

GE Healthcare

MR Project Implementation Guide

Working together to get your new technology online so you can begin providing patient care.



Table of Contents

- Table of Contents3
- Use of this Guide5
- Process Flow.....7
- Site Evaluation.....15
 - Magnetic Shielding.....16
 - System Upgrades17
 - Site Vibration.....17
 - Electromagnetic Interference.....17
 - Moving Metal17
 - System Delivery17
- Project Team19
- GE Healthcare Support.....21
- Roles and Responsibilities.....23
 - GE Healthcare Project Manager23
 - GE Healthcare Project Manager and Field Service Engineer23
 - GE Healthcare Field Service Engineer.....23
 - GE Healthcare Applications Team.....23
 - GE Healthcare Sales, Project Manager, PACS Engineer, Field Service Engineer23
 - Customer23
 - Architect/Engineer24
 - Contractor24
- Project Plan25
 - Develop a Preliminary Project Plan.....25
 - Develop a Preliminary Project Schedule.....25
 - Estimate Your Project Costs25
 - Initial Project Definition.....26
 - Design Kick-Off Meeting.....26
 - Gantt Chart28
 - GE Healthcare Site-Specific Final Equipment Installation Drawings.....29
 - Construction Drawings31
 - Building Codes and Regulatory Compliance Requirements.....31
 - Critical Design Elements:.....31
 - Delivery Considerations for Design Team.....33
 - Plan Review and Approvals33
 - Plan Review and Permits.....33
 - Pre-Construction Review Meeting.....34
- Construction37
- Site Readiness Assessment.....39
 - Critical items to be completed before delivery39

Table of Contents (Continued)

| | |
|---|----|
| GE Healthcare Site Readiness Checklist..... | 40 |
| Delivery | 41 |
| Sample Pictures | 41 |
| Magnet Delivery | 42 |
| System Delivery | 43 |
| System Turnover | 45 |
| Installation and Calibration | 45 |
| Application Training and First Patient | 45 |
| Project Completion Close-Out Meeting | 46 |
| Summary of Critical Items | 47 |
| Broadband and Network Connectivity | 48 |
| Cryogen Vent..... | 49 |
| Magnetic Shield..... | 50 |
| RF Shield Room..... | 51 |
| Additional RF Shield Room Pictures..... | 52 |
| Exam Room Pressure Equalization | 53 |
| Mechanical/Electrical Infrastructure | 54 |
| Power and Grounding | 55 |
| Floor Preparation..... | 57 |
| Floor Levelness Survey | 58 |
| MR Leveling and Flattening the Floor Area Overview..... | 58 |
| System Specific Component Information by Room | 59 |
| Typical Equipment Room Components | 59 |
| Typical Exam Room Components | 61 |
| Typical Control Room Components..... | 64 |

Use of this Guide

Installation of your new GE Healthcare system requires that your site be prepared to comply with the product's unique site preparation requirements. Our mutual goal is to prepare for delivery and installation of your system in a timely manner.

GE Healthcare has extensive experience assisting customers with preparing their sites for the delivery and installation of their systems. This guide provides an overview of many of the usual site preparation steps GE Healthcare has experienced while assisting its customers during the preparation of their sites for the delivery and installation of their systems. This guide contains information on the following topics.

- Project Implementation
- Construction
- Site Evaluation
- Site Ready
- Project Team
- System Delivery
- Preliminary Plans
- Installation and Calibration
- Construction Plans
- Applications
- Plan Review
- Project Completion
- Close-Out Meeting

In addition, your site plan and design needs to incorporate the site planning information and requirements found in the applicable GE Healthcare pre-installation manual and the site-specific final equipment installation drawings for your system. Please contact your GE Healthcare Project Manager if you have not yet received a copy of the applicable GE Healthcare pre-installation manual. PDF copies of the GE Healthcare's pre-installation manuals, along with PDF copies of typical preliminary project drawings and typical final installation drawings are available for viewing and downloading at the following link:

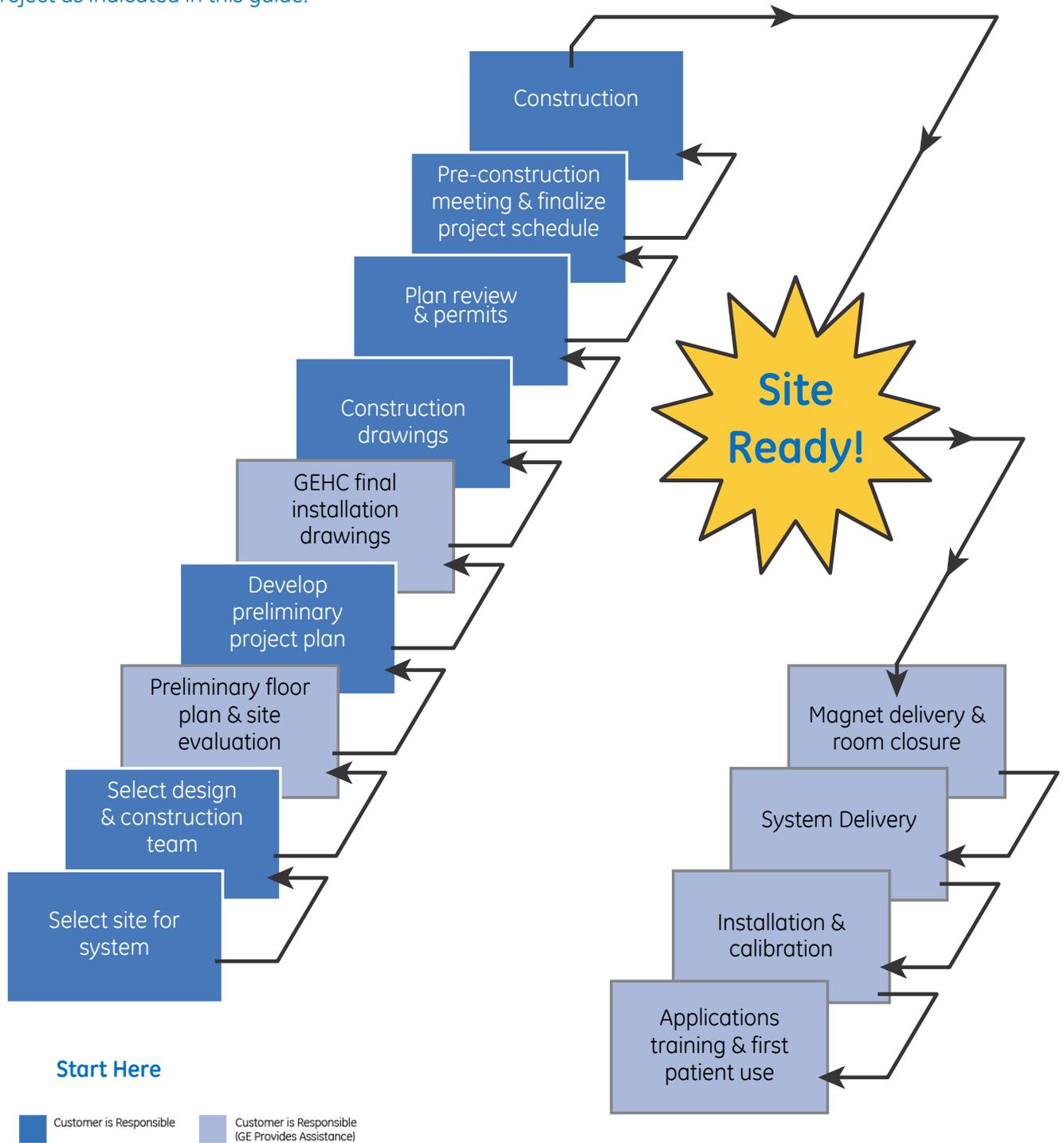
http://www3.gehealthcare.com/en/Support/Site_Planning

You may find it beneficial to share and utilize this guide with your facilities team, system users, architects, engineers, contactors, or others involved in the design and construction of your site. Portions of this guide are repeated in more than one section for completeness of information within a given section.

Your GE Healthcare team is available to provide assistance with your project. Your GE Healthcare Project Manager is your GE Healthcare focal point during the project implementation process. Please contact your GE Healthcare Project Manager with any questions you may have.

Process Flow

An understanding of the process steps by team members supports the creation of an objective schedule. In order to do this, all team members should have a good understanding of the steps in this process. This guide describes the typical project implementation process steps and time required for each step. Determine if your project has special needs not addressed by this typical process flow, and develop a specific schedule for your project. GE Healthcare will provide you with assistance during various steps of your site preparation project as indicated in this guide.



Process Flow (Continued)

This portion of the Process Flow section outlines additional task descriptions for each process step.

Note: This is not a comprehensive list of tasks or requirements in the project implementation process. You must work with your team to define all the specific tasks and scope for your site.

Select Site for System

Cycle Varies

- Finalize type of MR system to be installed
- Determine project type, such as new construction, addition, renovation, upgrade
- Gather MR system user inputs
- Facility planning involvement is critical
- The applicable GE Healthcare pre-installation manual and typical drawings will be provided to you by your GE Healthcare Project Manager
- Determine if a Certificate of Need or any special permitting is required

Select Design and Construction Team

Cycle 1–2 weeks

- Select an architect or qualified designer as early as possible
- Decide on Design-Build or Design-Bid-Build site preparation approach
- Conduct an onsite pre-bid meeting if the Design-Build approach is selected
- Consider the MR system construction experience as a main criteria for contractor selection
- Hire a rigger for the magnet delivery, verify experience

Preliminary Floor Plan and Site Evaluation

Cycle 1-2 weeks

- Team collaboration
 - GE Healthcare Project Manager
 - Customer team
- Perform a complete site evaluation specific to your MR system type, such as:
 - Gauss field containment
 - Moving metal
 - Electromagnetic interference
 - RF shield
 - Nearby steel

Process Flow (Continued)

- Vibration levels
- Acoustic requirements
- Perform a broadband (high-speed Internet) connectivity assessment
- Define filming, printing, and PACS interface requirements
- Review the magnet and system delivery route and the magnet access point
- Select the desired system location and room configurations
- Your GE Healthcare Project Manager will develop a preliminary floor plan incorporating your input
- Customer's written approval of GE Healthcare's preliminary floor plan
- Identify if permanent structural shoring is required under the magnet

Develop Preliminary Project Plan

Cycle included in preceding

- Select an architect for input
- Define your project scope
 - Unique elements for MR system configuration
 - Construction requirements
 - User inputs are critical
- Finalize the project floor plan
- Develop preliminary written project schedule to establish a planned first use date
- Agreement and commitment is required from all parties involved

GE Healthcare Final Installation Drawings

Cycle 1-2 weeks

- Customer's written approval of GE Healthcare's preliminary floor plan is needed to proceed with the site-specific final equipment installation drawings
- Your GE Healthcare Project Manager will coordinate with the GE Healthcare Design Center to complete the site-specific final equipment installation drawings
- AutoCAD and PDF files of the site-specific final equipment installation drawings are provided by GE Healthcare (prints are available upon request)
- GE Healthcare's final installation drawings are **NOT** construction drawings, but portions may need to be incorporated into the architect's construction documents/plans



Process Flow (Continued)

Construction Drawings

Cycle 3-7 weeks

- Conduct an on-site design kick-off meeting
- Utilize the GE Healthcare pre-installation manual and equipment installation drawings
- GE Healthcare Project Manager is available for support
- Facility Planning/Landlord involvement is critical
- Your architect/engineering team is responsible for code and regulatory compliance
- Finalize the magnet and system delivery route and verify elevator load capacity rating, if applicable; the Rigger and GE Healthcare Project Manager input is critical at this stage
- Hold periodic team review meetings

Plan Review and Permits

Cycle varies

- Required governmental approvals vary by location
- Obtain construction bids, if using the Design-Bid-Build approach
- Highlight potential customer risks resulting from delays to the schedule
- Arrange permits to close street or sidewalk for delivery or rigging, if applicable

Pre-Construction Meeting and Finalize Project Schedule

Cycle 1 week

- Team collaboration is essential
- Pre-Construction Review:
 - Critical that contractor, all suppliers and subcontractors are present
 - Identify critical path events
 - Identify long lead items
 - Ensure all shop drawings for construction are complete
 - Finalize the project schedule: focus initial efforts on the exam room, equipment room, and control room
- Schedule input and commitment from the entire team is critical
- Coordinate the project schedule with the rigging company
- Distribute appropriate construction drawings to all trade groups

Process Flow (Continued)

Construction

Cycle varies (site dependent)

- Complexity of the project drives total project cycle time
- Order long lead-time items
- Your GE Healthcare Project Manager is available for support and questions
- Communicate status updates to your GE Healthcare Project Manager
- Critical path items monitored and completed, such as:
 - RF shield
 - Magnetic shield, if applicable
 - Chiller
 - Cryogen vent
 - HVAC operational
 - Power available
- Closely monitor site progress
- Conduct required inspections and measurements
- Maintain planned completion date: focus construction efforts on the exam room, equipment room, and control room
- Confirm magnet and system delivery route
- Identify responsibility and plan for opening and closing of the magnet access point
- Hold periodic project team review meetings

Site Ready!

- Site Readiness Assessment complete: led by your general contractor and is conducted with GE Healthcare's Project Manager
- Maintain planned completion date: focus construction efforts on exam room, equipment room, and control room
- General contractor completes the items on the construction punch list
- Schedule and finalize magnet and system delivery dates
- Verify broadband connectivity and IP addresses are obtained



Process Flow (Continued)

System Delivery

Cycle 1-2 weeks

Your GE Healthcare MR system typically arrives through a 3-step delivery process so the equipment arrives on-site when it is needed. The 3-step delivery process and other key tasks are listed below.

- Final schedule notification sent to rigger and GE Healthcare Project Manager
- Coordinate temporary shoring, if needed
- Step 1: Pre-magnet delivery typically occurs 2 to 6 weeks prior to magnet delivery
Items typically shipped are the chiller, main disconnect panel, and heat exchanger cabinet
- Step 2: Delivery of the magnet and closing of the magnet delivery opening
- Cryogen vent and chiller connections to magnet which must occur within 24 hours of the magnet delivery
- Install any required anchors in the RF floor
- Final RF room test, send a copy to your GE Healthcare Project Manager
- Step 3: Delivery of the balance of the system components typically occurs 3 to 5 days after delivery of the magnet

Installation & Calibration

Cycle 2-3 weeks

- Identify trades that will be needed during mechanical installation, such as electrician, plumber, HVAC, facilities personnel
- Mechanical installation of the MR system
- Calibration completed by the GE Healthcare Field Service Engineer
- Connect to the hospital's network/PACS systems
- Connect to the broadband (high speed Internet and GE VPN)

Applications Training & First Patient Use

Cycle < 1 week

- GE Healthcare Applications Specialist scheduled for on-site training
- Review TiP pre-training materials provided by GE Healthcare
- Identify staff members who will participate in training
- Provide supplemental personnel support to allow for the technologists' participation
- TiP Education Center classes scheduled for technologists, if applicable
- Identify mix of exam types appropriate to the practice

Process Flow (Continued)

- Ensure appropriate patient loads are scheduled

Close-Out Meeting

As the project is now essentially completed, it is time to do a final assessment of the project, identify key contacts, and reflect on what worked and what could be improved upon. Your GE Healthcare Project Manager will initiate a project close-out meeting to review the following:

- Review the project plan to ensure all tasks have been completed
- Review follow-up requirements
- Identify project positives/improvement areas
- Complete the hand-off to GE Healthcare Service



Site Evaluation

There are several ways to accommodate your GE Healthcare system at your site.

Some examples are the following:

- New Facility
- Building Addition
- Renovation
- Replacement of existing MR system or upgrade
- Leased Space
- PDC Cassette or Mini-Clinic



New Facility



Building Addition



Renovation



Leased Space

Site Evaluation (Continued)

The specific site you select influences the complexity, schedule, and cost of the project. Your GE Healthcare Project Manager will help you identify potential locations for that could satisfy your patient flow requirements as well as GE Healthcare's space requirements.

Some questions to consider:

- What type of GE Healthcare MR system did you purchase?
- Is the MR system to be located at your existing facility or in a new independent clinic, medical office building, or leased space?
- Do you plan any future expansion into the surrounding area?
- Is the location appropriate for the MR System weight, size, fringe field, vibration sensitivity, moving metal environment, acoustics, and other specific requirements specified in GE Healthcare's applicable pre-installation manual?
- What system location and layout provides the most efficient workflow for your staff and patient flow, including proximity to other facility functions and diagnostic imaging systems?
- Is space available in your existing building to renovate?
- Is space available to build an addition?
- Are you replacing or upgrading an existing MR system in an existing location?
- Is this an independent clinic constructed on site or a PDC Cassette/Mini Clinic?



Construction



PDC Cassette or PDC Mini-Clinic

Magnetic Shielding

Determine the criteria for gauss field containment; refer to the applicable GE Healthcare pre-installation manual for proximity assessment and other criteria. This will determine if your site design will require magnetic shielding or if other proximity control methods are feasible. If an existing room has magnetic shielding, forward details of the shield to your GE Healthcare Project Manager for review.

Site Evaluation (Continued)

System Upgrades

If you are replacing or upgrading an existing system in an existing RF shield room, the existing RF shield must be tested for compliance with your new system's RF shield requirements. Those requirements are provided in GE Healthcare's applicable pre-installation manual. This test should be conducted prior to de-installation of the existing MR system. This test must be done with the PEN panel removed and a blank panel inserted. This will indicate the need for repair or modifications to the existing RF shield or the need for a new RF shield. Repairing, modifying, or replacing the RF shield should be factored into your project cost and schedule. You may also have to make other room modifications to meet current siting requirements, such as cable concealment, egress, floor levelness, and floor support.

Please see the RF shield subsection in the Summary of Critical Items section of this Guide. Reusing an existing RF shield may require modifications, including the cryogen vent, penetration panel, and floor.

Site Vibration

The vibration environment at your site can affect the MR system's performance. You need to have your site tested for the existing vibration levels to assure your site complies with the requirements provided in the applicable GE Healthcare pre-installation manual.

Electromagnetic Interference

The electromagnetic interference and power quality at your site can affect the MR system's performance. You need to evaluate your site to ensure compliance with the requirements provided in the applicable pre-installation manual. If your site does not comply with those requirements, appropriate corrective actions will be necessary prior to delivery and installation of your system.

Moving Metal

Your site needs to be evaluated to determine if it complies with the magnet moving metal requirements provided in the applicable GE Healthcare pre-installation manual. If your site does not comply with those requirements, appropriate corrective actions will be necessary prior to delivery and installation of your system.

System Delivery

Both the system delivery route and magnet access point need to be reviewed to determine if the floor support is needed along the delivery path during the delivery of system components. Determine if the delivery path to the designated rooms has adequate clearance to accommodate for the size and turning radius of the system components being delivered.

System delivery considerations include: the width and height of corridors and doorways, and the elevator size and capacity along the path from the point of delivery to the installation location.

Consult your GE Healthcare Project Manager regarding questions you may have concerning your site.

You will receive a preliminary floor plan from your GE Healthcare Project Manager. That floor plan should be reviewed with your entire team. Your GE Healthcare Project Manager needs your written approval of that preliminary floor plan in order to authorize starting your site-specific final equipment installation drawings.

Project Team

Overview

- You may find it helpful for applicable members of your project team to use this guide. Those team members may include:
 - Senior Management
 - Project Manager
 - Architectural and Engineering Firms
 - Construction Team
 - Information Technology Representative
 - System Users
 - Other personnel that have visibility and an impact on the implementation the project

Your team's involvement is critical to the success of your project's design and construction efforts. It is very important to identify your specific team members and start team meetings early in the project in order to develop an appropriate floor plan and project schedule.

A well developed and executed project plan and schedule helps to minimize the possibility of delays in system delivery and installation, thereby potentially avoiding:

- Delays in scanning patients
- Cost overruns for construction

The capabilities of your project architect and contractors are critical factors to the overall success of your project. GE Healthcare can provide Design-Build services through its internal MedFACS team. These Design-Build services are provided at an additional cost based on a mutually agreed upon scope of work. See the GE Healthcare Support section for additional information regarding the services the MedFACS team can provide.

Selecting Your Design and Construction Team

Selecting the right design and construction team is important to the outcome of your project. GE Healthcare's systems have unique and specific site preparation requirements. The design and construction professionals that you hire will need to use the applicable pre-installation manual which is available through your GE Healthcare Project Manager.

When assessing the qualifications of the design professionals and the construction contractors, it is a good idea to consider the amount of experience they have with respect the design and site renovation or construction for the installation and operation of systems that are similar to your new system.

You need to determine if you will use the Design-Build approach or the Design-Bid-Build approach for your project.

Project Team (Continued)

Design-Build

For Design-Build you will be looking for a contractor that has design capability or a design team with construction capability. You would enter into a contract with a single company for both the design and construction services. This method will eliminate the need for a construction bid cycle after construction drawings and specifications are completed.

Design-Bid-Build

For Design-Bid-Build you would be entering into contracts with both a design firm and a general contractor. This approach may require additional project management from your staff to coordinate the activities between the other parties. This differs from the Design-Build approach where you usually have a single point of contact. This method will require obtaining construction bids after the construction drawings and specifications are completed.

Once you review the qualifications of the design firms and construction contractors, you will need to select a design firm to prepare the construction drawings and specifications. When the construction drawings and specifications are completed, you will need to select one or more of more contractors to bid on the construction work; they should be invited to a pre-bid meeting at the project location. The meeting attendees should focus on understanding the scope of the construction work, the existing site conditions, and the planned project schedule.

Your GE Healthcare Project Manager will develop a preliminary floor plan incorporating your input. MR system sites need to be evaluated to determine if the magnetic shielding is required or if mitigation of existing moving metal, vibration, or acoustic conditions is required. You may need to evaluate more than one location and room configuration to find a location for your new MR system that meets your requirements and is consistent with GE Healthcare's site preparation requirements.

Team Collaboration

Identify your project team members. For an effective site design, obtain input from all team members and users regarding workflow, patient flow, and facility configuration.

It is your responsibility to evaluate potential design professionals and contractors for your project.

GE Healthcare Support

GE Healthcare Project Manager

GE Healthcare provides project implementation support through your GE Healthcare Project Manager. This support for your project implementation process will be provided through the following primary activities:

- Assist in assessing sites for the location of your system
- Assist in developing a preliminary floor plan your system
- Provide an applicable GE Healthcare pre-installation manual and site-specific final equipment installation drawings that include the site preparation requirements that your architect and engineer should utilize when designing your site
- Provide your architect and engineers with assistance resolving questions regarding GE Healthcare's site preparation requirements
- Provide GE Healthcare site-specific equipment installation drawings
- Provide supporting information to your contractor(s) related to schedule development and construction planning
- Provide assistance when you conduct periodic site readiness assessments to determine the status of the site preparation requirements that need to be completed for delivery of the system
- Assist you with the coordination of the system delivery and installation activities
- Coordinate the close-out meeting

GE Healthcare MR Siting and Shielding Team

GE Healthcare's MR Siting and Shielding team provides support services unique to the magnetic resonance product line.

Those support services are comprised of preliminary site evaluations, preliminary magnetic shield designs, reviews of vibration and electromagnetic interference test results, floor steel reviews, cryogen vent reviews, final magnetic shield design drawings, and shield shop drawing reviews.

All reviews of customer-provided facility drawings will be checked for compliance with the major requirements in the applicable GE Healthcare pre-installation manual for your MR system. For projects involving the relocation of existing MR systems, there is a fee for the MR Siting and Shielding team services.

Magnetic shield designs are created using GE Healthcare's proprietary finite element analysis computer programs or by selective use of GE Healthcare's pre-designed shields.

You may request MR Siting and Shielding team support services through your GE Healthcare Project Manager.

HPI Technical Support Group

GE Healthcare's HPI Technical Support Group lets you and your contractors connect live with GE Healthcare's system installation experts to discuss your system siting and installation questions.

GE Healthcare Support (Continued)

Just give GE Healthcare's HPI Technical Support Group specialists a few simple items:

- Your name and contact information
- Your site name and location
- Your GE Healthcare Project Managers name
- Project drawing number, if available
- The type and model of system being installed (e.g., GE Discovery MR750W)

You'll get answers to non-site-specific questions related to your system. GE Healthcare's HPI Technical Support Group Specialists will relay any site-specific questions to the applicable GE Healthcare Project Manager for follow-up.

The HPI Technical Support Group's line offers live coverage:

- Monday through Thursday, 7:00 a.m. to 6:00 p.m. Central time
- Friday, 7:00 a.m. to 1:00 p.m. Central time

Most callers will be connected immediately with a HPI Technical Support Specialist. If not, you may leave a message and a Support Specialist will prompt return your call.

Toll-Free: (877) 305 9677

Or Online: http://www3.gehealthcare.com/en/Support/Site_Planning

GE Healthcare's Design-Build Services

GE Healthcare is able to provide Design-Build services to its customers through its MedFACS (Medical Facilities Construction Services) team. MedFACS provides GE Healthcare's customers with single-source responsibility for both the equipment and the design and construction services needed to prepare your site for the installation and operation of your new system. Through this process GE Healthcare is able to deliver a predictable project schedule and provide its design and construction services in compliance with GE Healthcare's site preparation requirements for your new system.

The construction is custom tailored to meet your needs while integrating the site preparation requirements for your new system and the conditions at the existing site. Typical MedFACS projects include single room renovations, multi-modality imaging departments, modular buildings, and small building additions/clinics. The MedFACS team utilizes proprietary detailed standard documentation to create a detailed site-specific scope of work and a site-specific drawing indicating the site floor plan. These drawings are usually either the preliminary project drawings prepared by GE Healthcare's Project Manager or the site-specific final equipment installation drawings. Once the MedFACS quotation is accepted, the MedFACS team will commence the performance of its design and construction services.

Please contact your GE Healthcare Project Manager if you would like to explore this matter further with a representative of the MedFACS team.

Roles and Responsibilities

The following persons or firms, in conjunction with your team, will participate in the implementation of the project. Some of the participant's key project touch points are listed below:

GE Healthcare Project Manager

- Participate in the preliminary floor plan and site evaluation phase
- Participate in the construction kick-off meeting
- Periodic site visits
- Project progress report 30 days prior to the planned magnet delivery date
- Participate in the site readiness assessment prior to the magnet and system delivery

GE Healthcare Project Manager and Field Service Engineer

- System Delivery

GE Healthcare Field Service Engineer

- Mechanical Installation
- Calibration
- Acceptance

GE Healthcare Applications Team

- Applications training

GE Healthcare Sales, Project Manager, PACS Engineer, Field Service Engineer

- Project completion, Service hand-off, and close-out meeting

Customer

- Maintain good communications among all team members
- Ensure all site-specific construction items are completed prior to system delivery
- Your representative is available at the site to accept and inventory the system components when delivered
- Secure rigging services, if applicable

Roles and Responsibilities (Continued)

Architect/Engineer

- Develop an overall floor plan for your site and coordinate with the GE Healthcare Project Manager
- Develop site-specific construction drawings and specifications
- Coordinate the design with the applicable GE Healthcare pre-installation manual and the site-specific final equipment installation drawings, ensuring all those requirements are incorporated
- Comply with applicable governing code and regulation requirements
- Coordinate plan review and approval processes necessary for governmental approvals and construction permits
- Communicate with GE Healthcare's Project Manager regarding questions or changes with the following: floor plan, system selection, schedule changes, and other items that impact the project schedule and/or the site preparation

Contractor

- Develop the construction schedule and communicate to entire project team
- Obtain all required demolition and construction permits
- Keep the project on track with the construction schedule, ensuring all scheduled tasks are achieved by the scheduled dates
- Construct the site, manage sub-contractors, deliver the site consistent with the requirements in construction drawing and specifications, and complete it on time
- Coordinate/communicate all issues with your team, your architects and engineers, and GE Healthcare's Project Manager
- Obtain all required demolition and construction permits and coordinate all required construction inspections
- Ensure that both the site readiness assessment and the site assessment checklist are completed prior to system delivery
- Coordinates the system delivery with GE Healthcare's Project Manager
- Strictly enforce all federal, state, local, and project site safety requirements and ensure the project site and system components are secure

Project Plan

Develop a Preliminary Project Plan

Early project planning helps enable on time project execution. The earlier you develop the plan, the earlier you can identify when your system will be available for patient use, as well as identify potential risks to your project and schedule.

- Get input from your architect, construction contractor, facilities team, technologist, landlord, and other project team members
- Review and consider the requirements for the installation of your new system specified in the applicable GE Healthcare pre-installation manual and typical drawings
- The major project elements and events and their durations and estimated dates should be identified as you develop your preliminary project plan
- Typical standard durations of the major project elements and events can be obtained from various sources, such as architectural/engineering design firms and the construction, mechanical, electrical, and other specialty contractors

Develop a Preliminary Project Schedule

- A written project schedule, even though it is preliminary, will help you establish a planned “first use” date for your new GE Healthcare system
- Incorporate the durations identified when you developed your preliminary project plan
- Identify any needed construction drawing review, approval, and permit processes so the applicable durations can be included in the project schedule
- Identify any required or potential zoning changes that may be needed. The typical durations required for such changes should to be included in the project schedule
- Your GE Healthcare Project Manager will assist you in preparing the initial system installation durations that can be included in the project schedule

Estimate Your Project Costs

- Your costs will vary based on type of construction, the construction schedule, your location, and the complexity of the project
- Preliminary cost estimates should be obtained from your architect and/or contractor once you have a developed a preliminary scope of work and floor plan

Project Plan (Continued)

Initial Project Definition

- Your preliminary scope of work, project schedule, and preliminary floor plan will become the basis from which for your design and construction teams can begin the detailed planning for your project.
- The scope of work, preliminary floor plan, and project schedule can be used to review, refine, and obtain the agreement of your team members.
- Once you have the agreement of your team members, your GE Healthcare Project Manager can start to plan your system delivery date.

Design Kick-Off Meeting

The purpose of this meeting is to communicate the preliminary project requirements, begin to set expectations, review the project schedule, answer questions, explore concerns, and begin the process of refining all of the project elements.

Usual Attendees:

- Customer team usually consists of:
 - Director of Radiology
 - Facilities Management
 - IT Representative
 - Technologist Representatives
 - Customer's Internal or External Design Team
- GE Healthcare team usually consists of:
 - Sales Representative
 - Project Manager
 - Field Service Engineer

Meeting Prerequisites:

- GE Healthcare's Project Manager has received AutoCAD drawings of the site from customer's design team
- GE Healthcare's Project Manager has provided the applicable GE Healthcare pre-installation manual and typical final equipment installation drawings to customer's design team
- Send meeting agenda to attendees prior to meeting
- Communicate estimated length of meeting (usually 1 to 2 hours)
- GE Healthcare's Project Manager has provided preliminary floor plan drawings to customer

Project Plan (Continued)

Usual Agenda Topics:

- Introductions
- Discuss roles, responsibilities, and information flow
- Review initial preliminary floor plan drawings
- Discuss and identify the GE Healthcare system type on the order, note any changes required
- Project Implementation items to be discussed
 - Project Manager received preliminary site layout from customer's architect
 - Determine when a vibration study will be done
 - Determine when an electromagnetic interference study will be done, if applicable
 - Determine if seismic anchoring is required
 - Discuss rigging requirements
 - Determine if magnetic shielding is needed, and, if so, determine design requirements and magnet location so GE Healthcare's Project Manager can request a magnetic shielding design from GE Healthcare's MR Siting and Shielding team
 - Discuss magnet access and closure alternatives
 - Discuss and determine the cryogen venting route
- Customer's written approval of GE Healthcare's preliminary floor plan drawings
- Identify a preliminary system delivery date, discuss the ramifications of changing the delivery date once it is finalized
- Identify when the construction drawings and specifications will be completed and determine the likely schedule for governmental drawing reviews/approvals and the obtaining of construction permits
- Meeting Follow-up Activities:
 - Distribute a follow-up e-mail detailing expectations to each meeting participants
 - Resolve if magnetic shielding is required and, if so, complete a GE Healthcare magnetic shielding design
 - Resolve if seismic anchoring is required and, if so, obtain the seismic anchoring detain drawings
 - If electromagnetic interference countermeasures are needed, resolve how they will be addressed

Project Plan (Continued)

GE Healthcare Site-Specific Final Equipment Installation Drawings

The GE Healthcare site-specific final equipment installation drawings and the applicable GE Healthcare pre-installation manual include the requirements your design team will need to incorporate into the project construction drawings and specifications.

Installation Drawings Features:

- The site-specific final equipment installation drawings are provided in both AutoCAD and PDF file formats for utilization by your design team. Hardcopy drawings are also available upon request.
- The GE Healthcare site-specific final equipment installation drawings are not construction drawings. Your architect and engineers must create the project construction drawings and specifications for your project that meet local, state, and federal requirements.
- The GE Healthcare site-specific final equipment installation drawings indicate the configuration and interconnection of your system's components. Your architectural and engineering team will need to determine patient flow and other functional needs, such as dressing and waiting rooms, toilets, viewing rooms, lighting, electrical outlets, power feeders, HVAC, and other requirements that are specific to your project site.
- The requirements in the applicable GE Healthcare pre-installation manual must be carefully reviewed, understood, and incorporated into the project construction drawings and specifications by your architectural and engineering team.
- Any changes in the project design by you or your architectural and engineering team, contactor, or plan review agency require coordination with your GE Healthcare Project Manager. If that occurs and revised installation drawings are needed, they can be prepared and provided.
- Your GE Healthcare Project Manager is available to answer questions regarding GE Healthcare's site-specific final equipment installation drawings.
- The GE Healthcare site-specific final equipment installation drawings may need to be revised to incorporate any mutually agreed upon project design and construction changes.

It is important to work with a competent architectural and engineering team and construction contractor who both have experience in medical facility design and construction for diagnostic imaging systems.

See the typical electrical installation drawing E1 sheet on the next page.

Project Plan (Continued)

Construction Drawings

The construction documents (drawings and specifications) describe and detail what is needed to prepare your site for the installation of your GE Healthcare system. Proper and accurate planning by your design team prior to this stage will reduce issues that might occur during the construction or renovation phase of the project.

It is helpful for you to conduct a design kick-off meeting to get everyone's agreement on the overall project scope and schedule. This meeting should be held at the project site to help facilitate any discussion around the existing conditions. The project architect, engineers, and contractor should all be invited to this meeting along with your facilities team and your GE Healthcare Project Manager.

Hospital or clinic staff, facility planning department, and/or landlord involvement is critical during the design phase to ensure any of their special requirements are incorporated and any needed internal reviews and approvals are obtained.

The construction documents usually consist of design drawings and written specifications. You will need to check with the state and local authorities having jurisdiction over any plan review and permitting processes to determine if the drawings need to be sealed by licensed design professionals. Those authorities may include reviews/approvals by the local planning and building department, the state planning and building department, the state fire marshal's office, and/or the state department of health.

Building Codes and Regulatory Compliance Requirements

Your design team is responsible for complying with the applicable building codes and regulatory requirements, including the Americans with Disabilities Act. This includes the applicable building codes and state health department requirements, as well as any other regional design and construction laws, codes, or regulations.

Critical Design Elements:

The following is a list of critical design elements that often generate questions. While this list is not an all-inclusive listing of all critical design elements, it does contain a number of items that will require the design team's attention.

- Cryogen vent design
- Design of the exhaust fan required for the exam room
- Foundation design (e.g., seismic, vibration)
- Review relationship of ferrous materials (e.g., beams, columns, and rebar) to magnet isocenter
- Lighting in the exam and control rooms
- DC lighting controller for the exam room
- RF shield room and magnetic shield, if applicable, incorporation into the design and construction documents
- Moving metal and electromagnetic interference countermeasures, e.g., restrict parking, move driveways, re-direct traffic
- HVAC system designed to meet the system requirements specified in the applicable GE Healthcare pre-installation manual

Project Plan (Continued)

- Chiller and chilled water distribution and equipment, verify how it will be sourced
- GE Healthcare supplied heat exchanger cabinet or system cooling cabinet, if applicable
- Back-up water source, if required, must comply with the water quality and flow requirements specified in the applicable pre-installation manual
- Recommended room sizes and ceiling heights
- Clearances for magnet and system component delivery and servicing, including cryogen Dewar delivery
- Magnet and system delivery route, magnet delivery/removal access to the exam room, service clearances and egress clearances
- Floor loading during the magnet delivery process, and staging areas for unloading the equipment
- Floor levelness and preparation
- Conduits, overhead cable trays, recessed cable ducts for system cables and interconnects
- Verify GE Healthcare system cable length
- Junction box, electrical conduits, raceway size
- Power feeder requirements that comply with GE Healthcare's applicable power regulation and grounding requirements
- Main disconnect panel, verify how it will be sourced
- Uninterruptible power supply system, if one is required
- Personnel telephone equipment and services
- Broadband (high-speed Internet) connectivity
- Network connectivity

Requirements for many of these items can be found in the applicable GE Healthcare pre-installation manual or on GE Healthcare's site-specific final equipment installation drawings.

Project Plan (Continued)

Delivery Considerations for Design Team

Finalize the system delivery route during the construction drawing phase of the process. Make note of any doors to remove and if temporary floor supports are required along the delivery path during the delivery of the magnet and system components. This needs to be incorporated into the project during the design phase.

Plan Review and Approvals

Once the construction documents are completed, they may need to be submitted for review to the applicable state and local planning departments having jurisdiction for your location and those issuing construction permits.

Your design team is responsible for meeting all code and regulatory requirements, as well as the applicable site preparation requirements for the system. The design team is responsible for coordinating any plan reviews and necessary follow-up activities with the applicable local state and local planning departments.

Note: Some jurisdictions may require periodic reviews during the construction drawing phase of the design process.

Plan Review and Permits

This part of the process has the potential for adversely impacting the project schedule. By hiring an architectural/engineering design team with experience in the medical field and site preparation for diagnostic imaging systems you may have the opportunity to avoid some of the pitfalls that otherwise might occur with an inexperienced design team.

The project schedule includes many tasks that have the potential to create delays and the construction documents planning department review cycle is one of them.

If you are using the Design-Bid-Build approach for your project, the plan review period would be a good time to obtain bids for the construction work. The bidding process can take several weeks depending on the complexity of the project.

The duration of the state and local planning review process varies widely, ranging from days to months, depending on your location, the type of facility, and the type of construction. State and local planning reviews for projects in hospitals can take longer than projects in a commercial setting. These review processes may require multiple reviews at different stages during the preparation of the drawings and specifications. During the planning review process, it may be determined that follow-up submissions and reviews may be required. In that event it may be difficult to avoid delays in that will adversely affect the project schedule. Once the construction documents have been reviewed and approved by the applicable agencies, your contractor will be able to apply for and obtain the appropriate construction permits.

There are some situations and jurisdictions where demolition permits are available. These permits allow starting the on-site demolition work prior to commencing the construction work, possibly improving the project schedule.

Your contractor will need to schedule inspections throughout the construction process. The inspecting authority having jurisdiction may also require a final inspection. When the inspection is satisfactorily completed, a certificate of occupancy can be applied for and obtained. In some situations the certificate of occupancy may be required before you can begin to scan patients.

In addition to obtaining construction permits, you may need to obtain a permit to close portions of the street or sidewalk to accommodate system delivery and rigging vehicles.

Project Plan (Continued)

Pre-Construction Review Meeting

Purpose:

Reinforce expectations, review specifications, and answer questions. Establish timeline and solidify the system delivery date

Recommended Attendees:

- Customer Team
 - Director of Radiology
 - Facilities Management
 - Networking
 - Technologist
 - IT Representative
 - Customer Design Team
- Contractor
 - Project Manager
 - Superintendent
 - Mechanical and Electrical Subcontractors
- GE Healthcare
 - Sales Representative
 - Project Manager
 - Field Service Engineer

Prerequisites:

- Contractor's construction schedule and construction drawings
- GE Healthcare site-specific final equipment installation drawings
- Send meeting agenda to attendees prior to meeting and communicate estimated duration, approximately an hour

Project Plan (Continued)

Agenda Topics:

- Introductions
- Discuss roles, responsibilities, and information flow
 - Verify everyone has current version of the GE Healthcare's site-specific final equipment installation drawings
 - Review GE Healthcare site-specific final equipment installation drawings page by page
 - Discuss any changes in the system order that may affect the project design and construction work
 - Review the system delivery route
 - Review the rigging requirements
- Review contractor's project schedule
- Identify and discuss how to handle any long lead material items related to the system installation
- Establish final delivery date agreeable to all parties
- Establish key GE Healthcare milestones in calendar days
 - 30 days prior to delivery date
 - 15 days prior to delivery date
 - 6 days prior to delivery date
- Discuss disposal of system packing material and return of dollies
- Discuss safety training and policy requirements and the security of the delivered system components

Follow-up:

- Plan site visits for milestone reviews
- Follow-up e-mail detailing expectations sent to each attendee with an attached checklist
- Communicate delivery date

Project Plan (Continued)

Other Pre-Construction Items:

Once you obtain construction permits, you are ready to begin the construction phase. Early planning, agreement, and commitment by all your project participants will help focus on the on-time delivery of your system.

The pre-construction review meeting at the project location is a critical step to getting the entire team focused. This meeting is team collaboration and should include your representative, facilities or landlord representative, design team, the contractor's project manager, and superintendent, and the GE Healthcare Project Manager.

Your contractor is responsible for the construction schedule and adherence to all construction-related drawings and specifications. Use this meeting to make sure all project participants commit to the current project schedule. If the parties cannot reach agreement on the current project schedule during this meeting, schedule a timely follow-up meeting to resolve any schedule issues and obtain consensus ensure from all.

Publish the final written project schedule and distribute it to all members of the project team, including the GE Healthcare Project Manager. The project schedule determines the start of the manufacturing process at GE Healthcare for your new system.

| Topics to review | Facilities/ Landlord | | | GE Project Manager |
|--|-------------------------|-----------|------------|-----------------------|
| | Representative | Architect | Contractor | |
| Review the Site Readiness Assessment Checklist for items that need to be completed prior to delivery of the system | | | | |
| Finalize construction schedule to meet system delivery dates. | | | | |
| Set delivery dates for the magnet and system, including any pre-delivery items. | | | | |
| Review scope of project and impact on cycle times. | | | | |
| Highlight critical path events/long lead time items, such as RF shield, HVAC equipment, cryogen vent material, permanent power for the system, chilled water source, required exhaust vent, DC lighting controller, power feeder, main disconnect panel, cable trays, electrical ductwork, and other identified long lead items. | | | | |
| Identify roles and responsibilities for drawings, submittals, and review process in order to avoid schedule delays. | | | | |
| Review the GE Healthcare site-specific final equipment installation drawings and the construction drawings in detail with all subcontractors, including the delivery requirements/route. | | | | |
| Review and identify the delivery route and method for the magnet and system. Will a crane be utilized? Where will it be staged? Verify if a local street access permit is required and how it will be obtained by the delivery dates | | | | |

This is an example of topics to review and discuss. This is not an all-inclusive list.

Construction

The design and construction teams manage the construction at your site. If you are using the Design-Build method, you will most likely have a project manager and superintendent managing all aspects of the project.

If you are using the Design-Bid-Build approach, you will probably have separate contacts for both the design and construction portions of the project and will need someone to coordinate the interaction between them.

Key Items to Remember:

- Review the site readiness assessment checklist to monitor progress of the project
- GE Healthcare Project Manager is available for system-related questions
- Project complexity influences schedule times and risks
- Inform your GE Healthcare Project Manager about any design changes relative to the system and associated equipment
- Confirm system delivery route
- Coordinate installation of broadband (high-speed Internet) connectivity
- Testing and/or inspections of anchoring and cable routing methods
- Floor levelness is critical and may affect image quality
- Provide critical status updates to GE Healthcare Project Manager
- Governmental inspections related to construction permits and to satisfy the department of health and other agency requirements may be required
- Continue to manage the completion date and focus on completing the construction of exam, equipment, and control rooms



Contact your GE Healthcare Project Manager when issues or changes in the design, floor plan, or project schedule occur.

Site Readiness Assessment

Critical items to be completed before delivery

| | Check when complete | Notes/Issues/Action Plan |
|--------------------------|---|--------------------------|
| <input type="checkbox"/> | Cryogen vent is installed and ready to connect to magnet (within 24 hours) | |
| <input type="checkbox"/> | Main disconnect panel is installed, power is connected, and it is available 24x7 | |
| <input type="checkbox"/> | Chilled water supply is available 24x7 | |
| <input type="checkbox"/> | Exam room exhaust fan system is installed and operational | |
| <input type="checkbox"/> | RF shield room/magnetic shield are completed to the extent they can accept the magnet | |
| <input type="checkbox"/> | HVAC equipment is installed and operational | |
| <input type="checkbox"/> | The site meets the applicable GE Healthcare pre-installation manual requirements | |
| <input type="checkbox"/> | The conduits, cable trays, raceways, and plumbing are installed | |
| <input type="checkbox"/> | The broadband (high-speed Internet) connection is operational | |
| <input type="checkbox"/> | Personnel phone lines and phones are installed and operational | |
| <input type="checkbox"/> | Required governmental inspections are completed | |

For a detailed description of the site requirements for each item, refer to GE Healthcare's pre-installation manual for your system.

Site Readiness Assessment (Continued)

GE Healthcare Site Readiness Checklist

In addition to the assessment items to be completed, a GE Healthcare Site Readiness Checklist will be completed by the GE Healthcare Project Manager and GE Healthcare Field Service Engineer prior to system delivery. They will identify any corrections/actions that need to be completed by the contractor/customer prior to system delivery. Your GE Healthcare Project Manager can provide a copy of the current Site Readiness Checklist on request. The checklist below is a sample for reference only.

|  GE Healthcare Site Readiness Checklist Rev 19 | | | | | |
|--|------------------------------|--------------------------|-------------------------|--|---|
| Before using this document ensure you have the latest Rev from MyWorkshop on DOC0422752 | | | | | |
| GEHC Global Order # : _____ | | Customer: _____ | | | |
| GEHC PMI : _____ | | FE / Installer: _____ | | | |
| The customer is responsible for proper site preparation regardless of any GEHC measurements/inspections/assessments. | | | | | |
| Inspection Date: | | | | | Comments If "N", enter comments or action plan |
| GEHC Minimum Requirements | | | | | |
| | Storage In Room ready? | PMI In Room ready? | FE In Room ready? | | |
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 7 | | | | | |
| 8 | | | | | |
| 9 | | | | | |
| # | | | | | |
| # | | | | | |
| # | | | | | |
| # | | | | | |

Sample for Reference Only

Delivery

Sample Pictures

Below are typical pictures of an exam room and magnet delivery



Exam room ready for delivery



Exam room wall delivery access panel opened



Exam room with magnet delivery through the wall



Exam room with magnet delivery through the roof

Delivery (Continued)

Magnet Delivery

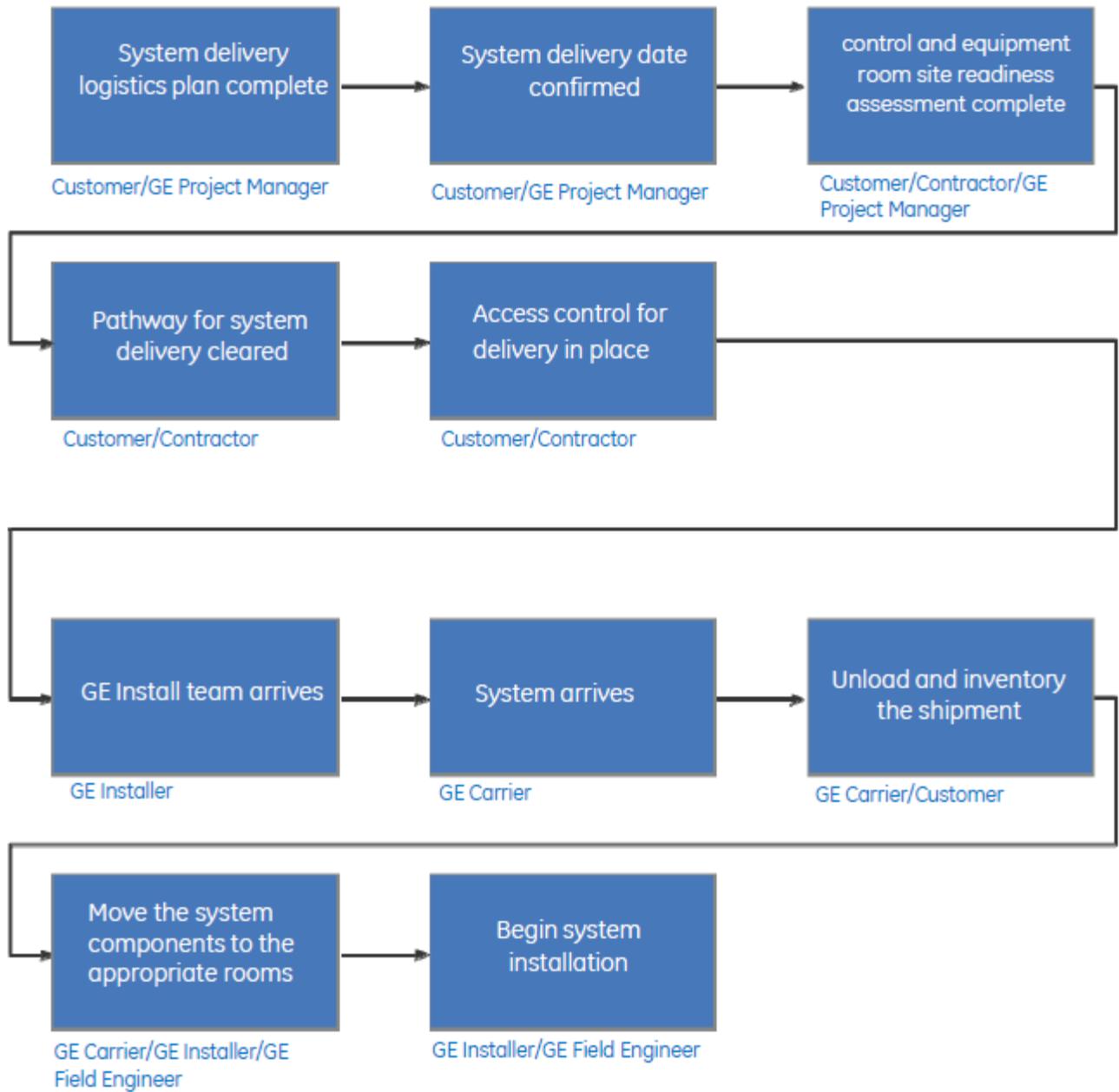
Below is the typical of the flow of events prior to and during magnet delivery.



Delivery (Continued)

System Delivery

Below is the typical of the flow of events prior to and during magnet delivery.



System Turnover

Installation and Calibration

Once the system arrives at your site, a team of GE Healthcare installers or the GE Healthcare Field Service Engineers arrive to install and connect the system components. A GE Healthcare Field Service Engineer is also assigned to calibrate and test your system to verify it is operating in accordance with GE Healthcare's published performance specifications that system.

Your broadband (high-speed Internet) service needs to be operational before the calibration activity begins. This enables GE Healthcare's diagnostic and applications support functions for your system to be activated and operational.

Schedule any applicable acceptance testing by your team to immediately follow completion of the system testing and calibration. If you require in-house testing of the system make sure you wait to schedule applications training until you complete your in-house testing. Coordinate your acceptance testing schedule with your GE Healthcare Project Manager and GE Healthcare Field Service Engineer to prevent delays and last minute cancellations.

Application Training and First Patient

GE Healthcare's TiP (Training in Partnership) clinical applications training offerings enable you to utilize the full capability of your new GE Healthcare system. The TiP Applications Team will contact you to set up your training.

Many training choices are available through the TiP training programs. They can be reviewed with and ordered through your GE Healthcare Sales representative. The "Partnership" is your level of engagement in the training process along with GE Healthcare commitment to training.

Customers who plan and allow for the recommended time to train their technologists and radiologists are then positioned to utilize the full capability your new System. Your team's level of engagement and dedication to the training process plays a major role how effectively your new system is used.

GE Healthcare's TiP offerings provide continuing education credits to your staff if they follow the recommended training curriculum. These offerings will allow your technologists and radiologists to optimize their procedures for image quality and improved productivity. For more additional information on TiP training programs please visit the below link.

<http://www3.gehealthcare.com/en/Education>

You are now ready to scan patients!

System Turnover (Continued)

Project Completion Close-Out Meeting

Purpose:

To verify that all project tasks have been completed and that any incomplete items are identified and promptly completed.

Usual Attendees:

- Customer team usually consists of:
 - Medical Director
 - Director of Radiology
 - Modality Supervisor
 - IT Representative
- GE Healthcare team usually consists of:
 - Sales Representative
 - Project Manager
 - Director of Service

Prerequisites:

- System installation is complete
- Applications training is complete
- Serial number of system recorded
- Unused applications days identified

Agenda topics:

- Status of project tasks
- Contact information reviewed
- GE Healthcare escalation process reviewed
- Future service level/programs reviewed
- Review warranty details

Summary of Critical Items

This section contains a summary of critical items that need to be addressed to optimize the installation of your new system. These items are provided to give a high level summary of system specific items you, your design team, and construction team need to address.

Your site specific plan and design also requires the use of all applicable planning information and requirements specified in GE Healthcare's applicable pre-installation manual and its site-specific final equipment installation drawings for your system.

Please contact your GE Healthcare Project Manager if you have not yet received a copy of the applicable pre-installation manual for your system. Alternatively, you can view and download a PDF copy of the applicable pre-installation manual electronically at the following link:

http://www3.gehealthcare.com/en/Support/Site_Planning

This section contains information on the following critical items:

- Broadband and Network Connectivity
- Cryogen Vent
- Magnetic Shield
- RF Shield Room
- Additional RF Shield Room Pictures
- Magnetic Room Pressure Equalization
- Mechanical/Electrical Infrastructure
- Power and Grounding
- Floor Preparation
- Floor Levelness Survey
- MR Leveling and Flattening the Floor Area Overview

Summary of Critical Items (Continued)

Broadband and Network Connectivity

Broadband Highlights

- High productivity, decreased costly downtime
- Proactively addresses security
 - Customer controlled and auditable
 - Secure encrypted transactions
- Improved speed and reliability vs. modem
- Single point access, reduce telecom costs
- All IP-based products are compatible
- Virtual applications assistance and training
- Remote diagnosis

Your GE Healthcare Project Manager can assist you on the path to broadband connectivity. You will need to provide the name of your facility information technology contact person to your GE Healthcare Project Manager. This will allow your GE Healthcare Project Manager to initiate GE Healthcare's process that will assist you in getting ready for broadband connectivity at the time of your system's delivery.



Summary of Critical Items (Continued)

Cryogen Vent

MR systems with cryogenic MR magnets (0.7T, 1.5T, 3.0T) require this item for safely venting cryogenic helium vapor from the exam room to outside the facility.

The cryogen vent design requirements are provided in GE Healthcare's applicable pre-installation manual. You need to select an engineer and fabricator to design and build a cryogen vent that complies with the requirements for your GE Healthcare MR system. It is important to have your mechanical design engineer validate the design and installation of your cryogen vent complies with the applicable GE Healthcare pre-installation manual requirements.

The design and fabrication lead time for a cryogen vent is typically 4 to 6 weeks. It is important to confirm the actual cryogen vent design and fabrication schedule cycle with the supplier(s) you select as those cycle times can vary. The waveguide through the RF room wall or ceiling should be provided by your RF shield supplier.

Please refer to the GE Healthcare's applicable pre-installation manual for requirements related to the design criteria, connection details, and materials for the cryogen vent.



Exam Room Interior



Roof exterior vent exit



Typical side wall exterior vent exit

Summary of Critical Items (Continued)

Magnetic Shield

Some sites require magnetic shielding to meet the site magnetic field containment requirements. It is important to select an experienced and specialized RF shield room/magnetic shield supplier shortly after selecting your design team.

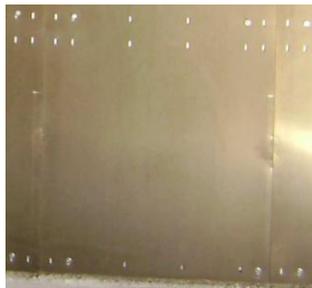
This provides the opportunity for your design team's questions related to the RF shield room and magnetic shielding to be addressed during the planning phase. This also provides an opportunity to help predict your project schedule and ensure you are getting the type of RF and magnetic shielding you desire.

The magnetic shielding requirements are provided in the applicable GE Healthcare pre-installation manual and the site-specific final equipment installation drawings. Once you determine your magnetic field containment requirements and other related site parameters, GE Healthcare has an engineering team that will provide the magnetic shielding design your site.

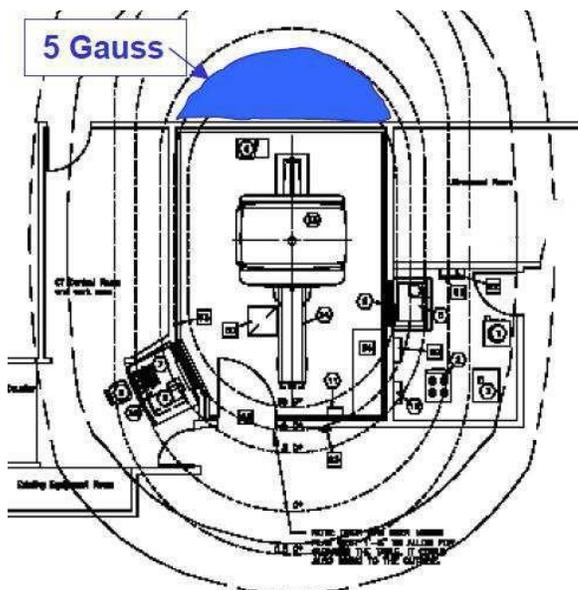
Generally, the magnetic shielding design, fabrication, and installation lead time averages between 8 and 12 weeks. It is important to confirm the actual magnetic shielding design, fabrication, and installation lead time with your magnetic shielding supplier as those cycle times can vary.



Magnetic Shield



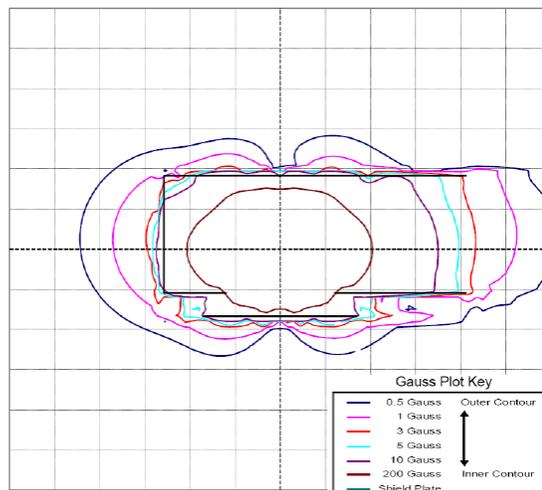
Non-oriented Silicon Steel or Armco



Typical Shielding: 5 Gauss Line Containment Back Wall

Side View

Grid Size = 1 m x 1 m



Summary of Critical Items (Continued)

RF Shield Room

It is important to select an experienced and specialized RF shield supplier shortly after selecting your design team. This provides the opportunity for your design team's questions related to the RF shield to be addressed during the planning phase. This also provides an opportunity to help predict your project schedule and ensure you are getting the RF and magnetic shielding you desire.

Your new or refurbished RF shield must comply with the requirements for your MR system found in the applicable GE Healthcare pre-installation manual. If you are replacing an existing magnet, you need to test the existing RF shield for compliance with GE Healthcare's current RF shield requirements prior to removing the existing magnet from the exam room. This helps to determine the scope of rework the existing RF shield may need to accommodate the installation and operation of your new GE Healthcare MR system.

The RF shield requirements are provided in the applicable GE Healthcare pre-installation manual. Critical requirements include the pressure equalization vent, floor levelness, shield isolation, filters, waveguides, cryogen vent, and other items unique to differing MR systems. All penetrations through the RF shield need detailed coordination in your project design and construction phases. Shield dimensions, materials, and details vary between RF shield suppliers. Flush floor trenches in the exam room can adversely impact imaging quality and may require the use of special materials and assembly techniques. This should be coordinated with your RF shield supplier.

Design, fabrication, and installation lead-time for RF shields averages between 8 and 12 weeks. It is important to confirm the actual RF shield design, fabrication, and installation lead time with your RF shield supplier as those cycle times can vary.

The final RF shield installation must be tested for compliance with GE Healthcare's requirements published in its applicable pre-installation manual. A copy of the written test RF shield report(s) should be provided to GE Healthcare's Project Manager.



Copper RF Shield



Galvanized RF Shield

Summary of Critical Items (Continued)

Additional RF Shield Room Pictures



Aluminum RF Shield



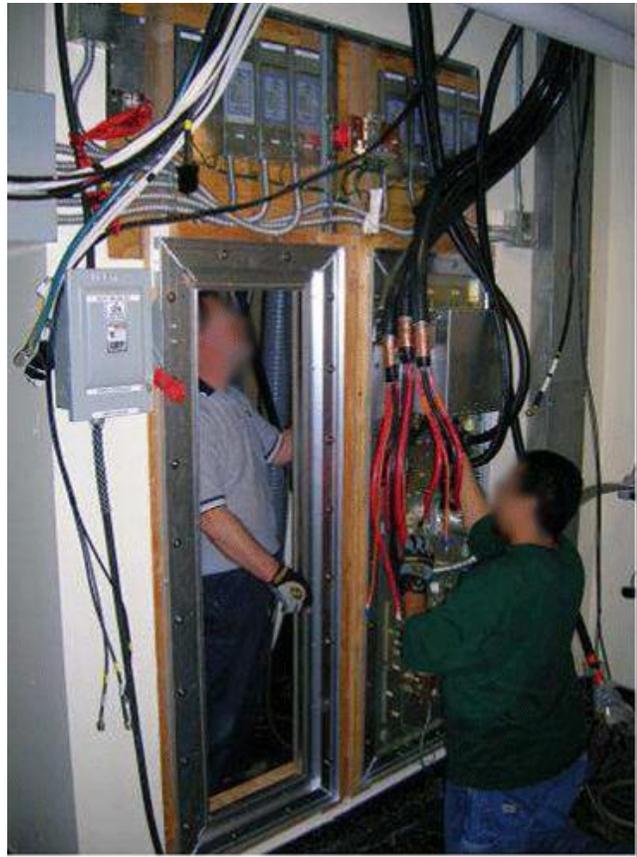
Acoustic Isolation



Electrical Filters/Med Gas/Sprinkler line



Example: Two piece removable anchor base



Penetration Panel/Frame
(Equipment Room Side)

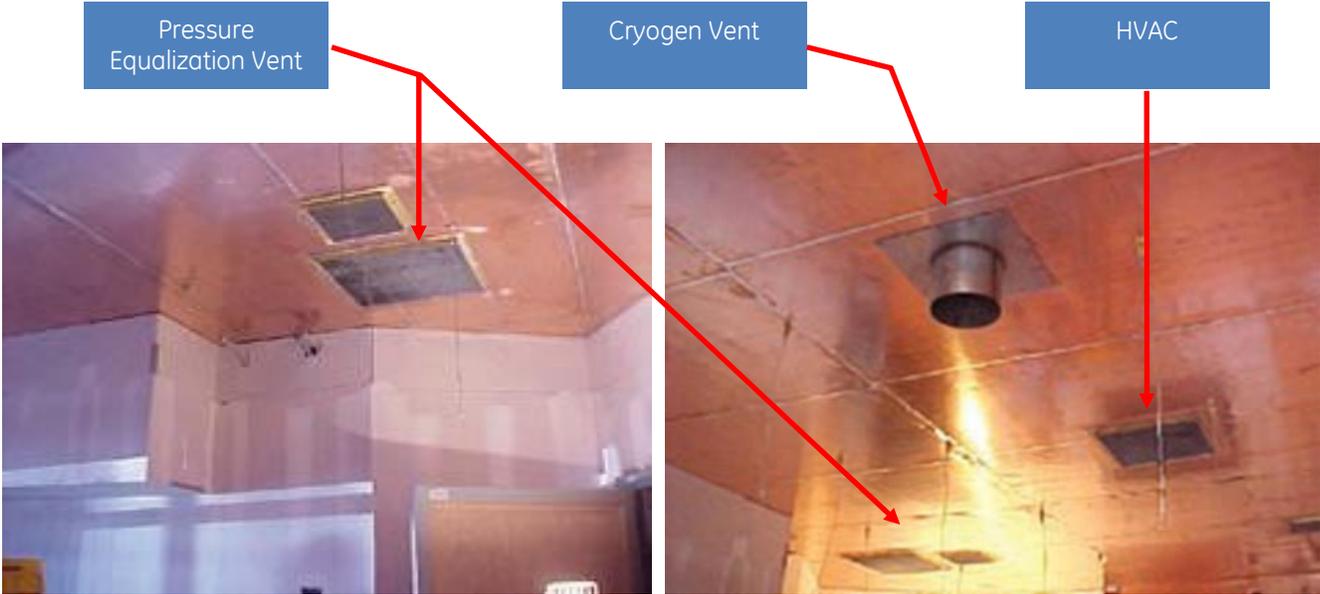
Summary of Critical Items (Continued)

Exam Room Pressure Equalization

All sites require a pressure equalizing waveguide vent for balancing atmospheric pressure between the exam room and the interstitial space.

The pressure equalization has specific requirements. Those requirements are provided in the applicable GE Healthcare pre-installation manual.

The exam room pressure equalization vent is an RF shield room supplier's responsibility and needs to be part of the RF shield room design and construction.



View of Exam Room Ceiling

Summary of Critical Items (Continued)

Mechanical/Electrical Infrastructure

Your GE Healthcare system has specific power, cooling, and HVAC requirements. Those requirements are provided in the applicable GE Healthcare pre-installation manual. These services must be available and operational at the time of system delivery.

Procurement and installation lead time for these items can average between 8 and 10 weeks; check their availability with your supplier. Your GE Healthcare Project Manager can assist you if you have questions regarding the environmental requirements and can provide contacts for equipment sources.



Main Disconnect Panel



Dimplex Chiller



Dynamic Sag Corrector Power Conditioner

Summary of Critical Items (Continued)

Power and Grounding

System site preparation projects can involve extensive electrical work. The system requires that electrical raceways, conduits, and cable trays be installed for the cables that interconnect to the system's sub-systems.

The GE Healthcare final equipment installation drawings for your site will show a diagram of these interconnects. The interconnect diagram describes the cable lengths provided with the system. The applicable GE Healthcare pre-installation manual gives details of cable diameters for each cable. It is important that this information be considered during the design and layout of the raceway, conduits, and junction boxes. If alternate solutions are needed, they should be discussed with your GE Healthcare Project Manager.

Diagnostic imaging equipment has become increasingly sensitive to power quality and proper electrical grounding. This sensitivity is influenced by the increased speed and complexity of the data acquisition computers. In order to obtain optimal system performance and avoid issues related to image quality and reliability, it is extremely important to comply with the specific power requirements for your diagnostic imaging equipment.

Wire size of the power feeder conductors must be carefully determined and specified by your electrical engineer so the wire size complies with GE Healthcare's wire size requirements. Failure to meet those requirements could prevent your system from operating in accordance with GE Healthcare's published performance specifications that system. GE Healthcare's equipment installation drawings include a feeder table chart listing the recommended wire size for each of the conductors. The wire sizes listed GE Healthcare's feeder table chart listing may exceed the wire size requirements specified by National Electrical Code. In all cases the wire sizes specified in GE Healthcare's feeder table chart listing must be used to ensure an unacceptable level of impedance is avoided.

There are often other questions regarding the following list of critical design elements during the design and construction phases of the project. Although this is not a comprehensive list of all potential critical design elements, your electrical engineer and electrical contractor will need to consider on the following:

- Design to meet current version of the National Electric Code for your location and facility
- Proper grounding materials along the ground path
- Proper ground and neutral bonding
- Size of ground wire
- Ground and circuit conductors run in the same conduit
- Single ground in the facility
- Ensure that wire termination connections are tight
- Ensure wires are terminated properly

See photographs of main disconnect panel and DC lighting controller on next page.

Summary of Critical Items (Continued)



Main Disconnect Panel & DC Lighting Controller



Main Disconnect Panel

Summary of Critical Items (Continued)

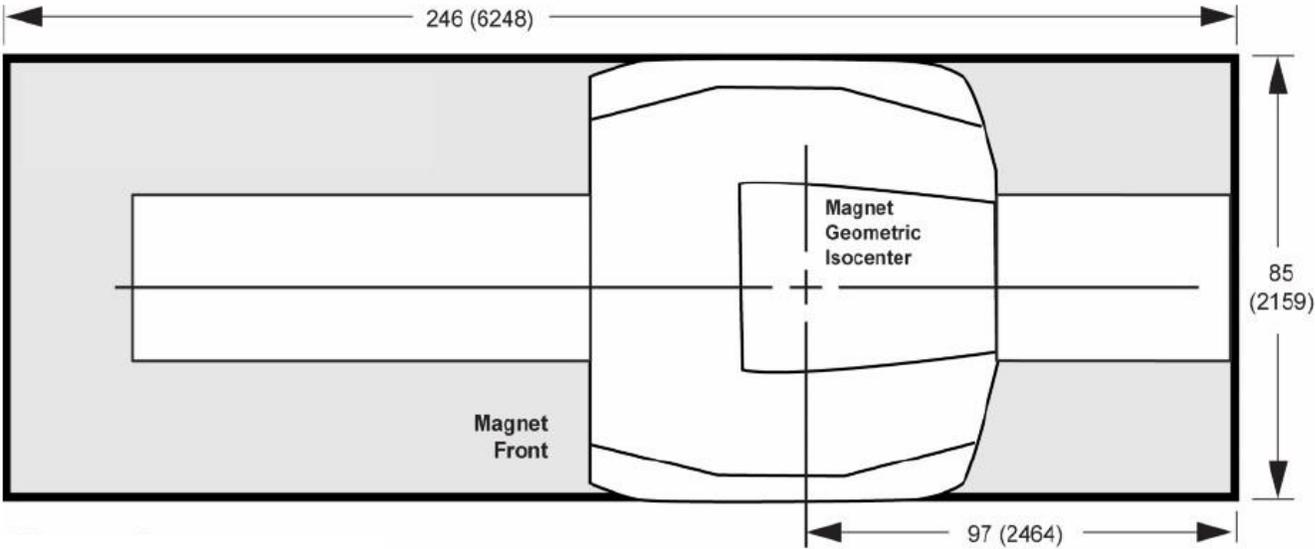
Floor Preparation

To ensure a quality installation of your system, the room floor must be level and its surface must be smooth. It is imperative that the system installation area, which includes the magnet and table area, be level and flat and comply with the requirements listed in GE Healthcare's applicable pre-installation manual.

Where possible, the entire floor of the exam room should be level and flat rather than just the system installation area. It is important to verify that the floor is both flat and level before system installation begins. Measurements should be taken left-to-right or right-to-left, front-to-back or back-to-front, and diagonally in either direction. Please refer to the applicable GE Healthcare pre-installation manual for the specific requirements.

The floor must be prepared so that it will support the floor loading as described in the applicable GE Healthcare pre-installation manual.

Important: Floor loading capacity must be confirmed by your structural engineer.



Exam Room Floor Levelness (Top View)

Summary of Critical Items (Continued)

Floor Levelness Survey

Floor levelness and floor flatness surveys must be completed prior to your MR system arriving on site to ensure floor complies with GE Healthcare's floor levelness and floor flatness requirements. Complete the survey following the detailed specifications and instructions provided in the applicable GE Healthcare pre-installation manual and GE Healthcare's Service Note 43872.

Contact your GE Healthcare Project Manager or Sales person to obtain a copy of Service Note 43872 and the applicable GE Healthcare pre-installation manual for your system.

MR Leveling and Flattening the Floor Area Overview

No fill material should be used to compensate for holes or depressions in the floor surface. If necessary, level and flatten the entire floor area. Please refer to the applicable pre-installation manual for details.

The exam room floor must be leveled, and its surface must be smooth. Any deviations in levels will have a detrimental effect on the system performance and operation.

It is desirable for the floor in the entire room will be leveled and flattened, in accordance with the requirements provided in the applicable GE Healthcare pre-installation manual. If this is not possible, it is imperative that the system installation area is leveled and flattened.

When the exam room floor is read for installation, verify the surface flatness (of the applicable area) complies with the floor levelness and flatness requirements of the applicable pre-installation manual using a straight edge of 150 cm (5') in length (or longer).

See the below example of the typical floor levelness and flatness requirements. Refer to the applicable pre-installation manual for the actual requirements for your system.

| Item | Requirement |
|---------------------|---|
| Floor Leveling Area | 7'1" X 20'6" (216 cm X 625cm) minimum |
| Flatness | Surface should be smooth and have no more than 0.125" (3 mm) deviation throughout the in the above-specified floor leveling area. |
| Levelness | Floor Levelness must be 0.125 in. (3 mm) between high and low spots in the above-specified floor leveling area. |

Example: Floor Levelness and Flatness Requirements

System Specific Component Information by Room

Typical Equipment Room Components



Heat Exchanger Cabinet



Power Gradient Cabinet



PEN Cabinet



PEN and Secondary Pen Wall
(Equipment Room Side)

System Specific Component Information by Room (Continued)

Typical Equipment Room Components



DC Lighting Controller



Main Disconnect Panel



Shield Cooler Cabinet



Magnet Monitor
Mounted on Either Side of Heat Exchanger Cabinet



Overhead Cable Trays

System Specific Component Information by Room (continued)

Typical Exam Room Components



Magnet and Patient Table (MR450W GEM System Shown)



Magnet Rundown Unit



Optional Coil Cart

System Specific Component Information by Room (Continued)

Typical Exam Room Components



Overhead Cable Trays



Cryogen Vent



Vibroacoustic Dampening Kit (installed under magnet feet)



Cable Concealment above Magnet

System Specific Component Information by Room (continued)

Typical Exam Room Components

Head Neck Unit



16ch Anterior Array



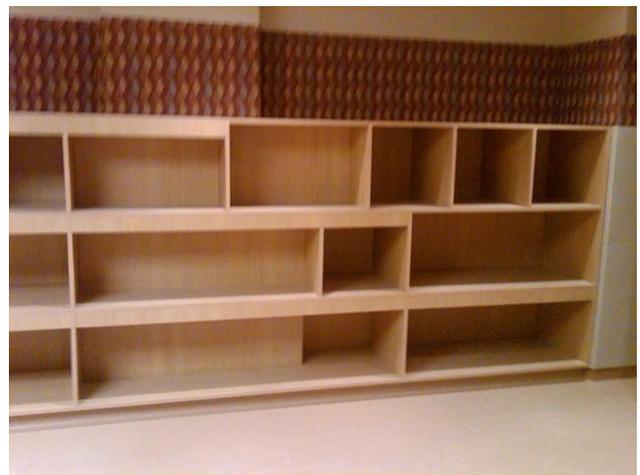
32 Ch Peripheral Vascular Array



integrated flat posterior array
Built into table



Optional: Injector



Coil Storage

System Specific Component Information by Room (Continued)

Typical Control Room Components



Optional: Intercom/Music System

Optional: Operators Workspace Table

Optional: Injector Control



Scan Control Interface Module and Keyboard



Patient Alert

© 2012 General Electric Company--All rights reserved.

General Electric Company reserves the right to make changes in specifications and features shown herein, or discontinue any products described at any time without notice or obligation. Please contact your GE representative for the most current information.

GE, GE Monogram and imagination at work are trademarks of General Electric Company.

GE Healthcare, a division of General Electric Company

About GE Healthcare

GE Healthcare provides transformational medical technologies and services that are shaping a new age of patient care. Our broad expertise in medical imaging and information technologies, medical diagnostics, patient monitoring systems, drug discovery, biopharmaceutical manufacturing technologies, performance improvement and performance solutions services help our customers to deliver better care to more people around the world at a lower cost. In addition, we partner with healthcare leaders, striving to leverage the global policy change necessary to implement a successful shift to sustainable healthcare systems.

Our “healthymagination” vision for the future invites the world to join us on our journey as we continuously develop innovations focused on reducing costs, increasing access, and improving quality around the world. Headquartered in the United Kingdom, GE Healthcare is a unit of General Electric Company (NYSE: GE). Worldwide, GE Healthcare employees are committed to serving healthcare professionals and their patients in more than 100 countries. For more information about GE Healthcare, visit our website at www.gehealthcare.com.

GE Healthcare
3000 North Grandview Blvd
Waukesha, WI 53188
U.S.A

