

**Section 4: Guide Plates**

Page

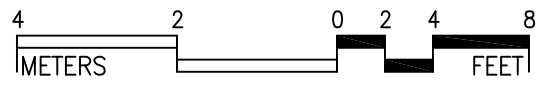
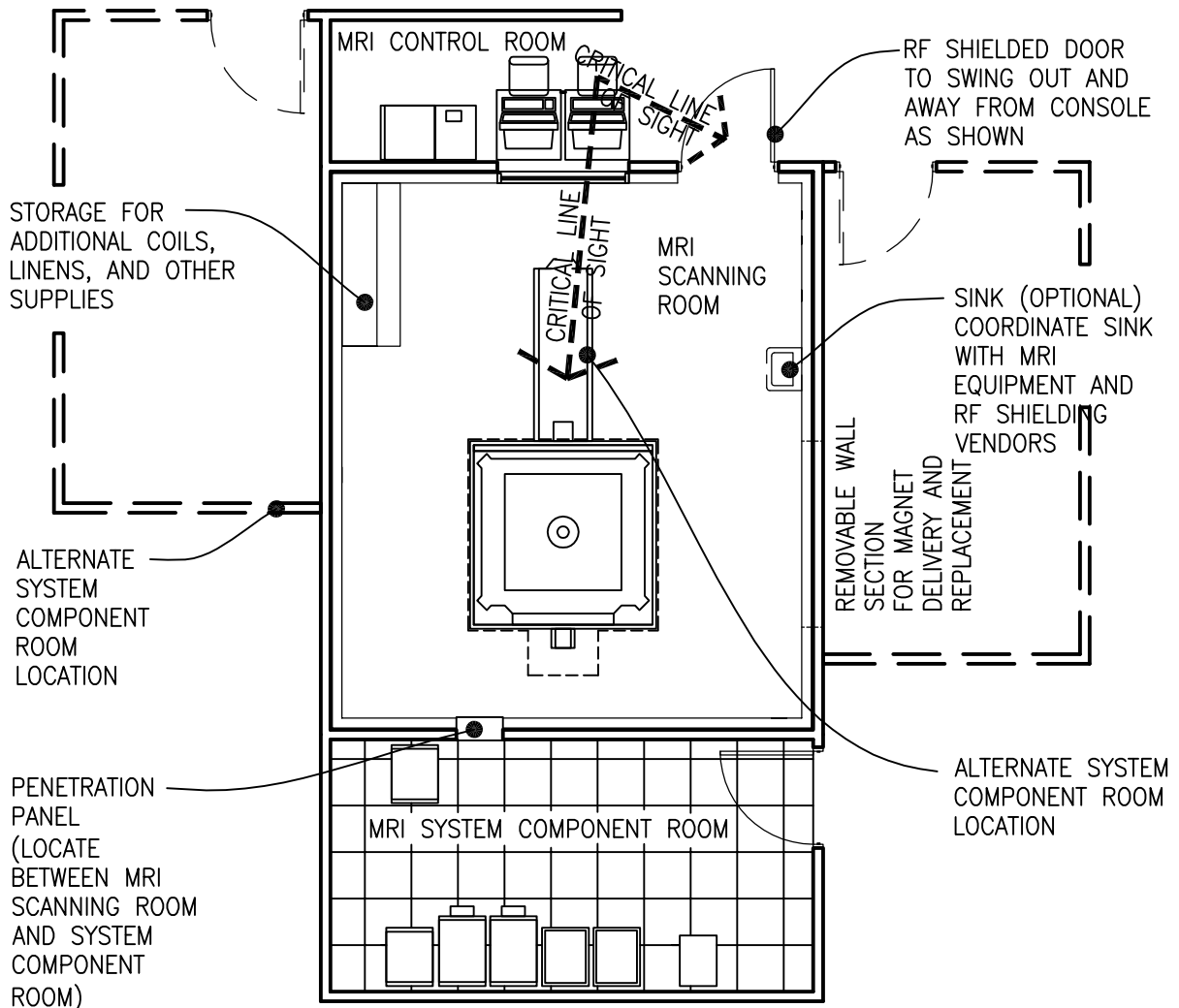
**Patient Areas**

MRI Scanning/Control/System  
Component Rooms  
Key Plan ..... 4-2  
MRI Scanning Room ..... 4-3  
MRI Control Room ..... 4-11  
MRI System Component  
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*Guide Plates are graphical representations of selected room types, illustrating the integration of space, components, systems and equipment. They provide typical configurations and general technical guidance, and are not intended to be project specific. Specific infrastructure design requirements are contained in VA Design Manuals located in the VA Technical Information Library.*

# MRI Suite

## Key Plan



1/8" = 1'-0"

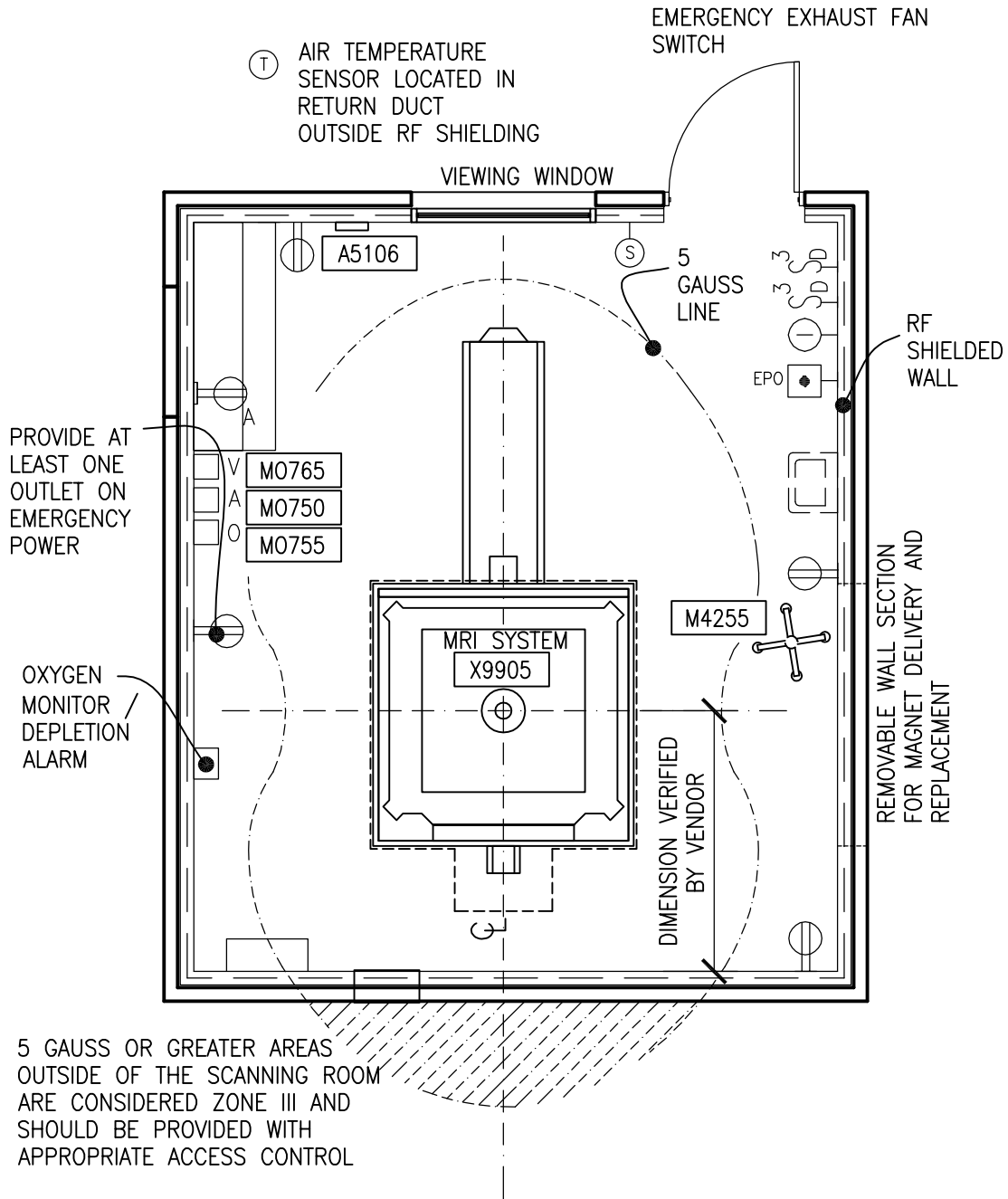
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MRI Scanning Room (XMRS1)

500 NSF

Floor Plan

46.5 NSM



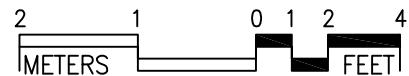
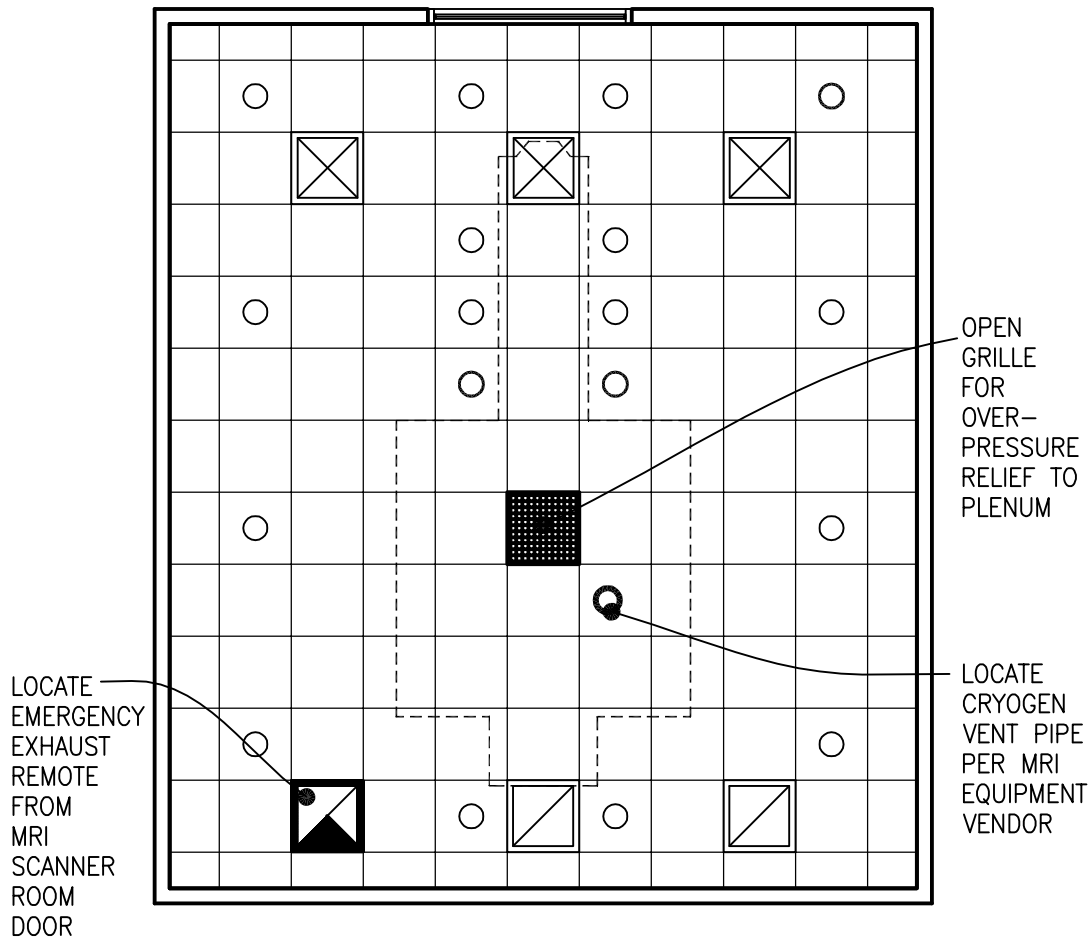
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MRI Scanning Room (XMRS1)

600 NSF

Reflected Ceiling Plan

46.5 NSM



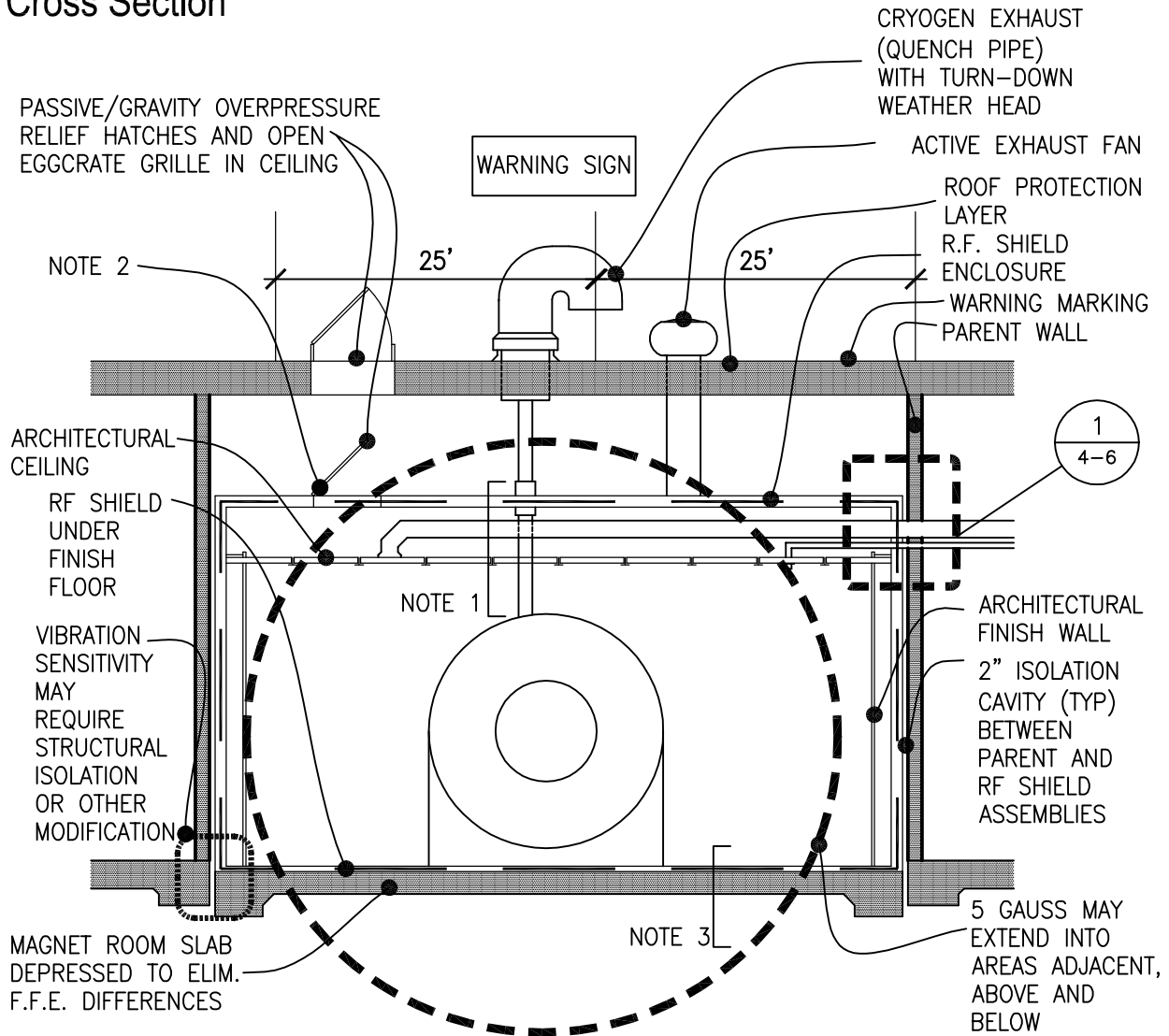
$3/16" = 1'-0"$

The locations and quantities of the air outlets and inlets are tentative and may not represent the optimum design solution(s) envisioned by the designer, who shall study the layout, calculate air volumes, and may alter the arrangement shown in the reflected ceiling plan, as required, to produce a project-specific air distribution system design.

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# MRI Scanning Room (XMRS1)

## Cross Section



**GENERAL:**

ALL PENETRATIONS THROUGH SHIELD ARE PROVIDED BY R.F. SHIELD VENDOR. PENETRATIONS MAY REQUIRE WAVE GUIDES AND DIELECTRIC BREAKS. MAGNET VENDOR MAY HAVE REQUIREMENTS FOR LOCATION OF ALL R.F. SHIELD PENETRATIONS. THIS IS A SCHEMATIC DIAGRAM. DISCHARGES OF CRYOGEN VENT, EXHAUST FAN AND OVER PRESSURE RELIEF CAN ALSO DISCHARGE THROUGH THE SIDEWALL, PROVIDED THAT THE DISCHARGE POINTS ARE LOCATED AT LEAST 25 FEET FROM WINDOWS, AIR INTAKES AND OTHER OPENINGS, AND FROM OCCUPIED AREAS.

**NOTE 1:** THE CONFIGURATION OF THE CRYOGEN VENT PIPING FROM THE MRI MAGNET THROUGH THE RF SHIELDING WILL VARY DEPENDING ON THE MRI MANUFACTURER. FOLLOW MRI MANUFACTURER'S REQUIREMENTS FOR CRYOGEN VENT PIPING DESIGN AND INSTALLATION.

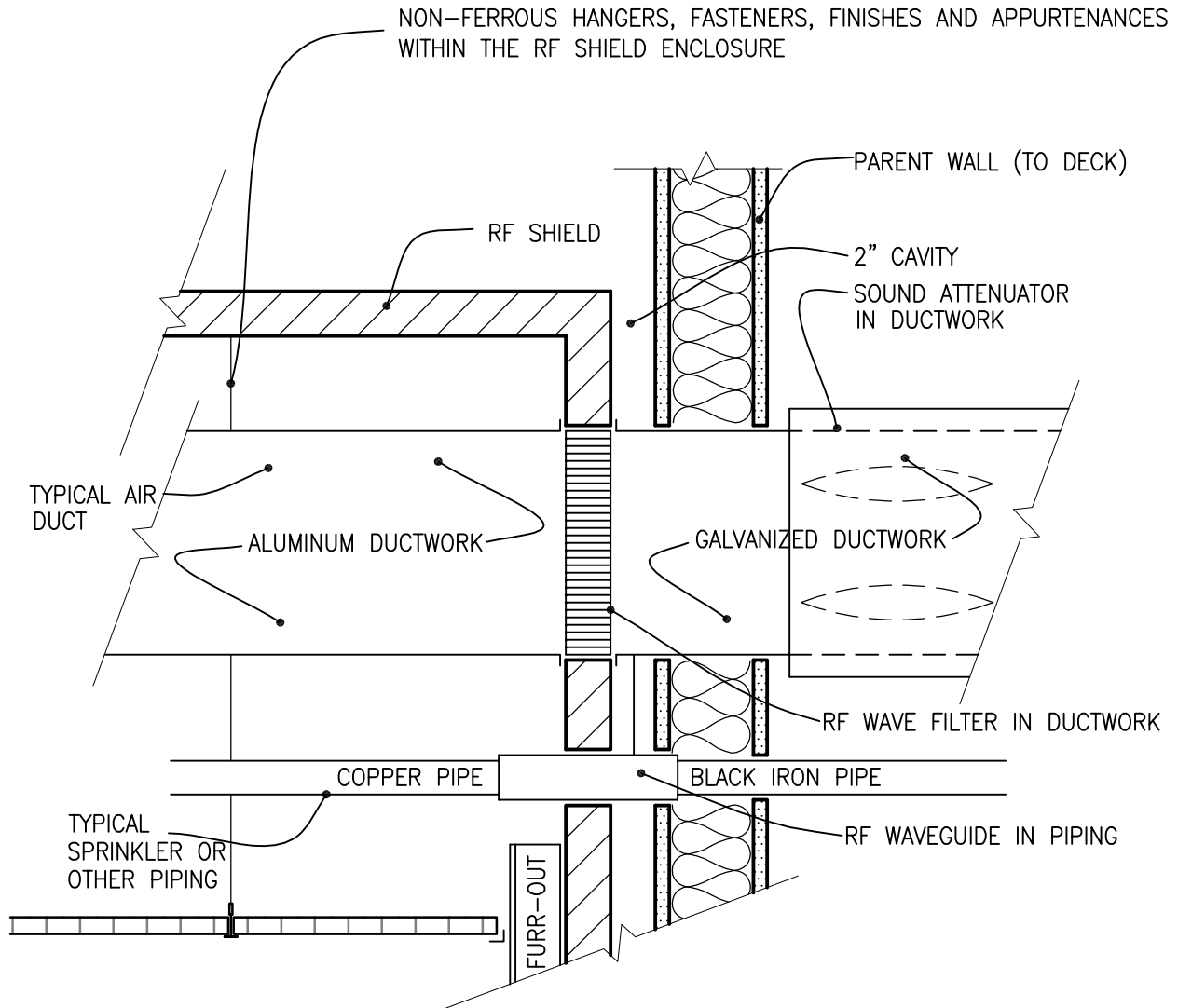
**NOTE 2:** "PRESSURE RELIEF DOORS"—HINGED PANEL, FRICTION FIT ON 3 SIDES, PROVIDED BY RF SHIELDING PROVIDER.

**NOTE 3:** CONSTRUCTION MATERIALS AND SYSTEMS FOR MRI SCANNER ROOM CONSTRUCTION SHOULD BE CHOSEN TO MINIMIZE FERROUS MATERIALS IN PROXIMITY TO THE MRI SCANNER. ADDITIONALLY, NON-FERROUS MATERIALS SHOULD BE USED FOR ASSEMBLIES, FASTENERS, HANGERS, CONDUITS AND APPURTENANCES WITHIN THE RF SHIELDED ENCLOSURE.

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# MRI Scanning Room (XMRS1)

## Detail 1



NOTE: RF WAVEGUIDES AND FILTERS FURNISHED AND INSTALLED BY RF SHIELDING SUPPLIER. DUCTWORK, PIPING, WIRING AND CONDUIT INSTALLATION MUST BE CAREFULLY COORDINATED BETWEEN CONTRACTOR'S FORCE AND THE RF SHIELD VENDOR, IN ACCORDANCE WITH THE MRI MANUFACTURER'S SITE PREPARATION REQUIREMENTS.

RF SHIELDING PENETRATION DETAIL

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## MRI SCANNING ROOM (XMRS1): Design Standards

### ARCHITECTURAL

Ceiling: Acoustical Ceiling Tile  
RF Ceiling Height: Coordinate w/ equipment manufacturer

Wall Finish: Paint  
Wainscot: --  
Base: Resilient Base / Cove  
Floor Finish: Static Dissipating Flooring  
Slab Depression: MR Manufacturer may require floor trench / raceway  
Sound Protection: NC 40

#### Notes:

- 4'0" wide RF door into Scanning Room coordinated radio frequency and magnetic shielding requirements with equipment manufacturer.
- RF Window from Control Room to Scanning Room

### LIGHTING

General: 30 fc

#### Notes:

- Dual switched recessed, lensed incandescent down light with 100 W, A-21 lamps.
- LED Down lighting or illuminated graphic display.

### POWER

General: 3,200 W (Receptacles)  
Emergency: --

#### Notes:

- 480 V, 3 phase, flush-mounted circuit breaker with shunt trip for MRI system. Coordinate rating with system supplier.
- 480 V, 3 phase, flush-mounted circuit breaker with shunt-trip for computer room A/C unit (when provided). Coordinate rating with system supplier.
- 3DC power supply (Rectifier) for MRI Scanning Room lighting (when provided). Rating as required for room lighting load.

### COMMUNICATION/SPECIAL SYSTEMS

ADP: --  
Data: --  
Telephone: --  
Intercom: MRI Scanning Room and Control Room. Via MRI Equipment  
Nurse Call: --  
Public Address: --  
Radio/Entertainment: As Required  
MATV: --  
CCTV: MRI Scanning Room and Control Room. As Required  
MID: --  
Security/Duress: --  
VTEL: --  
VA Satellite TV: --

### HEATING, VENTILATING AND AIR CONDITIONING

Inside Design Conditions: 70°F - 75°F  
(21°C - 24°C)  
40% - 60% RH  
Coordinate with MRI Manufacturer  
Minimum Air Changes per hour: 12  
-Supply Air  
100% Exhaust: No  
100% Outside air: No  
Room Air Balance: Positive  
Dedicated Exhaust System: Yes – Note 2  
Occupancy: 4 people  
AC Load-Equipment: 10,000 Btuh  
(3,000W)  
AC Load Lighting: 2.0 W/SF (21 W/M<sup>2</sup>)

#### Notes:

- Provide nonferrous material for piping, ductwork, and hangers inside the shielding enclosure, as well as in all associated dampers. All serviceable equipment should be located outside the Scanning Room.
- Provide an automatic / manual emergency exhaust system (minimum 12 AC/HR). The emergency exhaust fan is activated either automatically by the MRI alarm panel or manually by wall mounted switch, one in the MRI Scanning Room and one in the MRI Control Room. Shutoff the return air whenever the emergency exhaust fan is

- activated. This emergency exhaust fan should be on emergency power.
3. Provide a separate cryogen exhaust (quench pipe) from magnet to outside for cryogen boil-off and quench. Protect discharge point from wind-driven rain. Install in accordance with MRI manufacturer's requirements.
  4. Depending upon the particular MRI manufacturer, a dedicated fan, in addition to the emergency exhaust fan, may be required to remove air at the ventilation interface on the magnet.
  5. Provide wave guides for all ductwork and all piping penetrating the RF shield enclosure. RF wave guides furnished and installed by RF shielding vendor.
  6. An MRI magnet chiller is provided by the MRI manufacturer. Install this chiller in accordance with MRI manufacturer's requirements.
  7. The oxygen sensor / depletion alarm will not remain reliable if calibration and preventative maintenance is not performed per manufacturer's requirements. Oxygen sensor is not to be used for emergency exhaust fan activation except for MRI systems that do not provide a quench alarm relay for exhaust fan tie-in.
  8. Refer to HVAC design manual for additional information.
  9. Verify cooling loads and other specific requirements with the equipment manufacturer on the specific project.
2. Coordinate dielectric couplings, wave guides, and piping routing / grounding requirements with MRI and RF shield vendors.

#### PLUMBING AND MEDICAL GASES

Cold Water:	As Required.
Hot Water:	As Required
Laboratory Air:	--
Laboratory Vacuum:	--
Sanitary Drain:	As Required
Reagent grade Water:	--
Medical Air:	One wall outlet
Medical Vacuum:	One wall outlet
Oxygen:	One wall outlet

#### Notes:

1. Provide nonferrous material for piping, and hangers inside the shielding enclosure.



## MRI SCANNING ROOM (XMRS1): Equipment Guide List

JSN	NAME	QTY	ACQ / INS	DESCRIPTION	SPEC
A1010	Telecommunication Outlet	1	CC	Telecommunication outlet location.	27 31 00
A5106	Waste Disposal Unit, Sharps w/Glove Dispenser	1	W	The unit is designed for the disposal of sharps and complies with OSHA guidelines for the handling of sharps. It shall house a 5 quart container and be capable of being mounted on a wall. It shall have a glove dispenser attached. The unit shall be secured by a locked enclosure.	
F0355	Footstool, Straight (MR CONDITIONAL)	1	W	Step stool. Used to assist patients getting on and off exam or surgical tables. Fitted with electrically conductive rubber tips.	
M0750	Flowmeter, Air, Connect w/50 PSI Supply (MR CONDITIONAL)	1	W	Air flowmeter. Unit has a stainless steel needle valve with clear flowtube for connection to 50 PSI air outlet from central pipeline system. Requires the appropriate adapter for connection to the wall outlet and fitting to connect to tubing. Database prices reflect fittings with an attached DISS power outlet. Other outlet and adapter configurations are available.	
M0755	Flowmeter, Oxygen, Low Flow (MR CONDITIONAL)	1	W	Oxygen flowmeter. Consists of a clear crystal flowtube calibrated to 3.5 or 8 LPM depending on manufacturer. For oxygen regulation in hospital settings. Database pricing includes DISS fitting and DISS power outlet and wall adapter. Other fitting and adapter configurations are available.	
M0765	Regulator, Vacuum (MR CONDITIONAL)	1	W	An air/oxygen mixer is designed to accurately control a pressurized gas mixing with an oxygen concentration. Unit contains audible alarms to warn of supply failure, an auxiliary outlet and a oxygen concentration control adjustment range from 21% to 100%. The unit can also be used to supply an accurate pre-mixed gas source to respiration or ventilator units. A specific application may require an additional air inlet filter/water trap.	

M4255	Stand, IV, Adjustable (MR CONDITIONAL)	1	W	Adjustable IV stand with 4-hook arrangement. Stand has stainless steel construction with heavy weight base. It adjusts from 66 inches to 100 inches and is mounted on conductive rubber, ball bearing, swivel casters. Stand is used for administering intra	
X6196 - There is not an MRI injector in the 1691 Database but some CT and MRI injectors are used in the same capacity so this number was selected.	Injector, CT (MR CONDITIONAL)	1	CF	This unit is a specialized radiographic system that provides sharp, well-defined visual images of the vascular anatomy. The injector introduces a vision radiopaque fluid (contrast medium) into an artery or vein through a small catheter, making vessels contrast with their more radiolucent surrounding. The unit incorporates an electromechanical or pneumatically driven syringe to deliver the contrast medium. The syringe assemblies consist of an electric motor connected to a jackscrew that moves the syringe piston into or out of the syringe barrel. The unit is used in hospitals with radiographic procedures. The unit can be ceiling, wall, or remote stand mounted.	
X9705	Stretcher, MRI Compatible (MR CONDITIONAL)	1	CF	MRI compatible stretcher. This unit is used to prepare and transport patients in a magnetic resonance imaging area. It is a non ferrous, fixed height unit and is equipped with four locking casters and a MRI compatible pad.	
X9905	MRI System, Super Conductive	1	CF	Magnetic Resonance Imaging Units (MRI) use Superconducting strong magnetic fields (RF) radiation to translate hydrogen nuclei distribution in body tissues into computer-generated images of anatomic structure	
X9910	Wheelchair, (MR CONDITIONAL)	1	CF	MRI wheelchair. This unit accommodates any size patient, with 19" wide seat, yet it is compact enough to slip through narrow doorways and over thresholds. The chair easily locks for stable positioning and patient transfer and features a non-corrosive, I	

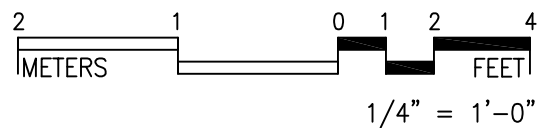
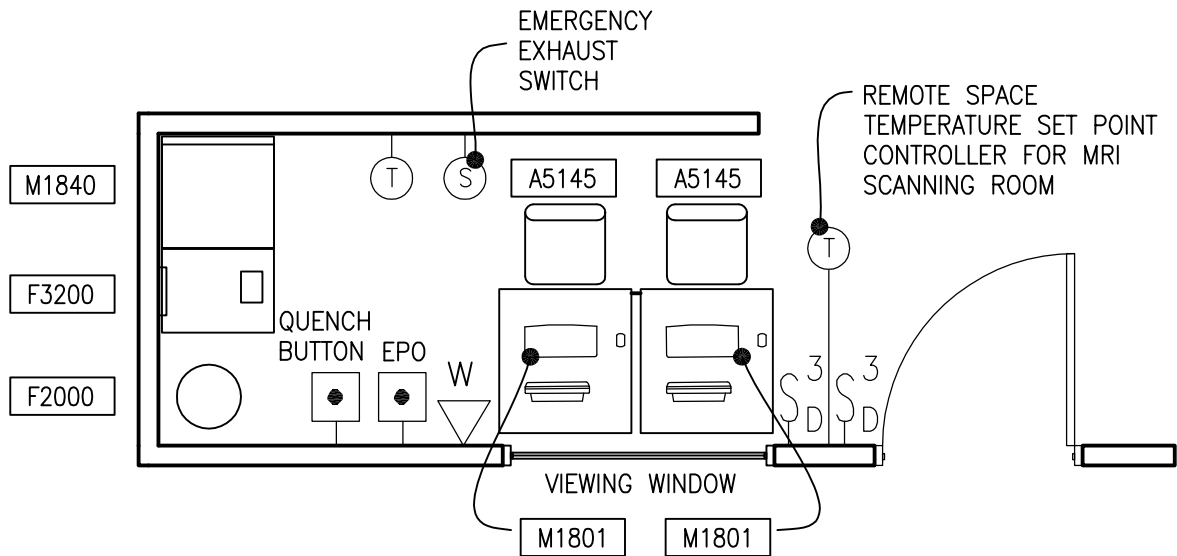
**Note: All equipment, tools, fixtures, devices and appurtenances to be used in the Scanning Room are to be tested and labeled MR Safe or MR Conditional per ASTM / FDA standards.**

MRI Control Room (XMRC1)

120 NSF

Floor Plan

11.2 NSM



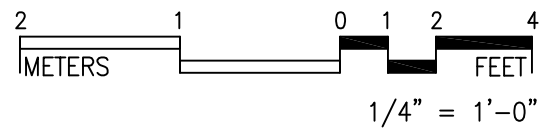
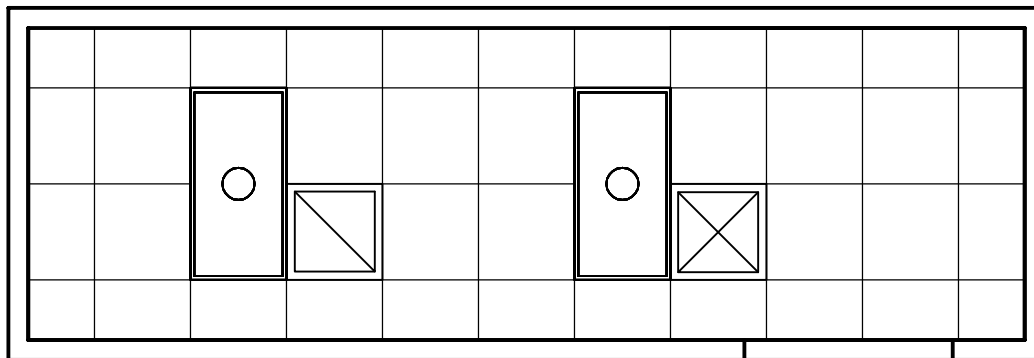
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MRI Control Room (XMRC1)

120 NSF

Reflected Ceiling Plan

11.2 NSM



The locations and quantities of the air outlets and inlets are tentative and may not represent the optimum design solution(s) envisioned by the designer, who shall study the layout, calculate air volumes, and may alter the arrangement shown in the reflected ceiling plan, as required, to produce a project-specific air distribution system design.

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## MRI CONTROL ROOM (XMRC1): Design Standards

### ARCHITECTURAL

Ceiling: Acoustical Ceiling Tile  
Ceiling Height: Coordinate w/ equipment manufacturer

Wall Finish: Paint  
Wainscot: --  
Base: Resilient Base  
Floor Finish: Vinyl Composition tile  
Slab Depression: --  
Sound Protection: NC 40

#### Notes:

1. 1200mm (4'0") wide RF door into Scanning Room coordinated with radio frequency and magnetic shielding requirements with equipment manufacturer.

### LIGHTING

General: 30 fc

#### Notes:

1. 2'x4' recessed dimmable fluorescent light fixture, glare control, acrylic prismatic lens, w/2 – F32T8 lamps, 4,100 K, CRI-85 (minimum).

### POWER

General: 3,200 W (Receptacles)  
Emergency: 1,200 W

#### Notes:

1. EPO: 480 V, 3 phase, flush-mounted circuit breaker with shunt trip for MRI system. Coordinate rating with system supplier.
2. 480 V, 3 phase, flush-mounted circuit breaker with shunt-trip for computer room A/C unit (when provided). Coordinate rating with system supplier.
3. 208 V, 3 phase flush-mounted circuit breaker for power conditioner or UPS equipment (when provided) for MRI computer equipment.

### COMMUNICATION / SPECIAL SYSTEMS

ADP / LAN Telecommunications outlets

Two per room minimum

Data: --  
Telephone: Yes  
Intercom: MRI Scanning  
Room and Control Room Via MRI Equipment  
Nurse Call: --  
PACS: two4-port telecommunications outlets per PACS station  
Public Address: --  
Radio/Entertainment: --  
MATV: --  
CCTV: As Required  
MID: --  
Security/Duress: --  
VTEL: --  
VA Satellite TV: --

### HEATING, VENTILATING AND AIR CONDITIONING

Inside Design Conditions: 70°F - 75°F  
(21°C - 24°)  
30% to 60% RH

Minimum Air Changes per hour: 6  
- Supply Air

100% Exhaust: No  
100% Outside air: No  
Room Air Balance: Positive  
Dedicated Exhaust System: No  
Occupancy: 2 people  
AC Load-Equipment: 5,000 Btuh  
(1,500W)  
AC Load-Lighting: 1.0 W/SF (17 W/M<sup>2</sup>)

#### Notes:

1. Verify cooling loads and other specific requirements with the equipment manufacturer on a specific project.

### PLUMBING AND MEDICAL GASES

Cold Water: --  
Hot Water: --  
Laboratory Air: --  
Laboratory Vacuum: --  
Sanitary Drain: --  
Reagent grade Water: --  
Medical Air: --  
Medical Vacuum: --  
Oxygen: --



## MRI CONTROL ROOM (XMRC1): Equipment Guide List

JSN	NAME	QTY	ACQ / INS	DESCRIPTION	SPEC
A1010	Telephone, Wall Mounted, 1 Line	1	CC	Telecommunication outlet location.	27 31 00
A1012	Telephone, Wall Mounted, 1 Line	1	CC	Telephone, wall mounted, 1 line.	27 31 00
A5145	Chair, Swivel, High Back	1	CC	Highback contemporary swivel chair, 41" high X 23" wide X 23" deep with five (5) caster swivel base and arms. Chair may be used at desks or in conference rooms. Back and seat are foam padded and upholstered with either woven textile fabric or vinyl.	
F0275	Basket, Wastepaper, Round, Metal	2	W	Round wastepaper basket, approximately 18" high X 16" diameter. This metal unit is used to collect and temporarily store small quantities of paper refuse in patient rooms, administrative areas and nursing stations.	
F2000	Clock, Battery, 12" Diameter	1	W	Clock, 12" diameter. Round surface, easy to read numbers with sweep second hand. Wall mounted unit for use when impractical to install a fully synchronized clock system. Battery operated, (batteries not included).	
M1801	Computer, Microprocessing, w/Flat Panel Monitor	1	W	Desk top microprocessing computer. The unit shall consist of a central processing mini tower, flat panel monitor, keyboard, mouse and speakers. The system shall have the following minimum characteristics: a 2.8 GHz Pentium processor; 512 MB memory; 80GB hard drive; 32/48x CD-ROM/DVD combo; a 3.5" floppy drive; 1.44MB network interface card; video 32 MB NVIDIA; a 15 inch flat panel color monitor. The computer is used throughout the facility to input, manipulate and retrieve information.	
M1840	Printer/Copier/Fax Combination	1	VV	Multifunctional printer, fax, scanner and copier (PFC) all-in-one machine.	



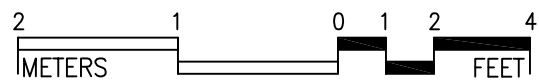
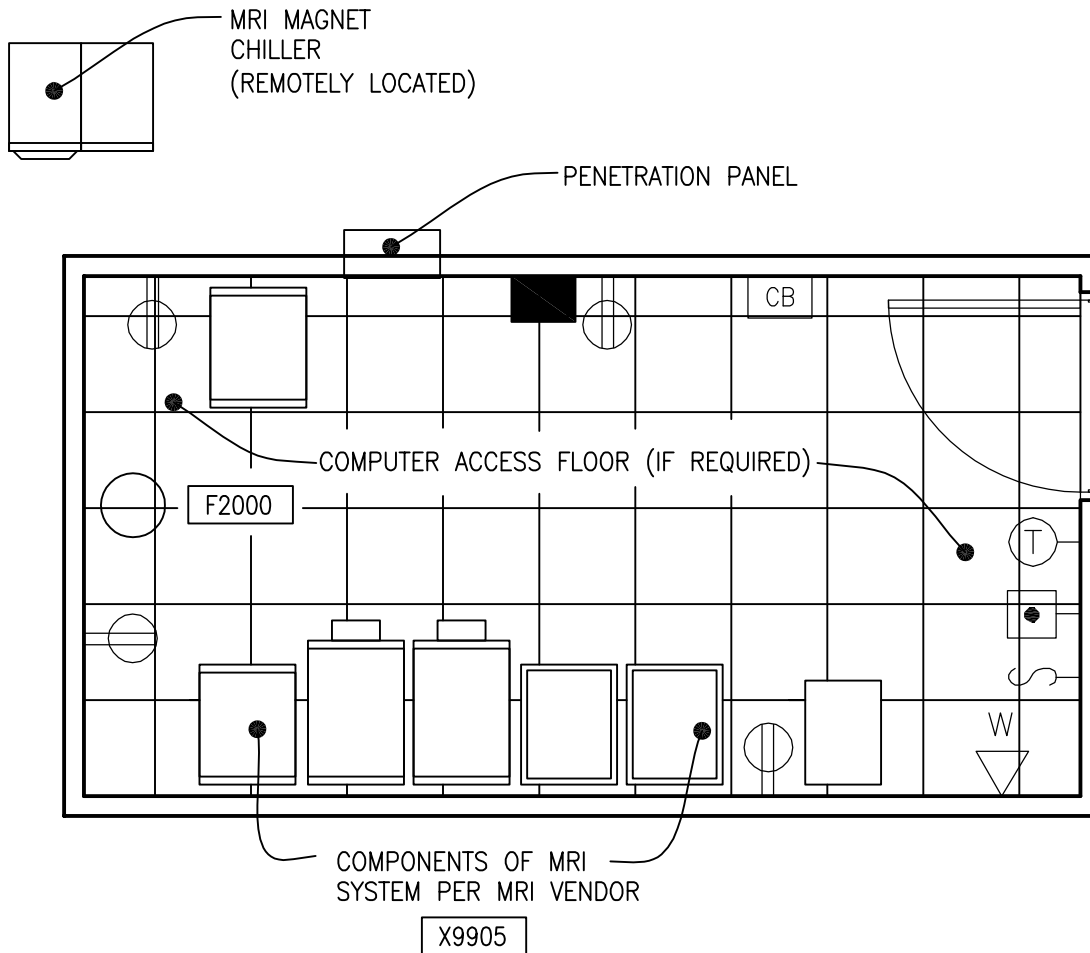
X1425	Imager, Laser (1024 X 1024) (Din/PACS)	1	CF	Solid state laser that provides high resolution images of superior quality and accuracy. An infrared laser beam is scanned across each film by a precision rotating polygon, while correcting optics focus and control the beam's intensity. Can be interfaced to as many as eight (8) modalities with interface kit. For use with digital output imaging modalities.	
X9905 - Components of workstation	<b>Components of Parent Item:</b> MRI System Super Conductive may include: Workstation with LCD/PACS Monitors, electronic station, and operator console and computer	1	W	Magnetic Resonance Imaging Units (MRI) use Superconducting strong magnetic fields (RF) radiation to translate hydrogen nuclei distribution in body tissues into computer-generated images of anatomic structure	

MRI System Component Room (XMRC2)

200 NSF

Floor Plan

18.6 NSM



1/4" = 1'-0"

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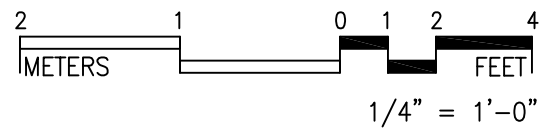
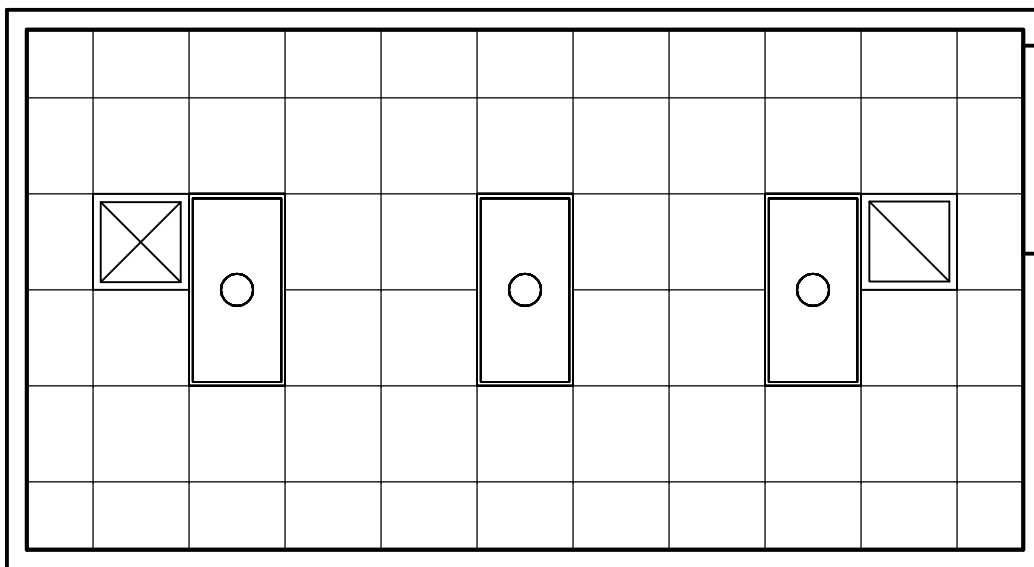


MRI System Component Room (XMRC2)

200 NSF

Reflected Ceiling Plan

18.6 NSM



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## MRI SYSTEM COMPONENT ROOM (XMRC2): Design Standards

### ARCHITECTURAL

Ceiling: Acoustical Ceiling Tile  
Ceiling Height: Coordinate with equipment  
Manufacturer

Wall Finish: Paint  
Wainscot: --  
Base: Resilient Base  
Floor Finish: Vinyl Composition tile  
Slab Depression: Access floor system—  
coordinate with  
manufacturer.

Sound Protection: NC 40

### LIGHTING

General: 30 fc

Notes:

1. 2'x4' recessed fluorescent light fixture, glare control, acrylic prismatic lens, w/2 – F32T8 lamps, 4,100 K, CRI-85.

### POWER

General: 3,200 W (Receptacles)

Emergency: --

Notes:

1. 480 V, 3 phase, flush-mounted circuit breaker with shunt trip for MRI system. Coordinate rating with system supplier.
2. 480 V, 3 phase, flush-mounted circuit breaker with shunt-trip for computer room A/C unit (when provided). Coordinate rating with system supplier.
3. 208 V, 3 phase flush-mounted circuit breaker for power conditioner or UPS equipment (when provided) for MRI computer equipment.

### COMMUNICATION/SPECIAL SYSTEMS

ADP: Telecommunications outlets  
– 2 per room (minimum)

Data: Two 4-port telecommunications  
outlets per PACS station.

Telephone: Yes

Intercom: --

Nurse Call: --

Public Address: --

Radio/Entertainment: --

MATV: --

CCTV: --

MID: --

Security/Duress: --

VTEL: --

VA Satellite TV: --

### HEATING, VENTILATING AND AIR CONDITIONING

Inside Design Conditions: 70 °F (21 °C)  
40% to 60% RH

Coordinate with the MRI manufacturer  
Minimum Air Changes per hour: 6

- Supply Air

100% Exhaust: No

100% Outside air: No

Room Air Balance: Positive

Dedicated Exhaust System: No

Occupancy: 2 people

AC Load-Equipment: (35,000 Btuh to  
86,000 Btuh)  
(10,000W to 25,000W)

AC Load-Lighting: 1.0 W/SF (17 W/M<sup>2</sup>)

Notes:

1. Verify cooling loads and other specific requirements with the equipment manufacturer on a specific project.
2. Provide dedicated AC unit to serve the System Component Room
3. Provide local and central high temperature alarms.

### PLUMBING AND MEDICAL GASES

Cold Water: --

Hot Water: --

Laboratory Air: --

Laboratory Vacuum: --

Sanitary Drain: --

Reagent grade Water: --

Medical Air: --

Medical Vacuum: --

Oxygen: --

Notes:

1. Provide a floor drain to coordinate with the chilled water equipment when required
2. Provide a backflow prevention device when a secondary emergency water connection to the chilled water equipment is required as a backup.
3. Provide domestic water backup to the MRI magnet chiller. Coordinate with MRI equipment vendor.

## MRI SYSTEM COMPONENT ROOM (XMRC2): Equipment Guide List

JSN	NAME	QTY	ACQ / INS	DESCRIPTION	SPEC
A1010	Telecommunication Outlet	AR	CC	Telecommunication outlet location.	27 31 00
A1012	Telephone, Wall Mounted, 1 Line	1	CC	Telephone, wall mounted, 1 line.	27 31 00
F2000	Basket, Wastepaper, Round, Metal	1	W	Round wastepaper basket, approximately 18" high X 16" diameter. This metal unit is used to collect and temporarily store small quantities of paper refuse in patient rooms, administrative areas and nursing stations.	
X9905 - Components of X9905 for workstation	<b>Components of Parent Item:</b> MRI System Super Conductive	1	W	Magnetic Resonance Imaging Units (MRI) use Superconducting strong magnetic fields (RF) radiation to translate hydrogen nuclei distribution in body tissues into computer-generated images of anatomic structure	