OVERHEAD PERSISTENT INFRARED (OPIR) SITE INTEGRATION STANDARD (OSIS)

FINAL Rev 1

PREPARED BY:

Space Systems Command, Space Sensing Product Support Delta (SSC/SNP)

1050 E Stewart Ave

Colorado Springs, CO 80914

OPIR ENTERPRISE

APPROVAL

MCCORVEY.ANITA.J.1040252408 Digitally signed by MCCORVEY.ANITA.J.1040252408 Date: 2024.06.24 12:53:56 -06'00'

ANITA J. MCCORVEY, NH-04
Director, Space Systems Command, Space Sensing Product Support Delta (SSC/SNP)

SUBMITTED BY

ELLESTAD.DAVID.S.1178755834 Digitally signed by ELLESTAD.DAVID.S.1178755834 Date: 2024.06.18 09:43:27 -06'00'

DAVID S. ELLESTAD, NH-03, USSF
Integration Branch, Sustainment Integration Lead (SSC/SNPDI)

REVISION HISTORY

Date	Author	Version	Description / Summary of Change
5/2023	Steven Meyers	Basic	Initial Release
03/2024	Patrick Taylor, Bryan Cannady & Bethany Ramirez	2	Increased Scope of PIK Modified Round Table structure Removal of SIB TIM Increased requirements for SIB Approval Added project screening criteria for OSIS applicability Revised PIK submission guidance Revised PICO routing guidance Added guidance for daily status briefs during project installation Revised Site Survey guidance Added project closeout requirements and explanations

CONTENTS

PART 1 - INTRODUCTION

1.1 Purpose and Scope

Consistent with Air Force Instruction (AFI) 63-101/20-101, Integrated Life Cycle Management is the responsibility of Program Manager and Product Support Manager. The purpose of this document is to codify the modification management process for the System of Record. Modifications are changes to a Program of Record (POR) Overhead Persistent Infrared (OPIR), both Space Based Infrared System (SBIRS) OPIR Battlespace Awareness Center (OBAC) sites including hardware, software (except for major SBIRS Baseline Release updates) and networks to satisfy an approved operational mission requirement. Modifications remove or add capability or function, enhance technical performance or suitability or change the form, fit, function and interface of POR system components (AFI 63-101). Furthermore, this document codifies the coordinated operational asset scheduling process ensuring Space Delta 4 (DEL 4) authorizes potential changes to mission operations and/or mission-employment driven by approved system-modifications. The specifics of how each type of change is handled is outlined in the various sections of this document. Finally, details related to Mission Control Station (MCS) and MCSB facility requirements are provided to include facility access, grounding standards, cable conveyances, power system characteristics and mechanical systems characteristics. The cable guidance section is applicable to all POR sites.

The OPIR Site Integration Standard (OSIS) documents achieve the follow:

- Operational baseline capabilities are preserved
- Risks to the mission-operations and the operational weapon-system baseline are minimized and understood by the Government
- All planned maintenance and modifications are presented on a single Enterprise Schedule
- Verification that configuration documentation has been updated to reflect the system changes
- Installation oversight through project closeout

SSC/SNPDI facilitates the following activities:

- A consistent Operations (Ops) Integration process is applied across the enterprise
- Required approvals are in place and documented
- Verification of Security approval (Physical and Cybersecurity)
- Facilities modifications are coordinated and completed
- All Baseline Change Closeout Requirements are complete

1.2 Terms and Definitions

Term	Definitions
Application Software	A program that performs a specific function directly for an end user or, in some cases, for another application.
Configuration Documentation	Documentation that affects the technical baseline. For example Technical Orders (TOs) Risk Management Framework (RMF) Procedures, processes, test plans Drawings that reflect the change-room layout, rack layout, cable table, physical interconnect diagrams, network interconnect diagrams and spares bill of material (BOM) Maintenance and warranty information All operational device configurations System build information - Operating System (OS)/firmware level, host name, Commercial Off the Shelf listing, serial number, Internet Protocol (IP) address, equipment part number, license information, virtual machine configuration Port, protocols and services configurations Single Line Diagrams
Firmware	The software that is “built in” to a particular piece of hardware. It can be upgraded or replaced, but it is effectively part of the hardware
Government Point of Contact (GPOC)	Assigned government personnel responsible for the oversite of Activity Request (AR) and compliance with contractual requirements
Installing Agency	Government agency or development contractor requesting changes to POR sites
Integration Documents	Project Integration Kickoff (PIK) template, Project Installation and Checkout (PICO), Schedule Request (SR), System Integration Board (SIB) Packages and applicable meeting minutes
Logical change	Logical changes are all baseline changes that do not include a physical element Examples include network changes, new or modification of Application Software, OS upgrades and adding/changing firmware within the system.
Maintenance Action	All actions required to retain an end item in or restore it to, a specified condition. This includes diagnosis, repair and inspection.
Operating System (OS)	The software that acts as the foundation layer on a computing device
Physical Modification	All changes to the physical baseline to include installation, removal and replacement.

Term	Definitions
Program of Record (POR) Site	Mission Control Station (MCS) Mission Control Station – Backup (MCSB) Survivable Mission Control Station (SMCS) Relay Ground Station MCS (RGSM) Relay Ground Station- Backup (RGSB) Survivable Relay Ground Station (SRGS) Relay Ground Station – Highly Elliptical Orbit (HEO) (RGSH) Relay Ground Station –MCS2 (RGSM2) European Relay Station (ERS) Relay Ground Station Europe (RGSE) Relay Ground Station Pacific (RGSP) Relay Ground Station (RGS) systems include work to be done within the RGS rooms as well as the radomes
Responsible Engineer (RE)	Engineer requesting/performing baseline configuration changes.
Roundtable Review (RT)	A meeting held by the Contractor Logistics Support (CLS) Ops Integration Team to review technical documentation with members of the POR Team. This review ensures that all organizations are aware of the effort and impacts associated with it. Mitigation plans and mission assurance testing should be identified during this process.

1.3 Roles and Responsibilities

Roles	Responsibilities
SSC/SNP Director, Space Systems Command, Space Sensing Product Support Delta	Responsible for sustainment of the Remote Sensing System of Systems
SSC/SNPE Chief Engineer	Determines AF Form 1067 applicability based upon AFI 63-101/20-101 guidance and coordination with Headquarters United States Space Force (USSF), when required
SSC/SNPDI Integration Branch Chief	SIB Chair, may be delegated to another government representative Responsible for day-to-day implementation of the OSIS Supervises SSC/SNPDI Team in execution of integration processes
SSC/SNPDI Ops Integration Lead	Oversees the Baseline Modification processes Coordinates with CLS, SSC/SNPDI Systems Engineering and Integration (SE&I) Team, SSC/SNPDI Facilities Integration Team (FIT) / Schriever Support Team (SST), Hardware (HW) Depot, Product Support Facility (PSF) and other agencies to ensure all applicable processes, instructions and regulations are met Chair at the SIB in place of SSC/SNPDI Section Chief Approval authority for out of cycle (OOC) SIB and process deviation requests Final Closure authority for Activity Requests (ARs)

Roles	Responsibilities
SSC/SNPDI Systems Engineering and Integration (SE&I) Team	Develops and maintains integration processes for all applicable Government organizations. Maintains approved knowledge management database (Confluence/Jira) for all projects. **Future Operations:** Responsible for receiving new projects and guiding them through the OSIS process through project approval at the SIB. Tasks include: -Schedules and facilitates all PIK meetings -Site survey -Reviews all documents for accuracy -Participates in Roundtable (RT) Reviews and project coordination meetings, when possible -Schedules and facilitates the SIB; produces minutes and documents approvals/disapprovals -Works with GPOC, RE and CLS Integration to ensure that all Integration board requirements are met prior to presentation for approval **Current Operations:** Responsible for facilitating closure of projects after approval at the SIB. Tasks include: -Attends ESG to maintain knowledge of installation timelines -Receives Daily Status Briefings during project installation -Works with GPOC, RE and CLS Integration to collect all required documentation and SME concurrence for project closure

Roles	Responsibilities
SSC/SNPDI Facilities Integration Team (FIT)	Oversees facilities changes Provides required and relevant baseline drawings to modification agency Coordinates facility modifications as necessary for MCS equipment installations Issues wire/cable numbers for delivered systems and upgrades. Prime contractor maintains wire numbers 1-59,999. Local facilities team issues wire numbers greater than 60,000 Provides or approves MCS cable routing through the cable tray/conduit system upon request Maintains POR facility drawings in the three-dimensional high-fidelity model and its associated relational databases. This tool is called the Facility and Mission Equipment Management System (FAMEMS). FAMEMS is the primary tool SNP uses for facilities level configuration management Maintains the Wire/Cable Management System database for delivered cables to include: wire/cable routing through tray segments, elevation changes, wall and floor penetrations, security classification, wire type and wire length Reviews MCS PICOs Completes quarterly power audits and equipment level rack connectivity Quality Assurance (QA) inspections Provides QA inspection/sign-off for modifications as required. Attends PIKs as necessary
Schriever Support Team (SST)	Provides logistical support for security oversight, administrative logistics, administrative computer and telephone liaison and facility manager duties Evaluates MCSB cooling and power requirements and provides recommendations to approval authorities Coordinates required facility changes with base civil engineering squadron Attends MCSB PIK, RT Reviews and Integration Boards

Roles	Responsibilities
Government Point of Contact (GPOC)	Submits required Integration documentation to SSC/SNPDI Is involved in all communication and data transfer between the RE and SSC/SNPDI Will attend or pre-coordinate covering the PIK, Enterprise Scheduling Group (ESG), document review, SIB Meetings Prepares Operations Acceptance Panel (OAP) briefing charts
Installing Agency	Adheres to all actions required by Contract and requirements in this document
Responsible Engineer (RE)	Completes all actions required by Contract and requirements in this document
SSC/SNPDC Cybersecurity & Comm Section	Maintains POR Sustainment Security Accreditation packages Tracks all equipment transfers in and out of POR facilities Attends PIK, RT Reviews, Integration boards and provides government oversight for ensuring secure methodologies and technologies will be applied on all POR systems
SSC/SNPDM Maintenance/Logistics Section	Maintain Integrated Product Support Elements Attends PIK, RT Reviews, Integration boards and provides government oversight for ensuring Logistical fidelity
Enterprise Scheduling Group (ESG)	Coordinates all segment schedule inputs to a single baseline schedule Must work within established constraints Verifies system performance from agreed to baseline is not compromised or decremented Attends all OSIS related meetings as applicable Maintains database of SRs
Contractor Logistics Support (CLS) Integration	Attends all OSIS related meetings as applicable Facilitates RT reviews, project coordination meetings and Project Inbriefs Coordinates with CLS to attend appropriate meetings

Roles	Responsibilities
DEL 4 S4/6 (Mission Sustainment and Integration)	Facilitate/support USSF OAP Briefings as required with HHQ and other stakeholders Participate in Handover Approval Board (HAB) as required Facilitate Mission Transfer Approval Board (MTAB) as required Participates in Transitions Integrated Product Teams (IPTs) Serves as local SSC liaison between program office and test team Facilitates/coordinates Operations Approval Sub Board (OASB), Standard Change Form (SCFs), Air Force (AF) Form 1067s, Version Content Notification/Version Content Request (VCN/VCR) processes and assigns Universal Control Number (UCN) to approved SCFs and other system modification processes Chairs Problem Report Working Group (PRWG)/Operational Assessment Review Board (OARB) and informs DEL 4 S4/6S of critical Problem Reports (PRs) Participates in Government Deficiency Review Board (GDRB) as stakeholder and briefs DEL 4 Directors of Operations (DOs) and DEL 4 Commander of critical information if needed Integrates various units across DEL 4 for system upgrades
DEL 4 S4/6O	Execute Chief of Maintenance (CoM) functions and maintenance assurance missions Stakeholder at the SIB Submits Schedule Requests (SRs) for external stakeholders without Enterprise Collaboration System (ECS) access
DEL 4 S4/6E	Responsible for final SR management/creating Daily Activity Schedule (DAS) Responsible for memo-routing and approval Coordinates usage of all operational on-orbit POR assets Confirms Ops Impacts related to POR on-orbit assets Develops Ops mitigation plans, coordinates with training/crews
460 Civil Engineering Squadron (460 CES) - Buckley Space Force Base	Adheres to the OSIS and site-specific standards for power/cooling and facilities related efforts/support Attends PIK, brief projects to SIB Facilitates submittal of applicable AF Form 332-Base Civil Engineer Work Request

Roles	Responsibilities
50 CES - Schriever Space Force Base	Adheres to the OSIS and site-specific standards for power/cooling and facilities related efforts/support Attends PIK, brief projects to SIB Facilitates submittal of applicable AF Form 332-Base Civil Engineer Work Request
Government Test Organization (GTO)	Reviews test plan to determine compliance with Test and Engineering Management Plan (TEMP) Coordinates integrated testing between the contractor, developmental test organization and the operational test organization where appropriate
Special Security Representative (SSR)	Maintains all Emission Security and Sensitive Compartmental Information Facility (SCIF) accreditations Tracks all equipment transfers in and out of POR facilities
Crew Commander	Commands the Ops floor. When required, exercises authority to stop any approved activity to mitigate risk and/or impact to operations Delegate for DO approval Execution/asset release authority

PART 2 - INPUT WORK PRODUCTS

The Project Installation and Checkout (PICO) and all chart submittal templates are content controlled. Any modifications to PICO template must be approved by SSC/SNPDI prior to use.

Required Product	Conditions
Enterprise Schedule	This schedule captures all planned maintenance, modifications and non-operational system usage activities. The schedule is based upon submitted SRs.
Schedule Request (SR)	A DAS Schedule Request (SR) is the sole method for projects to get onto the Enterprise Schedule. Additionally, SRs must be approved by the appropriate authorities to be added to the DAS and authorized for execution following SIB approval, if required
Project Integration Kickoff (PIK) Template	This template is required for all baseline changes The PIK charts provide an overview of the project as well as detailed information needed during the meeting
Project Installation and Checkout (PICO)	Required for all baseline changes unless specifically waived by SSC/SNPDI or other sections of this document.
System Integration Board SIB Template	This template is required for all baseline changes The charts provide an overview of the project as well as detailed information needed to determine approval/disapproval

Required Product	Conditions
Pre/Post Installation Checklist	This checklist is used during the Inbrief to ensure that the RE has final documents, Network Control Board (NCB) configurations, approved drawings, CLS support required, etc. prior to beginning a baseline change

PART 3 - ENTERPRISE SCHEDULING

The Enterprise Schedule is managed by the Enterprise Scheduling Group (ESG). This schedule captures all planned maintenance, modifications and non-operational system usage activities. Systems Engineering and Integration Team (SEIT) is responsible for administrating the enterprise schedule in support of the government co-chairs. They will maintain the scheduling database, de-conflict efforts and provide a schedule for review twice weekly.

The ESG is held twice a week with OOC boards held as required. The objectives of this board are to work as a team to schedule activities to be completed at a POR site; screen Schedule Requests (SRs) to ensure compliance within ESG constraints and discuss project details to determine if deconfliction is possible.

SRs are located on the Enterprise Collaboration System (ECS). The SR must be submitted per ESG submission timeline requirements. All SRs submitted after the prescribed deadline will be discussed at the following ESG unless there is a critical operational or programmatic need.

The Requestor or a representative that has a solid technical understanding of the effort must be in attendance, either in person or via ECS Voice Over Internet Protocol (VOIP) or the SR will not be discussed. If time permits, the ESG will also review projects with a significant Ops impact that fall within the Line Number window to begin the de-confliction process and submission of Line Numbers for Higher Headquarters (HHQ) approval.

Any SRs that present a conflict that cannot be resolved within the ESG constraints will be elevated to the Senior Program Leadership. Government oversight requirements will be discussed and until confirmed, SR will not be reviewed for approval, which may require the SR be brought back when requirements are met.

The ESG is chaired by 2 SWS and includes key stakeholders designated by the ESG chair. After each SR is discussed, the Chairs will be asked for approval to put the SR into the signature cycle or force approved on the spot. Detailed minutes will be sent via unclassified e-mail and High-Level minutes can be provided as requested on ECS. The final SR approval will occur after SIB approval for all baseline change activities. Decisions of this board can be appealed. This meeting is open to all to attend. An ECS Live Meeting and ECS call-in will be available. The Enterprise Schedule will be presented at the SIB, to include approved and in process SRs.

PART 4 –BASELINE CHANGE ACTIVITIES

All baseline change activities are coordinated and scheduled through SSC/SNPDI. All proposed changes, unless specifically excluded in this document, will be brought to a Project Integration Kickoff (PIK) for determination of process applicability. It is SSC/SNPDI responsibility to ensure all processes, board approvals and security approvals are in place before SIB approval. The ESG ensures that the effort has been de-conflicted with other previously approved activities and that all HHQ approvals are in place.

The process notionally has a 30-government working day timeline; however, the only "hard stop" actions built into the process are the approval boards that are on a set schedule. Once a schedule is determined all dates are No Later Than (NLT) and if a step in the process is ready earlier than what is scheduled, the next step can begin effectively shortening the schedule. Below is a synopsis of the process steps and the planned time to complete:

Step	Actions	Days
Project Integration Kickoff	RE Completes Chart Package GPOC Approves and Submits SSC/SNPDI SE&I Schedules and Facilitates	Start of Process
Document Preparation	RE Completes PICO GPOC Approves and Submits	10 Days (notional)
Document Review	SSC/SNPDI SE&I Performs RE Completes Updates (as Required)	2 Days (minimum) to 5 Days (maximum)
Technical Roundtable Review	CLS Integration Schedules and Facilitates RE Completes Updates (as Required) CLS Integration Finalizes	5 Days (maximum)
Signatures	SSC/SNPDI formats RE Signs CLS / Site Lead Signs SSC/SNPDI Signs	5 Days (maximum)
ESG	RE Completes SR ESG Approves	Prior to SIB
SIB	RE Completes Chart Package GPOC Approves and Submits SSC/SNPDI SE&I Schedules and Facilitates	4 Days (hard scheduled meeting date and time) Execution Approved
Outbrief	RE Completes Project Execution RE Completes Chart Package SSC/SNPDI SE&I Schedules and Facilitates	~30 days post SIB (notional)
Closeout	RE Completes Requirements GPOC Approves Closure SSC/SNPDI Finalizes Closure SSC/SNPDI SE&I Archives Deliverables	~30 days post Outbrief (notional)

4.1 Project Screening

Upon receipt of a project the SEIT will review the PIK charts for scope and impact to the SBIRS Baseline and operations to determine OSIS applicability. If the project does not have an impact to the baseline or operations, the project will be off-ramped and archived on the SNPDI Confluence and JIRA pages under closed projects for record. If there is an uncertainty as to the impact of the project, the project will be brought to PIK for additional screening. The SNPDI Ops Integration Lead is the decision authority for any of these actions.

4.2 Project Integration Kickoff (PIK)

All proposed changes, unless specifically excluded in this document, will be brought to a PIK for determination of OSIS process applicability. The purpose of the PIK is to understand the scope and impacts of a project to ensure the successful integration of a baseline change and determine project OSIS applicability and requirements.

If multiple related packages are submitted, the PIKs for the efforts may be either separately scheduled based upon the priority established by the GPOC or a single PIK may be scheduled to review all related projects. PIKs will be scheduled on Mondays and Wednesdays between 0930 and 1130 MST. The cut off for Monday PIKs is Thursday at 1200. The cut off for Wednesday is Monday at 1200 MST. Scheduling outside of these windows is authorized by the SSC/SNPDI Ops Integration lead. Attendees include but are not limited to: SSC/SNPDI, GPOC, RE, DEL 4 CoM, CLS Leads, CLS Integration, CLS Hardware (HW), CLS Network, CLS System Administration (SA), SSC/SNPDC Cyber Security, site Special Security Officer (SSO), SSC/SNPDI Facilities Integration Team (FIT) and Schriever Support Team (SST). To assist in maximum participation, the PIK is facilitated via an unclassified on-line meeting. REs will make every attempt to keep their briefing unclassified. If this proves not possible a classified meeting will be coordinated.

Installation agencies not associated with SSC/SNP that request an AR will have an SSC/SNP GPOC assigned. SSC/SNP will monitor the effort for sustainment concerns and have concurrence for project closeout.

A standard presentation is completed by the RE and must be approved by the GPOC prior to scheduling a PIK meeting. The presentation will be briefed at the PIK by the RE. Specific Instructions for filling out the PIK template are included in the template. GPOCs are encouraged to submit requests for PIK as soon as all information is available, and charts are complete; however, the PIK meeting will be scheduled not less than 30 government working days prior to project execution. For projects that have significant operational impacts requiring downtime and a line number, the RE will submit a SR to the ESG before project execution to provide time for SpOC to approve the line number. Status of the line number request should be included in the PIK presentation. RE’s will align the titles of their projects going through the OSIS process with their SR’s to the ESG to enable consistent and reliable tracking of projects through the lifecycle.

Projects requiring physical changes to Contiguous United States (CONUS) POR sites will have a site survey scheduled to determine equipment placement, cable routing, power and Heating, Ventilation and Air Conditioning (HVAC) concerns. Network, cyber and software modifications do not require a site survey. If it is determined that new racks are to be installed, a DEL 4 designated official must approve the location. It is preferable to have this survey prior to the PIK; however, it can occur either before or after the PIK. Site surveys must have the following POCs in attendance: SNPDI POC, RE, HW personnel, Facilities and Technical Director (for all installs/de-installs).

For Outside Contiguous United States (OCONUS) efforts the on-site Maintainers will review the package and determine if proposed locations are available and if the rack drawings provided reflect the installed rack content. All personnel traveling to RGSE or RGSP must comply with the SSC/SNP Implementation of the current HOST nomination requirements and procedures.

Coordination actions are completed by the RE. During the PIK there is discussion on what items need coordination before project approval. These coordination items are captured in the PIK Minutes. PIK

minutes are distributed to all parties upon completion of the PIK. All project data is subsequently captured and maintained on the project's Confluence and Jira pages, as well as archived for Integration team's discretion.

Projects that have not received SIB approval within six months of project kickoff will be required to restart the integration process from the beginning. If the project was originally brought to PIK in a previous calendar year, the project will be assigned a new Activity Request number and the associated confluence page will be moved to the current year. Exceptions to this process will require a waiver request at the approval of the Ops Integration Lead.

4.3 Document Processing

Documentation for a project is vital to successful baseline integration. The required document is completed by the RE, approved by the GPOC, reviewed by SSC/SNPDI and the Community to ensure technical accuracy. Once Final, the documentation is signed by the RE, the CLS management team and the SSC/SNPDI Ops Integration Lead.

4.3.1 Project Installation and Checkout (PICO) Document

The PICO fully captures and documents the entire scope of the project being performed. The PICO documents all steps being performed, equipment, software, modifications (physical and logical), personnel, locations among other material details of the project.

The purpose of the PICO is to:

- Provide all stakeholders with a written and detailed record of the project for review, discussion, and approval at the Roundtable. After the Roundtable, the signed PICO serves as the major milestone in the projects authorization to proceed.
- Document all changes being performed on the OPIR Baseline.
- Collect the data required to fully coordinate a modification to the Baseline and defines planned sustainment following closeout.
- Serve as a physical record of project performance using initialized *perform* and *confirm* signature blocks adjacent to each step of the process.
- Provide a physical record of project performance to the Subject Matter Experts (SME's) that are assigned to project validation.
- Provide a physical record of project performance to SSC/SNPDI for verification of performance and close-out authorization.
- Serve as an enduring physical record of the project's existence for future reference.

For physical installations a separate PICO will be required for each site at which the modifications will be completed. Logical changes for multiple sites can be combined if all changes are executed from a single site. The PICO must be returned to SSC/SNPDI with all installation and verification steps signed-off before a project will be granted close-out authorization.

The PICO captures the following information:

- An overview of the project
- Support required from CLS, FIT, SST or other agencies
- Training to be delivered as part of the project

- Network changes and approvals
- Software changes and approvals
- Step by step instructions on how changes will be made and verified
- Step by step plan on how mission operations will be restored if negatively impacted
- Full listing of risks to equipment and operations
- Full list of all equipment, material, and fixtures to be removed or installed
- A detailed cable table showing type of cabling and connectors and all connection points
- A list of drawings or interface documents that require updating
- Network diagrams, room and rack depictions of areas that will be modified
- Validation signature blocks for independent SME's (Cyber, System Administrator, etc.)
- Complete listing of actions needed to closeout the AR

During project execution, the steps in this document are to be checked off as completed to serve as a record of completion. If, during the completion of the PICO, the RE determines that deviations to the plan are required work must stop. The PICO template includes guidance to be followed in this situation. Following ~~Post~~ installation, the PICO showing all steps complete must be provided to SSC/SNPDI SE&I for archival as part of project closeout.

Specific Instructions for filling out the PICO are included in the template. The PICO template is locked to maintain formatting but may be modified to accommodate varying implementation strategies in coordination with SSC/SNPDI SE&I. RE and SSC/SNPDI SE&I will work together to complete template modifications. All elements of the PICO plan are required, therefore, altering or deleting content is not permitted by the RE once the Signed PICO is published. Sections that are not applicable to the installation effort may be marked NA and will be deleted prior to approval and signature.

4.3.2 PICO Initial Review

Once the PICO approved by the GPOC has been received, it will be reviewed by SSC/SNPDI SE&I and subsequently routed to CLS Ops Integration to verify the content is accurate and complete. This review is not for technical accuracy, but to ensure all required tabs are complete and cross-referenced (i.e., if a network device is to be changed, device is listed for change, steps to make the change and verify the change are included and risks associated with the change are identified). If during this review the reviewing team finds incomplete content the review will stop, and the document(s) will be returned to the GPOC/RE for rework. The reviewing team requires a minimum of two business days to conduct their initial review, but will not take more than five business days. Once the content is verified accurate and complete, SSC/SNPDI SE&I will schedule the Technical Round Table.

4.3.3 PICO Technical Roundtable Review

The Technical Round Table is a multi-site peer review chaired by the SSC/SNPDI Ops Integration Lead and facilitated by SSC/SNPDI SE&I. It serves as a pre-requisite for SIB presentation to request approval and is conducted as needed on Tuesdays and Thursdays. The Technical Round Table objective is for the community to ensure accuracy and completeness of the PICO while assessing any risk or potential operational impacts in performing the activity and to determine the best way to mitigate any identified risks or potential operational impacts. The community must issue concurrence before the activity can be presented to the SIB to be approved for implementation.

When notified that the CLS Ops Integration initial review is complete, the SSC/SNPDI SE&I will schedule a Roundtable (RT) Review with appropriate Subject Matter Experts (SMEs) to ensure the PICO is technically accurate and complete. SSC/SNPDI SE&I records minutes during the Roundtable Review

and provides them to the RE for PICO updates. The RE must answer questions and/or incorporate the comments derived from the review into the document. Minor changes to the document can be updated during the meeting. Any major updates must be completed by the RE and resubmitted to SSC/SNPDI SE&I for review. The Government Ops Integration Lead will determine minor versus major changes and if it necessary for SSC/SNPDI SE&I to schedule a follow-up review. SSC/SNPDI will format the Final PICO, insert the appropriate signature blocks and route the documents for approval signatures. Projects that have not submitted SIB charts for approval within three months of the Round Table will be required to return the project to Round Table to re-familiarize the stakeholders.

4.4 Integration Boards

The purpose of Integration Boards is to provide Government oversight and final installation approval authority for all activities conducted within POR sites. The process will ensure all potential risks have been identified, minimized and communicated to all stakeholders prior to implementation.

4.4.1 System Integration Board (SIB)

The SIB presides over modifications to OPIR operational ground segments. The SIB, in conjunction with the ESG, is the final milestone and approval authority to proceed with all modifications to the ground baseline. The SIB is chaired by SSC/SNPDI, who authorizes ground modifications to proceed with the concurrence of the stakeholders. The SIB is held Tuesday and Thursday per week as required; however, an out of cycle (OOC) SIB can be scheduled with approval of SSC/SNPDI Chair.

The SIB does not preside over operational maintenance actions including diagnosis, repair and inspection. These actions are under the purview of the ESG.

All Integration Board packages will be updated by the GPOC/Requestor with all SIB action items complete NLT noon the day prior to the SIB. Packages will not be presented to the SIB with outstanding action items unless completion is imminent.

SSC/SNPDI will verify that the following coordination for project execution has been completed or scheduled as required:

- Enterprise Scheduling Group Approved
- Dedicated CLS, Site, Other Organization Support
- CLS Inbrief
- Cyber Security
- Incoming Equipment Form
- OPIR Battlespace Awareness Cell (OBAC) / Tools, Application and Processing (TAP) Lab
- Training
- Drawings Approved
- PICO Signed
- Engineering Integrations Work
- Network Control Board

SSC/SNPDI SE&I facilitates the SIB. This team will produce the SIB presentation and distribute the day before the SIB. A GPOC is required for each effort that is presented to the SIB and must be present during the board. The GPOC and/or RE presents details of the activity under review, install plan, possible risks, mission assurance testing and mission restoration plans. Based on the information presented, the Board, consisting of the SSC/SNPDI Ops Integration Lead, GPOC, and Government Stakeholders

identified in the PIK determine if the activity may proceed as requested. Issues identified by the taken as action items that must be completed prior to returning to the Board. The Project must be Board approved before proceeding with the activity.

To assist in maximum participation, the SIB is facilitated via an unclassified on-line meeting. REs will make every attempt to keep their briefing unclassified. If this proves not possible a classified meeting will be coordinated.

4.5 Required Briefings post SIB Approval

4.5.1 Inbrief

An inbrief is held for all baseline changes typically the day of or the day before the scheduled start date. CLS Ops Integration facilitates this meeting. RE must pre-coordinate inbrief prior and may not start project until inbrief has been completed and Problem Report (PR) opened if applicable. Participants include the RE and the GPOC, Site Manager, Deputy Site Manager or Site Chief Ops Engineer, FIT, SST, CLS Leads and any other individuals identified in the PICO to provide support may be invited. The Pre/Post Installation Checklist is reviewed, to include site rules of engagement during the inbrief.

4.5.2 Daily Status Briefings

Daily status briefings are required for any activity that spans across several days to completion. The RE or Requestor will provide an end of day status report each day of the effort to both the CLS and SSC/SNPDI. We request the report will includes tasks completed, any issues identified and the plan for the next day Activity Request number (AR #), actions completed in the last 24 hours, planned actions for the 24 hours, planned actions not completed, issues identified and areas in need of assistance.

4.5.3 Installation Outbrief

The RE will attend the SIB to provide an installation Outbrief. The Outbrief template will be completed and presented at the SIB once all PICO actions are complete. The RE will identify problems encountered and any open issues. The items required for closeout will be presented for awareness of what remains to be done. Finally, the community will be permitted to ask questions or voice concerns with project completion and readiness for closeout.

4.6 Baseline Closeout Requirements

Baseline Closeout Requirements are reviewed during the PIK to determine which items apply to the effort. The GPOC/RE works with SSC/SNPDI, CLS Ops Integration, Cyber and CLS Leads to complete each item. Objective evidence is required for each item and will be filed as part of project closeout.

4.6.1 Physical Configuration Audit (PCA)

The Physical Configuration Audit (PCA) is a quality assurance/quality check (QA/QC) of physical modifications to POR sites as directed in the PICO. This is a requirement upon completion of the installation if directed in the PIK. If the installing agency does not have an internal QA, the FIT will provide the QA. The PCA documentation will be sent to the SEIT as part of closeout requirements upon completion of the QA.

4.6.2 Completed Documents

A completed PICO includes all CLS lead and Crew Commander signatures pertaining to the scope of the project as determined in the PIK. The document must show all modification steps complete including step by step verification from CLS and TTO leads if applicable.

4.6.3 Equipment List

A list within the PICO of all equipment coming in/out of the MCS/MCSB. This should align with the in/out form required for submission to the SSR except for serial numbers.

4.6.4 Drawings

Updated drawings are required for any physical or logical modifications to existing baseline drawings. These will be reviewed by the Hardware Control Board for approval prior to submission to SNPDI. These drawings are separate from floor plans, cable routes and network drawings. Logical changes diagrams and/or drawings will be reviewed by the Network Control Board for approval prior to submission to SNPDI.

4.6.5 Alternate Drawings

Alternate drawings are required for any physical or logical modifications to existing baseline drawings when the project engineering is not approved by the Boulder Hardware Control Board. These drawings are coordinated through the CLS Hardware Depot drawing team. These are separate from floor plans, cable routes and network drawings.

4.6.6 Cyber Approval

The assigned Cyber lead determined in the PIK has signed off on PICO or has given concurrence that work was completed as directed. This is required when any level of Security Impact Assessment (SIA) is present.

4.6.7 Hardware Lead Approval

The assigned Hardware lead determined in the PIK has signed off on PICO or has given concurrence that work was completed as directed. This is required when any hardware modification is present. Concurrence by email is acceptable, to which this and the date it was given will be documented.

4.6.8 System Administrator Lead Approval

The assigned System Administrator lead determined in the PIK has signed off on PICO or has given concurrence that work was completed as directed. This is required when any software modification is present.

4.6.9 COMSEC Approval

The assigned COMSEC lead determined in the PIK has signed off on PICO or has given concurrence that work was completed as directed. This is required when any COMSEC modification is present.

4.6.10 Training Approval

The assigned lead determined in the PIK has signed off on PICO or has given concurrence that training was completed as directed. This is approval is required when training is given to operators or maintainers. The approval for training is assigned from the audience the training pertains to.

4.6.11 Spares Approval

The assigned lead determined in the PIK has signed off on PICO or has given concurrence that spares are provided if required in the scope of the project.

4.6.12 Closure Approval

Projects will be closed by SSC/SNPDI Ops Integration Lead with written concurrence of project GPOC once all tasks are completed. If the RE or GPOC on record are no longer associated with the project, a memorandum for record will be signed by SNPDI Government lead as an overcome by events (OBE) circumstance. All data is archived following closure.

PART 5 - SOFTWARE BASELINE CHANGE ACTIVITIES

All additions, removals, modifications, patches, etc. to Operating Systems, Firmware and Application Software are subject to this document, unless specifically excluded. If during the PIK it is determined that the change activity has been fully vetted by HHQ and SSC/SNPDC and poses minimal risk to the system approval may be relinquished to the ESG and SSC/SNPDC. SSC/SNPDC will track the change and perform closeout.

PART 6 - NON-OPERATIONAL SYSTEM USAGE ACTIVITIES

Non-operational system usage activities are requests to utilize system resources with no change to form, fit, function or interface. Approval for these activities is controlled by the ESG and no PIK is required. This includes maintenance activities such Preventive Maintenance Inspection (PMI) and usage activities for development, training, etc. The requestor will submit a SR and attend the ESG to request the time and resources required to complete the activity.

6.1 OPIR Baseline Release (OBR)

The formation of content, implementation and testing of OPIR Baseline Releases are vetted and tracked by a separate process and do not require a PIK.

6.2 Testing Activities

Baseline activities may require additional test actions to validate functionality. The associated test plan coordination for these activities falls outside the scope of the OSIS and will be managed by the designated

Government Test Organization (GTO). Planned testing will be briefed at the PIK; included in the Project Installation and Checkout (PICO); and be briefed to the System Integration Board (SIB). Testing schedule will be approved by the ESG.

External test activities involve connectivity to other users or use POR operational assets such as End-to-End (E2E) testing and utilizing an RGS for uplink/downlink testing. For E2E testing, the operations crew commander retains responsibility for the POR mission and must be coordinated with. The crew commander serves as oversight of the POR mission and the military liaison as required. For testing that utilizes RGS, the RGS Safing procedures can be used as requested by the site maintainers. A test plan, test objective worksheet or Air Force procedure for the external test activity must be identified in the SR.

6.3 Maintenance Activities

Maintenance activities include normal PMIs, break-fix actions, Level 1s, part replacements, etc. Planned maintenance activities should follow the ESG process and submit a SR to de-conflict asset usage. Unscheduled maintenance should be briefed to the ESG if possible and de-conflicted real-time as necessary. System modifications shall not be implemented as maintenance activities.

6.4 Asset Return to Operations

Following a maintenance or usage activity, the assets are returned to operations. Usage activities do not include modifications (changes to form, fit, function or interface) to the system and do not require regression testing upon return to operations. Operational crews and CLS should perform normal checkout activities upon asset return.

PART 7 – PROCESS OPTIMIZATIONS AND SPECIAL CIRCUMSTANCES

7.1 Network updates for Out of Band Management (OOBM) and SBIRS Support Center (SSC)

The POR network is separated in that certain devices provide capabilities to perform the operational mission and other devices provide capabilities that support the operational mission. The devices that support the operational mission are OOBM and SSC. Since these devices cannot directly impact the performance of the operational mission, a more streamlined approach, determined during the PIK may be applied. These efforts will not contain any physical elements to include cable changes.

7.2 Non-SSC/SNP Enterprise System Control

To achieve the purposes of the OSIS it is necessary to apply controls regarding all physical changes within POR sites. These controls are necessary since the facility (space, power, cooling, cable tray, etc.) must be managed appropriately to prevent unintended operational impacts irrespective of controlling authority.

7.2.1 Physical Modifications

Physical installation of or modifications to all current or future systems installed within POR site that are managed and maintained by external organizations will fall under the purview of the OSIS and will require a PIK to determine impacts and OSIS applicability.

7.2.2 Logical Modifications

Logical changes within these systems that do not interface with the POR are controlled by the external organization and are outside the OSIS process. Systems where logical only changes are not managed by the OSIS include, but are not limited to:, Defense Red Switch Network (DRSN), Secure Terminal Equipment (STE), (Air Force) Satellite Control Network ((AF)SCN), Lockheed Martin Internet (LMI), Northrop Grumman Internet (NGI), National Geospatial-Intelligence Agency (NGA) Net, Secure Internet Protocol Router/Non-Secure Internet Protocol Router (SIPR/NIPR), Joint Worldwide Intelligence Communication System (JWICS), Host VOIP, Government Wide Area Network (GWAN), Ballistic Missile Defense System (BMDS) Overhead Persistent Infrared Architecture (BOA), Command and Control, Battle Management and Communications C2BMC, SBIRS Auxiliary Support Center (SASC) Toolkit, Operational Tool Enhancement Video Teleconference (OTE/VTC), Enterprise Ground System (EGS), meshONE-T and Defensive Cyber Operations (DCO)/Mission Defense Team (MDT) tools.

7.3 Alternate Drawing Update Process

The baseline drawings are managed by the CLS contractor. When baseline modifications are completed by Engineers that do not have access to the baseline drawing system needed to complete required drawing updates require an alternative process. Per SSC/SNP guidance, HW Depot is responsible for documenting interfaces with the POR, the power, space and cooling requirements of equipment installed within a rack and rack depictions within a room. HW Depot is not responsible for remedying any workmanship issues that arise from the 3rd party install because of the drawing effort. The steps below will be followed to complete this requirement.

SSC/SNPDI SE&I will annotate all ARs associated with the alternate drawing process with “-A”. For example, “21-067 -A”.

SSC/SNP Project Manager, QA and HW Depot will be notified prior to the PIK by SSC/SNPDI SE&I when they identify a need to use the alternative method for drawing updates. If this requirement is identified during the PIK, SSC/SNP Project Manager and HW Depot will be notified as soon as possible following the PIK.

SSC/SNP Project Manager and HW Depot personnel may participate in the PIK for full awareness of required scope.

The RE and HW Depot coordinate to determine drawings that require updates, and the sufficiency of the drawings will be evaluated during the document review process.

HW Depot will incorporate the content into the official drawings and provide softcopies of the updated drawings to SSC/SNPDI SE&I.

7.4 Administrative System Technology Refresh

An administrative system technology refresh is a simple removal and replacement of support systems that are not used for mission processing. A PIK will be conducted to determine all requirements

7.5 Temporary Modifications

A temporary modification includes an alteration of the baseline for no longer than 6 months. A PIK will be conducted to determine all requirements, including closeout requirements if the Temporary Modification becomes permanent. Current CLS procedures will be used to mark equipment and cabling. The planned removal date will be documented in the PICO. Steps will be included in the PICO to document the removal plan. SSC/SNPDI SE&I will annotate all ARs associated with the temporary modification with "-T". For example, "21-068 -T".

If there is a need for an extension, a request for the extension must be submitted in writing to SSC/SNPDI. The request will include the additional period requested, justification and if the request were to be denied, an impact statement.

If the GPOC determines a Temporary Modification is to become Permanent a request must be submitted in writing to SSC/SNPDI. The request will include justification and an impact statement if the request were to be denied. If approved the PIK minutes will be used to determine requirements for closeout.

7.6 Freeze Boards

Freeze Boards are put in place during critical milestones or launches. SSC/SNPDI works closely with the impacted organization(s) to develop the board's charter, which varies by the freeze activity. The charter will determine systems and actions affected by the freeze. The System Freeze Board (SFB) replaces the SIB during the critical activity. SSC/SNPDI SE&I facilitates the Freeze Boards, and the Board is typically co-chaired by the Commander of the impacted organization. The co-chair must be military or a government civilian. This cannot be delegated to contracted personnel.

7.7 Deviations and Addendums

A deviation occurs when the RE identifies that the planned effort must be changed after the document is signed. Upon identification of a need to deviate from the implementation plan specified in the PICO, work will stop. The specific instructions to be followed are documented in the PICO.

At times a project may require a deviation that is temporary in nature due to unforeseen circumstances. To be determined as a temporary deviation, the final installation must match the signed PICO. A Memorandum for Record approved by the GPOC will be submitted to SSC/SNPDI Ops Integration Lead which will include:

- Explanation of and Justification for the deviation
- Listing of risks to the system caused by the temporary deviation not covered in the signed PICO
- Projected timeline to rectify the temporary deviation

An addendum is completed when the RE identifies a need to do additional work prior to the closeout of an effort. An example is during verification testing, missing elements are identified such as monitoring or archiving. To reduce the amount of paperwork required, the existing, approved documentation will be updated to include the additional work. This content needs to be added with new sections at the end of the document and clearly identified as an addendum. The additional content will be reviewed and approved prior to proceeding. Addendums that increase risk will require SIB approval.

PART 8 – MCS AND MCSB FACILITY SAFETY REQUIREMENTS

8.1 Hazardous Materials

Agencies responsible for equipment installation and changes to the facility shall comply with the industrial safety, accident prevention and health programs defined in Air Force Occupational Safety and Health (AFOSH) Standards and Occupational Health and Safety Administration (OSHA) Standards as applicable. These same agencies shall coordinate with the FIT or the SST in advance whenever hazardous materials are either shipped or hand carried onto the site. This includes materials such as (but not limited to) explosive charges, shots for exothermic welding, corrosive or toxic chemicals, water reactive materials or oxidizers and flammable gases or liquids. All such hazardous material shall be stored in a designated area and in approved containers. Control of this material shall be the sole responsibility of each agency using the material. All hazardous material (HAZMAT) items must be pre-approved by Base authorities prior to bringing the material on Base.

8.2 Equipment Layout, Remodeling and New Construction

Equipment will be laid out and installed to meet the egress requirements and fire detection, warning and suppression requirements of National Fire Protection Association (NFPA) 101. Remodeling or new construction within the facility will conform to NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment, to include conformance with criteria for flame spread and smoke generation ratings of interior finishes and furnishings.

8.3 Equipment Tie Down

Equipment and cabinet tie-down to the raised floor or concrete floor slab will be considered on a case-by-case basis. Racks or cabinets identified as top heavy or have draw-out chassis present a possible personnel safety hazard. The installing agency will perform a tip analysis. The base safety office, FIT, SST and the squadron safety personnel will review this analysis. If there is a safety hazard the installation agency will tie the equipment down. Tie down can be accomplished in two ways, i.e., under-floor bracing with through floor bolting or by bolting multiple racks together to minimize tip hazard.

8.4 Support Equipment Power

There will be ABSOLUTELY no test equipment and or mechanical (motor driven electrical equipment or heating elements i.e., Heat Guns) tools plugged into either the racks power strip or the outlets on the face of the Rack Power Distribution Unit (RDU). Installing agencies and testers will plug their equipment into the available wall outlets, not the mission systems equipment racks power supply, i.e., Plug strips.

8.5 Security Requirement for Rack Doors

All new racks installed in any POR operational location will have back locking doors. Locking front doors may be required at the direction of the government. Once the installation and testing are complete keys will be given to the Lead of the Level 1 support team. If there is a technical concern with including the doors, please follow the waiver process identified in this document.

PART 9 – MCS AND MCSB SHIPPING AND RECEIVING

9.1 Freight Receiving Area

The MCS and MCSB each have a receiving area. Recommend all heavy and or palletized equipment be delivered by a vehicle with a "Lift gate" or "Tommy Lift" capability as there is no freight dock. If a forklift is required, pre-coordination with the site is required at least five days in advance. Equipment and supplies will be brought into the facility through the receiving area. There are no provisions for storage in the receiving area or within POR sites. Delivery arrangements must be coordinated with the applicable HW Lead prior to shipping materials. All new racks should be delivered fully populated when possible.

9.2 Equipment Passage

An approved Equipment In/Out Form is required for all equipment items prior to entry into the facility. The Special Security Representative (SSR) will conduct a 100% inventory of the serial numbered equipment items and hard drives during the entry process. A member of the installing agency must be present at the audit to assist with the verification process.

Equipment entry into the MCS SCIF is through the controlled access door, 45 inches x 9 feet, located on the Northwest side of the building. All interior doors are standard 80-inch-tall doors.

Equipment entry into the MCSB SCIF is through the controlled access door, the southeast SCIF door has a clearance of 45.5 x 81 inches. The southwest SCIF has a clearance of 45.5 x 80.5 inches with a removable frame that will allow a clearance of 47.5 x 99 inches. This door can be opened with advanced coordination with the MCSB SST.

NOTE - The door height creates problems when bringing in taller racks. All equipment racks shall be loaded "bottom heavy" and in a manner that permits the safe "tilting" of the rack to prevent equipment damage and or personnel injury. Recommend bringing a dolly to safely transport the racks.

During major reconstruction plywood, masonite, plastic film or equivalent material will be temporarily laid on hallway and room carpets during the movement of equipment from the receiving area to the equipment areas. Protective materials will also be placed on corridor walls and corners to prevent damage to the facility during equipment movement from the receiving area to the various technical equipment locations. The installing agency is responsible for any damage to the facility caused by the modification process. If damage occurs notify FIT at MCS or SST at MCSB.

PART 10– FACILITIES MODIFICATION GUIDANCE

This section provides facility and equipment installation guidance for POR sites. Funding for facility modifications is to be provided by the installing agency. GPOCs and REs should discuss any concerns or deviations with FIT at MCS or SST at MCSB if this guidance conflicts with contractual requirements, with other specific site guidance or with updated military or civilian standards.

10.1. Mechanical System Standards

The floor and ceiling tile grid systems within the MCS and MCSB are installed using metric system measurements. References that rely upon the floor/ceiling tile grid (i.e., rack width and depth) are metric. All other measurements are imperial.

10.1.1. Power System Characteristics

10.1.1.1 Overcurrent Branch Circuit Protection Guidance

Existing equipment modifications – If new nameplate data exceeds 80% of the threshold of supplied service, the components actual load rating (measured power consumption while in use) will be used. Total actual load rating cannot exceed 80% of the supplied service (new component plus existing).

All new and modified equipment racks will require power monitoring systems which monitor output distribution from power source to all rack components.

Rack power systems with dual cords: All new and modified equipment racks will require power monitoring systems which monitor output distribution from power sources to all rack components.

Rack power systems with single output service: Power monitoring is accomplished by branch circuit assessment by FIT and SST.

10.1.1.2 Power Redundancy Guidance

The objective of the power redundancy guidance is to ensure all equipment is powered by two separate room power sources. The following guidance is intended to ensure all equipment has power diversity:

- All new rack installations shall be provided with redundant power from two different room power distribution units (PDU) supplied from two different electrical lines
- Racks shall come with the appropriate number of RDUs to provide the necessary power redundancy within the rack and provide the ability to perform electrical maintenance within the rack as well as before the rack
- Automatic Transfer Switch (ATS) will be installed to provide power redundancy for mission equipment that uses a single power cord
- Any work in a rack that does not currently have power redundancy, as dictated in the paragraphs above, will require the work effort to include installation of an appropriate ATS into the rack or racks being updated or worked on provided by the installing agency

10.1.1.3 MCS Power System Characteristics

10.1.1.3.1 MCS General Description

The MCS receives both commercial and emergency generator backup power from the Aerospace Data Facility (ADF). Once in the building, electrical power is split into the technical and utility power systems. The maintenance responsibility for the power system is shared between FIT and 460 CES.

10.1.1.3.2 MCS Technical Power Distribution

The technical power supply is supported by an Uninterruptible Power Supply (UPS) system. There are two UPS Systems, the Primary supports all Mission System Computers and processing capabilities, the Secondary supports all Mission Essential Mechanical Systems. The UPS supports critical cooling machinery (Computer Room Air Conditioning (CRAC) in equipment rooms, Variable Air Volume (VAVs) in equipment rooms, pumps supporting large underground chilled water reservoir). The UPS is designed to provide continuous technical power to both mission essential equipment and necessary

facilities support equipment in the event of a power failure. PDUs supporting the technical power are designated typically as U1, U2, U3, etc. The PDUs provide technical power and are supported by the UPS. Technical power is distributed via floor-mounted PDUs and wall-mounted distribution panels located throughout the facility. Each PDU and power panel has a unique identifier indicating the unit number and the power system.

10.1.1.3.3 MCS Utility Power Distribution

The UPS does not support utility power. Utility power will be lost during a power failure until the emergency backup generator system is producing stable power. Utility power is used for lighting, air conditioning systems supporting people areas, most motor loads, wall receptacles and other non-technical equipment loads. Each utility power panel will have a unique identifier, indicating the unit number.

10.1.1.3.4 MCS Electrical Load Balancing

When planning a new installation, the Project Manager with assistance from FIT will balance all loads to the maximum extent possible (i.e., less than 10% imbalance between phases on three phase panels/PDUs) minimizing the current flow in the neutral conductor and maximizing the harmonic reduction. All electrical power installations will conform to the applicable sections of the National Electrical Code (NEC).

$$\% \text{ out of balance} = 100 \times \left\{1 - \frac{\text{Lowest load per phase}}{\text{Highest load per phase}}\right.$$

10.1.1.3.5 MCS 60 Hz System Characteristics

Electrical power distribution is nominally 480/277 Volts Alternating Current (VAC), 3-phase, 4 wire. Technical power is stepped down to 208/120 VAC, 3-phase, 5-wire by use of step-down transformers. The step-down transformers are part of the PDUs or, in the case of the wall-mounted power panels, located beneath the raised floor.

Civil Engineering is currently providing nominal technical 60 Hertz (Hz) power as follows:

Nominal Voltage:	208Y/120 VAC, 3-phase, 5-wire
Frequency:	60.0 Hz +/- 0.06 Hz
Voltage Regulation:	+/- 2% with 10% phase unbalance

Utility power is provided at 480/277 VAC, 3-phase, 4 wire. The voltage is stepped down to 208/120 VAC for wall-mounted receptacles and other selected equipment uses.

10.1.1.3.6 MCS Room Power Cables and Conductors

The distribution of power will be by jacketed multi-conductor cable or individual solid core wires. Cables will be installed in accordance with the most current NEC standard. If a cable uses a neutral, it must be a fully rated neutral. The neutral conductor for multi-device circuits will be sized to accommodate harmonic current loading. All branch circuits (PDU to receptacle) shall be home run with no splicing.

Individual conductors will meet the following requirements:

- 600 VAC rating
- Maximum operating temperature of at least 194 degrees Fahrenheit (F)
- Suitable for wet or dry locations
- Flame retardant, moisture and heat-resistant thermoplastic insulation
- Splices and taps will NOT be used on new installations/circuits
- For existing wire runs where splices or taps are required, the screw on wire nut splice is acceptable

10.1.1.3.7 MCS Circuit Breakers

The power distribution system will be provided with molded case circuit breakers sized in accordance with the NEC for their assigned loads. No newly installed circuit breakers will be rated at less than 20 amperes. Projects shall install new circuit breakers when connecting to the PDUs. These circuit breakers will be the same type and manufacturer as those in the PDUs or wall-mounted panels existing in the facility.

The circuit breaker panel will have output circuit breakers sized for the individual load requirements. Provision will be made for 25% spare breakers or space for breakers for new installations. All circuit breakers will have thermal-magnetic trips. Any main breaker in the main panel will have a minimum interrupting capacity of 10,000 Amps. The technical distribution system will not be connected to or provide power to, any motor generator, motor or other rotating equipment. Special soft start motors on critical pumps, valves and CRACs were installed to preclude various failure modes. The exception to this rule is the normal fans for equipment racks or computer peripheral equipment.

10.1.1.3.8 MCS Room PDU and Distribution Panel Circuit Identification

Any addition and/or modification with respect to the loads of a power distribution system will be documented by FIT at the time of the modification. Updates will be made on a schedule located inside of the room PDU or panel door cover. The information will consist of an estimated load, the room number in which the equipment is to be located, the date the schedule was updated and the equipment number or brief description of the equipment. All circuit assignments will be issued by FIT. All room PDUs and distribution panels installed will be labeled.

10.1.1.3.9 MCS Receptacle Marking

All technical power receptacles (UPS supported) will be labeled with the following information:

- “NOTICE, CRITICAL POWER OUTLET (UPS), DO NOT USE FOR DRILL MOTORS, SWEEPERS, CLOCKS AND OTHER NON-TECHNICAL EQUIPMENT”
- The room PDU or circuit panel and the circuit breaker number which serve the receptacles will be listed

10.1.1.3.10 MCS Adding Power

The ability to add loads to room PDUs and power panels will be determined by FIT by performing a load, balance and space availability assessment of the impacted room PDU (for wire way distribution) and Load Balance assessment on the individual busway power meter. FIT will maintain a current baseline for all room PDUs. After each modification is complete, the baseline will be updated after quarterly power audits.

10.1.1.3.10.1 MCS Power Distribution Systems

During the site survey available power must be assessed. Additional room PDUs and wall-mounted panelboards will be installed as required to provide localized power for new or augmented equipment suites installed in the facility. Funding for additional room PDUs will be provided by the installation agency. Final location of room PDUs, panels and supporting distribution system components will be reviewed and coordinated by FIT. DEL 4 will approve location. Each distribution system will be located as close as possible to the loads served.

10.1.1.3.10.2 MCS Wire-Way and Busway

Rooms 270, 340 and 350 are wire-way. Busway has been installed into Rooms 300, 341, 380, 510, 525, 520, 539, 532, 534, 560 and 570. During the site survey available power must be assessed. In the case of busway, both the current and phase must be verified to identify available space and phase on the busway assembly. Failure to check the load and phase balance during the site survey and upon completion of an installation could potentially cause an overload and possibly shut down all components on that bus rail or phase. Starline is the chosen manufacturer for the busway. All new receptacles must be Starline compatible and be provided by the installing agency. Under-floor conduit runs and enclosed wire-ways connect the PDUs and panels to receptacles mounted below the equipment. All under-floor receptacles will be twist lock type to prevent accidental unplugging of equipment.

10.1.1.4 MCSB Power System Characteristics

10.1.1.4.1 MCSB General Description

The MCSB receives two commercial power feeds from Schriever AFB. The facility has both technical and utility UPS and four emergency generators to backup electrical power. Electrical power is split into two different systems. These are the Technical Power Systems (TPS) for mission equipment and the Utility system that provides support power to all required infrastructure systems such as HVAC and lighting.

10.1.1.4.2 MCSB Technical Power Distribution

The TPS is supported by a parallel redundant 300KVA UPS system (four 300KVA UPS with two UPS feeding two separate technical bus systems) that provide technical power to mission equipment in the event of a power failure. Technical power is distributed to critical equipment via room PDUs and wall-mounted distribution panels located in the equipment, mission and administrative areas. Each room PDU and distribution panel has a unique identifier that indicates the unit number. Under-floor electrical busway located in the MCSB Space Operations Center (SOC) Floor, Computer Room, Technical Control, Launch Anomaly Resolution Center, Relay Ground Station, RGS Office area, Alt Launch Anomaly Resolution Center (LARC) and Backbone provides three phase (208/120 VAC) technical power for equipment. All under-floor receptacles connected to the busway shall have twist lock receptacles. These under-floor receptacles will be supplied by the installing agency. SST Facility Manager will provide the correct part number and type to that Agency.

10.1.1.4.3 MCSB Utility Power Distribution

Utility power utilizes four 100 KVA UPS systems to support mission critical infrastructure systems. Utility power is used for CRAC Units, lighting, facility air conditioning system, motor loads, wall receptacles and other non-technical equipment load.

10.1.1.4.4 MCSB Electrical Load Balancing

The installing agency, with assistance from the facility manager and facility contractor, shall balance all loads to the maximum extent possible (i.e., less than 10% unbalance between phases on three phase panels) to minimize current flow in the neutral conductor. All electrical power installations shall conform to the applicable sections of the NEC.

$$\% \text{ out of balance} = 100 \times \left\{1 - \frac{\text{Lowest load per phase}}{\text{Highest load per phase}}\right.$$

10.1.1.4.5 MCSB 60 Hz System Characteristics

Both Technical power and Utility power are distributed at 480/277 VAC, 3-phase, 4 wire. The TPS is stepped down to 208/120 VAC, 3-phase, 4 wire plus ground by use of step-down transformers up stream of technical power panels or transformers installed in the room PDUs. Nominal TPS power is as follows:

Nominal Voltage:	208Y/120 VAC, 3-phase, 5-wire
Frequency:	60.0 Hz +/- 0.06 Hz
Voltage Regulation:	+/- 2% with 10% phase unbalance

Utility power is provided at 480/277 VAC, 3-phase, 4 wire. The voltage is stepped down to 208/120 VAC for wall-mounted receptacles and other selected equipment uses.

10.1.1.4.6 MCSB Room Power Cables and Conductors

The distribution of power shall be by jacketed multi-conductor cable or individual wires. Cables shall be installed in accordance with the NEC. Cables shall have a fully rated neutral and a ground wire. The neutral conductor for multi-device circuits shall be sized to accommodate harmonic current loading. Minimum conductor size for individual TPS branch circuits shall be #10 American Wire Gage (AWG) solid core wire. Individual conductors shall meet the following requirements:

- 600 VAC rating
- Maximum operating temperature of at least 194 degrees F
- Suitable for wet or dry locations
- Flame retardant, moisture and heat-resistant thermoplastic insulation

10.1.1.4.7 MCSB Circuit Breakers

The power distribution system will be provided with molded case circuit breakers sized in accordance with the NEC for their assigned loads. No newly installed circuit breakers will be rated at less than 20 amperes. Projects shall install new circuit breakers when connecting to the PDUs. These circuit breakers will be the same type and manufacturer as those in the PDUs or wall-mounted panels existing in the facility. Provision shall be made for 25% spare breakers or space for breakers for new installations. All

circuit breakers shall have thermal-magnetic trips. Any main breaker in the main panel shall have a minimum interrupting capacity of 22,000 Amps.

The voltage from the TPS distribution systems shall not be connected to any motor generator, motor or other rotating equipment. The exception to this rule is the normal fans for equipment racks or computer peripheral equipment.

10.1.1.4.8 MCSB Room PDU and Distribution Panel Circuit Identification

All distribution panels installed shall be labeled with the following information:

- Panel number
- Source of power (main panel number and location)

Any addition and/or modification with respect to the loads of a power distribution system shall be documented at the time of the modification. Updates shall be made on a schedule located inside of the panel door cover. The information shall consist of an estimated load, the room number in which the equipment is to be located, the date the schedule was updated and the equipment number or brief description of the equipment.

Cables supplying power to individual loads from the power distribution system shall be pre-cut to length and either hard-wired to the load terminals or provided with matching connectors if the load requires it.

10.1.1.4.9 MCSB Receptacle Marking

All receptacles shall be marked using the following criteria:

- All non-busway receptacles shall be labeled with the following information (Figure 10-1 Typical Receptacle Label)
  - Panel and circuit breaker numbers that serve the receptacles Example: Rack 2A133, CO 19, PDU U17-2, Cir 8, 10, 12.
  - Use a 1.5" wide Black on White Brady label or equivalent; label and font size can vary dependent on the length of information to be shown

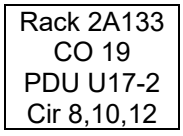

Figure 10-1 Typical MCSB Receptacle Label

- Receptacles utilizing the busway system will be mounted in appropriate boxes and then installed on the busway. The box containing the receptacle shall be marked to identify the busway and the receptacle identification of the receptacle. A label will be affixed on the “receptacle side” of the box with the following information (Figure 10-2 Typical Receptacle Label)
  - Example: The label information for Starline Busway “TC04” and receptacle “01” in the Starline Busway box attached to “TC04” would be “TC 04-01”
  - Use a clear “Brady type” label or equal, ½” wide; font size can vary dependent on the length of information to be shown

TC 04-01

Figure 10-2 Typical MCSB Receptacle Label

10.1.1.4.10 MCSB Busway Marking

All newly installed Busway will be labeled at the beginning, end and at each junction. The feeder boxes are labeled with the bus it feeds, room PDU feeding it and room PDU circuit.

10.1.1.4.11 MCSB Adding Power

During the site survey available power must be assessed. Additional room PDUs and wall-mounted panelboards will be installed as required to provide localized power for new or augmented equipment suites installed in the facility. Funding for additional room PDUs will be provided by the installation agency. Final location of room PDUs, panels and supporting distribution system components will be reviewed and coordinated by the SST. DEL 4 will approve location. Each distribution system will be located as close as possible to the loads served.

10.1.2 Grounding Standards

10.1.2.1 MCS Equipment Grounding

Equipment racks and cabinets with grounding studs and miscellaneous equipment with grounding studs will be grounded to the Signal Reference Ground (SRG) system in accordance with equipment manufacturers' specifications. A green wire grounding bus is provided in each power distribution panel. The raised floor stanchion and stringer system is connected to the SRG but shall not be used as an electronic reference ground plane for mission equipment. For high frequency processing equipment, strings of equipment racks may be tied together in addition to being grounded to the SRG system. Inter-rack connection may be made by means of a short ground jumper cable between rack ground lugs or by strapping the racks together internally. Jumper cables and straps will be sized in accordance with manufacturers' recommendations.

All grounding conductors will be:

- Insulated
- Color coded green, green with a yellow stripe
- Not smaller than AWG #8 when the conductor is not part of a power cable
- Connected by bolts or screws capable of maintaining 1200 to 1500 pound per square inch (psi) between contact surfaces or welded at each termination
- Will be tested in accordance with Industry Standards with results documented in the completed PICO

10.1.2.2 MCSB Equipment Grounding

Equipment racks, cabinets with grounding studs and miscellaneous equipment with grounding studs shall be grounded to the SRG system in accordance with equipment manufacturers' specifications and this guide. Low Impedance Risers (LIRs) will be provided by the SST and shall be used to connect to each equipment enclosure to the SRG. The Project Manager is responsible for connecting the LIR to the equipment rack and coordinating the safety inspection prior to power up.

All grounding conductors shall be:

- Insulated (if a power ground)
- Color coded green, green with a yellow stripe or marked green at each end
- Not smaller than AWG #8 when the conductor is not part of a power cable
- Connected by bolting or screws able to maintain 1200 to 1500 psi between contact surfaces or exothermically welded at each termination
- Bolt and screw connections shall utilize a star washer to ensure proper bonding

10.1.3 Environmental Controls

New racks should be configured to properly cool the equipment contained within while also complying with existing room and row configurations. Racks in non-technical equipment areas shall be assessed for additional cooling if necessary. New construction or facility modifications will not create conditions which could jeopardize indoor air quality as specified by the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) Standard 62.1.

10.1.3.1 MCS Interior Environmental Conditions

The technical equipment areas are provided with a controlled environment designed to support computer operations and other electronic equipment with precise environmental control. Technical equipment areas use a raised floor plenum system for delivery of equipment cooling air. Air conditioning systems in the technical equipment areas are provided to maintain equipment cooling requirements rather than creature comfort and will maintain the following environmental parameters:

Temperature (degrees F Dry Bulb (DB))	
Control Point	65 degrees F
Controllability	± 5 degrees F
Relative Humidity (%)	
Control Point	45 %
Controllability	± 5 %
Filtration Efficiency (%)	86 %

All equipment/racks installed will be capable of operating in the ambient room temperature of 65 degrees F ± 5 degrees F. The installing agency should provide a thermal analysis of all new racks and modifications to existing racks for review and approval by FIT. Equipment/racks requiring forced air for cooling must contain the necessary fans, chimneys, etc., as part of the equipment/racks.

10.1.3.1.1 MCS Raised Floor Air Delivery

Conditioned air is supplied by a combination of ceiling-mounted variable volume air handling systems fan coil units and freestanding floor mounted CRAC units. Each under-floor plenum is maintained at a constant temperature by an adjustable thermostat located in the under-floor plenum with a remote set point controller. Facility modifications or new construction requiring the HVAC system penetrations of fire walls in areas containing computer equipment and/or data processing equipment will require automatic fire and smoke dampers in the duct system per NFPA 75.

10.1.3.1.2 MCS Direct Air Intake

Direct under-floor cooling is the primary cooling system. Rack cooling is dependent upon rack equipment requirements and row/floor tile setup.

10.1.3.1.3 MCS Ambient Air (No under-floor cooling)

The following rooms rely solely on above ceiling Blower/Coil Units (BCU): 0XX, 1XX, 221, 230, 250, 271, 280, 290, 5XX, Data Chase

Each room is maintained at a constant temperature by computer-controlled system.

10.1.3.2 MCSB Interior Environmental Conditions

The technical equipment areas are provided with a controlled environment designed to support computer operations and other electronic equipment with precise environmental control. Technical equipment areas use a raised floor plenum system for delivery of equipment cooling air. Air conditioning systems in the technical equipment areas are provided to maintain equipment cooling requirements rather than creature comfort and shall maintain the following ambient environmental parameters:

Temperature (degrees F Dry Bulb (DB))	
Control Point	68 degrees F
Controllability	+ or - 5 degrees F
Relative Humidity (%)	
Control Point	40 %
Controllability	+ or - 5 %
Filtration Efficiency (%)	86 %

All equipment/racks installed shall be capable of operating in the ambient room temperature of 68 degrees F plus or minus 5 degrees F. Equipment /racks that require forced air for cooling must contain the necessary internal fans, chimneys, etc. as part of the equipment/racks. The installing agency should provide a thermal analysis of all new racks and modifications to existing racks for review and approval by SST.

10.1.3.2.1 MCSB Air Distribution System

Conditioned air is supplied by a combination of ceiling-mounted BCUs and freestanding, floor-mounted CRAC units. Each room is maintained at a constant temperature by a computer-controlled system operated by the 50 CES and maintained by the facility maintenance contractor. Facility modifications or new construction requiring the HVAC system penetrations of fire walls in areas containing computer equipment and/or data processing equipment will require automatic fire and smoke dampers in the duct system per NFPA 75, Chapter 8.

10.1.3.2.3 MCSB Technical Equipment Areas

The technical equipment areas utilize a raised floor for CRAC air distribution. These areas are designed to provide a constant ambient air temperature for equipment cooling. Rooms 220, 270, 340, 350 have raised floors that provide under-floor cooling air distribution.

These areas are designed to provide a constant ambient air temperature. Therefore, direct under floor / under rack cooling shall only be used for equipment/rack where the available ambient cooling is not sufficient to satisfy manufacturer specifications for cooling of the equipment in the rack.

10.2 Raised Floor Area

The raised floor areas are used for signal cable routing, under-floor power distribution and the transfer of chilled air for equipment cooling. CRAC units located in individual rooms provide chilled air for equipment cooling. Since the CRAC units providing the chilled air are dedicated to a designated room/area and do not share chilled air with adjacent rooms, the raised floor areas are compliant with NFPA 75 and NFPA 70.

The under-floor fire detection system shall not be altered or impaired without a thorough analysis of the potential impact to the non-plenum rated materials located in that space. Furthermore, all under-floor installation of electrical branch circuit wiring or any other potential ignition source will be analyzed for any impact in relation to non-plenum rated materials or equipment within that space by FIT at MCS or SST at MCSB.

The maximum floor loading on the tiles on the raised floor areas will not exceed 300 pounds per square foot (psf). Loads that exceed posted room load limits where several heavy pieces of equipment (i.e., four drawer safes) are in proximity will have additional bracing.

10.2.1 Raised Floor Tile Penetrations

Penetrations in the raised floors areas will be kept to an absolute minimum. Tiles with penetrations that are no longer needed will be replaced by the installing agency to ensure structural integrity of the floor system and safety. All modifications to floor tiles will be performed by the installing agency and will be completed outside the building Floor tile penetrations and openings will conform to the following requirements:

- Be reinforced, if required, per manufacturers recommendations to preserve floor-loading characteristics
- Be of optimum size to allow adequate rack airflow and to prevent adverse impacts to the HVAC system
- Be lined with material suitable to prevent exposed sharp edges thus providing protection to personnel, conduit, cables or other hardware passing through the opening
- Be sealed to prevent deterioration of the exposed concrete filling in the cut floor tile and to prevent the spread of cement dust
- Be of minimum size to allow adequate area for the passage of signal and power cables through the raised floor while restricting chilled air passage

Contact the FIT at MCS or the SST at MCSB penetration options.

10.2.2 Raised Floor Tile Removal and Reinstallation

10.2.2.1 Safety Procedures for Floor Openings

- Remove all carpet squares above the desired floor opening location. If the squares cannot be removed, the carpet squares will be folded back and taped or clamped so the entire floor opening is visible
- Use orange safety cones to mark the opening
- Removed floor tiles must be relocated away from the floor opening and leaned upright against a wall or equipment rack to remove the tripping hazard
- If a need exists to leave the work area unattended, even with safety stanchions in place, all floor tiles will be replaced to cover the opening
- The requirements above do not apply to floor openings during site preparation activities. For site preparation, the entire work area will be restricted to site preparation workers and individuals requiring entrance for construction/modification surveillance activities

10.2.2.2 Tile Removal without Installed Electronic Equipment

- Removal of contiguous floor tiles and associated stringers is permitted where an open floor area forms no more than one ninety-degree turn (Figure 10-3). (A ninety- degree turn consists of a minimum of 3 tiles forming an “L” shape)
- An open floor area formed by the removal of contiguous floor tiles and associated stringers will have a maximum width of one floor tile
- Replace floor tiles according to the vendor installation criteria

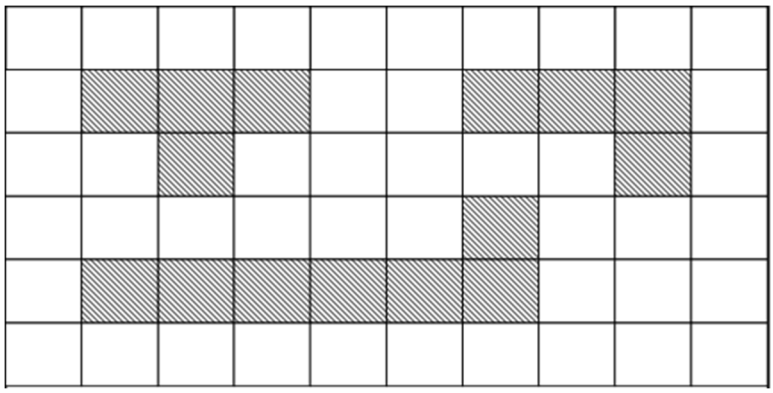

Figure 10-3, Floor Tile Removal Diagram for Area with No Electronic Equipment Installed

10.2.2.3 Tile Removal with Installed Electrical Equipment

When accessing an area under a raised computer floor, care should be taken to ensure adequate cooling air is maintained and to not disturb the floor level adjustment. The sections below provide guidelines and safety procedures for removing raised floor tiles and stringers.

10.2.2.3.1 Tile Removal When Equipment is Operating

- Remove no more than four tiles either contiguous or “L” shaped to sustain equipment cooling (Figure 10-4)
- Replace floor tiles according to the vendor installation criteria

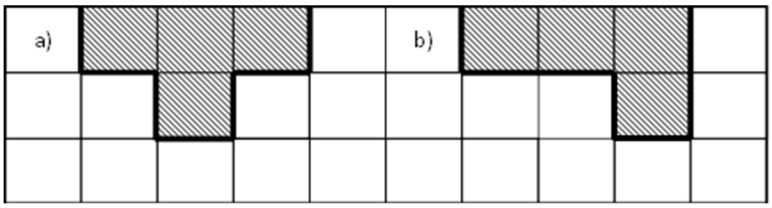

Figure 10-4, Floor Tile Removal Diagram for Operating Equipment

10.2.2.3.2 Tile Removal When Equipment is Not Operating

- If no more than three contiguous or "L" shaped floor tiles are removed, up to two stringers may be removed (Figure 10-5a)
- Remove no more than ten contiguous floor tiles. If ten contiguous floor tiles are removed, no stringers may be removed (Figure 10-5b)
- If less than ten contiguous floor tiles are removed, one stringer may be removed (Figure 10-5c)
- Replace stringers and floor tiles according to the vendor installation criteria

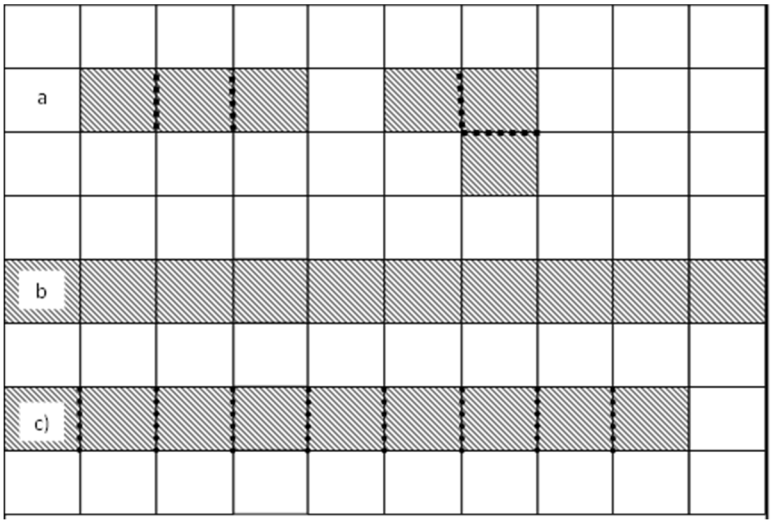

Figure 10-5a, b, c, Tile Removal Diagram when equipment is not operating

10.3 Cable Conveyances

10.3.1 Cable Trays

Trays will be hot-dip galvanized steel or aluminum ladder type or vented closed bottom and will be sized as required. Addition to or replacement of trays will be of like size and material.

10.3.1.1 Cable Tray Anchoring

Trays shall be rigidly anchored to the facility at intervals not exceeding the manufacturers recommended specifications for loads of 75 pounds per linear foot. One of the following methods shall be employed:

- When trays are suspended below the raised floor, the floor pedestals using approved UNISTRUT/clamp system shall rigidly support them

- When suspended in other locations such, as above ceiling, the trays shall be supported via an approved beam clamp, threaded rod and UNISTRUT system

10.3.1.2 Cable Tray Grounding

The cable trays shall be bonded at changes in direction ("T" and 90s) using a green #6 wire. The tray system is mechanically attached and supported with UNISTRUT that in turn is mechanically connected to the raised floor stanchions that are bonded to SRG system. Rigid metal conduit and Electric Metallic Tubing (EMT) will be bonded to facility ground at each end. Steel compression couplers will be used.

10.3.1.3 Adding Cable Tray

New program or current mission requirements may generate the need to install cable tray through existing firewalls, directly from one technical area to another without use of the data chase Funding for new installations will be provided by the installing agency. Project Managers must coordinate with FIT at MCS or SST at MCSB to obtain approval and guidance prior to making new penetrations. The firewall integrity must be maintained as this prevents the propagation of smoke and heat between separate fire areas, which could cause facility damage and potential mission impairment. Methods, which may be used for firewall penetrations, involve the use of covered metal wire way, rigid conduit, EMT fireproof sealant.

The method of penetration is described below:

- Cut a hole in the firewall approximately one inch larger than the perimeter of the wire way or conduit diameter
- Pack fiberglass insulation into the one-half inch gap around the wire way or conduit
- Use tape to hold fiberglass in place
- Use fire caulk over tape to complete seal
- Use fire-proof putty to completely seal around cabling in one end of the wire way, rigid conduit or EMT
- The new block outs will be sealed with "fire pillow" blocks and/or sealed cable tray

10.3.2 Flexible Metal Conduit

The use of flexible metal conduit for power distribution is permitted and will be provided by the installing agency. All flexible conduits shall be securely anchored at intervals not to exceed 5 feet and within 1 foot 6 inches of each end, even if terminated into a fixture. Vertical installations of flexible metallic conduit inside walls may exceed 6 feet 6 inches in length and the 6-foot 6-inch support requirement does not apply. In no case shall the conduit be used as a safety ground. All flexible conduits shall be grounded to the facility ground at each end except where it terminates in a box/receptacle for a unit load. When used in potentially wet areas, flexible conduit shall be used with NEC approved damp/dry rated cabling. Completed by site support or local Civil Engineering as requested by the PICO.

10.3.3 Conduit Junction Boxes

Conduit forms a grid network with nodes consisting of junction boxes. The standard junction boxes provided by the installing agency should be 4 x 4-inch metal boxes with up to four ¾" conduits connected to it. For more than four conduits or for larger than ¾" conduit, the junction boxes can be larger than 4 x 4-inch box when required. To make cable pulling easier, 1 x 4-inch junction boxes can be added.

10.3.4 Cable Way/Wire Way, Conduit and Junction Box Labeling

All cable trays/wire ways, conduits and junction boxes will be marked with identifier code and security classification. Each section of the cable tray/wire way and each conduit and junction box will have a unique alpha room designator and 4- or 5-character numeric identifier so that "from - to" cable routing can be tracked. Labels will be placed at least every 25 feet. For specific-function conduit, the label will also contain the specific system supported and the numbers of the network nodes. FIT at MCS or SST at MCSB will issue the designators and ensure proper labeling is completed.

10.3.5 Data Chase

Distribution of signal cables between rooms within the MCS/MCSB is via cable trays in the data chase located beneath the corridors and phone room. Data cable facility access is via an underground duct bank system. Personnel access to the data chase is by means of three stairways located within the MCS/MCSB.

10.3.6 Firewall Integrity

Running cables from room to room is normally accomplished by using the existing facility cable tray system in the technical and data chase areas. Technical area cable trays leave the rooms by means of a block out leading into the data chase. Cable trays in the data chase convey the cables to the next technical area where another block out allows the cable tray access into the next technical area. The block outs will be sealed with "fire pillow" blocks and/or sealed cable tray to assure integrity of the firewall. Project Managers will ensure that the block outs are sealed after cable routing is complete each day.

10.3.7 Under-floor Cable Routes

The signal cable conveyance and distribution systems include cable trays, wire ways, conduit/inner-duct and bridle/d-rings. All signal cables will be installed in one of these cable conveyance means. Cable conveyances must not exceed an 80% fill capacity. If during a site survey the conveyance is deemed to have 80% or greater fill capacity the effort must either purchase new cable conveyance or route cables through a different path. Cable will not be installed directly on the sub-floors, raised floors or suspended ceiling tiles. All communications, data, telephone, fiber optic and other non-power cabling will be installed in accordance with Air Force Manual (AFMAN) 33-214, Volume 2. Cables will be installed parallel and in a neat orderly fashion to permit the maximum number to be installed in each section of the tray. All cables will be free from sharp bends and kinks and cut to an appropriate length to prevent coiling excess cable under the systems floor. Service loops should be sized appropriately and used as infrequently as possible. Service loops should be secured on a stanchion as close to its termination point as possible, preferably with Velcro. Copper service loops shall not exceed 15 feet or 10% of the overall cable run length, whichever is larger. Fiber service loops shall not exceed 15 feet or 20% of the overall cable run length, whichever is larger. Where cable transitions are made, cables will be installed without tension. A horizontal run from the conveyance to the point of equipment connection will not exceed 4 feet. Runs exceeding 4 feet will be through conduit or bridle/d-rings to a floor support stanchion within the 4-foot distance. Cable shall enter/exit suspended cable ladders from the bottom of the tray for entry into a rack assembly. The raised floor and sub-hallway data chase areas will be compliant with NFPA 75 and NFPA 70. Any cable that runs through an identified room or hall must be plenum rated.

All cables that carry classified data that are installed or routed will comply with security requirements for media type, proximity, routing and any other applicable security standards to protect classified data.

10.3.8 Overhead Cable Routes

Overhead routing of cables is currently not authorized except with special permission from SSC/SNPDI.

10.4 Signal Cabling

Signal cables will be standard at all locations and must be plenum rated. If standards cannot be met the RE will request a deviation from SSC/SNPDI. Cable splicing is not allowed.

10.4.1 Cable Coloring

10.4.1.1 Copper Cabling

All copper signal cables will be installed with the following color cable jacket:

Jacket Color	Classification of Data
White or Black	Unclassified
Red	Secret
Blue or Yellow	Top Secret (TS)/Sensitive Compartmented Information (SCI)

If properly colored cabling is not available, colored tape strips matching the above table will be added to any copper signal cables within 1 inch of cable labels and every 25 feet of cable length**.**

10.4.1.2 Fiber Optic Cabling

All fiber optic signal cables will be installed with the following color cable jacket:

Jacket Color	Mode / Micron
Yellow	Single Mode
Orange	Multimode OM1 62.5 micron
	Multimode OM2 50 micron
Aqua	Multimode OM3, OM4 50 micron
Lime	Multimode OM5 (50 micron)

10.4.2 Cable Terminations

When cables are terminated each must be certified in accordance with Industry Standards. Test results will be documented. Cable assembly drawings are required for any non-standard or special cable installations and must detail the non-standard cable pin-out. Prior approval from SSC/SNPDI is required for all non-standard (Institute of Electrical and Electronics Engineers (IEEE) and the Electronic Industries Alliance (EIA)) cable installations.

10.4.3 Cable Re-termination

All cable re-terminations must be completed in accordance with Industry Standards. Interconnections must maintain all cable electrical and mechanical characteristics. Shield integrity will be maintained to

include color-coding. When cables are re-terminated, the cables must be re-tested in accordance with Industry Standards.

10.4.4 Cable Installation

All cable installations shall not be run from directly from the floor penetration to a device port in the racks and will be properly dressed with Velcro to ensure:

- Proper / secure connection
- Maintainability
- No mechanical strain on the connector

10.4.5 Cable Labels

All cables will be labeled by the installing agency at time of installation within the following parameters:

- Labels will be affixed to both ends and may be affixed every 25 feet along the cable
- End labels will be installed within the first 12 inches of the connector unless ends are not visible or accessible. In this case labels will be affixed to the cable down-line at the first place where access can be achieved
- Labels will be typed and of sufficient size and spacing to be legible with have black letters on white background
- Labels will contain three rows of information as follows separated by a space where possible

Row	Information				Example
One	Wire Number		Local Position Identifier		W123456 P1
Two (Near end)	Room	Rack	Elevation	Jack number	380 C08 A26 J1
Three (Distant end)					340 E05 A26 J1

W123456 P1
380 C08 A26 J1
340 E05 A39 J1

Figure 10-6, Cable Label Example

- The label on cables with multiple ends will identify each end P1, P2, P3, P4. All cable ends must be connected. No disconnected ends are allowed. If any cables/cable ends are not required they must be terminated in a patch panel
- The second row of information provides near end cable connection information
- Desk connections consist of: desk reference designator, item description and jack number at the near end

Each data point shall be separated by a space
Examples: 6K06 A47 STE J1, 8K12 A24 SCI VOIP1

- The third row of information provides the same information as the second line but for the distant end
- For cable labels placed along the cable length, the label information is the same as the label for “P1” but without the “P1” designator

Cables to peripheral devices such as a mouse, keyboard and monitor do not require cable labels.

Cable label requirements in this document are minimum requirements for labels at POR sites. Installing agencies may use cable labels that exceed the requirements below.

10.5 Equipment Installation and Removal

10.5.1 Racks

DEL 4 will approve the placement and location of all new Rack installations. Approval of rack locations will be maintained and archived as part of closeout. All new rack installations will be assigned new reference designators by FIT.

All new racks must be metric to match floor tiles and shall be 600 mm wide and not more than 1200 mm deep. Height of racks is determined by ceiling height and sprinkler head location. Per fire safety standard there is an 18-inch requirement from the bottom of the sprinkler head to top of the rack.

Equipment racks will be installed level within 1/8-inch tolerance for single enclosures and to within 1/4-inch tolerance, from end-to-end, multiple enclosure groupings. Free standing enclosures mounted adjacent to each other will have the front faces flush to within 1/8 inch. Rear faces of racks may be offset; however, the depth of racks cannot intrude into the walkway so that safe passage per AFOSH/OSHA standards is obstructed or maintenance of equipment in that rack or racks in adjacent rows cannot be safely performed.

10.5.2 Equipment Installation

Industry standard installation guidelines will be adhered to while completing new rack installations. Reference designators for equipment will be as follows:

- Elevation - Designation of where equipment is in the height of the rack. Numbering will begin at bottom of rack and increment upward
- Multiple at same Elevation - Designation of where equipment is mounted in the width of the rack. If more than one piece of equipment is installed at the same elevation reference designators will increment from the first installation to the left of the cabinet looking from the front
    - A: First installation
    - B: Second installation
    - C: Third installation, etc.
- Rail - Designation of where equipment is mounted in the depth of the rack
    - A: Front rail
    - B: Rear rail
    - C: Center rail

Equipment will be installed using recommended chassis guides and secured for safety. Equipment will be placed in the rack with maintainer safety in mind and should be populated with heaviest equipment in the bottom of the rack. Pull out chassis will be placed in a manner that will not lend to a rack tipping hazard. Racks are not to be used for storage and should not contain paper, boxes, tools, office supplies, etc.

10.5.3 Equipment Labels

At a minimum, installed equipment shall have the following labels:

- Rack Reference Designator: On the front and back of each rack above the door
- Security Classification: Appropriate security classification labels will be applied
    - to racks on the top of the frame both front and back
    - to individually installed classified equipment items
    - to removable hard drives
- Hostname: All devices with hostnames will include a label with the hostname affixed to the device or at the elevation of the device on the rack frame

All installed labels shall not obstruct manufacturer installed equipment identification. Only installations that occur after approval of this document will be required to abide by this requirement.

10.5.4 Overhead and Above Ceiling Equipment

Equipment requiring overhead mounting (i.e., television monitors, projectors, etc.) must be supported by the structural steel beams above the suspended ceiling. Suspended ceiling support wires and/or ceiling grid system will not be used to support overhead equipment. The installing agency shall provide an engineering analysis, which shows that the design furnishes adequate mechanical strength to support overhead and above ceiling equipment, with an appropriate safety factor. This design will be approved by FIT at MCS or SST at MCSB prior to implementation.

PART 11 - PROCESS WAIVER REQUESTS

An OSIS process waiver request will be required to change any portion of the OSIS process to include any waivers to installation standards. A waiver request may be submitted as a part of the PIK Charts to waive any portion of this process. These Waiver Charts are included in the PIK Template. If it is determined during the PIK or at any point during the OSIS process that a waiver will be necessary, the GPOC for the effort will send a separate OSIS process waiver request to SSC/SNPDI Ops Integration Lead who will coordinate with SSC/SNP for approval.

PART 12– REFERENCE DOCUMENTS

Reference number	Title	Date
AFI 63-101/20-101	Integrated Life Cycle Management	30 June 2020
AFSPCI 21-108	Space Systems Maintenance Management –Rewrite	18 Apr 2019
ASHRAE Standard 62.1	Ventilation for Acceptable Indoor Air Quality	2022
NFPA 75	Standard for the Fire Protection of Information Technology Equipment	2020
NFPA 101	Life Safety Code	2021
NFPA 70	National Electrical Code	2020
AFMAN 17-1301	Computer Security (Compusec)	11 Feb 2020

PART 13 - ACRONYMS LIST

Acronym	Definition
2 SWS	2nd Space Warning Squadron

Acronym	Definition
ADF	Aerospace Data Facility
AF	Air Force
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFOSH	Air Force Occupational Safety and Heath
AR	Activity Request
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
BCU	Blower/Coil Units
BOM	Bill of Material
CES	Civil Engineering Squadron
CLS	Contractor Logistics Support
COE	Chief Operations Engineer
CoM	Chief of Maintenance
COMM	Communications
CONUS	Contiguous United States
COTS	Commercial Off the Shelf
CRAC	Computer Room Air Conditioner
DAS	Daily Activity Schedule
DB	Dry Bulb
DEL 4	Space Delta 4
DO	Director of Operations
DoD	Department of Defense
DT	Developmental Testing
E2E	End to End
ECS	Enterprise Collaboration System
EIA	Electronic Industries Alliance
EMT	Electric Metallic Tubing
ERS	European Relay Station
ESG	Enterprise Scheduling Group
F	Fahrenheit
FAMEMS	Facility and Mission Equipment Management System
FIT	SSC/SNPDI Facilities Integration Team
GDRB	Government Discrepancy Review Board
GPOC	Government Point of Contact
GTO	Government Test Organization
HAB	Handover Approval Board

Acronym	Definition
HAZMAT	Hazardous Material
HEO	Highly Elliptical Orbit
HHQ	Higher Headquarters
HVAC	Heating, Ventilation and Air Conditioning
HW	Hardware
Hz	Hertz
IAO	Information Assurance Officer
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IPT	Integrated Product Team
IQT	Initial Qualification Trainer
KVA	kilo-volt-ampere
LARC	Launch Anomaly Resolution Center
LIR	Low Impedance Risers
MCS	Mission Control Station
MCSB	Mission Control Station Backup
MTAB	Mission Transfer Approval Board
NCB	Network Control Board
NEC	National Electrical Code
NFPA	National Fire Protection Association
NLT	No Later Than
OAP	Operations Acceptance Panel
OARB	Operational Assessment Review Board
OASB	Operations Approval Sub Board
OBR	Overhead Persistent Infrared Baseline Release
OBAC	Overhead Persistent Infrared (OPIR) Battlespace Awareness Cell
OBE	Overcome By Events
OCONUS	Outside Contiguous United States
OOBM	Out of Band Management
OOC	Out of Cycle
OPIR	Overhead Persistent Infrared
Ops	Operations
OS	Operating System
OSHA	Occupational Safety and Health Administration
OSIS	OPIR Site Integration Standard
OT	Operational Test
PCA	Physical Configuration Audit
PDU	Room Power Distribution Unit

Acronym	Definition
PICO	Project Installation and Checkout
PIK	Project Integration Kickoff
PMI	Preventive Maintenance Inspection
POR	Program of Record
PR	Problem Report
PRWG	Problem Report Working Group
psf	Pounds per Square Foot
PSF	Product Support Facility
QA	Quality Assurance
RDU	Rack Power Distribution Unit
RE	Responsible Engineer
RGS	Relay Ground Station
RGSB	Relay Ground Station Backup
RGSE	Relay Ground Station Europe
RGSH	Relay Ground Station HEO
RGSM	Relay Ground Station MCS
RGSM2	Relay Ground Station MCS2
RGSP	Relay Ground Station Pacific
RMF	Risk Management Framework
RT	Roundtable
SA	System Administrator
SAGE	Space Awareness and Global Exploitation
SBIRS	Space Based Infrared System
SBR	SBIRS Baseline Release
SCF	Standard Change Form
SCI	Sensitive Compartmented Information
SCIF	Sensitive Compartmented Information Facility
SE&I	Systems Engineering and Integration
SEIT	Systems Engineering and Integration Team
SF	Space Force
SIB	System Integration Board
SMCS	Survivable Mission Control Station
SOC	Space Operations Center
SR	Schedule Request
SRG	Signal Reference Ground
SRGS	Survivable Relay Ground Station
SSC	Space Systems Command / SBIRS Support Center
SSO	Special Security Officer

Acronym	Definition
SSR	Special Security Representative
SST	Schriever Support Team
TAP	Tools, Application and Processing
TCTO	Time Change Technical Order
TEMP	Test and Engineering Management Plan
TO	Technical Order
TPS	Technical Power Systems
TS	Top Secret
UCN	Universal Control Number
UPS	Uninterruptible Power Supply
UQT	Unit Qualification Trainer
US	United States
USSF	United States Space Force
VAC	Volts Alternating Current
VAV	Variable Air Volume
VCN	Version Content Notification
VCR	Version Content Request
VOIP	Voice Over Internet Protocol