

Pre-Fabricated Facilities For HEMP /EMP / IEMI Protection



An alternative to traditional construction

Features

- Designed and Configured as needed
 - Size and Compartmentalization
 - Electrical Service and Lighting
 - Heating and Cooling
 - Communications, IT, and Data Networks
 - Electronic Security Systems
- Continuously Welded $\frac{1}{4}$ " Steel Exterior Shell
- Equipment Integration Design & Installation
- 3rd Party HEMP Testing and Certification



Advantages

- Shielding Effectiveness
- Designed to meet your specific requirements and applications
- Manufactured off site in a controlled environment
- Equipment can be integrated at the factory
- Quick and easy installation, “Plug & Play”
- Cost effective
- Flexibility – ability to relocate without loss of structural integrity

Limitations

- Transportation –

- Height Restrictions
- Width Restrictions
- Length Restrictions

- Interior Dimensions Limited

- Understand Equipment and Space Requirements

- Can Combine Units to Form Duplexes & Multiplexes

- Limits for functionality and cost

- Part of a Shielding System

RF Shielding for TEMPEST & HEMP/EMP Protection

- RF Shielding for Resilient Structures
 - Equipment Protection
 - Continuous Operations
- Forced Entry & Ballistic Resistance for Additional Hardening
- SCIF – Command & Control
- Communications Shelters
- SCADA Control Systems
- Hardened Data - IT Modules
- Power Modules – Generators
- Electric Utility Substations

How much EMP is needed to destroy your data equipment?

- Volts per meter (V/m) are the standard units of electric field strength used to determine electromagnetic immunity in products and equipment.
- Most electronic equipment can survive a pulse of 10 Volts per meter.
- An EMP would create a pulse higher than 10,000 V/m.

Courtesy of Michael A. Caruso, HEMP/IEMI Facility Design

Immunity Standards

- IT Equipment - 10 Volts/meter
- Medical Equipment – 10 Volts/meter
- Network Telephone Equipment – 10 Volts/meter
- Aircraft- (HIRF) 7,200 Volts/meter
- Automobiles – 100 Volts/meter
- Military Equipment – 200 Volts/meter

Courtesy of Michael A. Caruso, HEMP/IEMI Facility Design

Threat Level Attenuation

Threat Level	50,000 V/m	40,000V/m	30,000 V/m	20,000 V/m	10,000v/m
Attenuation	Resulting Volts per meter				
100 dB	0.5	0.4	0.3	0.2	0.1
80 dB	5	4	3	2	1
70 dB	15	13	9.5	5	3
60 dB	50	40	30	20	10
50 dB	150	125	94	50	31
40 dB	500	400	300	200	100
30 dB	1550	1250	940	630	310

Courtesy of Michael A. Caruso, HEMP/IEMI Facility Design

How do Pre-Fabricated Facilities with $\frac{1}{4}$ " Steel Exterior Perform?



RF Testing



RF Shielding Effectiveness Testing has been done by (3) 3rd Party Agencies and Test Results are available upon request.

(3) 3rd Party Tested & Certified

● ETS Lindgren

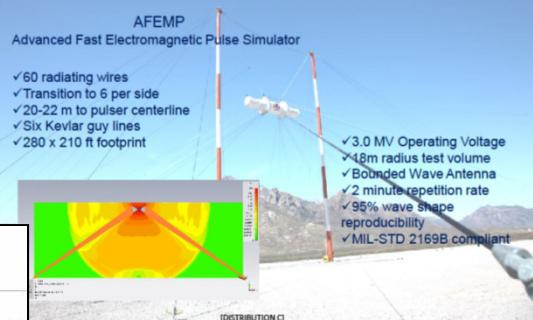
- MIL-STD-188-125
- NSA 94-106



● Air Force Research Laboratory (AFRL)

- White Sands Missile Range
- Advanced Fast Electromagnetic Pulse Simulator
- MIL-STD-188-125

Electromagnetic Pulse System



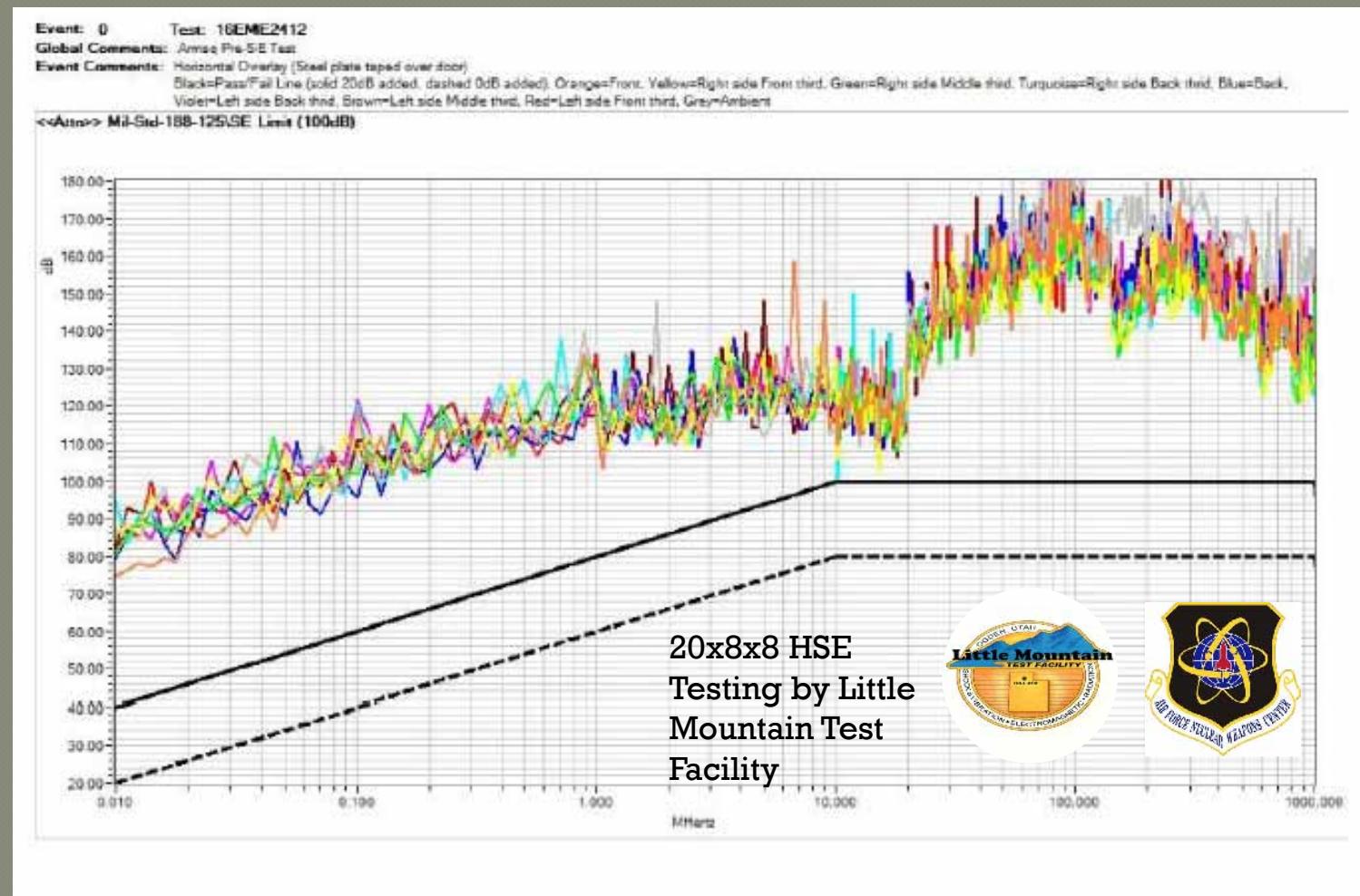
● Boeing Little Mountain Test Facility

- MIL-STD-188-125 Enhanced 20dB



Combined Test Results

MIL-STD-188-125 Enhanced+20dB



Multiple Sizes



Singles



Duplexes



Triplexes



Multiplexes

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RF Production Processes and Equipment

- Certified Welders
- ACCU-PULSE Welders
- Welding Surface Prep
- Weld Log & QA



Flame Spray Metallization Dye Penetrant Testing of all HEMP Welds

- Flame Spray Metallization of Surfaces
- Dye Penetrant Testing



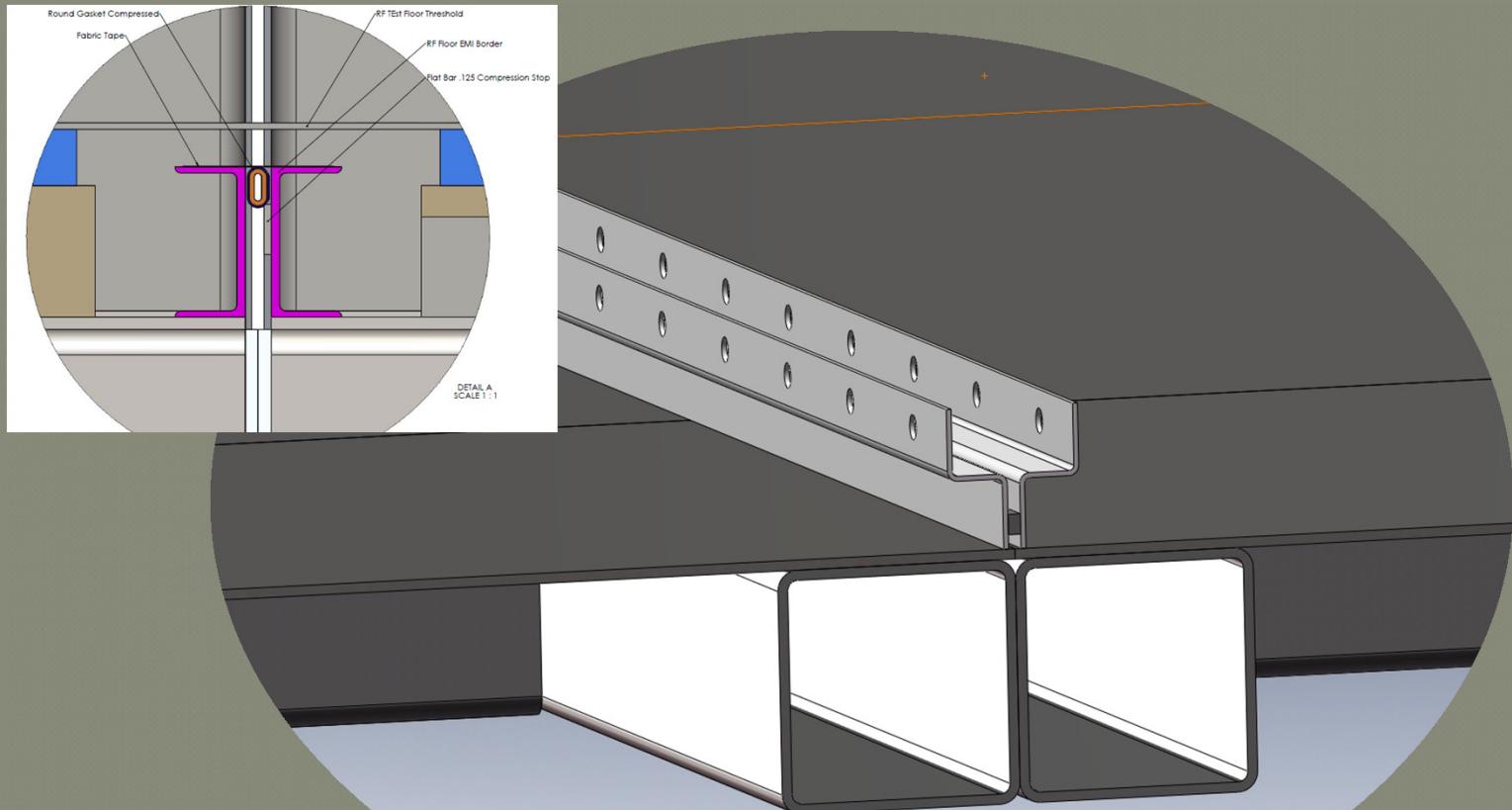
RF Construction Features



- Welded In Wave Guide Pipes
- RF Filter Mounts
- Tubular Steel Base w/ Drain-Fiber Test Port



Welded or Patent-Pending Bolted RF Seams



Tested to 188-125 and NSA 94-106 SE Requirements

Protected Points of Entry (POE)

- Fiber Optic WVG-12 & Wave Guides
- RF Power & Signal Filters
- Environmental Protected Junction Boxes

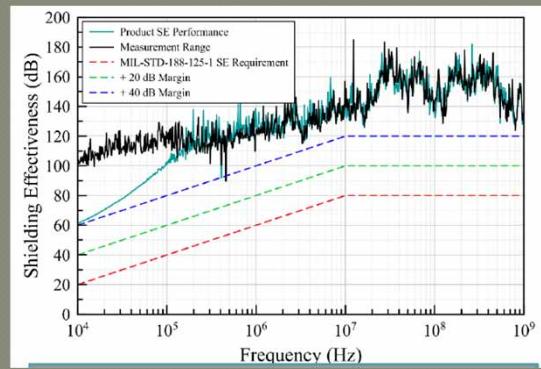


RF Shielded Doors

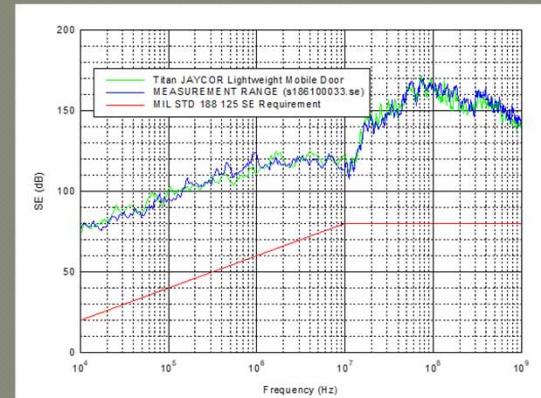


Typical Single Knife Edge RF Doors (120dB @ 10 GHz)

RF Shielded Doors Options

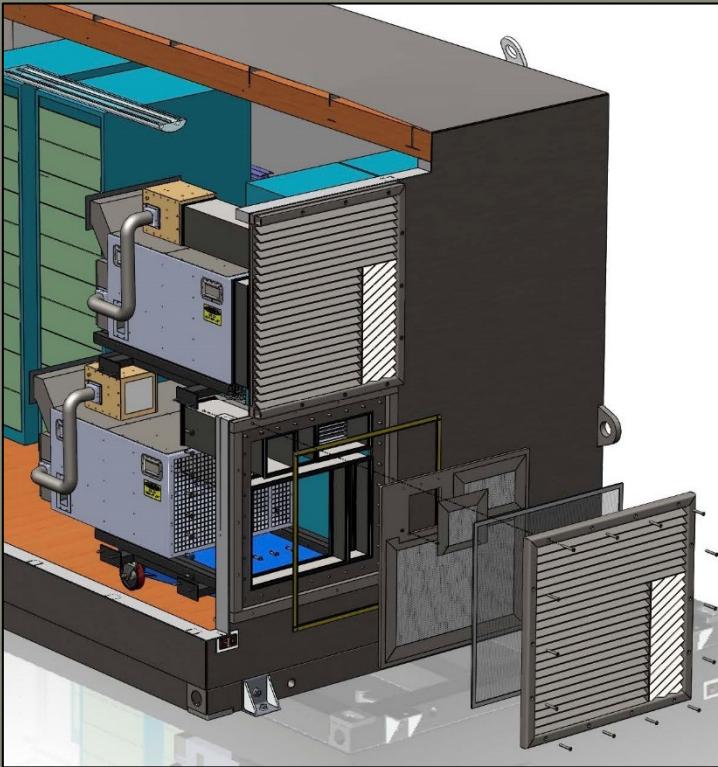


High Performance
RF SKE Doors



Welded & Bolt-On Wave Guides

- Bolt-On Wave Guides
- Flame Spray
- Environmental and RF Gaskets

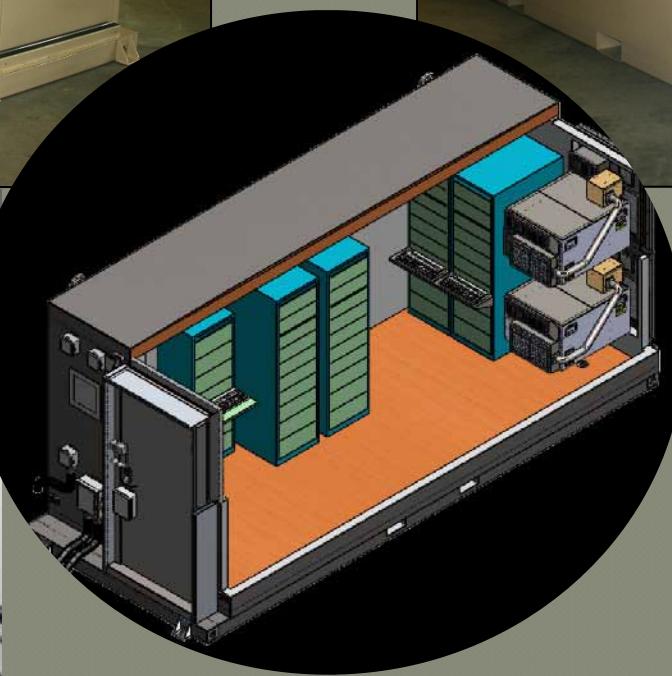


RF Construction Features



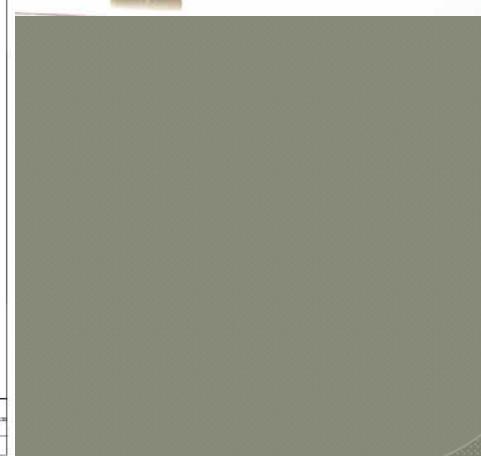
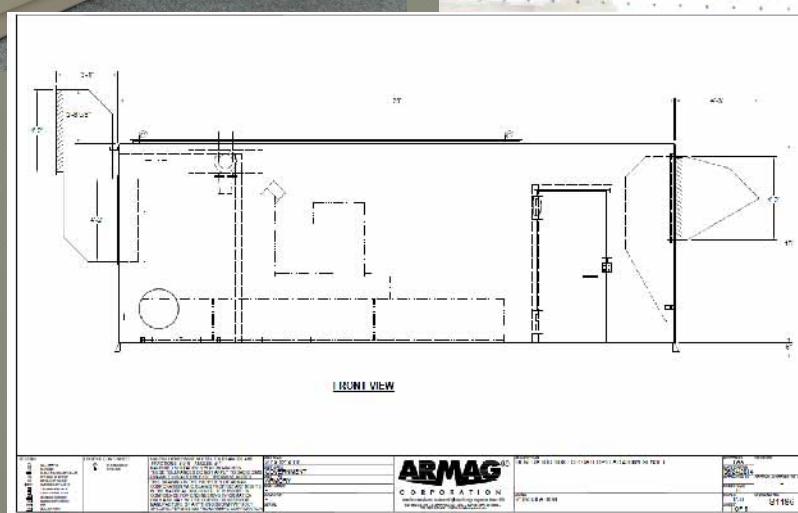


Communications HEMP Shelter Enclosure (HSE)

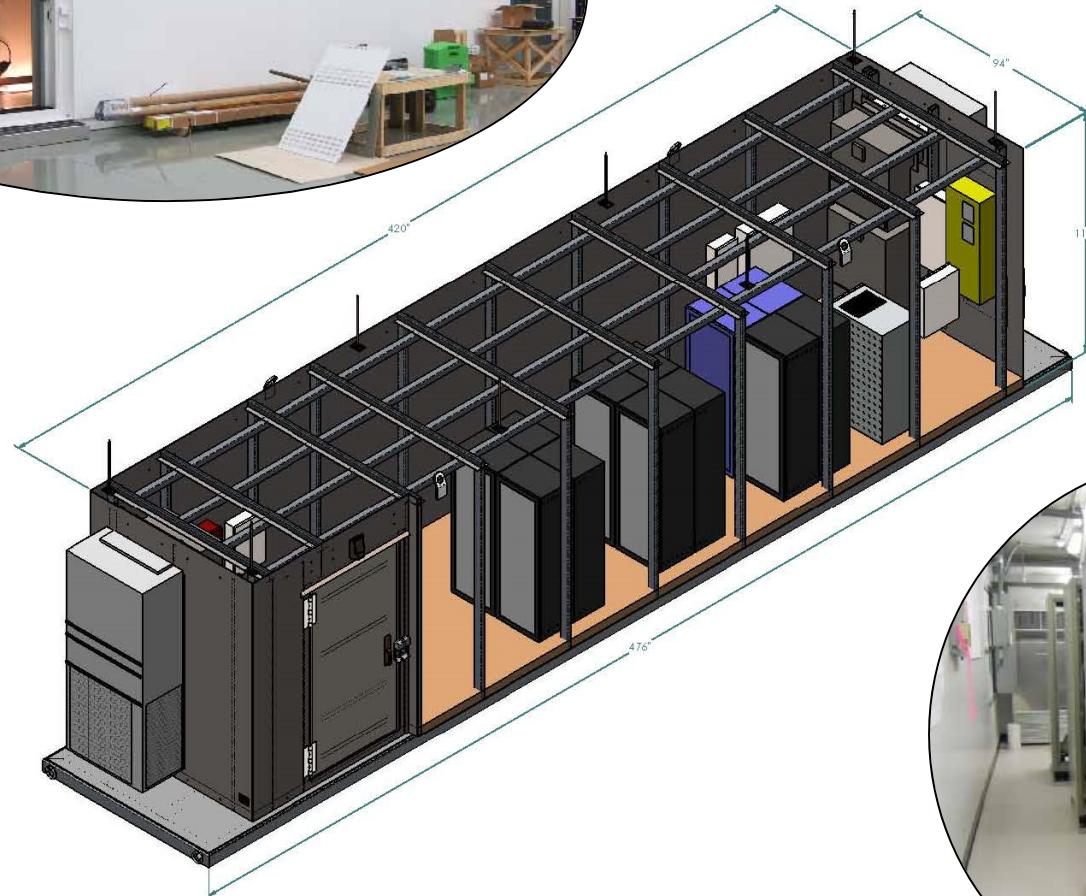


RF Shielded Generators

65KW – 1,500KW



Data Nodes



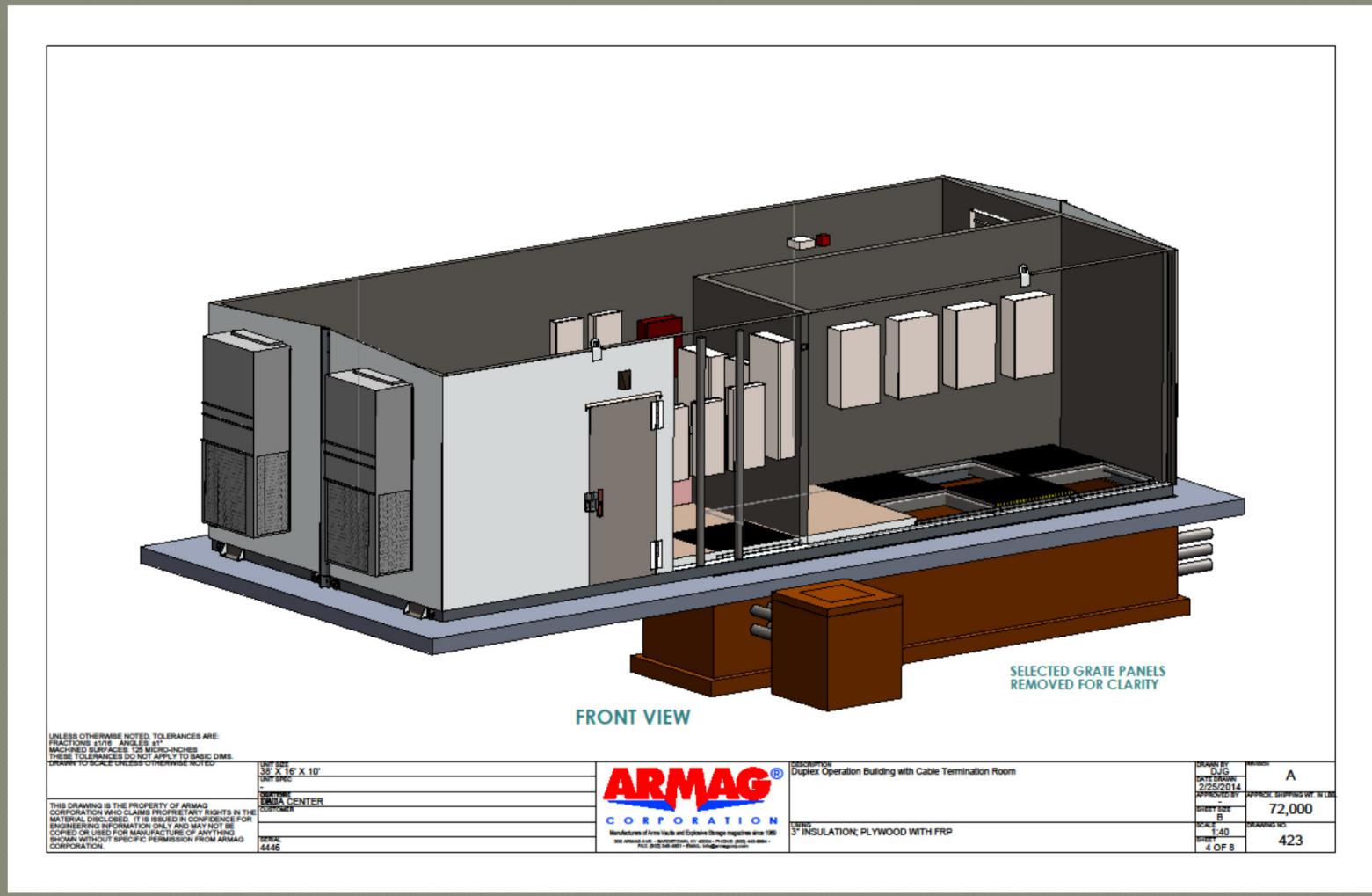
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2 OF 7

Data Receiving & Processing Facilities



Hardened IT Data & Power Modules



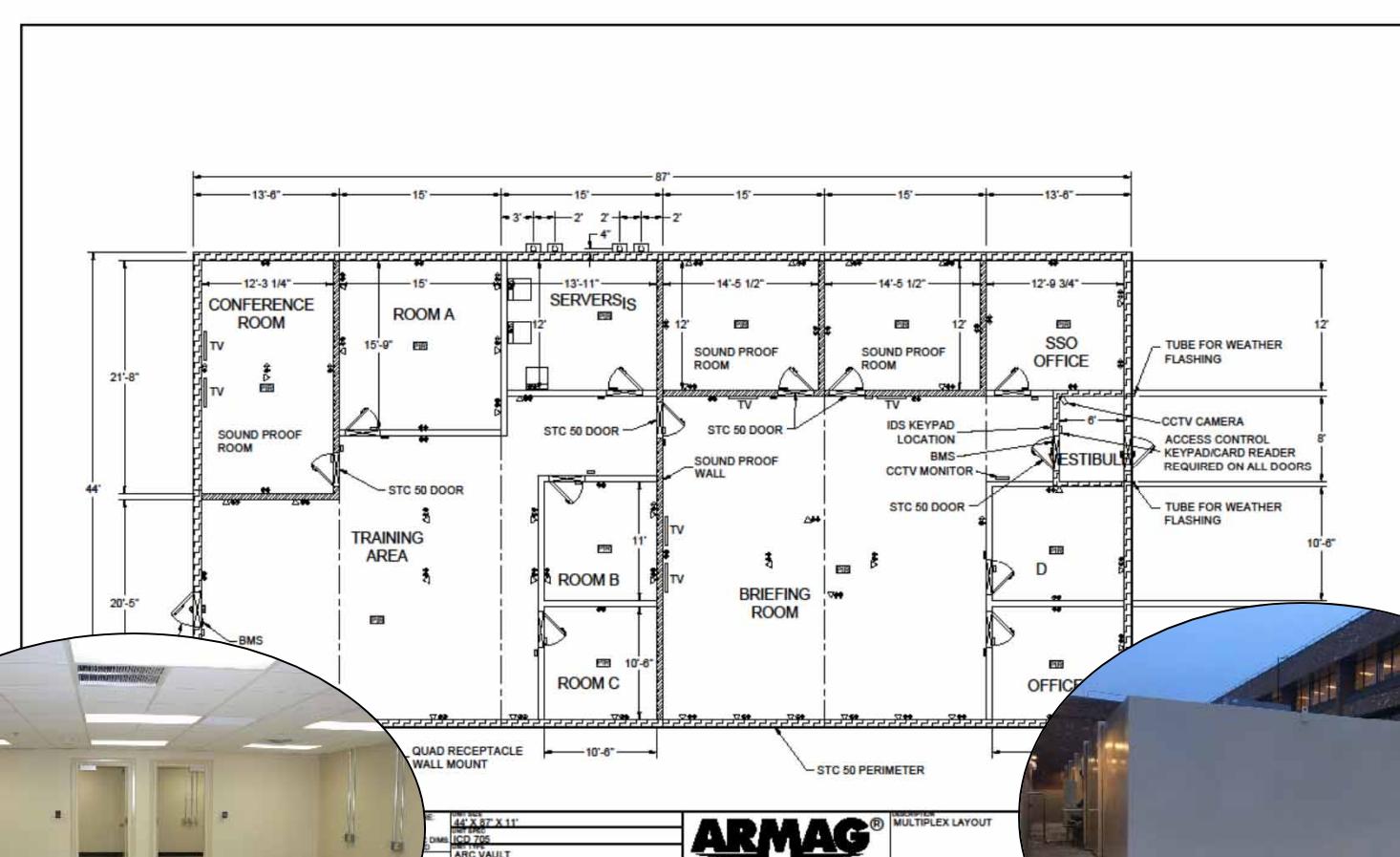
Hardened Transmission Substations



SCIF, SAPF & COMSEC



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