

**Dynamic Prototype BIM Manual for a
Security Force Facility – V1.0**

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TABLE OF CONTENTS

INTRODUCTION

Executive Summary	2
Goals	2
Scope and Use	2-3
Program Assumptions	
Kit of Parts	

GUIDELINE INTEGRATION

Site Design	4
Tool Utilization Strategies	
<i>Siting Requirements</i>	
<i>Circulation</i>	
<i>Establishing the Model</i>	
Additional Requirements and Integration Concepts	
<i>Parking & Site Considerations</i>	
<i>Site Amenities</i>	
<i>Landscape Architecture</i>	
Building Design	5-6
Tool Utilization Strategies	
1. <i>Structural</i>	
2. <i>Heating, Ventilation and Air Conditioning (HVAC)</i>	
3. <i>Plumbing</i>	
4. <i>Building Configuration</i>	
5. <i>Interior/Exterior Relationships</i>	
6. <i>Noise Considerations</i>	
7. <i>Architecture</i>	
8. <i>Interior Design</i>	
9. <i>Electrical</i>	
10. <i>Fire protection</i>	
Specifications	7
Tool Utilization Strategies	
LEED Checklist	7
Tool Utilization Strategies	
Software Requirements	7
Additional Requirements	

LIST OF FIGURES

Figure 1 – <i>Module Square Footage Comparisons</i>	8-11
Figure 2 – <i>Module 1: Police Service & Installation Security/ S5–Floor Plan</i>	12
Figure 3 – <i>Module 1: Police Service & Installation Security/ S5–Reflected Ceiling Plan</i>	12
Figure 4 – <i>Module 2: Guardmount/ Armory – Floor Plan</i>	13
Figure 5 – <i>Module 2: Guardmount/ Armory – Reflected Ceiling Plan</i>	13
Figure 6 – <i>Module 3: Mobility/Supply – Floor Plan</i>	14
Figure 7 – <i>Module 3: Mobility/Supply – Reflected Ceiling Plan</i>	14
Figure 8 – <i>Module 4: ECC/ BDOC – Floor Plan</i>	15
Figure 9 – <i>Module 4: ECC/ BDOC – Reflected Ceiling Plan</i>	15
Figure 10 – <i>Module 5: Training/Quality – Floor Plan</i>	16
Figure 11 – <i>Module 5: Training/Quality – Reflected Ceiling Plan</i>	16
Figure 12 – <i>Module 6: Confinement – Floor Plan</i>	17
Figure 13 – <i>Module 6: Confinement – Reflected Ceiling Plan</i>	17
Figure 14 – <i>Module 7: Investigation/ S2 – Floor Plan</i>	18
Figure 15 – <i>Module 7: Investigation/ S2 – Reflected Ceiling Plan</i>	18



Figure 16 – <i>Module 8: Command/Orderly – Floor Plan</i>	19
Figure 17 – <i>Module 8: Command/Orderly – Reflected Ceiling Plan</i>	19
Figure 18 – <i>Module 9A: Back of House Restrooms – Floor Plan</i>	20
Figure 19 – <i>Module 9A: Back of House Restrooms – Reflected Ceiling Plan</i>	20
Figure 20 – <i>Module 9B: General Support – Floor Plan</i>	21
Figure 21 – <i>Module 9B: General Support – Reflected Ceiling Plan</i>	21
Figure 22 – <i>Module 9C: Break Room – Floor Plan</i>	22
Figure 23 – <i>Module 9C: Break Room – Reflected Ceiling Plan</i>	22
Figure 24 – <i>Module 9D: Front of House Restroom – Floor Plan</i>	22
Figure 25 – <i>Module 9D: Front of House Restroom – Reflected Ceiling Plan</i>	22
Figure 26 – <i>Module 10: Operations & Training/ S3 – Floor Plan</i>	23
Figure 27 – <i>Module 10: Operations & Training/ S3 – Reflected Ceiling Plan</i>	23
Figure 28 – <i>Building Example Floor Plan 1</i>	24
Figure 29 – <i>Building Example Floor Plan 2</i>	25
Figure 30 – <i>File Directory Structure Example</i>	26

REFERENCES

Security Forces Facilities Design Guide

www.wbdg.org/ccb/AF/AFDG/securityforcefacilities.pdf

INTRODUCTION

Executive Summary

The intent of this Dynamic Prototype BIM (Building Information Model) Manual is to describe the process for utilizing the electronic design tool to improve efficiency and effectiveness in the implementation of the Security Forces Facilities Design Guide. This Dynamic Prototype is a flexible design model that leverages the advantages of BIM to standardize components of a building type (in this case a security force facility) through a schematic 3D model. Design models can vary from performance criteria to prescriptive criteria depending on the number of variables. For a security forces facility the prototype is utilizing a kit-of-parts approach. The kit-of-parts model contains an Architecture model with the intent that other disciplines will be added as the A/E develops the site.

Goals

The goal is to provide vital information from Security Forces Facilities Design Guide as well as lessons learned from installations into a BIM platform that will allow A/Es to quickly and easily produce a security force facility project design.

Scope and Use

During the design of this Prototype it became apparent that the square footage calculation that was generated in the prototype was significantly different from the Security Forces Facilities Design Guide based on differing requirements from the time the design guide was created. The design of the prototype was created with the assumption that the Design Guide will be updated to comply with the prototype. In all other areas however the prototype was designed in accordance with the Security Forces Facilities Design Guide, used as the primary reference document in the planning stages of the project. Additional assumptions for the models were made to test the assembly of the kit-of-parts models into a building that meets the space calculator spreadsheet. Examples of these arrangements can be found on *Illustration 3 – Assembled Plan Examples*. The assumptions for Version 1.0 are as follows:



1. Program Assumptions

- Each module is designed based on its specific function.
- The design guide will be updated to comply with the prototype
- All areas are open to adjustment to comply with relationships between groups
- Mechanical, Electrical, Telecommunication, and other building utility spaces will need to be designed and integrated depending upon the location and specific installation requirements.
- It is recommended by the design guide to use structural systems that allow for flexibility and expansion, minimize the number of load bearing walls to allow for reconfiguration, and to use structural systems that allow for large column free areas. All building systems should be explored based on installation-specific requirements.
- Building envelope systems may be applied based on installation-specific requirements.
- All unit configurations have been approved by the appropriate authority.
- Other reconfigurations of the units must meet the requirements listed in the Air Mobility Command: Security Force Facilities Design Guide.

2. Kit of Parts

a. Architectural

i. Kit-of-Parts (KoP) includes units:

- 1- Police Service & Installation Security/ S5
- 2-Guardmount/Armory
- 3- Mobility/Supply
- 4- ECC/ BDOC
- 5- Training/ Quality
- 6- Confinement
- 7- Investigation/ S2
- 8- Command/Orderly
- 9A- Back of House Restrooms
- 9B- General Support
- 9C- Break Room
- 9D- Front of House Restrooms
- 10- Operations & Training/ S3

ii. There is only one type for every grouping

b. Structural

- i. Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.

c. Mechanical

- i. Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.

d. Electrical

- i. Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.

e. Plumbing

- i. Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.

f. Fire Protection

- i. Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.



GUIDELINE INTEGRATION

Site Design

Tool Utilization Strategies

1. **Sitting Requirements**
 - Establish whether a one level or a two level facility should be utilized.
 - Confirm the facility includes 100% of the scope for the design
 - Coordinate sizing with the design guide.
 - Utilize the KoP to assemble the initial massing model.
 - Configure model to the appropriate site dimensions and established setback requirements listed in the AMC- SFFDG and other references.
 - After sighting has been set ungrouping can be used to speed up work flow
2. **Circulation**
 - Ideas and concepts should be explored through other mediums quickly before narrowing the concepts to the selected proposition.
 - Establish site circulation to maximize building site efficiency.
 - Create outdoor spaces that are extensions of the building entrances allowing for small groups to stop and gather.
 - After all site circulation constraints and sitting requirements have been established the A/E should utilize the prototype tool to configure the initial massing model.
3. **Establishing the Model**
 - A/E is responsible for establishing a clear File Directory Structure (*Refer to Illustration 4 – File Directory Structure Example*).
 - See Attachment F to the contract for full extent of BIM related deliverables.

Additional Requirements and Integration Concepts

1. **Parking & Site Considerations**
 - All disciplines need to have their own model that is linked to the master model.
 - All work shall be in 3D with associated parametric information and linked to the master model.
 - Establish finish floor and floor-to-floor elevations early in the process.
 - Coordinate utilities between all disciplines early in the process.
2. **Site Amenities**
 - Small structures shall reside within discipline models.
 - In the example of site furniture and site lighting establish the furniture in the landscape architect's model and the site lighting in the electrical engineer's.
 - Coordinate site amenities early and allocate the work to the responsible disciplines.
3. **Landscape Architecture**
 - Like Civil, the work developed within the discipline of landscape architecture is very specific to the installation and should be developed in 3D with associated data to inform and develop the coordination between other disciplines.



Building Design

Tool Utilization Strategies

1. Structural
 - Not included in the (KoP), intended to be designed and inserted on a project by project basis. Space has been allocated for such elements.
 - A/E shall provide cost analysis on 3 structural systems that satisfy AMC-SFFDG.
 - A/E will need to run load calculations and size members and spacing depending upon final building configuration.
2. Heating, Ventilation and Air Conditioning (HVAC)
 - The prototype provides a starting point for the A/E with systems that already meet Air Force design criteria.
 - Location of the building and type of unit will determine the unit climate zone the A/E selects as a starting point for the HVAC system design.
 - HVAC systems may be proposed on a life cycle cost analysis basis. The systems utilized must enable the building to meet the requirements of EPAAct 2005 as well as LEED.
 - A/E will need to run load calculations for the actual climate zone in order to properly select equipment, size ductwork, select diffusers/grilles, and size piping. The configuration of mechanical chases can be adjusted for each site location depending on Base requirements.
 - Overall building systems such as outside air pretreatment, exhaust air collection, and method of chilled and heating water production to be determined by A/E.
 - All HVAC equipment such as diffusers, and FCU's should be linked to schedules. This allows any changes that are made to the equipment data within the model to automatically update the associated schedules.
 - All equipment, ductwork, piping, diffusers, dampers, etc. should have been created as families within the model.
3. Plumbing
 - The piping within the units should be sized in accordance with Uniform Plumbing Code (UPC) by the A/E.
 - Sizes for plumbing risers to be determined by A/E based on the actual building height.
 - Overall building plumbing systems such as the method of producing domestic hot water to be determined by A/E.
 - Location(s) of water heaters either in centralized location or multiple locations to be determined by A/E.
 - All piping, and plumbing fixtures have been created as families within the model and are intended as place holders for routing purposes. Actual sizes to be determined by A/E.
4. Building Configuration
 - Building Circulation – In developing the site circulation the building circulation will become apparent. In deciding the building's circulation the A/E should be aware that the units presented are intended for any building footprint:
 - In developing the model it is required to use the provided kit-of-parts as a starting point. Each unit is a group and should remain a group to leverage the efficiency of BIM. By the time the A/E begins Construction Documents and is solely developing details there may come a logical point to not utilize groups any longer in this manner. (*Refer to Illustration 2 for Group Manipulation Example*).



5. Interior/Exterior Relationships
 - Building Circulation – Develop a clear path of travel, consider egress distances and associated site considerations to design not only the location of the hardscapes but the surrounding landscape and the creation of outdoor gathering areas.
 - Civil and Landscape Models – 3D models that work with the specified BIM platform shall be developed concurrently with the other disciplines and maintained as a linked and integral part of the project development.
6. Noise Considerations
 - Wall types – Develop clear requirements as per the AMC- SFFDG and manipulate existing wall types as needed.
7. Architecture
 - Building Envelope – Designs shall amplify the local architectural character through the development of the building envelope.
 - Glazing Systems – The prototypes have windows as current place holders within the wall types. The ultimate size and quantities depend upon installation requirements and building envelope design.
 - Coordinate chases within units after mechanical system is selected.
8. Interior Design
 - Comprehensive Interior Design – The furniture provided within the model only dictates the scale and placement of furniture for the units. A/E's should develop a comprehensive interior design package per installation requirements.
 - Finishes and Materials – The prototype units have the Air Force's preference modeled and the guidelines list some options. The A/E may explore other options as long as they meet or exceed the materials' characteristics listed.
 - Bathrooms and Kitchens – The prototype units provide cabinets and millwork for dimensional purposes only. The A/E can alter the style, countertops, and back splashes to fit the appropriate aesthetics of that particular installation.
9. Electrical
 - Exterior lighting and other associated work with the buildings exterior or landscape will be developed as part of the local installation design.
 - Building electrical loads and service to be determined by A/E.
10. Fire Protection
 - Sprinkler heads are to be laid out in accordance with NFPA 13, *Installation of Sprinkler Systems*.
 - There is flexibility within the model to locate heads depending upon modifications in the floor plan to meet base needs.
 - Fire alarm equipment should be laid out within the model in accordance with NFPA 72, *National Fire Alarm Code*.

Specifications

Tool Utilization Strategies

1. e-SPECS for Revit 2011 with MASTERSPEC 2004
 - ESspecs links specifications sections with objects in the Prototypes through the use of assembly codes listed within each objects property elements.
 - After all of the specification sections have been properly bound to the objects within Revit notes on drawings will be coordinated, listing the same language tied to the specification language. Text will be consistent and concise.
 - Specifications for the prototypes have been developed based upon the AMC-SFFDG and the developed Prototypes
 - Other specifications specific to the development of the full design at local installations will need to be developed. Some of these include:
 - Civil associated specifications



- Landscape associated specifications
 - Foundation systems
 - Building envelope
 - Roof structure
 - Mechanical Specifications
 - Electrical Specifications
 - Plumbing Specifications
 - Fire Protection Specifications
2. Linking ESspecs for Prototypes
- A Microsoft SQL database will be provided on the website for download. This database will contain all information related to the prototype project manual. This also holds the bindings to each Revit file.
 - E-Specs for Revit should be installed per installation instructions given by InterSpec (<http://www.e-specs.com/>).
 - E-Specs for Revit plug-in should also be installed per installation instructions given by InterSpec (<http://www.e-specs.com/>).
 - Special interaction will be required to ensure that the database file downloaded is set as the main database file during installation.
 - A uniformClassifications.txt file will be provided which contains information on bindings from and to Revit and E-Specs. This must be placed in the following directory: C:\Program Files\Revit Architecture 2009\Program
 - Once files have been downloaded all questions and problems related to integration and setup of E-Specs should be directed to InterSpec @ 888-50-SPECS.

LEED Checklist

Tool Utilization Strategies

1. LEED 2009 Checklist
 - Consolidates all points from Federal Mandates and creates an initial starting point for the A/E to utilize.

Software Requirements

Additional Requirements

1. Autodesk Revit 2011 or higher (latest Service Pack)
 - Revit was utilized in developing the Prototypes and shall be utilized in developing all discipline models.
2. E-Specs for Revit (latest release) with MASTERSPEC 2004
 - E-Specs for Revit 5.0 was utilized in developing the Prototypes specifications and shall be utilized in developing the specifications throughout the completion of design.
 - MASTERSPEC 2004 licenses must be purchased as E-Specs uses MASTERSPEC 2004 format.
 - E-Specs and Masterspec are separate entities and each require the purchase of software/Licenses which can be coordinated through InterSpec.
 - Software licensing agreements will supersede all information in this document and must be followed.



Figure 1. *Module Square Footage Comparisons*

Square Footage Comparison			
Room Number	Room Name	Bim Manual Required Area	Actual Area

Module 1: Police Services & Installation Security/ S5

1.01	Chief's Office	150 SF	150 SF
1.02	Plans Office	120 SF	121 SF
1.03	Installation Security Office	120 SF	121 SF
1.04	Reports & Analysis	150 SF	151 SF
1.05	Open Office Area	1100 SF	1117 SF
1.06	Waiting Room	120 SF	121 SF
1.07	Counter Area at Lobby	60 SF	60 SF
1.08	Files/ Equipment/ Supply Storage	100 SF	98 SF
1.09	Computer Storage	100 SF	100 SF

Module 2: Guardmount/Armory

2.01	Guardmount Area	740 SF	736 SF
2.02	Ammunition Storage	150 SF	150 SF
2.03	NCOIC Armory Office	120 SF	119 SF
2.05	Restroom	60 SF	54 SF
2.06	Gear Lockers	920 SF	919 SF
2.07	Weapons Issue Area	220 SF	211 SF
2.08	Weapons Storage	300 SF	300 SF
2.09	Issue Windows	160 SF	165 SF
2.10	Weapons Cleaning Area	120 SF	113 SF
2.11	Transient Weapons Storage	100 SF	100 SF
2.12	Personal Weapons Storage	64 SF	64 SF

Module 3: Mobility/Supply

3.01	Maintenance Supply	400 SF	400 SF
3.02	Open Office Area	220 SF	224 SF
3.03	Logistics Officer	120 SF	120 SF
3.04	Supply Room	1200 SF	1205 SF
3.05	Advisor Resource Office	120 SF	120 SF
3.06	Hazmat Storage	140 SF	143 SF



Room Number	Room Name	Bim Manual Required Area	Actual Area
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Module 4: ECC / BDOC

4.01	Alarm Room	120 SF	126 SF
4.02	Server Room	80 SF	83 SF
4.03	Battle Staff Room	150 SF	144 SF
4.04	Communication Center	300 SF	288 SF
4.05	Waiting Area	140 SF	139 SF
4.06	Interview Room A	80 SF	73 SF
4.07	Interview Room B	80 SF	73 SF
4.08	Restroom	80 SF	50 SF
4.10	Flight Sergeant	120 SF	120 SF
4.11	Flight Chief	200 SF	178 SF
4.12	Break Room	140 SF	133 SF
4.13	Patrol Room	150 SF	164 SF
4.14	DUI	90 SF	92 SF
4.15	Holding Cell A	90 SF	92 SF
4.16	Man Trap	140 SF	138 SF
4.17	Storage	90 SF	90 SF
4.18	Holding Cell B	90 SF	90 SF
4.19	Restroom	60 SF	58 SF

Module 5: Training/Quality

5.01	Training Officer Office	150 SF	154 SF
5.02	Superintendent	150 SF	154 SF
5.03	Classroom A	750 SF	752 SF
5.04	Quality Control NCOIC Office	120 SF	120 SF
5.05	Private Testing Room A	80 SF	77 SF
5.06	Private Testing Room B	80 SF	77 SF
5.07	Shared Office	130 SF	132 SF
5.08	Study Carrells	120 SF	117 SF
5.09	Open Office Area	400 SF	407 SF
5.10	Storage	50 SF	55 SF
5.12	Central Conference Area	150 SF	145 SF
5.13	Classroom B	750 SF	752 SF
5.14	Files/Office Equipment/ Supply	160 SF	165 SF
5.15	Classroom Storage	130 SF	130 SF



Room Number	Room Name	Bim Manual Required Area	Actual Area
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Module 6: Confinement

6.01	Waiting	125 SF	131 SF
6.02	SP	100 SF	68 SF
6.03	Admin. Processing	180 SF	182 SF
6.04	Storage	100 SF	127 SF
6.05	Janitor's Closet	60 SF	73 SF
6.06	Restroom	60 SF	64 SF
6.07	Female Shower	60 SF	68 SF
6.08	Female Cell	80 SF	80 SF
6.09	Female Segregated Cell	80 SF	80 SF
6.10	Male Segregated Cell	80 SF	80 SF
6.11	Male Cell	80 SF	80 SF
6.12	Male Shower	60 SF	68 SF
6.13	Visitation/Training Room	120 SF	125 SF
6.15	Guard Room	120 SF	112 SF
6.16	Day/Recreation Room	150 SF	144 SF
6.17	Outdoor Yard	250 SF	258 SF

Module 7: Investigation/S2

7.01	Evidence Storage Vault	175 SF	175 SF
7.02	Intel (S2) Office	120 SF	120 SF
7.03	Files/ Equipment/ Supply Storage	100 SF	107 SF
7.05	NCOIC Investigations	120 SF	120 SF
7.06	Open Office/ Conference Area	375 SF	372 SF
7.07	Interview 1	100 SF	110 SF
7.08	Waiting Area	80 SF	83 SF
7.09	Interview 2	100 SF	95 SF

Module 8: Command/Orderly

8.01	Files/ Office Equipment/ Supply Storage	60 SF	58 SF
8.02	Open Office Area	650 SF	642 SF
8.03	First Sergeant	150 SF	153 SF
8.04	Waiting Area/ Secretary	220 SF	220 SF
8.06	Files/ Office Equipment/ Supply Storage	160 SF	160 SF
8.07	SFM	180 SF	182 SF
8.08	Commander	300 SF	289 SF
8.09	Command Conference Room	400 SF	410 SF



Room Number	Room Name	Bim Manual Required Area	Actual Area
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Module 9A: Back of House Restrooms

9A.1	Male Restroom	400 SF	404 SF
9A.2	Female Restroom	400 SF	404 SF
9A.3	Janitor	60 SF	69 SF

Module 9B: General Support

9B.1	Mechanical Room	860 SF	860 SF
9B.2	General Office Storage	220 SF	215 SF
9B.3	Electrical/ Comm. Equipment Storage	200 SF	192 SF

Module 9C: Break Room

9C.1	Break Room	500 SF	564 SF
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Module 9D: Front of House Restroom

9D.1	Restroom	60 SF	56 SF
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Module 10: Operations & Training/ S3

10.01	S3 Officer	120 SF	125 SF
10.02	S3 SMGT	120 SF	127 SF
10.03	Work Stations	100 SF	100 SF
10.04	Planning Area	225 SF	233 SF
10.05	Assistant S3 MSGT	120 SF	124 SF
10.06	PMD	120 SF	127 SF



INDIVIDUAL MODULE FLOOR PLANS



Figure 2. Module 1: Police Service & Installation Security/ S5 – Floor Plan

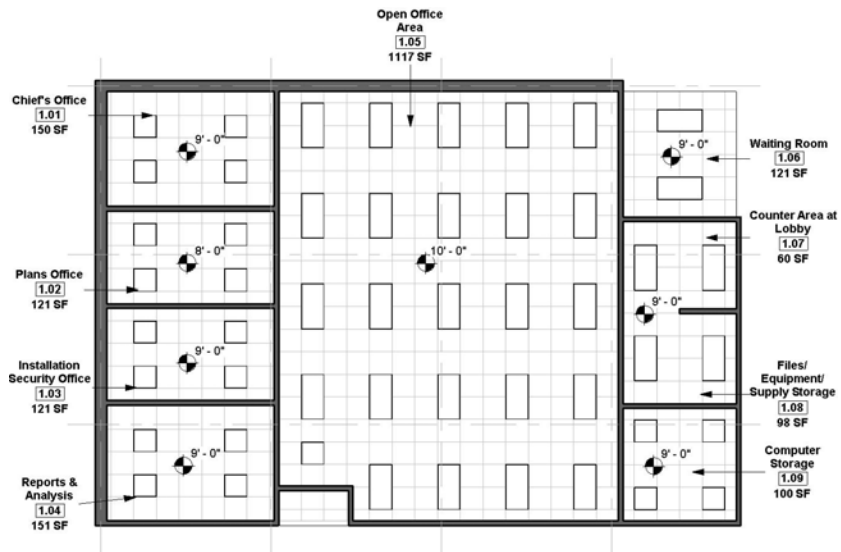


Figure 3. Module 1: Police Service & Installation Security/ S5 – Reflected Ceiling Plan

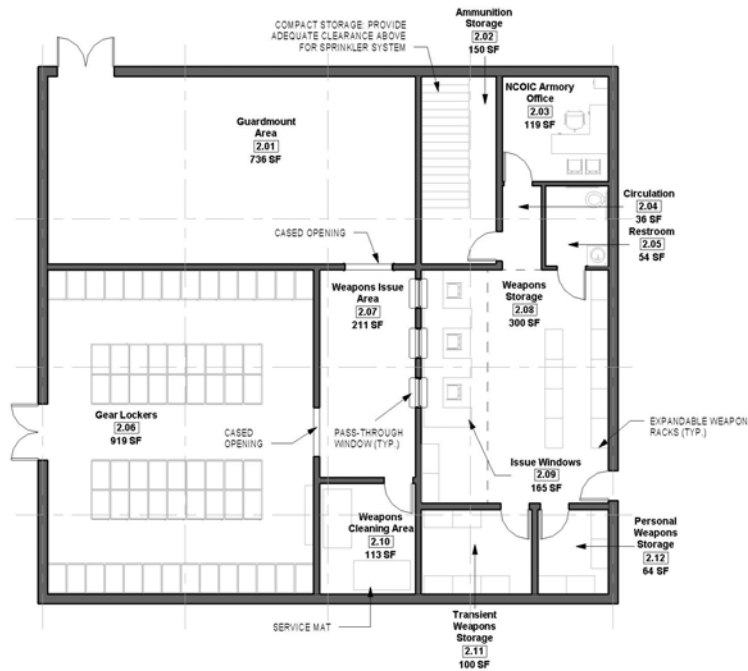


Figure 4. Module 2: Guardmount/ Armory – Floor Plan

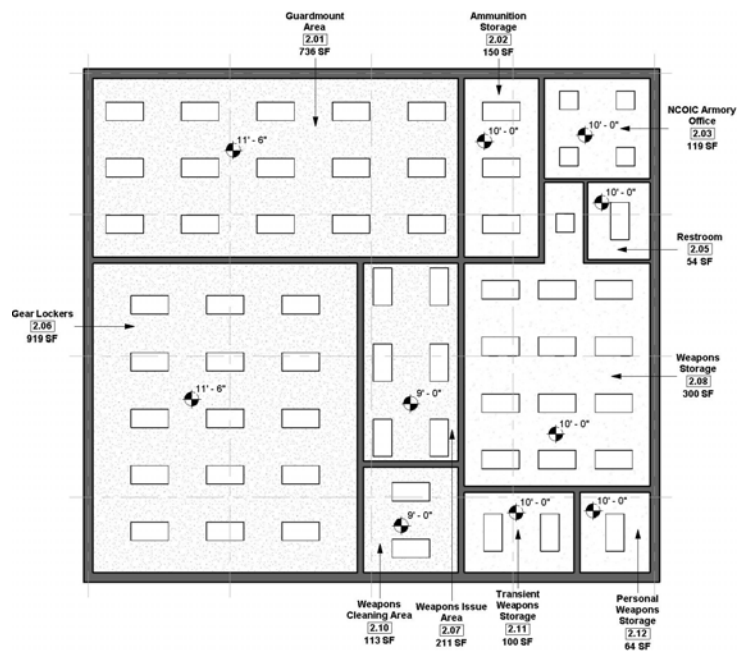


Figure 5. Module 2: Guardmount/ Armory – Reflected Ceiling Plan



Figure 6. Module 3: Mobility/Supply – Floor Plan

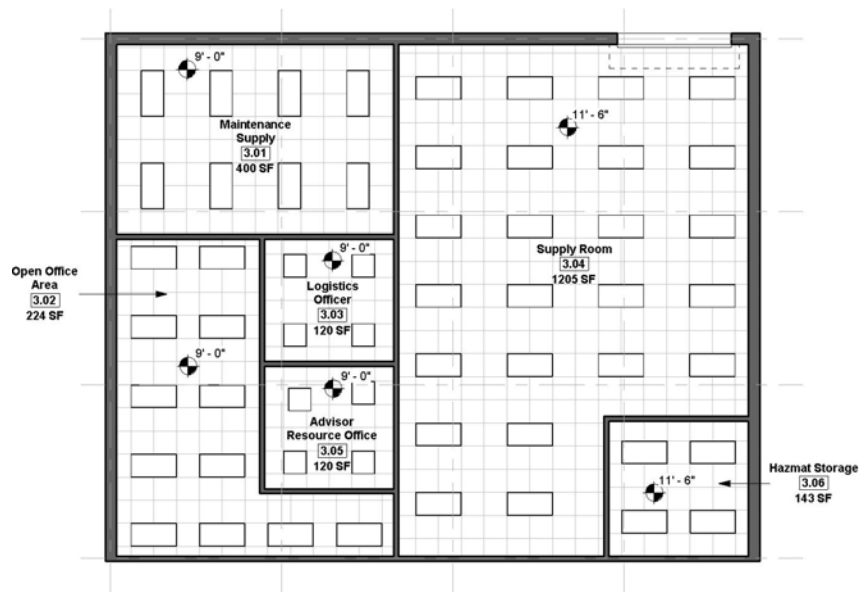


Figure 7. Module 3: Mobility/ Supply – Reflected Ceiling Plan

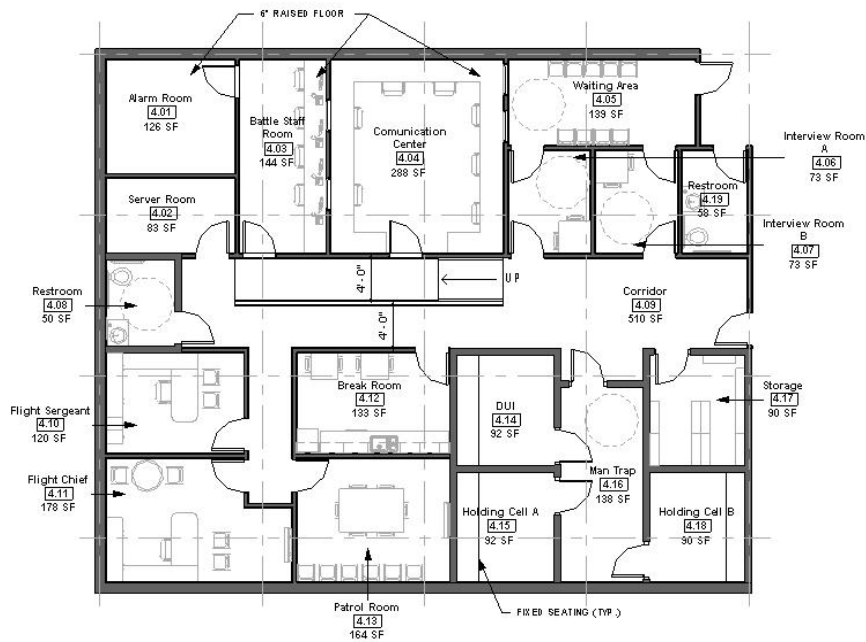


Figure 8. Module 4: ECC/ BDOC – Floor Plan

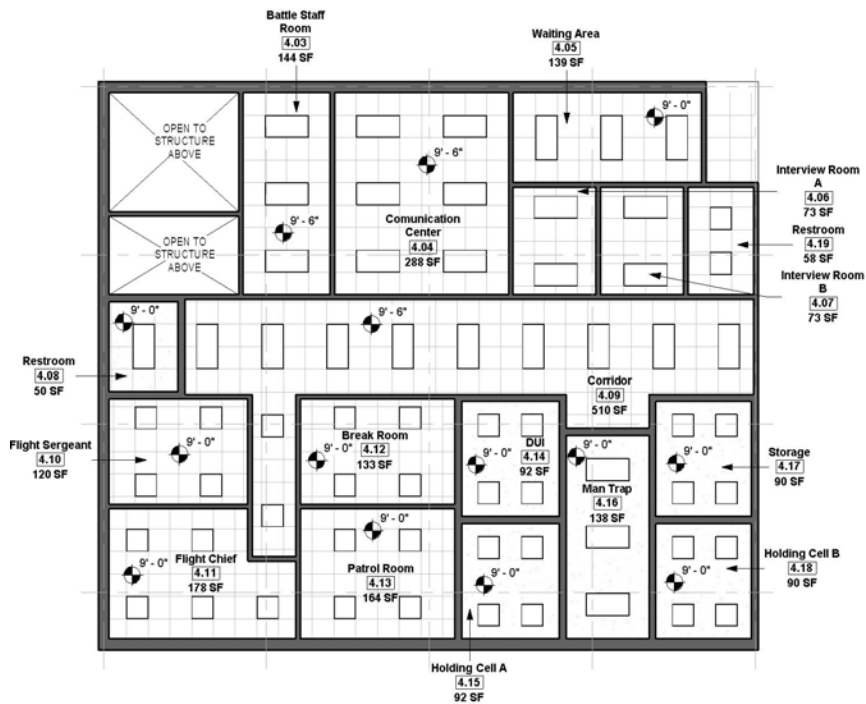


Figure 9. Module 4: ECC/ BDOC – Reflected Ceiling Plan

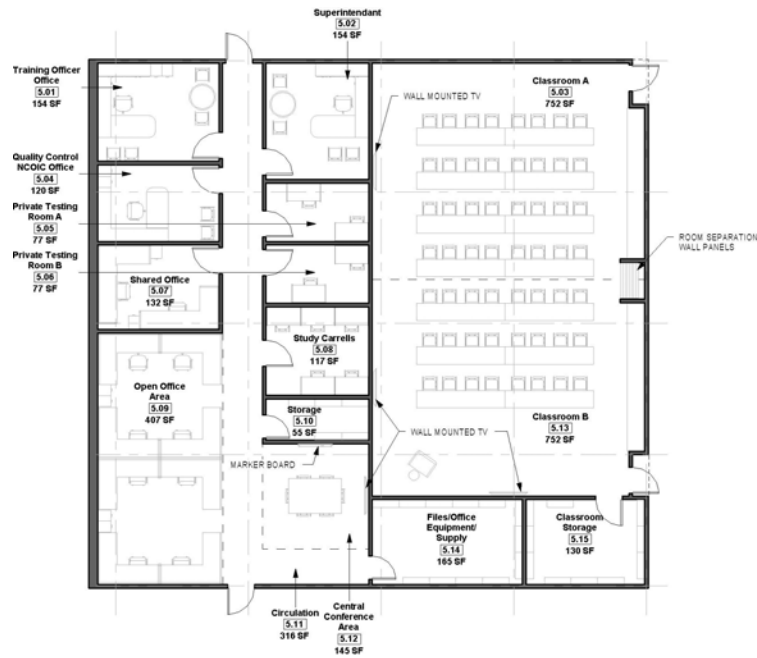


Figure 10. Module 5: Training/Quality – Floor Plan

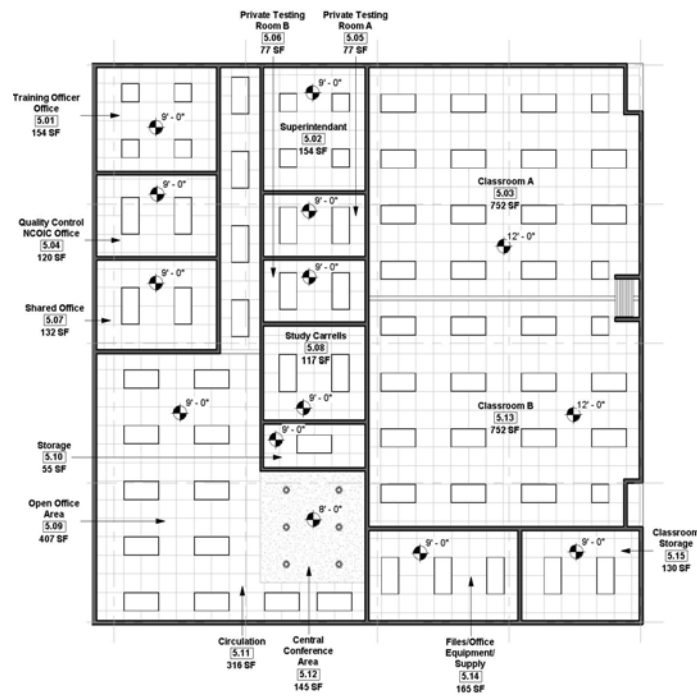


Figure 11. Module 5: Training/Quality – Reflected Ceiling Plan

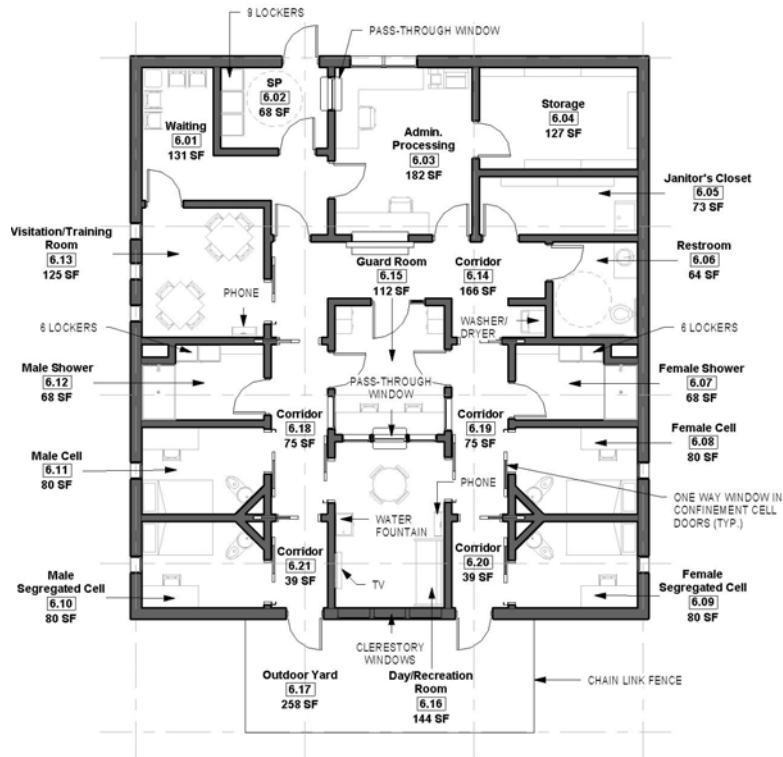


Figure 12. Module 6: Confinement – Floor Plan

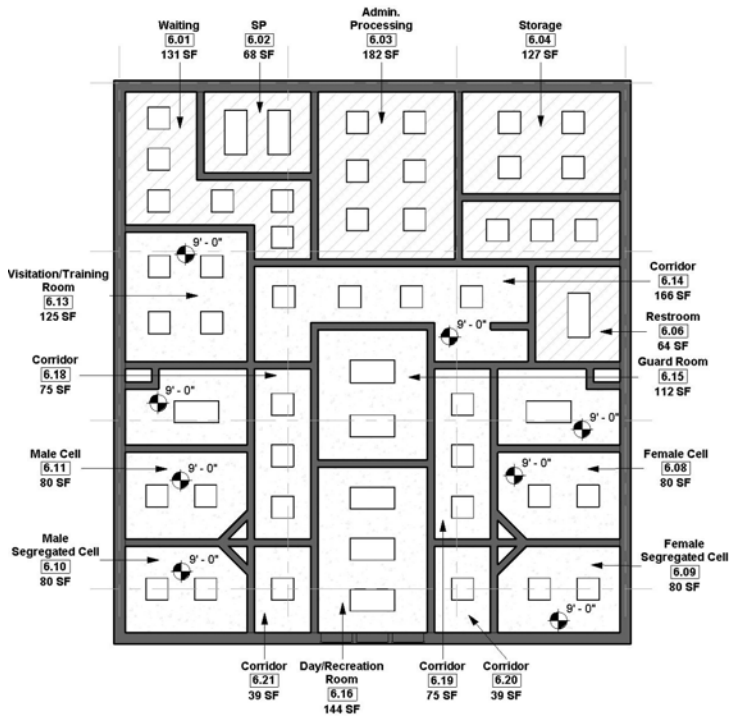


Figure 13. Module 6: Confinement – Refelcted Ceiling Plan

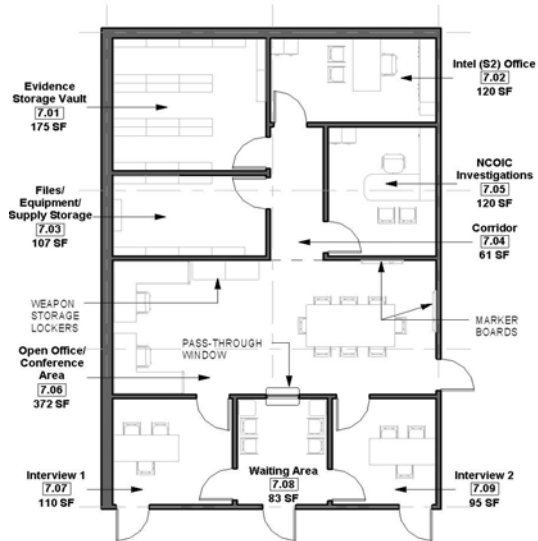


Figure 14. Module 7: Investigation/ S2 – Floor Plan

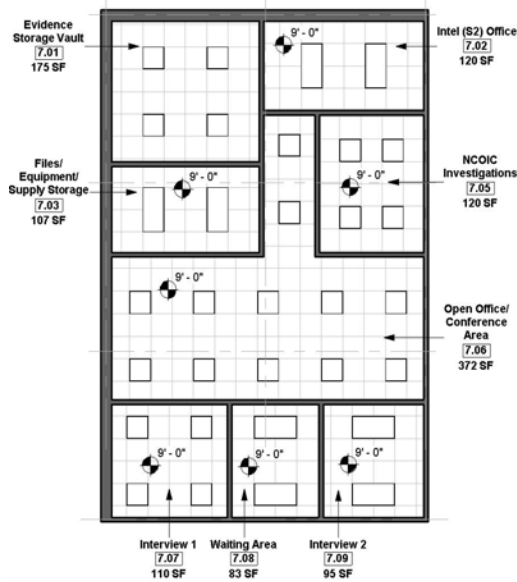


Figure 15. Module 7: Investigation/ S2 – Reflected Ceiling Plan



Figure 16. Module 8: Command/Orderly – Floor Plan

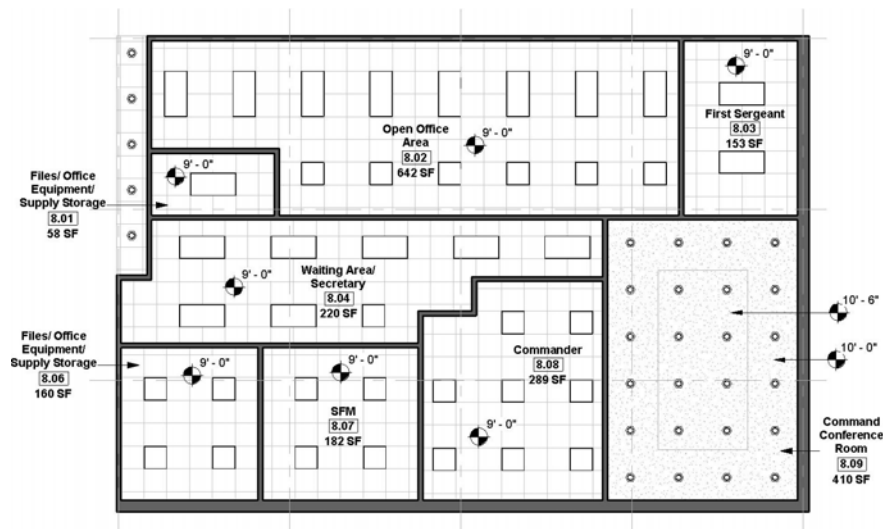


Figure 17. Module 8: Command/Orderly – Reflected Ceiling Plan

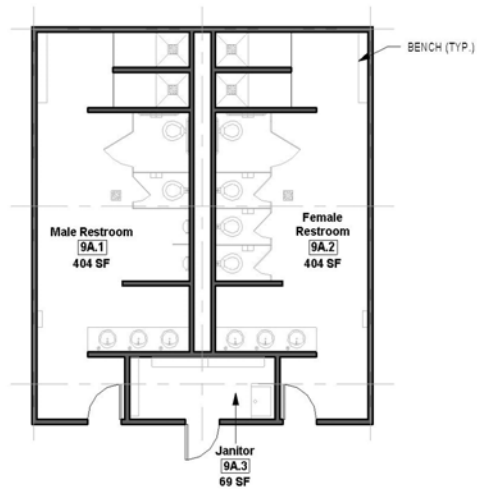


Figure 18. Module 9A: Back of House Restrooms – Floor Plan

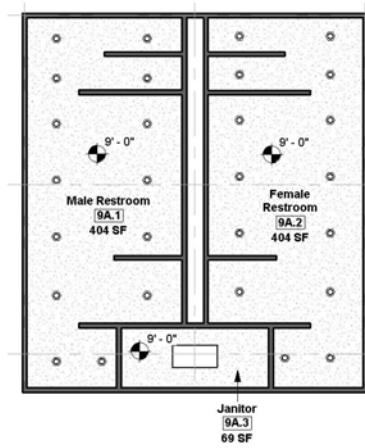


Figure 19. Module 9A: Back of House Restrooms – Reflected Ceiling Plan

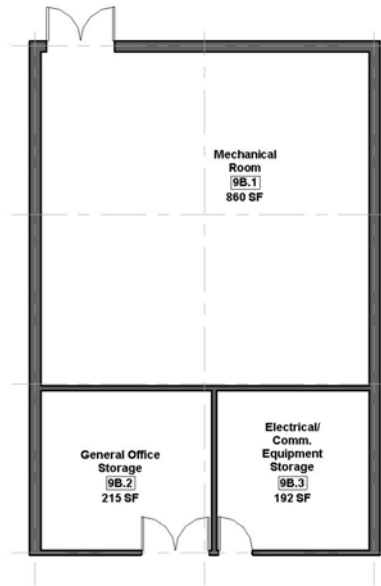


Figure 20. *Module 9B: General Support – Floor Plan*

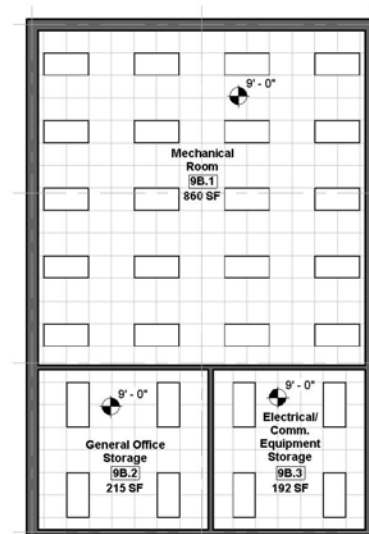


Figure 21. *Module 9B: General Support – Reflected Ceiling Plan*

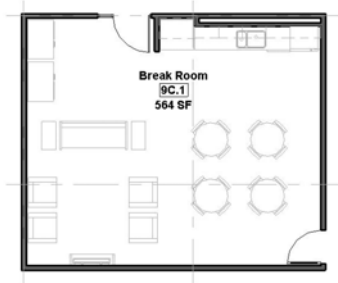


Figure 22. Module 9C: Break Room – Floor Plan

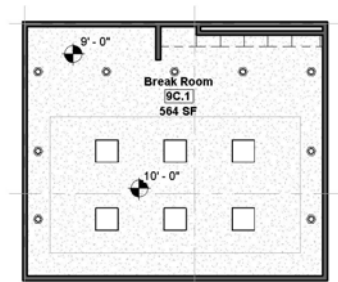


Figure 23. Module 9C: Break Room – Reflected Ceiling Plan

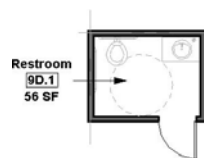


Figure 24. Module 9D: Front of House Restroom – Floor Plan

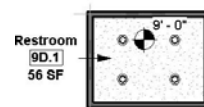


Figure 25. Module 9D: Front of House Restroom – Reflected Ceiling Plan

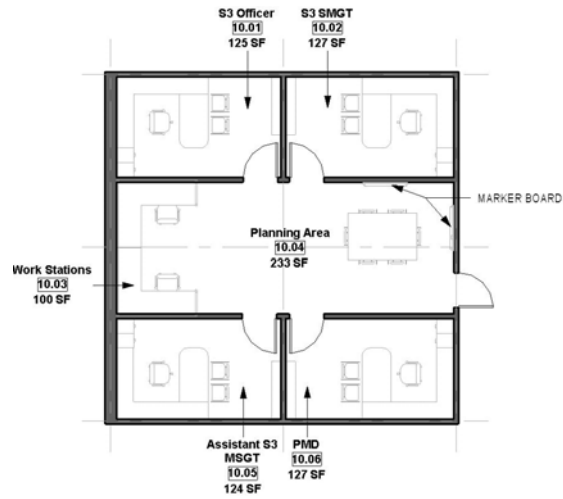


Figure 26. Module 10: Operations & Training/ S3 – Floor Plan

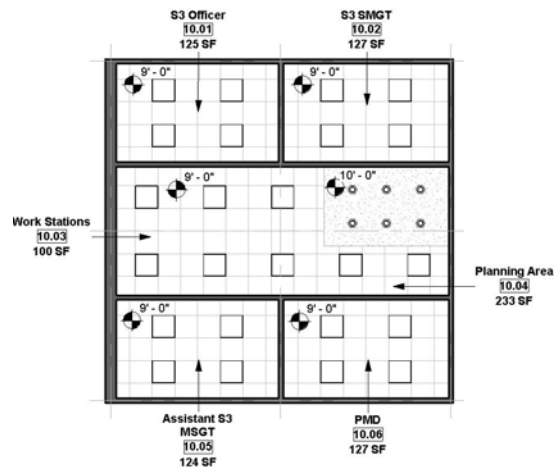


Figure 27. Module 10: Operations & Training/ S3 – Reflected Ceiling Plan



Figure 28. Building Example Floor Plan 1

* This building layout is provided to illustrate one possible way of arranging the individual modules. It is not intended to constitute a final design.





Figure 29. *Building Example Floor Plan 2*

* This building layout is provided to illustrate one possible way of arranging the individual modules. It is not intended to constitute a final design.





Figure 30. File Directory Structure Example

FILE DIRECTORY STRUCTURE

