Log relative to DDC issues.Report progress of corrective actions relative to DDC issues.
Construction	Final Commissioning Report	Compile a comprehensive commissioning report documenting all commissioning activities, including but not limited to: <ul style="list-style-type: none">Commissioning scopeTest methods and resultsOutstanding commissioning issuesIssues logCommissioning planStatus reportsSubmittal and O&M manual reviewsTraining recordCompleted Pre-Functional ChecklistsDesign Review Comments	SRE	<ul style="list-style-type: none">Review preliminary Commissioning Report.Provide comments to CxA.Review and approve Final Commissioning Report
			CxA	<ul style="list-style-type: none">Prepare preliminary Commissioning Report.Incorporate SRE comments into final report.Issue Final Commissioning Report.
			Design Team	<ul style="list-style-type: none">Review Final Commissioning Report
			Contractor	<ul style="list-style-type: none">Review Final Commissioning reportReport on progress and completion of corrective actions.
			DDC	<ul style="list-style-type: none">Review Final Commissioning Report.Report on progress and completion of corrective actions relative to DDC.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			TAB	<ul style="list-style-type: none">Review Final Commissioning Report.Report on progress and completion of corrective actions relative to DDC.
Construction	Owner Architect and Construction Manager Meetings (Construction Phase)	Attend selected Owner/Architect/Contractor Meetings to discuss commissioning issues, review the Commissioning Issues Log, and to maintain awareness of general construction schedule and issues.	SRE	<ul style="list-style-type: none">Schedule, facilitate and attend meetings.
			CxA	<ul style="list-style-type: none">Attend selected meetings to review commissioning issues.
			Design Team	<ul style="list-style-type: none">Attend meetings.
			Contractor	<ul style="list-style-type: none">Conduct meetings.Prepare and issue Meeting Minutes.
			DDC	<ul style="list-style-type: none">Attend selected meetings to review DDC issues.
			TAB	<ul style="list-style-type: none">Attend selected meetings to review DDC issues.
Construction	Status Reports	Provide monthly status reports detailing activities, significant unresolved issues, and upcoming commissioning activities. Prepare report outlining status of deliverables for the project. Status reports are submitted with	SRE	<ul style="list-style-type: none">Review and approve status reports.
			CxA	<ul style="list-style-type: none">Prepare Status Reports to summarize commissioning activities, significant unresolved issues and provide a two-month look-ahead of commissioning activities.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		invoices for professional services.	Design Team	<ul style="list-style-type: none">None.
			Contractor	<ul style="list-style-type: none">None.
			DDC	<ul style="list-style-type: none">None.
			TAB	<ul style="list-style-type: none">None.
Construction	Master Issues Log	Maintain a Commissioning Issues Log to document commissioning issues identified during construction and functional testing. The Commissioning Issues Log will include recommended responsible party and recommendations for resolution of the issue. The Commissioning Issues Log will also be used to document progress toward resolution and the final resolution	SRE	<ul style="list-style-type: none">Review Master Issues LogCoordinate and direct corrective actions to resolve commissioning issues.
			CxA	<ul style="list-style-type: none">Provide monthly updates to Master Commissioning Log.Provide updated Master Commissioning Log after each Construction Visit to document specific issues observed during the visit.Update Master Issues Log to document progress on corrective actions.Update Master Issues Log to document completion of corrective actions.
			Design Team	<ul style="list-style-type: none">None.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			Contractor	<ul style="list-style-type: none">Review Master Issues Log.Provide status of corrective actions.Provide notification of corrective action completion.
			DDC	<ul style="list-style-type: none">Review Master Issues Log.Provide documentation of punch list or other issues noted by DDC vendor.Provide status of corrective actions relative to DDC issues.Provide notification of corrective action completion relative to DDC issues.
			DDC	<ul style="list-style-type: none">Review Master Issues Log.Provide documentation of punch list or other issues noted by TAB vendor.Provide status of corrective actions relative to TAB issues.Provide notification of corrective action completion relative to TAB issues.
Construction	Review Change Orders, ASI, and RFI	Review change orders, architect's supplemental instructions and requests for	SRE	<ul style="list-style-type: none">Issue change orders, ASI and/or RFI.Provide copies of change orders, ASI and RFI to CxA



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		information (with AE response) for issues that affect commissioning. Review is for information only and does not constitute technical or contractual approval or disapproval.	CxA	<ul style="list-style-type: none">Review change orders, ASI, and RFI for changes that affect system/equipment design or installation.Incorporate changes into revised Functional Test Procedures or Pre-Functional Checklists.
			Design Team	<ul style="list-style-type: none">Respond to RFIs.Prepare change orders and/or ASI.Update construction documents as necessary.
			Contractor	<ul style="list-style-type: none">Issue RFI.Request change orders and ASI as needed.
			DDC	<ul style="list-style-type: none">Monitor system changes for impact on DDC installation and/or sequences of operations.Update DDC programming or sequences of operations to implement approved changes.
			TAB	<ul style="list-style-type: none">Monitor system changes for impact on TAB.Update TAB Plan as necessary to implement approved changes.
Warranty	Monitor Systems Operation	Monitor system operation using trend data from DDC.	SRE	<ul style="list-style-type: none">Coordinate corrective actions with Contractor as necessary



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			CxA	<ul style="list-style-type: none">Periodically monitor systems operation using DDC trend data.Prepare and issue brief narrative reports documenting issues noted during systems monitoring.Update Master Commissioning Log with issues noted during systems monitoring.
			Design Team	<ul style="list-style-type: none">None.
			Contractor	<ul style="list-style-type: none">Provide corrective actions as directed by SRE.
			DDC	<ul style="list-style-type: none">Provide corrective actions as directed by SRE.
Warranty	Deferred and/or seasonal Testing	Direct testing that was deferred due to lack of system readiness or for seasonal requirements. Testing will be conducted in accordance with Functional Test Plans.	SRE	<ul style="list-style-type: none">Schedule, facilitate and witness deferred/seasonal testing.FMD staff should assist in deferred/seasonal as additional systems training opportunity.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		Testing support will be required from the DDC Vendor and FMD.	CxA	<ul style="list-style-type: none">• Witness deferred/seasonal testing using previously prepared Functional Test Procedures.• Document deferred/seasonal testing on Functional Test Procedures.• Issue Field Reports to document deficiencies.• Update Master Commissioning Issues Log to document and track deficiencies.
			Design Team	<ul style="list-style-type: none">• None.
			Contractor	<ul style="list-style-type: none">• Contractor, MC and EC will conduct seasonal/deferred testing by operating systems in accordance with SRE directions and functional test procedures. For noted tests, Contractor will conduct tests in presence of Engineer of Record.• Make corrections, repairs or adjustments to systems during testing as directed by the SRE.• Correct outstanding deficiencies after testing as directed by the SRE.• Report corrective actions to SRE and CxA upon completion.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
			DDC	<ul style="list-style-type: none">• Conduct deferred/seasonal testing by operating DDC in accordance with CxA directions and functional test procedures.• Assist in troubleshooting and corrective action as necessary
			TAB	<ul style="list-style-type: none">• Assist deferred/seasonal testing as directed by the CxA and functional test procedures.• Verify selected DDC data by spot measurements of air and/or water balancing data.
Warranty	Post-Occupancy Warranty Checkup	Return to the project approximately 10 months into the 12-month warranty period to review the building operation with the facility staff and	SRE	<ul style="list-style-type: none">• Schedule and facilitate Warranty Checkup Visit.• Direct Contractor and/or DDC to provide corrective action for Warranty claims.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
		Discuss outstanding issues related to commissioning and outstanding warranty issues. Provide suggestions for improvements. Assist facility staff in developing reports, documents and requests for service to remedy outstanding problems.	CxA	<ul style="list-style-type: none">• Conduct Warranty Checkup Visit.• Interview facility users and/or FMD staff to identify specific operational concerns.• Review FMD Work Order logs for potential warranty claim issues.• Verify corrective action on outstanding unresolved issues shown on Master Issues Log.• Document other deficiencies noted during Warranty Checkup Visit.• Prepare report of potential Warranty Claims noted during Warranty Checkup Visit.
			Design Team	<ul style="list-style-type: none">• None.
			Contractor	<ul style="list-style-type: none">• Implement corrective actions on Warranty Claims as directed by SRE.
			DDC	<ul style="list-style-type: none">• Implement corrective actions on Warranty Claims as directed by SRE.
			TAB	<ul style="list-style-type: none">• None
Warranty	Final Commissioning	Amend Final Commissioning Report to document	SRE	<ul style="list-style-type: none">• Review and approve Commissioning Report Amendment.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Cx Task	Description	Team Member	Responsibility
	Report Amendment	The Warranty Phase commissioning activities.	CxA	<ul style="list-style-type: none">• Prepare Final Report Amendment to document Warranty phase commissioning activities.
			Design Team	<ul style="list-style-type: none">• None
			Contractor	<ul style="list-style-type: none">• None.
			DDC	<ul style="list-style-type: none">• None.



XIII. Commissioning Schedule

- A. The following is a general outline of the Commissioning Schedule for the commissioning tasks that will be performed on the project site or at the CxA Offices:
- B. Please note this is a preliminary schedule and Early Turn Over work (ETO) will be incorporated once preliminary schedules are developed.

Commissioning Schedule

Project Phase	Task	Duration	Schedule	Predecessors
Design	Review Owner's Project Requirements	3 weeks	Comments submitted concurrent with design review comments	Receive Owner's Project Requirement document
Design	Review Design Narrative	3 weeks	Comments submitted concurrent with design review comments	Receive Design Narrative
Design	Commissioning Specifications	3 weeks	Specifications issued concurrent with Phase 3 comment log	Receive Phase 3 drawings and specifications
Design	Review DD-1	3 weeks	Comment log issued 3 weeks after receipt of SD-2 design Attend DD-1 Design Review Meeting	Receive DD-1 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after SD-2 Design Review Meeting	DD-1 Design Review meeting. Receive DD-1 Design review comments from peer reviewer.
Design	Review DD-2	3 weeks	Comment log issued 3 weeks after receipt of DD-1 design Attend DD-2 Design Review Meeting	Receive DD-2 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after DD-2 Design Review Meeting	DD-2 Design Review meeting. Receive DD-2 Design review comments from peer reviewer.



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Task	Duration	Schedule	Predecessors
Design	Review CD-1	3 weeks	Comment log issued 3 weeks after receipt of DD-2 design Attend CD-1 Design Review Meeting	Receive CD-1 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after CD-1 Design Review Meeting	CD-1 Design Review meeting. Receive DD-2 Design review comments from peer reviewer.
Design	Review CD-2	3 weeks	Comment log issued 3 weeks after receipt of CD-1 design Attend CD-2 Design Review Meeting	Receive CD-2 drawings and specifications
Design	Update Design Narrative	3 weeks	Updated Design Narrative issued 3 weeks after CD-2 Design Review Meeting	CD-2 Design Review meeting. Receive CD-1 Design review comments from peer reviewer.
Design	Design Phase Meetings	1 day each	Scheduled by PM and Design Team	None
Construction	Final Commissioning Team	3 weeks	Issue 3 weeks after Construction Commissioning Kickoff Meeting	Commissioning Kickoff Meeting
Construction	Duration Schedule for Commissioning Activities	None	Issued as part of Final Commissioning Plan	Preliminary construction schedule
Construction	Submittal and Shop Drawing Request List	None	Issued as part of Final Commissioning Plan	Final Construction Document plans and specifications
Construction	Submittal and Shop Drawing Review	2 weeks	Comment log issued 2 weeks after receipt of shop drawings and submittals	Receipt of submittal or shop drawings. Comment log will be updated after receipt of each requested submittal



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Task	Duration	Schedule	Predecessors
Construction	Pre-Functional Checklists	TBD	Preliminary checklists issued approximately 4 months prior to substantial completion Final checklists issued approximately 3 months prior to substantial completion	Receive equipment submittals Receive installing contractor's QC checklists
Construction	Witness selected Contractor Equipment Startup	1 day	Scheduled by CPM	1-week written notice of scheduled startup
Construction	Review Contractor Equipment Startup Checklists	1 week	Comment log issued 1 week after receipt of completed checklist	Receive Startup Checklist completed by installing sub-contractor.
Construction	Prepare Functional Test Procedures	TBD	Preliminary Functional Test Procedures issues approximately 4 months prior to substantial completion. Final Functional Test Procedures issues approximately 3 months prior to substantial completion	Receive all requested equipment submittals and shop drawings. Receive submittals and final sequences of operations.
Construction	Review O & M Manuals	3 weeks	Comment log issued 3 weeks after receiving O&M Manuals	Receive O&M Manuals
Construction	Prepare Systems Manuals	8 weeks	Systems Manuals issued 8 weeks after receiving O&M Manuals	Receive O&M Manuals
Construction	Review Training Plans	3 weeks	Comment log issued 3 weeks after receiving Training Plans	Receive Training Plans



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Task	Duration	Schedule	Predecessors
Construction	Warranty Review	3 weeks	Comment log issued 3 weeks after receiving Warranty documents	Receive Warranty documents
Construction	Systems Functional Testing	TBD	Functional testing of electronic safety and security systems and irrigation system to begin coordinated with construction schedule and systems completion	See separate table.
Construction	Systems Functional Retesting	TBD	TBD	Corrective actions complete
Construction	Construction Observation	1 day	<p>Construction observations scheduled concurrent with progress meetings – approximately 1 visit per month.</p> <p>More frequent visits may be scheduled during the 3 months preceding substantial completion. Crypts will be verified on-site during site visits and via review of test reports.</p> <p>Cx Specialist will provide a verbal out-brief of significant issues to the CPM prior to leaving the construction site.</p> <p>Field Report will be issued 1 week following visit.</p>	None



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Task	Duration	Schedule	Predecessors
Construction	Final Commissioning Report	6 weeks	Preliminary Commissioning Report issued approximately 6 weeks after completing Functional Testing	Functional Testing completed.
Construction	Owner Architect and Construction Manager Meetings (Construction Phase)	1 day	Scheduled by PM and CPM. CxA will attend approximately 1 meeting per month. More frequent attendance may be warranted during the 3 months prior to substantial completion.	None
Construction	Status Reports	1 day	Status Reports will be issued monthly in conjunction with invoices for professional services	None
Construction	Master Issues Log	1 day	Master Issues Log will be updated and issued following each progress meeting and/or Construction Observation visit	Construction Observation visit and/or progress meeting.
Construction	Review Change Orders, ASI, and RFI	TBD	Ongoing throughout construction	Receive Change Order, ASI or RFI
Warranty	Deferred and/or seasonal Testing	TBD	Seasonal testing scheduled approximately 6 months after completing Functional Testing Deferred testing schedule to be determined	Seasonal changeover (i.e. summer-to-winter or winter-to-summer) Completion of system installation or corrective action completed

National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Project Phase	Task	Duration	Schedule	Predecessors
Warranty	Post-Occupancy Warranty Checkup	TBD	Scheduled approximately 10 months after substantial completion	Initial Functional Testing is complete. Seasonal/deferred testing is complete. Receive FMD work order log for HVAC equipment.
Warranty	Final Commissioning Report Amendment	2 weeks	Final Commissioning Report Amendment issued approximately 2 weeks following Warranty Checkup	Warrant Checkup visit complete

- C. The following is a general outline of the Commissioning Schedule for the Functional Testing activities that will be performed on-site. This information is provided to assist the Design Build Contractor in incorporating the commissioning activities into the overall construction schedule:

Functional Testing Activities				
System	Test Duration	Schedule	Predecessors	Notes
Precast Crypts				
Functional load testing and inside shelf removal demonstration	2 – 4 hours	TBD	Checklists completed.	<ul style="list-style-type: none">CxA witness the installing contractor perform functional load testing and inside shelf removal demonstration
Global Navigation Satellite System (GNSS)				
GNSS Equipment	2 – 4 hours	TBD	Checklists completed and system functional.	<ul style="list-style-type: none">CxA witnesses the installing contractor(s) performing functional testing of a representative sample of devices



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

Functional Testing Activities				
System	Test Duration	Schedule	Predecessors	Notes
Security Systems				
Intrusion Detection	2 – 3 hours at each affected building	TBD	Checklists completed and system functional.	<ul style="list-style-type: none">CxA witnesses the installing contractor(s) performing functional testing of a representative sample of devices
CCTV System	2 – 4 hours	TBD	Checklists completed and system functional.	<ul style="list-style-type: none">CxA witnesses the installing contractor(s) performing functional testing of a representative sample of devices
PACS System	2 – 4 hours	TBD	Checklists completed and system functional.	<ul style="list-style-type: none">CxA witnesses the installing contractor(s) performing functional testing of a representative sample of devices
Irrigation Systems				
Irrigation pumps and distribution systems	1 day	TBD	Checklists completed and system functional., TAB completed.	<ul style="list-style-type: none">CxA witnesses the installing contractor(s) performing functional testing of a representative sample of devices
Underground Electrical Utility Replacement				
Underground electrical utility equipment	TBD	TBD	TBD	<ul style="list-style-type: none">Scope to be determined during design

XIV. Appendix A – Preliminary Log of Required Documentation



National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

The following log provides a preliminary summary of all the Pre-Functional Checklists, Functional Performance Tests and Integrated Systems tests that will be required to complete the Commissioning process. The log is preliminary and will be updated based on the components and systems installed by the contractor on the project. It will also be updated to reflect any clarifications or changes in the construction documents that may be reflected by ASIs, ESI, Addendum or other amendments to the construction documents.

Preliminary Log of Required Documentation	
<i>Pre-Functional Checklists</i>	
Individual Precast Crypts	
Batch Precast Crypts	
Global Navigation Satellite System (GNSS)	
Security – Access Control System	
Security – Intrusion Detection System	
Security – Video Surveillance System	
Irrigation System	
Underground Electrical Utility Replacement	
<i>Functional Performance Tests</i>	
Precast Crypts	
Global Navigation Satellite System (GNSS)	
Security – Access Control System	
Security – Intrusion Detection System	
Security – Video Surveillance System	
Irrigation System	
Underground Electrical Utility Replacement	



U.S. Department
of Veterans Affairs

National Cemetery Administration
Great Lakes National Cemetery Phase II
Oakland County, MI

XV. Appendix B – Pre-Functional Checklists

XVI. Appendix C – Functional Performance Tests