## Drawing Index

These sheets are a document set and should not be separated. Electrical information and references are contained on all sheets.

SITE READINESS

EQUIPMENT LAYOUT

(Equipment locations, heat loads, component weights, environmental specs)

STRUCTURAL LAYOUT

(Structural support/mounting locations for floor/wall/ceiling, wall support elevations)

STRUCTURAL DETAILS

(Floor and Ceiling loading information) ELECTRICAL LAYOUT

(Contractor supplied wiring, interconnect methods, junction point locations and descriptions)

ELECTRICAL SPECIFICATIONS

(Maximum wiring run lengths, interconnect diagram, system power specifications)

ELECTRICAL DETAILS

EQUIPMENT DETAILS

E3

MECHANICAL LAYOUT

M 1

(Chiller information)

D1 THRU D3

These equipment IS drawings indicate the placement and interconnection of the listed equipment components. These drawings are not construction or site preparation drawings. Customer remains ultimately responsible for preparing the site to accommodate the IS and operation of such equipment in compliance with GE Healthcare's written specifications and all applicable federal, state, and/or local requirements.

## \* REQUIRED REFERENCE \*

Signa 1.5T HDe Pre Installation Manual

5143464

A mandatory component of this drawing set is the GE Healthcare Pre Installation manual. Failure to reference the preIS manual will result in incomplete documentation required for site design and preparation.

Pre Installation documents for GE Healthcare products can be accessed on the web at:

www.gehealthcare.com/siteplanning

# GEHealthcare



# MRi Site Planning



## Customer Site Readiness Requirements

- Any deviation from these drawings must be communicated in writing to and reviewed by your local GE Healthcare Installation Project Manager prior to making changes.
- Make arrangements for any rigging, special handling, or facility modifications that must be made to deliver the equipment to the installation site. If desired, your local GE Healthcare Installation Project Manager can supply a reference list of rigging contractors.
- New construction requires the following; 1. Secure area for equipment, 2. Power for drills and other test equipment, 3. Capability for image analysis, 4. Restrooms.
- Provide for refuse removal and disposal (e.g. crates, cartons, packing)
- It is the customer's responsibility to contract a vibration consultant/engineer to implement site design modifications to meet the GE vibration specification. Refer to the system preinstallation manual for the vibration specification.

# GE Equipment Delivery Requirements

The items on the GE Healthcare Site Readiness Checklist are REQUIRED to facilitate equipment delivery to the IS site. Equipment will not be delivered if these requirements are not satisfied.

(P)

	GE Healthcar						
	GEHC Global Order # :		•	г	C Nation	ustomer: Supplie:::	
GEHC On-site Representative :  Name of customer reviewed with :  GEHC PMI :							
				Lead Installer:		Installer: _	
	Target Site Prep Completion Date:  The customer is responsible for proper site pre	paration	regard	lless of	any GEHC		nents/inspections/assessments.
	MR Magnet Delivery: Ensure cryogen vents, power for the cool					e installed ar	nd operational (0.7T, 1.5T & 3T) and chilled water
sup	ply is available 24x7 that meets system cooling equipment requi Inspection Date	rements.	Broadba 	na/phor	1 		
	mispection butt		Pre (Pre-	dict	٥.	<u>;</u> ;	
Item #	GEHC Minimum Requirements	Storage: Is item ready?	Is this item ready?	Will item be ready?	Verify (Delivery): Is item ready	Validate (Mech Install): Is item ready?	Comments If "N", please enter in comments or action plan
1	Equipment installation drawings must match actual room size, equipment placement and must meet clearance requirements. Deviations that meet installation requirements may be red-lined, if allowed by local code. Seismic requirements identified on construc						
2	Delivery route to installation or storage area meets requirements and has been discussed and scheduled with the customer. Ensure floor protection is discussed, requirements identified, and will be available at time of delivery and installation.						
3	Rooms that will contain equipment, including storage areas- not in scan suite, are dust free. Provisions taken to maintain a dust free room. Room security to prevent unauthorized access and theft has been discussed with customer. The customer is aware of						
4	In room HVAC ductwork and units (in room) must be mechanically installed and dust free. Installation rooms appear to meet environmental conditions (see Further Definitions) and observed issues have been communicated to the customer. If being stored, sto						
5	Ceiling grid is installed. Permanent lighting is installed and operational. Unistrut (or equivelant) location and spacing was measured and is consistent with the requirements of the installation drawings.						
6	Floor is clean and prepared for final floor covering. For MR, CT & Nuc scan rooms, floor levelness was measured and does not exceed tolerances specified in GEHC's applicable PIM, and no visible floor surface defects were observed.						
7	Access to a working phone at the facility for emergency use, including MR magnet delivery.						
8	All walls primed (final coat not needed on Day 1).						
9	Mechanical supplier has been provided with a set of equipment installation drawings for reference. For California, permitted construction drawings or PMI-specified installation drawings are required.						
#	Conduit/electrical cable ducting/dividers/ access flooring installed, with the exception of surface-mounted floor ducting. Wiring to the main disconnect panel is installed and compliant with equipment installation drawings or pre-installation manual.						

READINESS NA HDe - TYF

8-198F CHECKED BY: TMS



THE FOLLOWING ITEMS WHICH HAVE BEEN ADDEDED FROM OF HEALTHOADS

	TH AR	E FOLLOWING ITEMS, WHICH HAVE BEEN O E TO BE INSTALLED BY THE CUSTOMER OF	RDERED R HIS (	FR( CONT	OM GE RACTOR	HEAL <sup>®</sup>	THCARE,			
(50)	1	MR COMMON CHILLER SYSTEM	683	lbs	52560	btu	M3088TL	_	MRCC	_
(5 <sub>1</sub> )	1	SHIELD COOLER Compressor	253	lbs	28123	btu	M6015G	_	MS50	_
<b>(52)</b>	1	REMOTE CONTROL For Chiller System	2	lbs			M3088R	,	RCP	_

MOVING METAL SENSITIVITY LINE FOR

NOTE: FERRROUS OBJECTS MUST NOT MOVE INTO OR INSIDE OF THE MOVING

MOVING METAL SENSITIVITY LINE FOR BUSES AND TRUCKS (DUMP, TRACTOR TRAILER, UTILITY, FIRE TRUCKS)

METAL SENSISTIVITY LINE DURING SCANS

CARS, MINIVANS, PICKUP TRUCKS,

AND AMBULANCES.

EQUIPMENT LAYOUT

RECOMMENDED CEILING HEIGHT = 8'-9''

This equipment layout indicates the placement and interconnection of the indicated equipment components. There may be federal, state, and/or local requirements that could impact the placement of these components. It remains the Customer's responsibility for ensurina the site and final equipment placement complies with all applicable federal, state, and/or local requirements.

#### MRI SITE PLANNING REMINDERS

PLEASE REFER TO PRE-INSTALLATION CHECKLIST IN PRE-INSTALLATION MANUAL LISTED ON SHEET C1 FOR ITEMS CRITICAL TO IMAGE QUALITY.

- THE LAYOUT SHOULD BE ARRANGED SO THAT THE 5G LINE IS CONTAINED TO THE MAGNET ROOM. IF NOT POSSIBLE, A BARRIER IS RECOMMENDED TO PREVENT ENTRY TO THE 5G FIELD AREA.
- THE SPACES AROUND, ABOVE, AND BELOW THE MAGNET MUST BE REVIEWED FOR EFFECTS OF THE 5G, 3G, 1G, AND .5G FIELDS. REFER TO THE PROXIMITY LIMIT CHART IN THE MR PRE-INSTALLATION MANUAL REFERENCED ON C1.
- FOR MOVING METAL, THE RESTRICTION LINES TYPICALLY EXTEND OUTSIDE OF THE MRI SPACE. PLEASE CONFIRM THERE ARE NO MOVING METAL CONCERNS WITHIN THESE AREAS. AN EMI STUDY IS RECOMMENDED IF THE RESTRICTION LINES ARE VIOLATED.
- . FOR VIBRATION, PLEASE CONFIRM THAT A VIBRATION STUDY HAS BEEN RECOMMENDED AND/OR SUCCESSFULLY COMPLETED.
- FOR EMI, REVIEW THE SITE FOR THE LOCATION OF THE MAIN ELECTRICAL FEEDERS, AC DEVICES, OR DISTRIBUTION SYSTEMS. AN EMI STUDY IS RECOMMENDED IF LARGE AC SYSTEMS ARE NEARBY.
- DETAILS OF THE FLOOR BELOW THE MAGNET MUST BE REVIEWED. THE STRUCTURAL ENGINEER MUST VERIFY THAT THE QUANTITY OF STEEL IN THE VOLUME 10FT [3.1M] X 10FT [3.1M] X 1FT [.3M] DEEP (BELOW THE MAGNET) DOES NOT EXCEED THE ALLOWABLE STEEL CONTENT AS GIVEN IN THE MR PRE-INSTALLATION MANUAL REFERENCED ON SHEET C1.

RESPONSIBILITY FOR THE COORDINATION, DESIGN, ENGINEERING, AND SITE PREPARATION RESIDES WITH THE CUSTOMER AND THEIR PROJECT ARCHITECTS AND CONTRACTORS, GE DOES NOT, BY PROVIDING REVIEWS AND FURNISHING COMMENTS AND ASSISTANCE, ACCEPT ANY RESPONSIBILITY BEYOND ITS OBLIGATIONS AS DEFINED N THE MR SYSTEM, SALE/PURCHASE AGREEMENT

> 5 GAUSS ∖BARRIER -

AIR CONDITIONING UNIT BY OTHERS LOCATED ELSEWHERE

#### IMAGE QUALITY CONSIDERATIONS

BROADBAND RF NOISE IS A SINGLE TRANSIENT OR CONTINUOUS SERIES OF TRANSIENT DISTURBANCES CAUSED BY AN ELECTRICAL DISCHARGE. LOW HUMIDI ENVIRONMENTAL CONDITIONS WILL HAVE HIGHER PRO- BABILITY OF ELECTRICAL DISCHARGE. THE ELECTRICAL DISCHARGE CAN OCCUR DUE TO ELECTRICAL ARCING (MICRO ARCING) OR MERELY STATIC DISCHARGE, SOME POTENTIAL SOURCES CAPABLE OF PRODUCING ELEC- TRICAL DISCHARGE INCLUDE:

- LOOSE HARDWARE/FASTENERS VIBRATION OR MOVEMENT (ELECTRICAL) CONTUNUITY MUST ALWAYS BE MAINTAINED)
- FLOORING MATERIAL INCLUDING RAISED ACCESS FLOORING (PANELS & SUPPORT HARDWARE) AND CARPETING
- ELECTRICAL FIXTURES (i.e. LIGHTING FIXTURES, TRACK LIGHTING, EMERGENCY LIGHTING, BATTERY CHARGERS, OUTLETS)
- DUCTING FOR HVAC AND CABLE ROUTING

TO BE INSTALLED OUTSIDE BUILDING, WITH A MAXIMUM [100 FEET [30 M] VERTICALLY ABOVE OR 10 FEET [3 M] BELOW FROM THE GRADIENT COIL/SHIELD COOLER, WITH 200 FEET [60 M] AS MAXIMUM TOTAL DISTANCE.

- RF SHIELD SEALS (WALLS, DOORS, WINDOWS ETC.)
- FOR ADDITIONAL INFORMATION REGARDING IMAGE QUALITY, REFER TO THE PRE-INSTALLATION MANUAL LISTED ON SHEET C1

NOTE: VERIFY DELIVERY ROUTE FOR MAGNET, EQUIPMENT, AND SERVICE EQUIPMENT PRIOR TO DELIVERY.

#### CRITICAL ITEMS FOR MAGNET DELIVERY

- ☐ 24/7 CHILLED WATER AND 480V POWER FOR SHIELD/CRYO COOLER
- □ 24/7 120V POWER FOR THE MAGNET MONITOR
- ☐ PHONE LINES FOR MAGNET MONITORING AND EMERGENCY USE
- ☐ MAGNET ROOM EXHAUST FAN ☐ CRYOGEN VENTING (IF ROOF HATCH, COMPLETED WITHIN 24 HRS)

PRE-INSTALLATION MANUAL REFERENCED ON SHEET C1.

\* THE ISOGAUSS CONTOUR PLOTS DEPICTED ON THIS DRAWING REPRESENT MAGNETIC

THE CONTOURS SHOWN ARE ONLY APPROXIMATIONS OF ACTUAL FIELD INTENSITIES

FOUND AT A CORRESPONDING DISTANCE FROM THE MAGNET'S ISOCENTER.

- MINIMUM DOOR OPENING FOR EQUIPMENT DELIVERY IS 43 In. W × 82 In. H [1092mm × 2083mm], Contingent On A 96 In. [2438mm] Corridor Width ☐ MAGNET ANCHORS INSTALLED AND TESTED THIS IS ONLY A PARTIAL LIST OF ITEMS REQUIRED FOR DELIVERY OF THE MAGNET. FOR A COMPLETE CHECKLIST REFER TO THE
  - MAGNET ROOM EXHAUST FAN
- FRINGE FIELDS RESULTING FROM THE NORMAL OPERATION OF THE MAGNET PROVIDED WITH THE MR SYSTEM. THE ACTUAL MAGNETIC FIELD INTENSITY AT ANY POINT IN THE VICINITY OF THE MAGNET WHEN INSTALLED MAY VARY FROM THE CONTOUR PLOTS DUE TO FACTORS SUCH AS THE CONCENTRATING EFFECTS OF NEARBY FERROUS OBJECTS AMBIENT MAGNETIC FIELDS, INCLUDING THE EARTH'S MAGNETIC FIELD. THEREFORE,

THE FOLLOWING ITEMS ARE AVAILABLE FROM GE HEALTHCARE

DC LIGHTING CONTROL PANEL

DC LIGHTING AUTO TRANSFORMER 60 (bs [27 kg] 171 btu/hr (50W) (PART OF VARIABLE DIMMER SYSTEM)
(CAT. NO. E4502SD/SF INCLUDES BASIC SYSTEM)

WORKSTATION TABLE CAT. NO. M20032FK

#### GENERAL SPECIFICATIONS

- THE REQUIRED CEILING HEIGHT INDICATED ON THESE PLANS IS TO ENSURE EQUIPMENT FUNCTION IS NOT INHIBITED. CONSULT WITH YOUR LOCAL GEHC IS SPECIALIST REGARDING ACCEPTABILITY OF OTHER CEILING HEIGHTS.
- RADIATION PROTECTION REQUIREMENTS ARE NOT INDICATED ON THIS PLAN. WHERE NEEDED PER NATIONAL OR LOCAL CODE THEY SHALL BE SPECIFIED BY A QUALIFIED
- THE DEVELOPMENT OF THE EQUIPMENT LAYOUT, ROOM DIMENSIONS, MECHANICAL AND ELECTRICAL SUGGESTIONS IS PREDICATED UPON THE BEST INFORMATION OBTAINABLE FROM THE SITE, COUPLED WITH THE CUSTOMER'S KNOWN DESIRES. ARCHITECTURAL OR ELECTRICAL CHANGES INCLUDING RELOCATION OF EQUIPMENT ILLUSTRATED ON THIS DRAWING IS ALLOWED ONLY WITH NOTIFICATION, IN WRITING, AND REVIEW BY GEHC SERVICE DEPARTMENT. EQUIPMENT OPERATION, SERVICEABILITY, AND RESTRICTING CABLE LENGTHS, ETC., MAKE THIS ESSENTIAL FOR A PROPER IS. GEHC RESERVES THE RIGHT TO MAKE ON THE JOB CHANGES BECAUSE OF CUSTOMER REQUIREMENTS AND/OR OBSTACLES IN CONSTRUCTION, ETC..

- AMBIENT OPERATING TEMPERATURE: 59-89.6 DEG (F) [15-32 (C)] FOR THE CONTROL AND EQUIPMENT AREAS,  $\{59-69.8 \text{ DEG (F) } [15-24 \text{ 1C})\}$  FOR THE MAGNET ROOM.
- HUMIDITY: 30 TO 75 (30-60 FOR THE MAGNET ROOM) PERCENT NON-CONDENSING, MAXIMUM ALLOWABLE CHANGE OF 5 PERCENT/HOUR.
- DO NOT RESTRICT THE AIR INTAKE OR AIR EXHAUST OF THE SYSTEM COMPONENTS.
- INCLUDING FOR EXAMPLE OVERNIGHT, WEEKENDS, AND HOLIDAYS.
- CRYOGEN VENTING AND MAGNET ROOM EXHAUST FAN SYSTEMS MUST BE COMPLETED IN THE MAGNET ROOM PRIOR TO DELIVERY.

- THE CUSTOMER MUST ESTABLISH PROTOCOLS TO PREVENT PERSONS WITH CARDIAC PACEMAKERS, NEUROSTIMULATORS, AND BIOSTIMULATION DEVICES FROM ENTERING MAGNETIC FIELDS OF GREATER THAN 5 GAUSS (EXCLUSTION ZONE).
- MAIN POWER TRANSFORMERS MUST REMAIN OUTSIDE THE 3 GAUSS FIELD.
- ACCORDINGLY (SUCH AS PLACING 5 GAUSS WARNING SIGNS AT EXPANDED LOCATIONS).
- THE FERROUS METAL OBJECTS LISTED BELOW MUST NOT MOVE INTO OR INSIDE OF THE MOVING METAL SENSITIVITY LINE DURING SCANS.

	TYPCIAL MOVING MAGNETIC MASS	DISTANCE RADIALLY	DISTANCE AXIALLY
	CARTS, GURNEYS 100-400 lbs [45-182 kg]	3 GAUSS LINE	3 GAUSS LINE
	FORKLIFTS, SMALL ELEVATOR, CARS, MINIVANS VANS, PICKUP TRUCKS, AMBULANCES (OBJECTS GREATER THAN 400 lbs [182 kg])	15.5 ft. [4.72 m]	21.0 ft. [6.4 m]
$\Big]  \Big[$	BUSES AND TRUCKS (DUMP, TRACTOR TRAILER, UTILITY, FIRE TRUCKS)	18.1 ft. [5.52 m]	24.5 ft. [7.47 m]

THIS SHEET IS PART OF THE DOCUMENT SET LISTED ON SHEET C1 AND SHOULD NOT BE SEPARATED

ANCILLARY ITEMS

CUSTOMER/CONTRACTOR SUPPLIED AND INSTALLED

ITEM DESCRIPTION (\* INDICATES EXISTING)

RF FILTERS - LOCATE WITHIN 24 in. [610 mm] OF THE RF COMMON GROUND STUD

AIR CONDITIONING, (VIBRATION ISOLATION IS RECOMMENDED AT SUPPORTS OF EACH UNIT TO BE INSTALLED.)

SHELF - CUSTOMER TO PROVIDE ADEQUATE WALL SUPPORT VALVES AND HOSE BARBS FOR COOLING SYSTEM

MINIMUM 9 FT.-O IN. [2743 mm] x 9 FT.-O IN. [2743 mm] removable wall section for magnet delivery/removal.

RF SCREEN, INCLUSIVE DF WALLS, FLOOR, DOOR, ETC. Ground impedance greater than 1000 dhms. Attenuation 100db at 10-100mhz planewave.

BASE CABINET FOR STORAGE OF: SURFACE COILS, PATIENT POSITIONING PADS, PHANTOMS, ETC.

TECHNOLOGIES. CONTACT YOUR LOCAL GE HEALTHCARE SERVICE REPRESENTATIVE FOR PRICING AND AVAILABILITY.

155 lbs (70 kg) 1024 BTU/HR, (300W) (CAT, NO, E4502SC/SE - BASIC SYSTEM)

MAIN DISCONNECT CONTROL 900 BTU (264 W) 350 lbs (158kg) CAT NO. M3088TM

METAL DETECTOR (HAND HELD)

- CHECK ALL DOOR OPENINGS AND HALLWAYS FROM DELIVERY LOCATION TO WHERE EQUIPMENT IS TO BE INSTALLED TO ENSURE THE ROUTE PHYSICALLY AND STRUCTURALLY WILL ACCOMODATE THE EQUIPMENT AS SHIPPED.
- ALL WORK TO BE IN COMPLIANCE WITH NATIONAL AND LOCAL BUILDING SAFETY CODES.
- DIMENSIONS ARE TO FINISHED SURFACES OF ROOM

#### SITE ENVIRONMENT SPECIFICATIONS

- MAXIMUM ALLOWABLE TEMPERATURE CHANGE OF 5 DEG (F)/HR [3 (C)/HR]. MAXIMUM ROOM TEMPERATURE GRADIENT 5 DEG (F) [3 (
- ALTITUDE: 100 FT [30.5M] BELOW SEA LEVEL TO 8,000 FT. [2438M] ABOVE SEA LEVEL. ENVIRONMENTAL RESTRICTIONS ABOVE MUST NOT BE EXCEEDED FOR THE ELECTRONICS.
- ENVIRONMENTAL CONDITIONS LISTED ABOVE MUST BE MAINTAINED AT ALL TIMES
- THE SHIELD COOLER COMPRESSOR CABINET REQUIRES WATER COOLING TO DISSIPATE THE HEAT OUTPUT. HEAT DISSIPATION TO AIR IS NEGLIGIBLE. 24 HOUR POWER AND WATER COOLING MUST BE AVAILABLE UPON MAGNET DELIVERY.
- FLUORESCENT LIGHTING IS NOT ALLOWED IN THE MAGNET ROOM DUE TO RF NOISE.

#### MAGNETIC INTERFERENCE SPECIFICATIONS

- EMI < 40mG AC. EMI < 4.43mG DC.
- POTENTIAL EXISTS UNDER FAULT CONDITIONS THAT THE 5 GAUSS LINE MAY EXPAND RADIALLY TO 16.4 FT. [5.0 m] AND AXIALLY TO 22.96 FT. [7.0 m] FOR 2 SECONDS OR LESS. IT SHOULD BE NOTED THAT NORMAL RAMPDOWNS OR MRU (MAGNET RUNDOWN UNIT) INITIATED QUENCHES WILL NOT CAUSE THE MAGNETIC FIELD TO EXPAND.
- IT IS RECOMMENDED EVERY SITE CONSIDER THE EVENT OF A QUENCH AND PLAN

TYPCIAL MOVING MAGNETIC MASS	DISTANCE RADIALLY	DISTANCE AXIALLY
CARTS, GURNEYS 100-400 lbs [45-182 kg]	3 GAUSS LINE	3 GAUSS LINE
FORKLIFTS, SMALL ELEVATOR, CARS, MINIVANS VANS, PICKUP TRUCKS, AMBULANCES (OBJECTS GREATER THAN 400 lbs [182 kg])	15.5 ft. [4.72 m]	21.0 ft. [6.4 m]
BUSES AND TRUCKS (DUMP, TRACTOR TRAILER, UTILITY, FIRE TRUCKS)	18.1 ft. [5.52 m]	24.5 ft. [7.47 m]

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LAYOUT - TYPE A

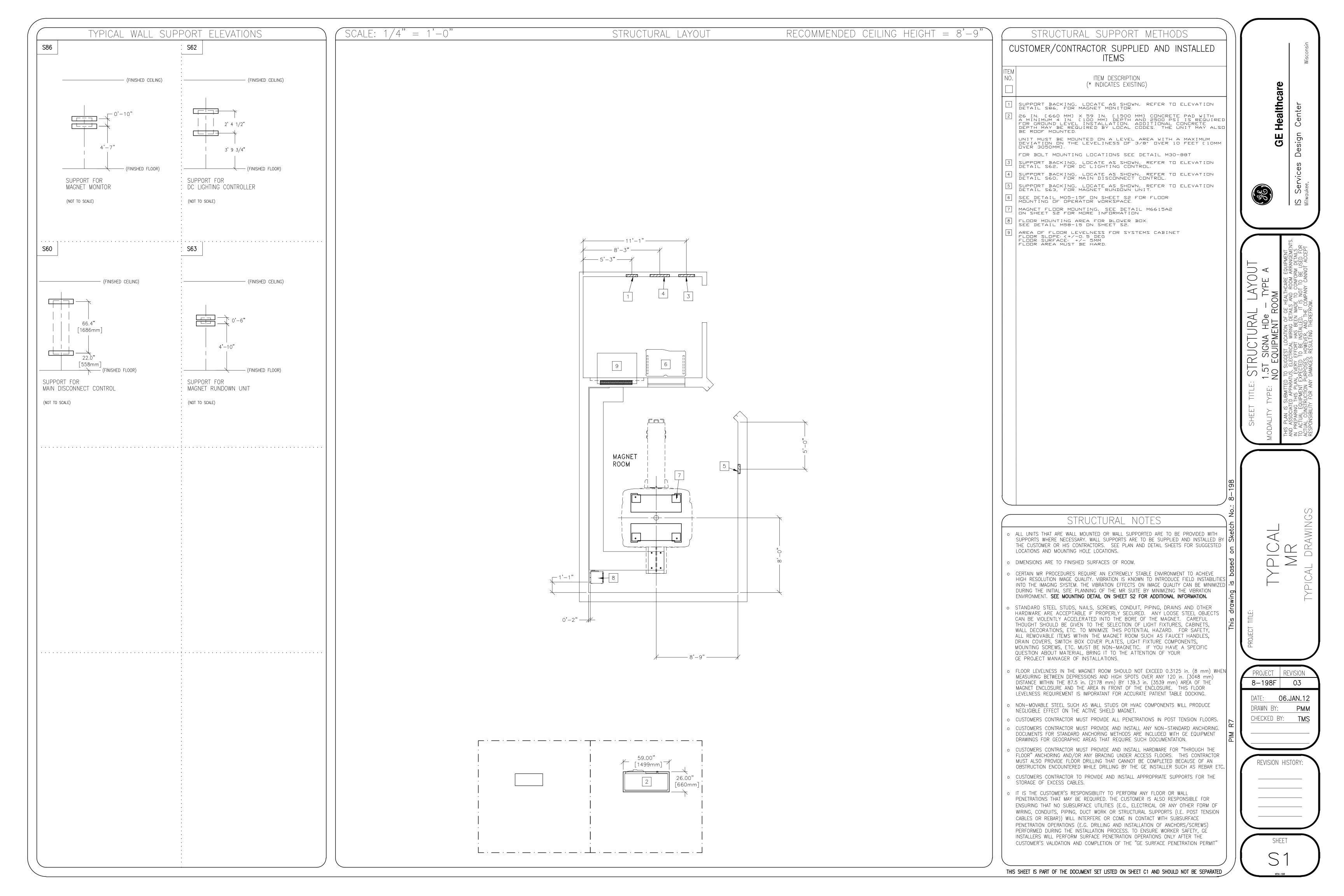
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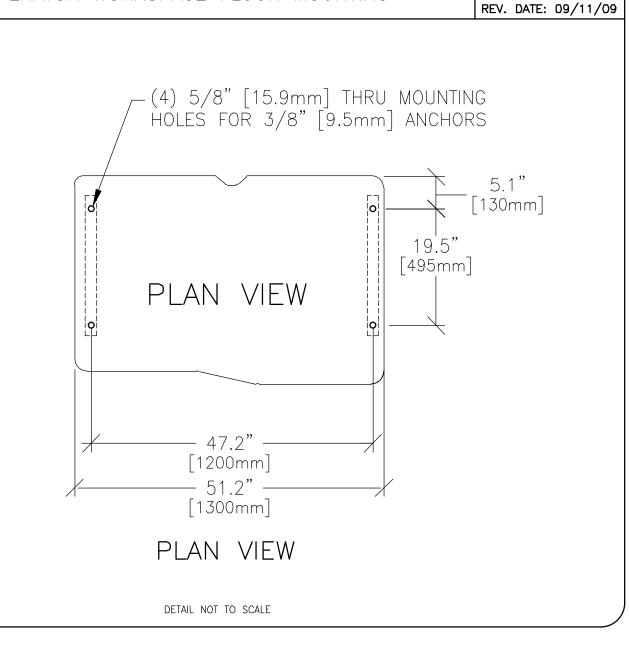
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REVISION HISTORY:



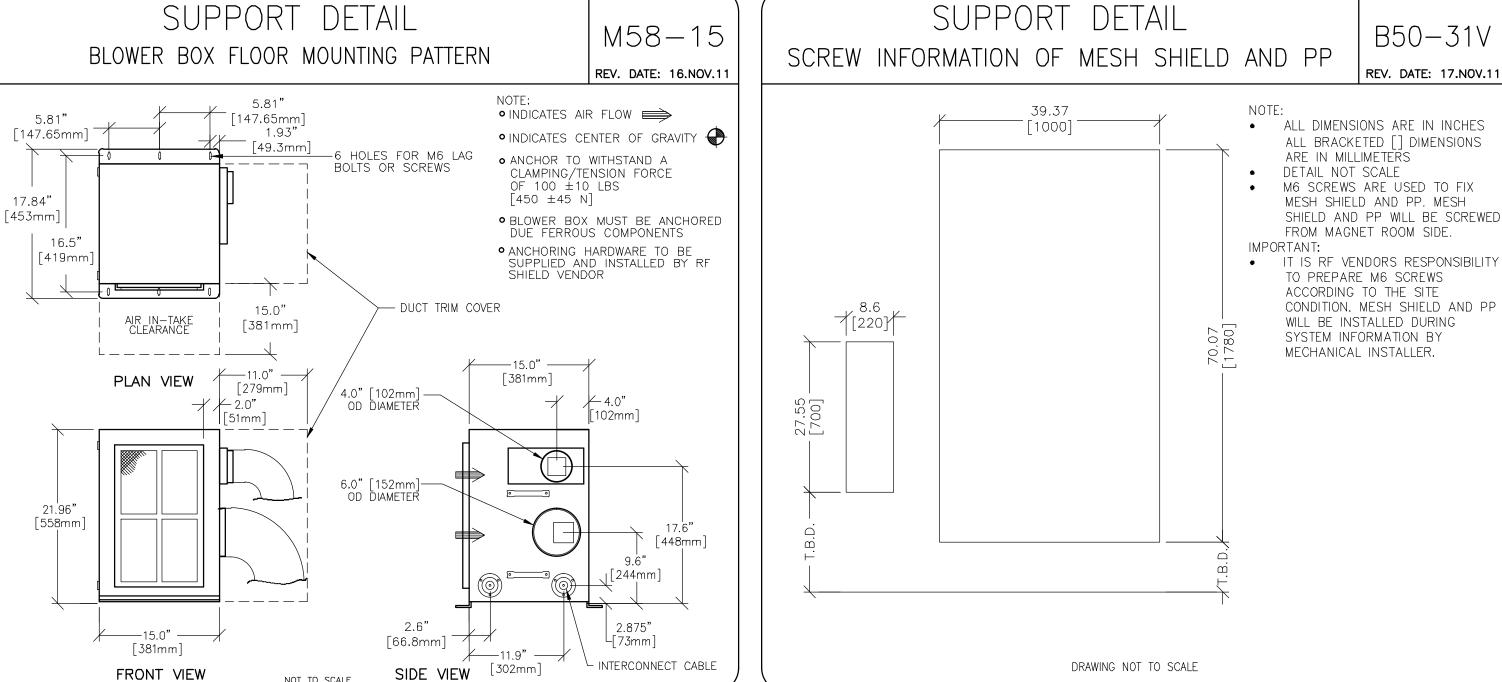
### SUPPORT DETAIL

M05 - 15KOPERATOR WORKSPACE FLOOR MOUNTING



M66 - 15G

REV. DATE: 08/22/05



# DRAWING NOT TO SCALE

[1346mm]

[350mm

[719mm]

**⊁**— 26.5" —

[673mm]

#### ACOUSTICS AND VIBRATION GUIDELINES: SIGNA LCC MAGNET - (CXK4)

SYSTEM ACOUSTIC NOISE LEVELS

ANY GE FACTORY-INSTALLED PROTOCOL CAN BE MODIFIED BY OPERATORS, WHICH CAN INCREASE OR DECREASE ACOUSTIC SPL (SOUND PRESSURE LEVEL): OR OPERATORS MAY CREATE THIER OWN PROTOCOL WHICH COULD PRODUCE A HIGHER OR LOWER ACOUSTIC SPL AS STATED UNDER OPERATING CONDITIONS CONDITION 1 BELOW. TYPICAL SCANS GENERATE ACOUSTIC LEVELS AS STATED UNDER OPERATING CONDITIONS CONDITION 2 BELOW. IN ADDITION, THE EXPOSURE TIMES ARE COMPLETELY UNDER OPERATOR CONTROL. CONSEQUENTLY, HEARING PROTECTION IS REQUIRED FOR ALL PEOPLE IN THE MAGNET ROOM DURING SCANS TO PREVENT HEARING IMPAIRMENT, ACOUSTIC LEVELS MAY EXCEED 99 dba. AGAIN, FOR MORE INFORMATION ABOUT RECOMMENDED SAFETY PROCEDURES REGARDING PATIENT EXPOSURE TO MR-GENERATED ACOUSTI NOISE, SEE THE MR SAFETY GUIDE INCLUDED IN THE USER MANUAL.

AMBIENT CONDITIONS

TO REDUCE ANY BACKGROUND NOISE DUE TO CABINET BLOWERS, ETC., ACOUSTICAL CEILINGS, WALLS, AND FLOORS ARE RECOMMENDED. THE FOLLOWING ARE TYPICAL NOISE LEVEL READINGS

- EQUIPMENT ROOM ..75 dBA ...69.1 dBA
- MRCC (MR COMMON CHILLERS). OPERATING CONDITIONS

CONDITION 1

MR SCANNERS UNDER "WORST-CASE" OPERATING CONDITIONS, COULD GENERATE ACOUSTIC LEVELS (AS MEASURED AT THE MAGNET ISO-CENTER) AS FOLLOWS:

AVERAGE SPL 118 dBA SPL = SOUND PRESSURE LEVEL PEAK 128 dB

FREQUENCY RANGE 20 TO 20k Hz

MR SCANNERS FOR MANY TYPICAL CLINICAL SCANNING SCENARIOS THOUGH, GENERATE ACOUSTIC LEVELS (AS MEASURED AT THE MAGNET ISO-CENTER) SOMEWHAT LOWER AS FOLLOWS:

PEAK 110 TO 120 dB FREQUENCY RANGE 20 TO 20k Hz

AS RECENT HISTORY HAS SHOWN AN EVOLUTION TOWARDS MORE POWERFUL (AND HENCE LOUDER) GRADIENT SUBSYSTEMS, ARCHITECTS SHOULD CONSIDER THE ACOUSTIC LEVELS STATED IN THE "WORST CASE" CONDITION 1, MENTIONED ABOVE. NOTE THAT HIGH-FIELD SIGNA SYSTEMS HAVE THE ABILITY TO RUN SCANNING PROTOCOLS WHICH CAN GENERATE ACOUSTIC LEVELS OVER THE ENTIRE HUMAN PERCEPTIBLE FREQUENCY RANGE (20 TO 20k Hz), THEREFORE ATTENUATION OVER THIS ENTIRE RANGE MUST BE CONSIDERED FOR SITE DESIGN.

#### VIBRATION

- THE MAGNET MAY BE SENSITIVE TO VIBRATIONS IN THE FREQUENCY RANGE OF 0.5 TO 45 Hz DEPENDING ON THE AMPLITUDE OF THE VIBRATION. IN THE PHYSICAL AREA WHERE THE MR SYSTEM IS TO BE LOCATED, EVERY PRECAUTION MUST BE TAKEN TO ENSURE THAT THE VIBRATION IS MINIMIZED. IN THE MAGNET SITING AREA, THE STRUCTURAL STABILITY AND BEHAVIORAL CHARACTERISTICS CAN BE ASSESSED. THE VIBRATION TESTS OUTLINED CAN BE USED TO ASSESS THE VIBRATION ENVIRONMENT. SITES WHICH CURRENTLY PASS THE VIBRATION STABILITY CRITERIA MAY PROCEED WITH INSTALLATION. SITES WHICH HAVE MARGINAL VIBRATION STABILITY REQUIRE SOURCE ISOLATION OR STRUCTURAL MODIFICATIONS. THEN IT IS THE CUSTOMER'S RESPONSIBLITY TO CONTRACT A VIBRATION CONSULTANT OR QUALIFIED ENGINEER TO IMPLEMENT DESIGN MODIFICATIONS TO MEET THE SPECIFIED LIMITS. WITH THE VIBRATION CONSULTANT PRESENT, LOCAL GE FIELD SERVICE AND/OR INSTALLATION SPECIALIST MUST VERIFY THE ELIMINATION/REDUCTION OF ALL IDENTIFIED SOURCES DO IMPROVE THE VIBRATION ENVIRONMENT. GE CAN ASSIST IN INTERPRETING MARGINAL SITE TEST RESULTS AND PREDICTING THE IMPACT ON SYSTEM PERFORMANCE. HOWEVER IT IS ULTIMATELY THE CUSTOMER/ARCHITECT/ENGINEER RESPONSIBLITY TO DESIGN SITE SOLUTION.
- TO MINIMIZE THE INTERFERENCE, THE MAGNET SHOULD BE PLACED ON A SOLID FLOOR, LOCATED AS FAR AS POSSIBLE FROM THE VIBRATION SOURCES, SUCH AS PARKING LOTS, ROADWAYS, SUBWAYS, TRAINS, HALLWAYS, ELEVATORS, HELIPORTS AND HOSPITAL PHYSICAL PLANTS CONTAINING PUMPS, MOTORS, AIR HANDLING EQUIPMENT,

PLEASE NOTE THAT OTHER ITEMS NOT LISTED COULD ALSO BE POTENTIAL SOURCES OF VIBTRATION. VIBRATION ISOLATION IS RECOMMENDED AT FLOOR CONNECTION POINTS OF THE AIR CONDITIONING UNIT(S) TO BE INSTALLED FOR THE PURPOSE OF COOLING THE MR SUITE. ISOLATION OF THE MR MAGNET IS NOT A RECOMMEDED SOLUTION FOR REDUCING ENVIRONMENTAL VIBRATION.

- VIBRATION MEASUREMENTS SHOULD BE MADE WHEN THE PROPOSED SITE IS LOCATED NEAR ANY OF THE SOURCES LISTED HERE. MEASUREMENTS SHOULD BE MADE USING A SPECTRUM ANALYZER CAPABLE OF PERFORMING THE TEST GUIDELINES. MAGNET SITING REQUIREMENT
- o THE MAGNET MUST BE RIGIDLY BOLTED TO THE FLOOR. VIBRATION MEASUREMENTS ON THE MAGNET SUPPORT MUST MEET THE GUIDELINES BELOW. CUSTOMER/CONTRACTOR IS RESPONSIBLE FOR THE PROPER MAGNET ANCHORING.
- TIME HISTORY VIBRATION LEVELS (WITH ALL STEADY STATE VIBRATION SOURCES POWERED DOWN) EXCEEDING TRIGGER OF 0.0005 g, ZERO TO PEAKUST BE FULLY ANALYZED TO ASSESS THE POTENTIAL IMPACT TO THE BUILDING STRUCTURE. THE BUILDING (SPECTRAL) RESPONSE IMMEDIATELY FOLLOWING THE 0.0005 g, ZERO TO PEAK TRIGGER LEVEL (ENDING AT THE DECAY OF THE VIBRATION SIGNAL) MUST NOT CAUSE THE SITE ENVIRONMENT TO EXCEED THE STEADY STATE VIBRATIONVELS DEFINDED BELOW.
- STEADY STATE VIBRATION
- o THE MAXIMUM STEADY STATE VIBRATION TRANSMITTED THROUGH THE FLOOR MUST NOT EXCEED THE FOLLOWING MAXIMUM SINGLE FREQUENCY COMPONENTS ABOVE AMBIENT BASELINE:
  - o  $5 \times 10^{-5}$ g rms at 0 Hz ramping to 10 x 10 g at 20 Hz
  - o  $10 \times 10^{-5}$ g rms 20-40 Hz o  $45 \times 10^{-5}$  g rms 40-50 Hz

IN ORDER TO ENSURE THAT ANY DISCRETE SIGNAL REPRESENTS A REAL MECHANICAL VIBRATION SOURCE, THE SIGNAL MUST HAVE A BANDWIDTH THAT TYPIFIES DYNAMIC SYSTEM RESPONSE.

TEST MEASUREMENTS (1.1)

VIBRATION MEASUREMENTS ARE IN THE RANGE OF  $10^{-6}$  q. TEST EQUIPMENT MUST HAVE THE REQUIRED SENSITIVITY TO THESE LEVELS.

INSTRUMENTATION IS RECOMMENDED TO HAVE A LOW TOLERANCE TO TEMPERATURE EFFECTS AS MANY TIMES THE LOW FREQUENCY THERMAL DRIFT MAY INFLUENCE THE MEASUREMENTS. IT IS HIGHLY RECOMMENDED ALL MEASURED DATA IS REAL TIME DATA ACQUISITION. RECORDING THE VIBRATION DATA WILL

NOT ALLOW FOR A PROPER SITE SURVEY, SPECIFICALLY WHEN STUDYING TRANSIENT VIBRATION AND WHEN SEARCHING FOR

ALL ANALYSES ARE TO BE NARROWBAND FAST FOURIER TRANSFORMS (FFT'S) OVER THE FREQUENCY BANDS LISTED BELOW: FREQUENCYBAND FREQUENCY RESOLUTION

0.2 TO 50 HZ  $\Delta f = 0.125$  HZ TIME HISTORIES OF THE VIBRATION MUST BE RECORDED AS ACCELERATION LEVELS VS. TIME. THE RESOLUTION OF THE TIME HISTORY MUST BE ADJUSTED TO CLEARLY CAPTURE THE TRANSIENT EVENT. THE ANALYZER SET-UP WILL BE SITE DEPENDENT AND. IN SPECIAL CASES. VIBRATION RESPONSE DEPENDENT. IT IS THE RESPONSIBLITY OF THE VIBRATION CONSULTANT TO STUDY THE TRANSIENT ENVIRONMENT, CAPTURE DATA TO CONFIRM TRANSIENT ACTIVITY EXCEEDS THE

EQUIPMENT (SPECTRAL ANALYZER) SET-UP (1.2)

- FREQUENCY AVERAGE A MINIMUM OF 20 LINEAR AVERAGES. DO NOT USE PEAK HOLD OR 1/3 OCTAVE ANALYSIS.
- AVERAGE AND STORE A MINIMUM OF 10 PLOTS TO SUPPORT THE SITE VIBRATIONS CONSISTENCY

TRIGGER LEVEL, THEN EXPAND THE TIME HISTORY DATA TO EXHIBIT THE STRUCTURAL RESPONSE.

O HANNING WINDOW MUST BE APPLIED TO THE ENTIRE SPECTRA

SPECTRUM ANALYZERS CAPABLE OF THESE MEASUREMENTS ARE READILY AVAILABLE FOR PURCHASE OR RENTAL. MODELS SUCH AS THE HP 3560A, NICOLET PHASZER, B&K PULSE, AND HP 35670 ARE ALL CAPABLE OF MAKING THE SITE VIBRATION MEASUREMENTS. ACCELEROMETERS MUST HAVE THE CAPABILITY TO MEASURE FROM 0.2 Hz BEYOND 50 Hz. TIME HISTORIES CAN BE RECORDED USING ANY OF THE ANALYZERS LISTED ABOVE. PLEASE NOTE THAT THE EQUIPMENT MENTIONED ARE FOR EXAMPLE ONLY. IT IS THE RESPONSIBILITY OF THE ENGINEERING TEST FIRM TO PROVIDE EQUIPMENT THAT WILL ALLOW MEASUREMENTS COMPLIANT WITH THIS GUIDELINE.

DATA COLLECTIONS (1.3)

AMBIENT BASELINE CONDITION:

ALL OF THE MEASUREMENTS DEFINED IN 1.1 AND 1.2 (ABOVE) MUST BE MADE IN A 'QUIET' ENVIRONMENT. THAT IS, IN AREAS WHERE EXCESSIVE TRAFFIC, SUBWAY TRAINS, ETC. EXISTS. A VIBRATION MEASUREMENT MUST ALSO BE MADE DURING PERIODS WITHOUT TRAFFIC OR DURING PERIODS OF LIGHT TRAFFIC. MEASUREMENTS MUST DEFINE THE LOWEST LEVELS OF VIBRATION POSSIBLE AT THE SITE.

THE SOURCE OF ANY STEADY STATE VIBRATION WHOSE LEVELS EXCEED THE SPECIFICATIONS MUST BE IDENTIFIED AS TO THE SOURCE OF THE VIBRATION DISTURBANCE. A SECOND MEASUREMENT SHOULD BE MADE WITH ALL OF THE IDENTIFIED CONTRIBUTORS POWERED DOWN IF POSSIBLE. IN SITUATIONS WHERE IT IS NOT POSSIBLE TO POWER DOWN EQUIPMENT, VIBRATION DATA MUST BE COLLECTED TO IDENTIFY SPECIFIC SOURCE OF THE VIBRATION CONCERN. THE MAJORITY OF STEADY STATE VIBRATION PROBLEMS CAN BE NEGATED BY ISOLATING THE VIBRATION

NORMAL CONDITION

ALL OF THE VIBRATION MEASUREMENTS LISTED ABOVE MUST BE REPEATED DURING PERIODS OF 'NORMAL' ENVIRONMENTAL CONDITIONS INCLUDING THE FFT'S AND TIME HISTORIES. THE TRANSIENT MEASUREMENTS MUST BE PROVIDED TO DEFINE THE DYNAMIC DISTURBANCES THE MR SYSTEM MIGHT BE EXPOSED TO. TRANSIENT ANALYSIS IS REQUIRED FOR A TRUE ASSESSMENT OF THE SITE.

SPEICAL ATTENTION MUST BE PAID TO THE SITE ASSESSMENT DURING THE ENTIRE ANALYSIS. SINCE TRANSIENT VIBRATION IS NOT EASILY ADDRESSED ONCE THE MR SUITE IS FULLY CONSTRUCTED, THE TEST CONSULTANT MUST FULLY UNDERSTAND THE NEEDS FOR THIS ANALYSIS. THE SOURCE OF ANY TRANSIENT MUST BE IDENTIFIED AND SUPPORTED WITH VIBRATION PLOTS. IF THE SOURCE OF ANY TRANSIENT IS NOT ABLE TO BE LOCATED, IT IS RECOMMENDED THAT THE CUSTOMER SHOULD HAVE AN ALTERNATE LOCATION IDENTIFIED AND VIBRATION STUDIED.

TRANSIENT VIBRATION IS DIFFICULT TO ASSESS IF THE DETAILS OF THE TRANSIENT VIBRATION IS NOT UNDERSTOOD. THE 0.0005 g, ZERO TO PEAK TRIGGER LEVELA STARTING POINT TO BEGIN UNDERSTANDING THE VIBRATION STABILITY. THE TRANSIENT VIBRATION PEAK AMPLITUDE, STRUCTURAL (TIME VARIANT) RESPONSE, DECAY RATE AND AN ESTIMATE OF THE NUMBER OF EVENTS PER UNIT TIME WOULD CONSTITUTÉ A COMPLETÉ TRANSIENT ANALYSIS. ALL TRANSIENT FAILURES MUST BE SUPPORTED BY TIME HISTORY PLOTS. THE PLOTS MUST CLEARLY SHOW THE STRUCTURAL RESPONSE, THE FREQUENCY OF THE SIGNATURE AND THE DECAY RATE. FROM THIS DATA, GE CAN HELP DETERMINE COMPLIANCE TO THE

TEST CONSULTANT MUST PROVE DESIGN RECOMMENDATIONS FOR ALL SITES/BUILDING STRUCTURES WHICH ARE FOUND TO EXCEED THE SPECIFICATIONS.

PRESENTATION/INTERPRETATION OF RESULTS (1.4)

THE RECOMMENDED FORMAT FOR SITE VIBRATION DATA COLLECTION, PRESENTATION, AND ANALYSIS IS ILLUSTRATED IN THE EXAMPLES SHOWN IN ILLUSTRATIONS 1.1 THROUGH 1.4. IN THE PRE-INSTALLATION MANUAL PRESENTATION OF THE DATA IN ANY OTHER FORMAT (LINEAR UNITS ONLY) MAY RESULT IN AN INCORRECT INTERPRETATION AND DIAGNOSIS OF THE SITE. ADDITIONAL DATA COLLECTION OR PRESENTATION METHODS IS AT THE OPTION OF THE VIBRATION TESTING SERVICE.

IT IS THE RESPONSIBILITY OF THE CUSTOMER'S VIBRATION TESTING SERVICE TO INTERPRET THE RESULTS AND DETERMINE IF THAT SITE MEETS GE'S SPECIFICATIONS. ILLUSTRATIONS A-1 AND A-2 ARE EXAMPLES PROVIDED TO ASSIST A TEST CONSULTANT IN THE USE OF GE STEADY STATE SPECIFICATIONS (VIBRATION SPECIFICATIONS ABOVE AMBIENT BASELINE). IF THE VIBRATION LEVELS ARE TOO HIGH, ADDITIONAL DATA ACQUISITION MAY BE NECESSARY TO:

> O DETERMINE THE SOURCE OF THE VIBRATION o PROPOSE A SOLUTION TO THE PROBLEM o FIND AN ALTERNATE SITE LOCATION.

ILLUSTRATIONS A—3 AND A—4 IN THE PRE−INSTALLATION MANUAL ARE EXAMPLES PROVIDED TO ASSIST A TEST CONSULTAN IN THE USE OF GE TRANSIENT SPECIFICATIONS. THE 500 MICRO-G, ZERO TO PEAK TRIGGERIDENTELFIES DATA COLLECTION TO BEGIN ASSESSMENT OF THE SITE VIBRATION ANALYSIS. THE RESPONSE OF THE TRANSIENT MUST BE ASSESSED RELATIVE TO THE STEADY STATE VIBRATION SPECIFICATIONS IN SECTION SPECIFICATIONS.

ANY QUESTIONS REGARDING TEST EQUIPMENT REQUIREMENTS, TEST PARAMETERS, OR GENERAL QUESTIONS SHOULD BE DISCUSSED WITH YOUR GE INSTALLATION SPECIALIST.

#### REFER TO SHEET A1 FOR FLOOR MOUNTING DETAIL: SIGNA LCC MAGNET (CXK4)

WHEN THE MAGNET IS INSTALLED WITH THE VIBROACOUSTIC DAMPING

OCAL GE HEALTHCARE PROJECT MANAGER, INSTALLATIONS.

OPTION THEN THE MAGNET IS BOLTED TO THE VIBROACOUSTIC DAMPING

OPTION MATS. FOR VIBROACOUSTIC DAMPING OPTION MOUNTING IN SEISMIC

ZONES REFER TO SEISMIC DRAWINGS AVAILABLE ON REQUEST FROM YOUR

DUTLINE OF VIBROACOUSTIC DAMPING OPTION:

-MAGNET FOOT-

-1.0" [25.4mm] MAGNET FOOT-

ALUMINUM SPACER BLOCK

\* CUSTOMER SUPPLIED

SPACER BLOCK

\* RF SHIELD ROOM VENDOR SUPPLIED ALUMINUM, BRASS OR STAINLESS STEEL PLATES TO SUPPORT THE MAGNET FEET

MAGNET FOOT ALUMINUM

-SUBFLOOR RF SHIELD :

- CONCRETE

CONDUCTIVE FIBEROUS

WASHER, RF SEAL

NOT TO SCALE

TABLE DOCK

REBAR FREE

2477 AREA

0.375" [10mm] MOUNTING HOLE FOR TABLE DOCK. ANCHOR TO WITHSTAND A

CLEAR SPACE-

BETWEEN RECESSED

FLOOR AREA &

OUTSIDE EDGE OF

SPACER BLOCK

FINISHED FLOOR

BENEATH

MAGNET FOOT)

OR GROUT

NO PLYWOOD, FILLER BOARD OR GROUT IN THIS AREA.

(NOT TO EXTEND

M6615A2

-CRYOGEN VENT TO MAGNET CENTER

ALIGNMENT REFERENCE

REV. DATE: 10/03/08

STRUCTURAL 1.57 SIGNA HDe -NO EQUIPMENT RO

DETAIL! TYPE A

GE

03

8-198F | 06.JAN.12 DRAWN BY: CHECKED BY:

REVISION HISTORY

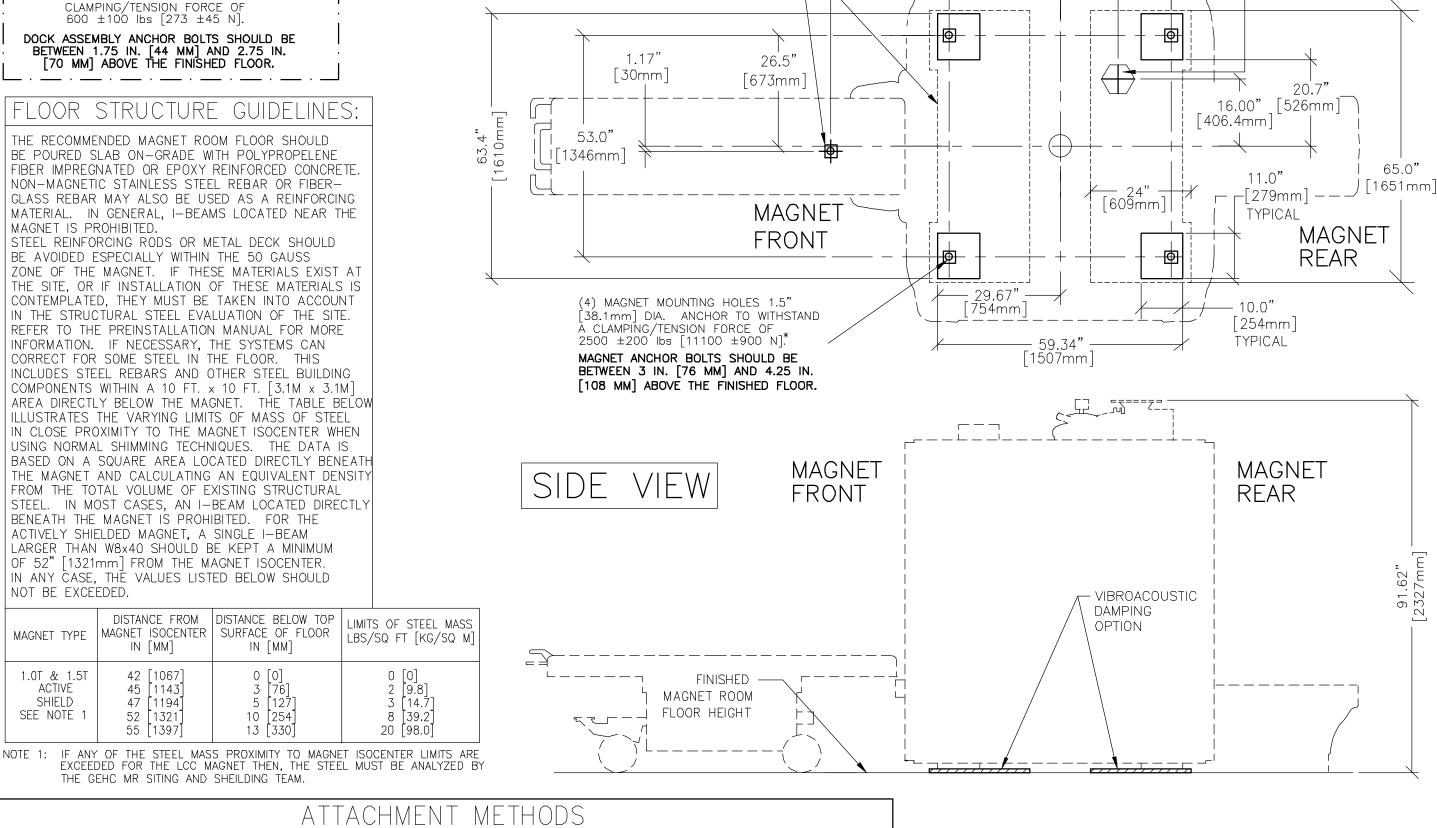
GENERAL NOTES:

STEEL REBAR MUST NOT BE POSITIONED IN SHADED AREAS NOTED AS "REBAR FREE" TO PREVENT INTERFERENCE WITH MOUNTING BOLTS.

MAGNET MOUNTING AND ANCHOR HARDWARE REQUIREMENTS ARE THE CUSTOMER/CONTRACTOR RESPONSIBILITY.

RF SCREEN ROOM VENDOR MUST PERFORM A PULL TEST ON EACH ANCHOR PRIOR TO MAGNET DELIVERY TO VERIFY THE CLAMPING/TENSION REQUIREMENTS.

THIS SHEET IS PART OF THE DOCUMENT SET LISTED ON SHEET C1 AND SHOULD NOT BE SEPARATED



CLEAR SPACE

BETWEEN RECESSED

FLOOR AREA &

SPACER BLOCK

FINISHED FLOOR

MAGNET FOOT

-FILLER BOARD

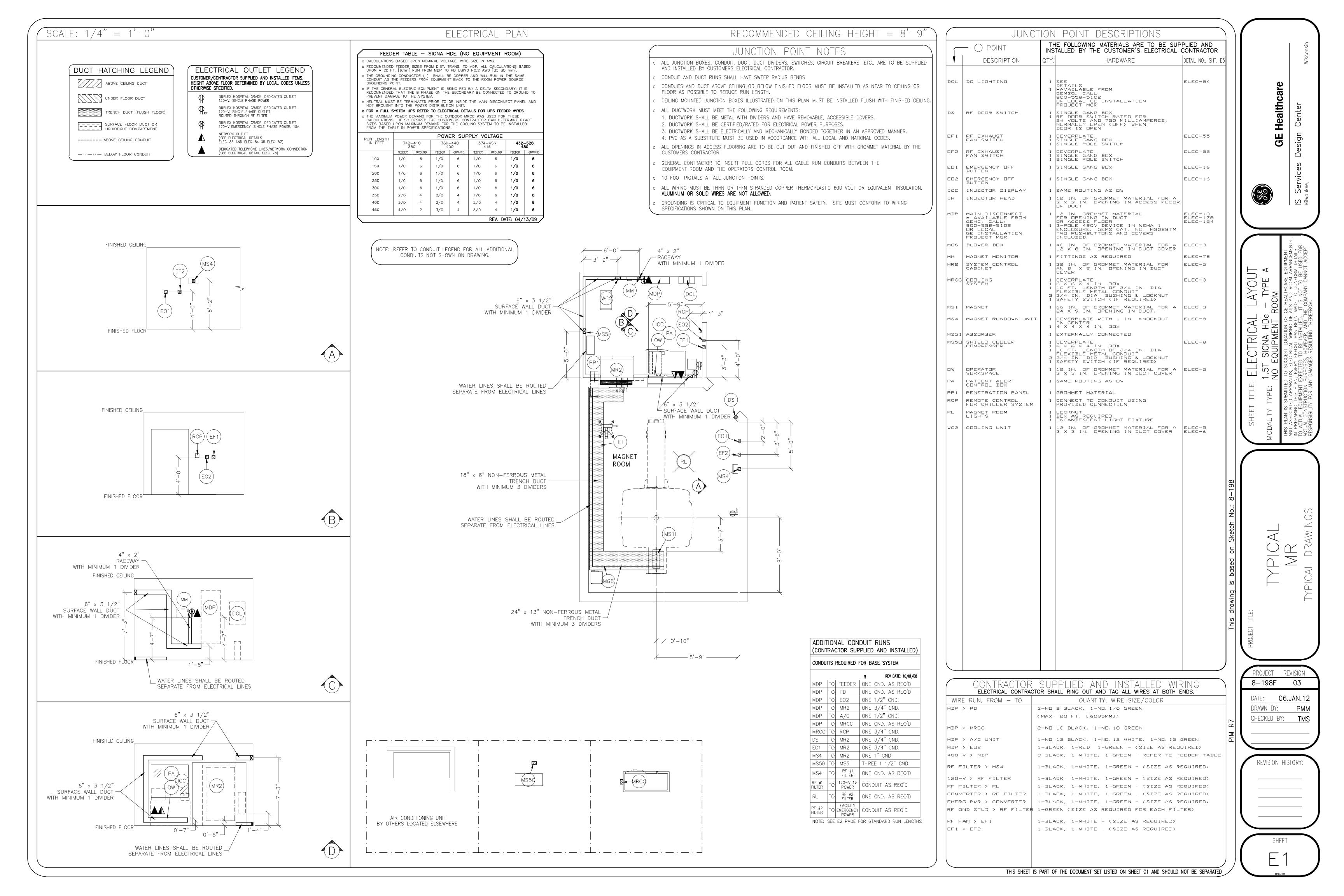
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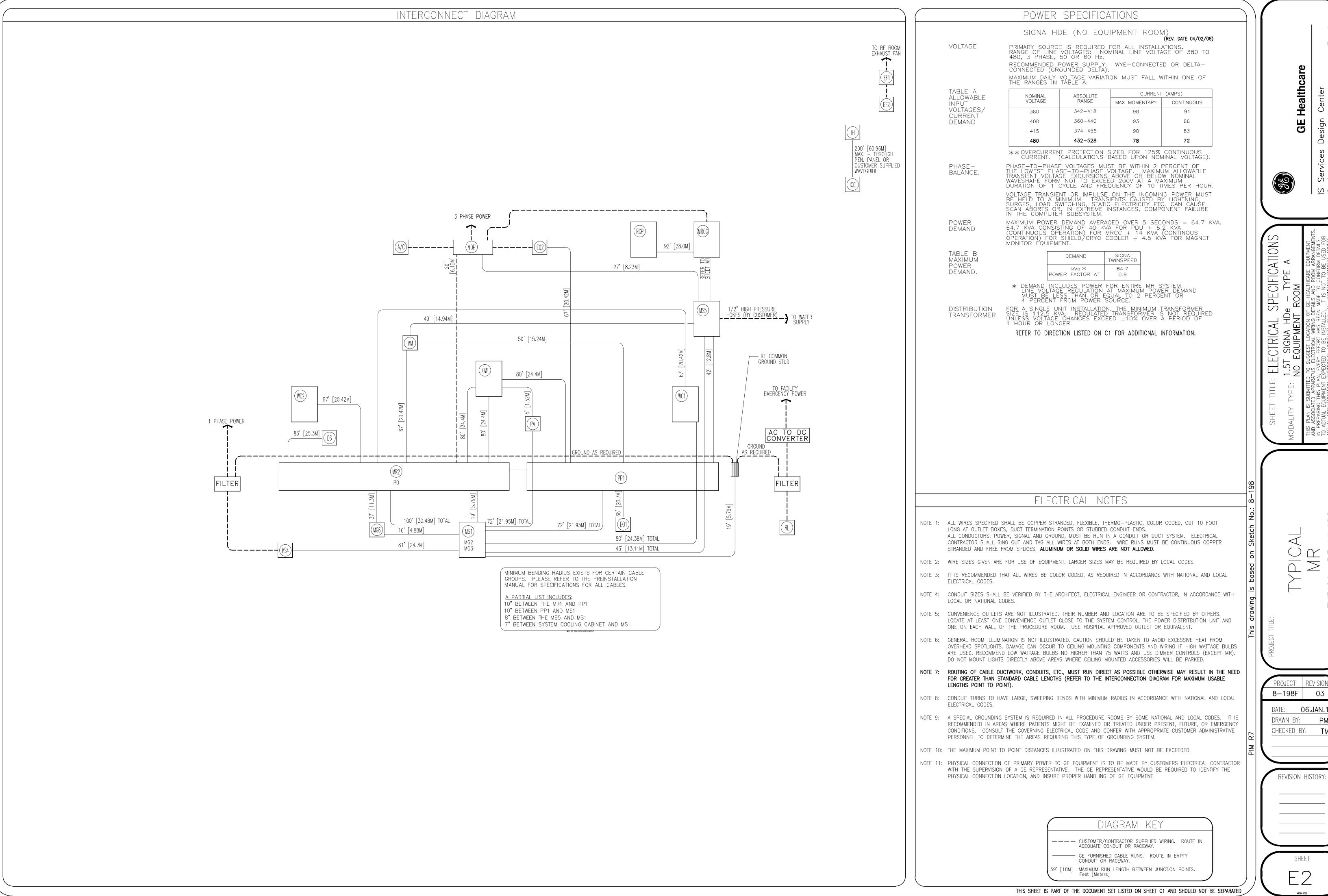
FEMALE INSERT ANCHOR

OR GROUT

(NOT TO EXTEND

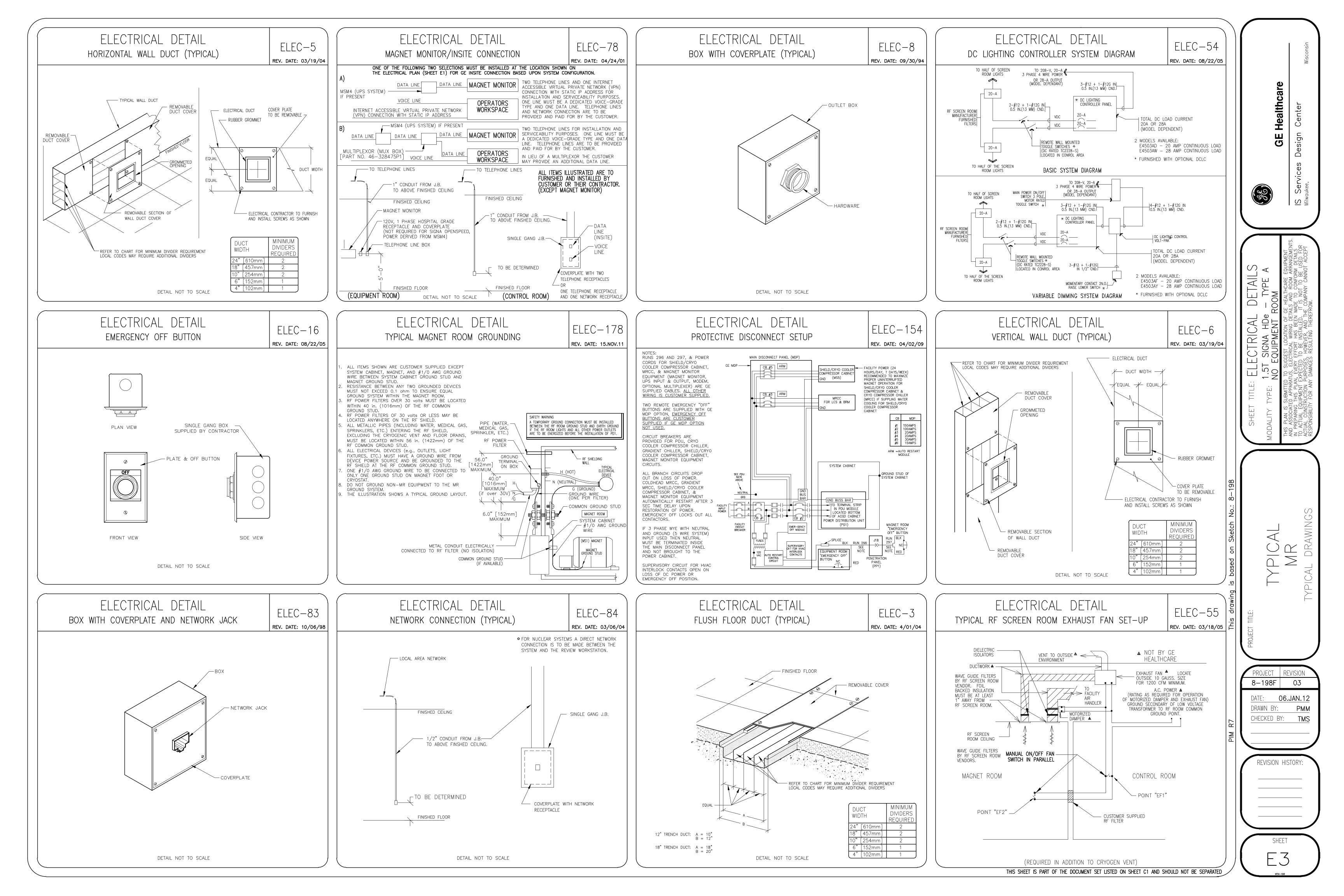
OUTSIDE EDGE OF

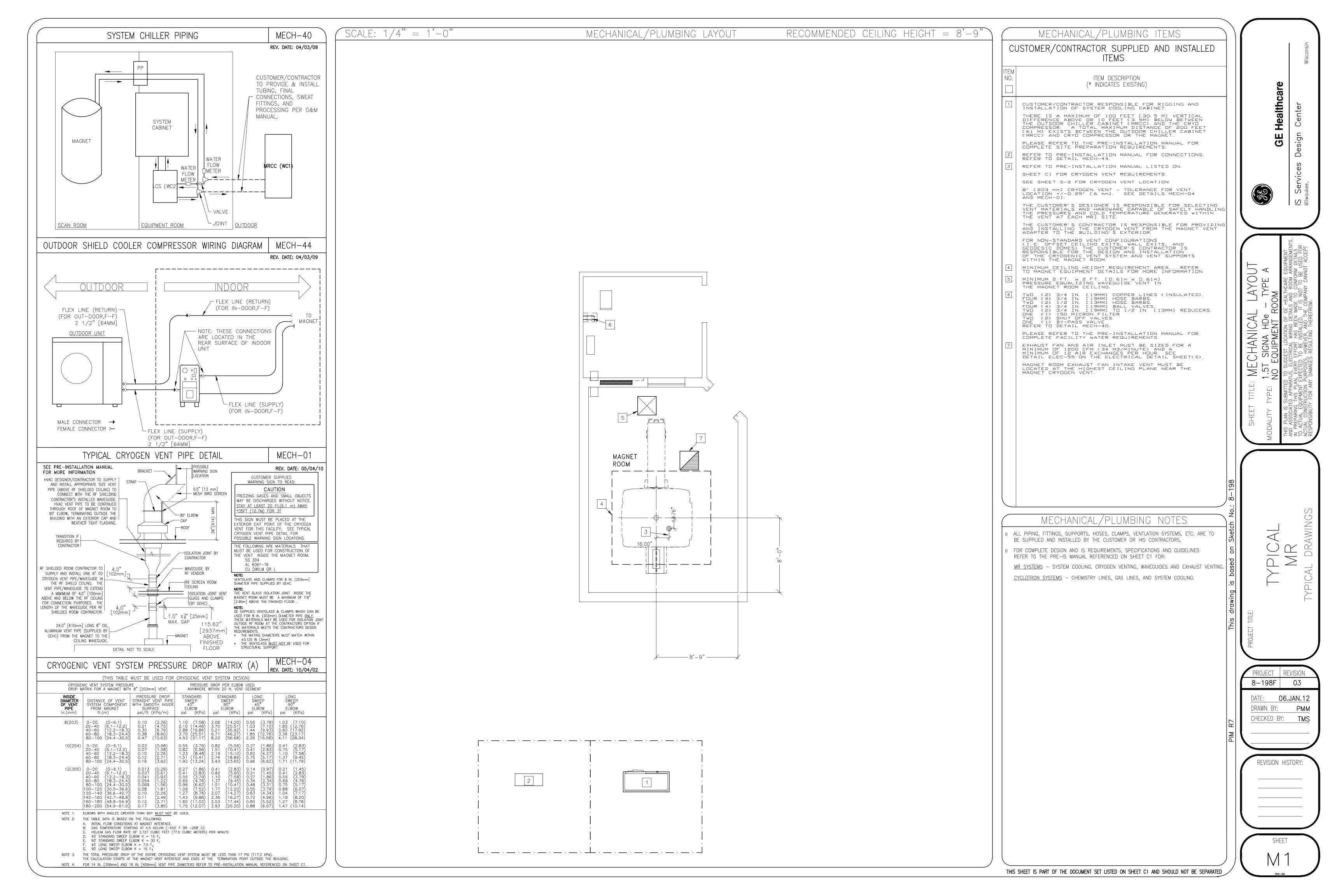


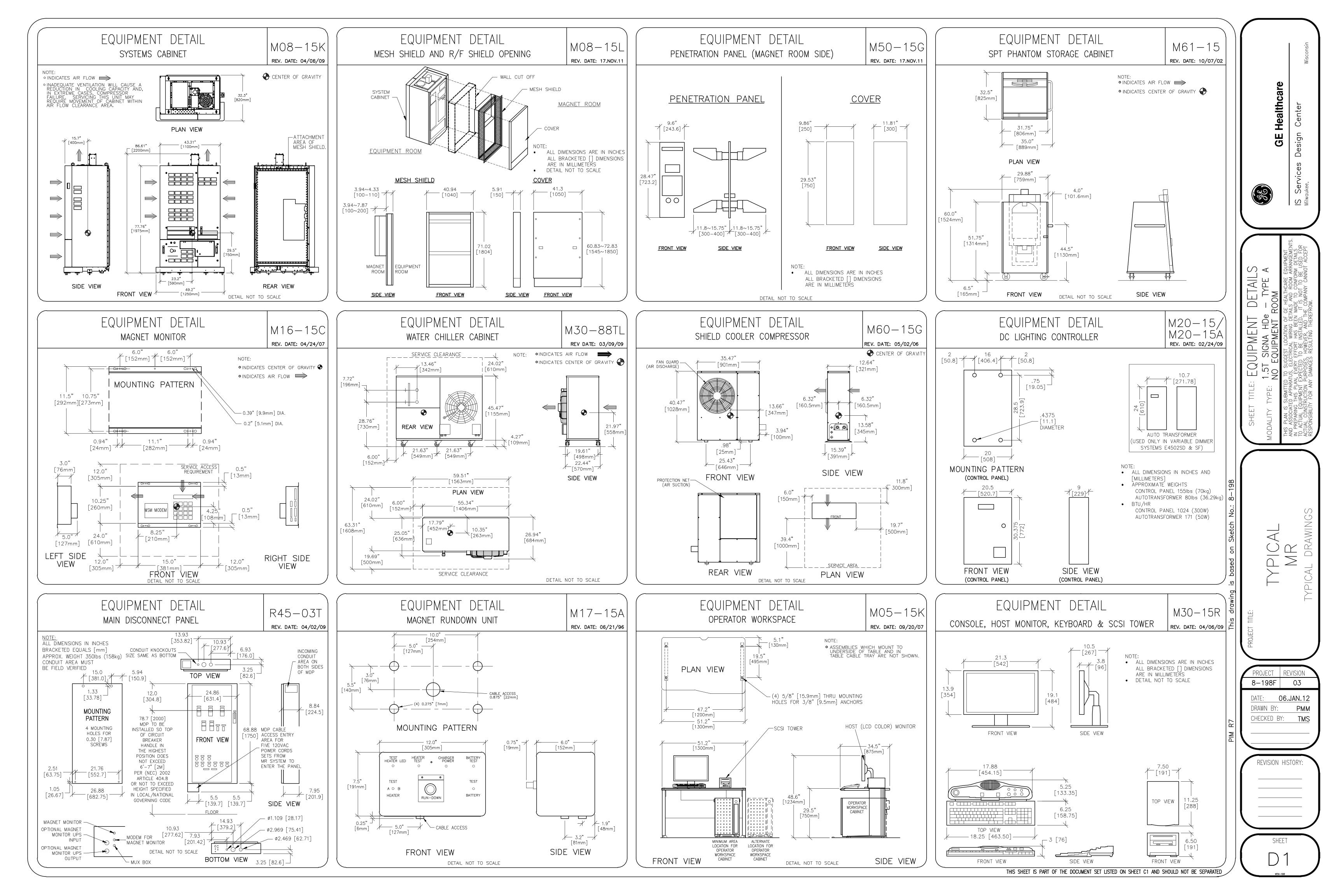


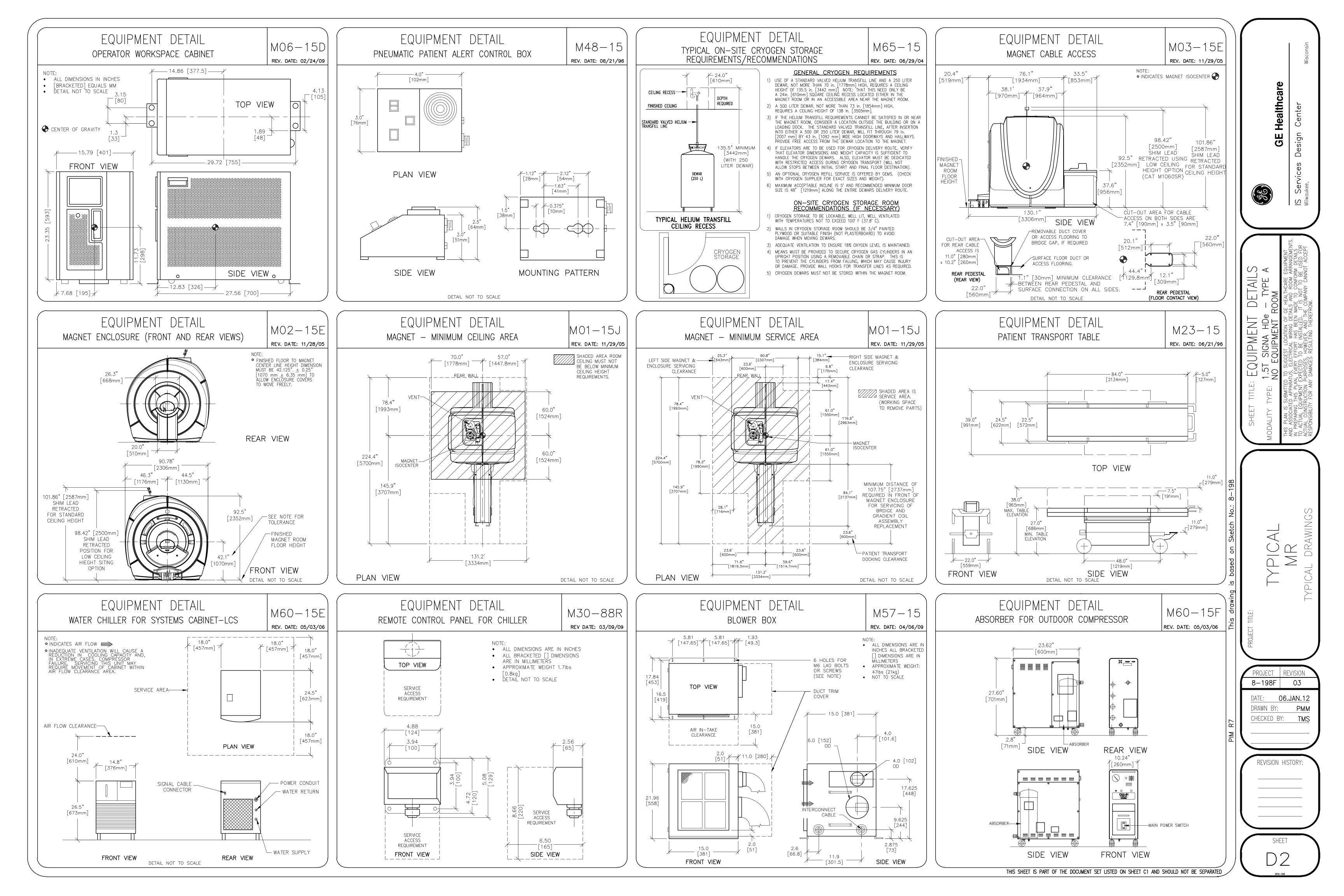
PROJECT | REVISION 8-198F 03

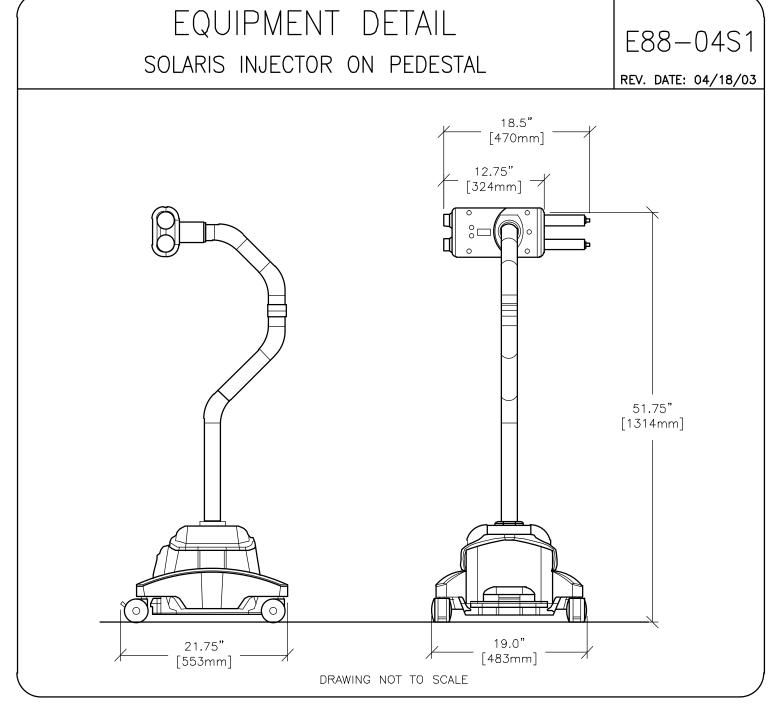
DATE: **06.JAN.12** CHECKED BY: TMS

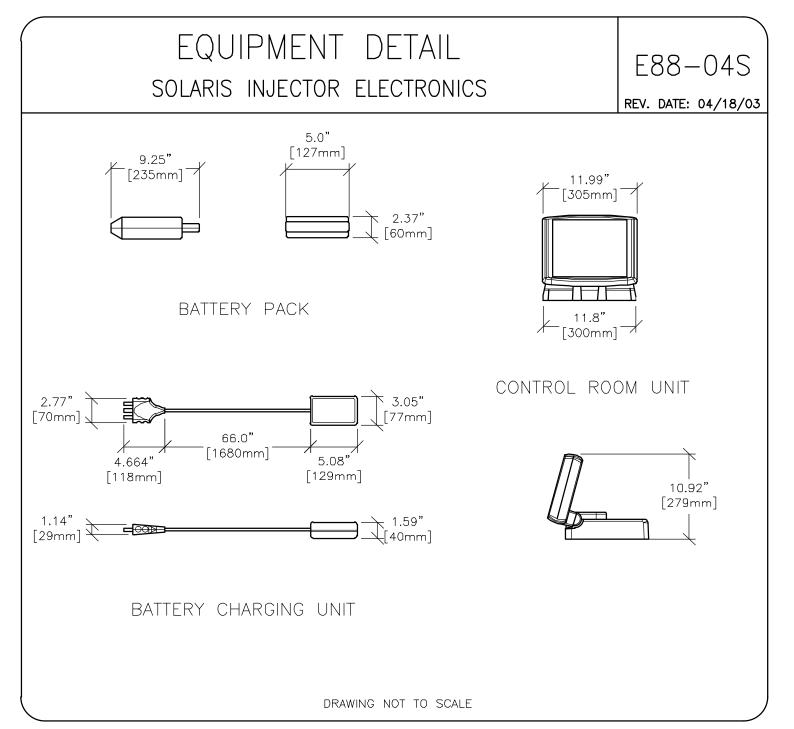












SHEET TITLE: EQUIPMENT DETAILS

MODALITY TYPE: 1.5T SIGNA HDe - TYPE A

NO EQUIPMENT ROOM

THIS PLAN IS SUBMITTED TO SUGGEST LOCATION OF GE HEALTHCARE EQUIPMENT

GE Healthcare

95) 100)

TYPICAL

PROJECT REVISION
8-198F 03

DATE: 06.JAN.12

DRAWN BY: PMM
CHECKED BY: TMS

REVISION HISTO

SHEET

D.3