THE
University of Vermont
MEDICAL CENTER

By Courier & Email *Office of the General Counsel*

May 1, 2019

Donna Jerry, Senior Health Policy Analyst
Green Mountain Care Board
144 State Street
Montpelier, VT 05602

Re: Letter of Intent and Certificate of Need Application
for Replacement of an MRI System and Renovation of MRI Space

Dear Donna:

On behalf of The University of Vermont Medical Center (the "Medical Center"), I am pleased to submit the following documents in connection with the Medical Center's Certificate of Need application for the replacement of its General Electric 1.5T MRI System and renovation of its MRI space (the "Project"):

1. Letter of Intent, requesting expedited review;
2. Verification under Oath, signed by John Brumsted, MD;
3. Certificate of Need application with:
    a. A Narrative Description of the Project;
    b. A detailed response to the applicable CON criteria, including the HRAP CON standards;
    c. Financial Tables; and
    d. Applicable attachments to the CON application.

Since we are requesting expedited review, we understand that your office will take care of the public notice requirements in accordance with 18 V.S.A. §§ 9440(c)(2)(B) and 9440(c)(5)(A).

We look forward to receiving your decision on our request for expedited review and to working closely with you during the review process. If you have questions concerning our application materials, please do not hesitate to contact me.

Very truly yours,

Steven J. Klein, Esq.
Director of Legal Affairs & Assistant General Counsel

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By Courier & Email *Office of the General Counsel*

May 1, 2019

Donna Jerry
Senior Health Policy Analyst
144 State Street
Montpelier, VT 05602

Re: Letter of Intent for Replacement of an MRI System and Renovation of MRI Space

Dear Donna:

In accordance with 18 V.S.A. § 9440(c)(5) and the Certificate of Need Program Rule 4.000 ("Rule 4"), The University of Vermont Medical Center (the "Medical Center") is filing this Letter of Intent and the enclosed Certificate of Need application seeking expedited approval, without a hearing and with such other abbreviated process as the Green Mountain Care Board determines is appropriate, of a project to replace its General Electric 1.5T MRI System and renovate its existing MRI space (i.e., procedure and waiting rooms, changing areas, and restrooms) (the "Project").

Under 18 V.S.A. § 9440(c)(5) and Rule 4, a request for expedited review may be granted if the project is likely to be (a) uncontested and (b) does not substantially alter services. Because this Project simply involves the replacement of outdated MRI equipment and the renovation of MRI support spaces for purposes of compliance with the American's with Disabilities Act, it is unlikely it will be contested.

Under § 4.304 of Rule 4, a CON project does not "substantially alter services" if:

(a) The project raises no significant health care policy or planning concerns; and
(b) The expenditures associated with the proposed project do not have a significant impact on the services provided, the cost of health care, or the financial strength of the applicant.

The Project's cost of $2.86 million is not substantial in terms of the Medical Center's overall budget, and the Project will not have a significant impact on the Medical Center's existing services or financial health. Because this Project will permit the Medical Center to provide high quality magnetic resonance imaging and improved access to such imaging, the Project is consistent with Vermont's health care reform policy objectives and will not raise any significant health care policy or planning concerns.

Under Rule 4, we believe that the Green Mountain Care Board may declare this application uncontested and issue written notice granting a Certificate of Need without any further process, and we respectfully request that the Board do so.

In accordance with 18 V.S.A. § 9440(c)(2) and the underlying CON regulations and guidelines, we provide the following information concerning the Project, which is amplified in the enclosed application:

Project Scope:	The Project involves the purchase and installation of a Philips 1.5T MRI system to replace the Medical Center's GE MRI 1.5T system and the renovation of the Medical Center's MRI spaces for a total capital cost of $2.86 million.
Project Rationale:	The current GE MRI 1.5T system is in its twenty-first year of service and is experiencing image deterioration, which impacts the ability of providers to visualize and read MRI scans. Further, the MRI changing spaces and restrooms were designed in 1988 with the first MRI system installed at the Medical Center and are not in compliance with the Americans with Disabilities Act of 1990 (the "ADA") and the regulations promulgated thereunder.
Needs to be Addressed:	The Project will replace a deteriorating MRI system with one that will deliver improved image quality and serve a more diverse group of patients, including bariatric patients. The Project will also bring MRI spaces into compliance with the ADA to improve accessibility.
Cost, Access , Quality:	The Project will provide continued and improved access to high quality magnetic resonance imaging services without any increase in costs or charges.
Location:	The new Philips 1.5T MRI system and renovated spaces will be located at the Medical Center in the McClure Building.
Service Area:	The majority of patients (58%) served by the Medical Center's MRI program come from Chittenden County, Vermont. The Medical Center does, however, treat patients from across the University of Vermont Health Network ("UVMHN") service area. Approximately 80% of patients are from Vermont, 11% are from New York, and 9% are from outside the UVMHN service area.
Projected Expenditures:	$2.86 million.

We look forward to working with you during the review process for this application.

Very truly yours,

Steven J. Klein, Esq.
Director of Legal Affairs & Assistant General Counsel

STATE OF VERMONT
GREEN MOUNTAIN CARE BOARD

In re:	The University of Vermont Medical Center Inc.	)
	Application for Certificate of Need to Replace	)
	An MRI Unit and Renovate MRI spaces	)
	Capital Expenditure: $2.86 million	)

JOHN R. BRUMSTED, M.D., being duly sworn, states on oath as follows:

1. My name is John R. Brumsted, M.D. I am the Chief Executive Officer of The University of Vermont Medical Center Inc. (the "Medical Center") and President and Chief Executive Officer of The University of Vermont Health Network. I have reviewed the foregoing Certificate of Need Application (the "Application").

2. Based on my personal knowledge, after diligent inquiry, the information contained in the Application is true, accurate and complete, does not contain any untrue statement of a material fact, and does not omit to state a material fact necessary to make the statement made therein not misleading, except as specifically noted herein.

3. My personal knowledge of the truth, accuracy and completeness of the information contained in the Application is based upon either my actual knowledge of the subject information or, where identified below, upon information reasonably believed by me to be reliable and provided to me by the individuals identified below who have certified that the information they have provided is true, accurate and complete, does not contain any untrue statement of a material fact, and does not omit to state a material fact necessary to make the statement made therein not misleading.

4. I have evaluated, within the 12 months preceding the date of this affidavit, the policies and procedures by which information has been provided by the certifying individuals identified below, and I have determined that such policies and procedures are effective in ensuring that all information submitted or used by The University of Vermont Medical Center Inc. in connection with the Certificate of Need program is true, accurate, and complete. I have disclosed to the Board of Trustees all significant deficiencies, of which I have personal knowledge after diligent inquiry, in such policies and procedures, and I have disclosed to the Board of Trustees any misrepresentation of facts, whether or not material, that involves management or any other employee participating in providing information submitted or used by The University of Vermont Medical Center Inc. in connection with the Certificate of Need program.

5. The following certifying individuals have provided information or documents to me in connection with the Application, and each such individual has certified, based on his or

her actual knowledge of the subject information or, where specifically identified in such certification, based on information reasonable believed by the certifying individual to be reliable, that the information or documents they have provided are true, accurate and complete, do not contain any untrue statement of a material fact, and do not omit to state a material fact necessary to make the statement made therein not misleading:

(a) Paula Gonyea, Regional Director, Radiology. This individual certified to the accuracy of the description of the Medical Center's magnetic resonance imaging program included in the narrative, including all information regarding the current operations of the facility and future operational plans and additional staffing needs.

(b) Fiona Daigle, Finance Manager. This individual certified to the accuracy of all financial information submitted with the Application, including the CON Financial Tables.

(c) Peter Bero, Project Manager, Facilities Planning & Construction. This individual certified to the accuracy of all information in the Application describing the construction work to be performed, including the Project's consistency with the FGI Guidelines and the schematic drawings submitted with the Application.

6. In the event that the information contained in the Application becomes untrue, inaccurate or incomplete in any material respect, I acknowledge my obligation to notify the Green Mountain Care Board, and to supplement the Application, as soon as I know, or reasonably should know, that the information or document has become untrue, inaccurate or incomplete in any material respect.

JOHN R. BRUMSTED, M.D.

On April 30 2019, JOHN R. BRUMSTED, M.D. appeared before me and swore to the truth, accuracy and completeness of the foregoing.

Sharon L. Bracey

Notary Public
My commission expires 1/31/21.

Notary Public State of Vermont
Sharon L. Bracey
Commission No. 157.0005542
My Comm. Exp. Jan. 31, 2021

CERTIFICATE OF NEED APPLICATION
BY
THE UNIVERSITY OF VERMONT MEDICAL CENTER INC.
TO
REPLACE ITS GENERAL ELECTRIC MRI SYSTEM
AND
RENOVATE ITS MRI SPACE

Dated May 1, 2019

Steven J. Klein, Director of Legal Affairs & Assistant General Counsel
Amanda S. Angell, Assistant General Counsel

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SECTION I
PROJECT OVERVIEW

A. Description of Project

The University of Vermont Medical Center Inc. ("the Medical Center") hereby submits this Certificate of Need ("CON") application (the "Application") in accordance with 18 V.S.A. § 9440(c)(5), seeking expedited approval of a $2.86 million project (the "Project") to replace its current General Electric Excite 1.5T Magnetic Resonance Imaging system ("GE 1.5T MRI"), which was installed in 1998, with a new system, and to make the necessary renovations to the space housing the equipment and related patient restrooms, changing, and waiting areas. Specifically, this application seeks approval of the following:

(1) Replacement of the depreciated GE 1.5T MRI located on the Medical Center's Main Campus in the McClure Building with a Philips Ingenia Ambition 1.5T X MRI system ("Philips 1.5T MRI"), for a total equipment capital cost of $1,288,994[1]; and

(2) Facilities renovations to house the new MRI system and improve patient accessibility for a total capital cost of $1,569,518, which consists of (i) renovation and construction costs of $1,151,129; (ii) design and bidding contingency expenses of $57,560; (iii) construction contingency expenses of $230,220; (iv) furnishings, fixtures and other equipment expenses of $21,280; (v) architectural and engineering fees of $105,760; and (vi) administrative and permitting expenses of $3,569.

These capital expenditures have been included in the capital plans previously submitted by the Medical Center and reviewed by the Green Mountain Care Board ("GMCB"). The total cost of the Project, $2,858,512, will be covered by available working capital, without the need for borrowing.

B. Project Rationale

The Project does not involve any new program or service, the expansion or modification of any existing service or program, or the construction of any new health care facilities.

The Project involves only the (1) routine replacement of existing MRI equipment; and (2) renovation of the existing MRI spaces, consistent with sound business practices. The equipment was first installed in 1998, is now fully depreciated, and lacks certain enhancements made available by current technology: particularly, the ability to deliver high quality images (as the system is experiencing image deterioration due to its age) and the capacity to accommodate bariatric and claustrophobic patients. The new equipment will provide these enhancements and will improve aspects of patient care, as discussed more fully below.

[1] This amount includes a reduction in the purchase price of $67,100 as a result of the trade-in of the Medical Center's existing GE 1.5T MRI unit.

Further, the current MRI changing and bathroom areas were designed in 1988, with the first MRI system installed at the Medical Center, and are not in compliance with the Americans with Disabilities Act of 1990 ("ADA"). The renovations to the MRI space are necessary to bring the space into compliance with the ADA and to make the space more accessible for all patients of the Medical Center.

Taken in its entirety, the Project is vital and necessary to enable the Medical Center, the only tertiary and regional referral center in Vermont, to maintain its existing level of radiology services and utilize quality enhancements made available by current technology, without a disruption in care to its patients.

C. Consistency with CON Criteria and Standards

The proposed Project meets the statutory criteria set forth in Section 9437 of the Vermont Certificate of Need law, and is consistent with the Health Resource Allocation Plan published on July 1, 2009 ("HRAP") and the applicable HRAP CON standards, as explained in detail in Section IV of this Application.

SECTION II
DESCRIPTION OF THE UNIVERSITY OF VERMONT MEDICAL CENTER'S MRI SERVICES

A. The Purpose of Magnetic Resonance Imaging

MRI is a diagnostic imaging technique that uses magnetic fields and radio waves to produce two or three dimensional images of organs, soft tissues, bones, and virtually all other structures inside the body. MRI images often give physicians a better assessment of various parts of the body than other imaging modalities (e.g., X-ray, ultrasound, and computed tomography), which results in better detection of disease and improved diagnoses. Further, because MRI does not use ionizing radiation (X-rays) to generate images, patients do not incur radiation exposure when they receive this type of imaging exam. It follows that MRI is often the preferred choice of modality for patients who require diagnostic imaging.

MRI represents a means of evaluating a problem without having to invade or surgically access the area of concern. These benefits of MRI are well documented, and MRI has become the standard of care for the diagnosis of many types of problems. For example, MRI has been shown to prevent unnecessary biopsies of the liver. MR elastography is currently regarded as the most accurate, noninvasive (i.e., non-surgical) method for detection and staging of liver fibrosis. Calculations of liver stiffness with MR elastography are highly reproducible and show excellent interobserver agreement (that is, a high degree to which two or more observers report the same observed values after measuring the same events).[2]

[2] Babu, A. et al, *Elastography in Chronic liver Disease: Modalities, Techniques, Limitation, and Future Directions*, 36 RadioGraphics 1987-2006 (Nov. 2006).

Further, MRIs offer important benefits in regard patient safety. Unlike a CT exam or X-ray, MRI does not expose patients to radiation. Reducing radiation exposure from advanced diagnostic imaging is a major initiative as ionizing radiation from diagnostic imaging has been shown to increase the risk of cancer, burns, and other injuries. Children and young adults are at a particularly greater risk of harm from diagnostic radiation because they are inherently more radiosensitive and have a longer remaining life-expectancy during which a radiation-induced cancer may develop.[3] Because of this risk, in a Sentinel Event Alert, the Joint Commission advised hospitals that in "order to reduce the exposure of the patient to ionizing radiation, use other imaging techniques, such as ultrasound or MRI, whenever these tests will produce the required diagnostic information at a similar quality level."[4]

An MRI procedure goes as follows: The area of the patient's body being studied is placed inside a special machine that contains a powerful magnet. Radio waves from the machine interact with certain atoms in the patient's body and then the machine's magnet, thereby allowing the machine to produce digital, cross-sectional images of an area of the body (much like a slice of bread) that can be saved and stored on a computer for study. These digital images can then be reviewed remotely, such as in a clinic or an operating room.

Some common uses of MRI include scanning of the following:

- Major organ systems including heart, liver, biliary tract, kidneys, spleen, bowel, pancreas, prostate, and adrenal glands for the detection of various diseases and abnormalities;
- Blood vessels (i.e., MR Angiography) for the diagnosis of aneurysms and arterial blockages;
- Breast for the detection of tumors;
- Abdominal region for the detection of lesions;
- Musculoskeletal system for the diagnosis of joint or cartilage tears; and
- Neurological system for the detection of tumors and the diagnosis of multiple sclerosis, Alzheimer's disease, and dementia.[5]

B. Description of the Medical Center's MRI Services

The Medical Center's Radiology Department offers state-of-the-art magnetic resonance imaging capabilities and features four fixed MRI scanners and one mobile MRI scanner:

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[3] *Id.* at 1425.

[4] *The Joint Commission Sentinel Event Alert*, Issue 47 (Aug. 24, 2011).

[5] *See, e.g.*, Tatlisumak T., *Is CT or MRI the Method of Choice for Imaging Patients with Acute Stroke? Why Should Men Divide if Fate Has United?*, Stroke 33:2144 –2145 (2002); Kayhan A. et al. *Dynamic contrast-enhanced magnetic resonance imaging in prostate cancer*, 20(2) Magn. Reson. Imaging 105-12 (Apr. 2009); Demehri S. et al. *Conventional and novel imaging modalities in osteoarthritis: current state of the evidence*, 27(3) Curr. Op. Rheumatol. 295-303 (2015 May); Parizel P.M. et al. *Magnetic resonance imaging of the brain*, Reimer P. et al. (eds.) Clinical M.R. Imaging 107-195 (2010), Springer-Verlag Berlin Heidelberg; Filippi M. et al. *EFNS task force: the use of neuroimaging in the diagnosis of dementia*, 19 Eur. J. Neurol. 1487–1511 (2012).

1. GE Excite 1.5T system (installed in 1998, which this application seeks to replace);
2. Philips Ingenia 1.5T system;
3. Philips Ingenia 1.5T system;
4. Philips Ingenia 3.0T system; and a
5. Philips Ingenia 1.5 T mobile system.

The Medical Center has several MRIs with varying tesla strengths and functionality, as certain tesla strengths and functionalities are better suited for different patient populations. A summary description of each MRI scanner is included in the table below.

Summary Description of MRI Scanners

Model/Location	**Types of Scans & Distinctive Features**	**Limitations**
GE Excite 1.5T (Closed Bore) McClure Lobby *MRI 2* ***Seeking to replace***	Musculoskeletal, Neurological, Abdominal, Breast, Simple Cardiac cases, and Blood vessels (MR Angiogram)	Closed bore is not appropriate for claustrophobic or bariatric patients. Resolution not high enough for all cases (i.e., certain neuro, breast, prostate, body and pediatric cases). Resolution is deteriorated compared to new technology.
Philips Ingenia 1.5T (Wide Bore) Tilley Drive	Musculoskeletal, Neurological, Abdominal, Breast, Simple Cardiac cases, Blood vessels (MR Angiogram) Wide bore can accommodate claustrophobic and bariatric patients.	Resolution not high enough for all cases (i.e., certain neuro, breast, prostate, body and some pediatric cases).
Philips Ingenia 3.0T (Wide Bore) McClure Lobby	Neurological, Musculoskeletal, Breast, Blood vessels (MR Angiogram), Cardiac, Prostate and Pediatrics Suitable for scanning bariatric and claustrophobic patients.	Some implants are not suitable for 3T scanning, so patients may need to be scanned on 1.5T depending on contraindicated implants.

Model/Location	Types of Scans & Distinctive Features	Limitations
Philips Ingenia 1.5T (Wide Bore) McClure Lobby	Musculoskeletal, Neurological, Abdominal, Breast, Simple Cardiac cases, Blood vessels (MR Angiogram) Wide bore can accommodate claustrophobic and bariatric patients.	Resolution not high enough for all cases (i.e., certain neuro, breast, prostate, body and some pediatric cases).
Philips Ingenia 1.5T (Wide Bore) Mobile MRI Fanny Allen Campus	Musculoskeletal, Neurological, Abdominal, Breast, Simple Cardiac cases, Blood vessels (MR Angiogram) Suitable for scanning bariatric and claustrophobic patients. Wide bore can accommodate claustrophobic and bariatric patients.	Resolution not high enough for all cases (i.e., certain neuro, breast, prostate, body and pediatric cases).

The Medical Center's Magnetic Resonance Imaging volumes have been growing steadily over the last five to ten years. Indeed, this volume, driven by an aging population and the gradual volume shifts to safer imaging modalities, grew roughly fifteen percent (15%) between fiscal year 2014 and fiscal year 2018.[6] Most recently, in fiscal year 2018, the Medical Center performed 20,800 MRI scans. Volumes for fiscal year 2019 are on track to be at similar levels as fiscal year 2018, as shown in the table below.

[6] Although the Medical Center's volume of MRI procedures increased from fiscal year 2014 to fiscal year 2018, population-based utilization data indicate that the Medical Center's MRI utilization is still lower than state and national averages, as discussed in CON Standard 1.1.

MRI Volumes

Fiscal Year	*Annual Volume*
FY 2014	18,070
FY 2015	18,785
FY 2016	18,971
FY 2017	19,209
FY 2018	20,818
FY 2019	10,009 YTD 20,527 annualized

As was the case for previous years, because of the aging population combined with the safety and wide range of MRI applications, outpatient volume for this modality is expected to increase.[7] In the years to come, MRI growth will, however, be somewhat modest compared to historic rates. National health system consultancy group Sg2 has forecasted a moderate increase of approximately three-percent (3%) in the demand for MRI over the next five (5) years. As it stands, however, the Medical Center's MRI scanners are utilized to their fullest capacity. Because of this, it follows that the replacement of a twenty-one-year-old MRI, which is becoming increasingly prone to downtime and image quality issues, is necessary for the Medical Center to continue providing high quality MRI services at current and forecasted levels.

C. Overview of the GE 1.5T MRI and the Need for its Replacement

The Medical Center's GE 1.5T MRI was installed in 1998 and is fully depreciated. It is primarily used for imaging when the highest resolution images are not necessary (those scans would be performed in the 3.0T MRI). This includes the scanning of multiple anatomical regions and major organ systems, including cardiac, breast, and gastrointestinal imaging. 1.5T imaging has long been the standard in clinical settings as it has the widest clinical application; it is a true workhorse in the field.

Although the current GE 1.5T MRI has served our patients well since its installation, the machine is now at the end of its useful lifespan. The technology available on the current GE 1.5T MRI lacks certain functionality. Moreover, due to the age of the system, it has been experiencing periods of downtime. This required approximately forty (40) service calls during the past year.

[7] The average age of a patient who received an MRI at the Medical Center during FY 2018 is fifty-one (51).

Specifically, benefits of the proposed replacement system, the Philips 1.5T MRI, include the following:

- **Better Image Quality.** The replacement scanner will feature a more uniform image quality with fewer artifacts (that is, features appearing in the image that do not exist in the object that was scanned). As noted, MRI is the preferred imaging method for the clinical evaluation of many disease processes, including brain tumors, Alzheimer's disease, motor neuron disease, dementia, stroke, multiple sclerosis, liver lesions, pancreatic lesions, cartilage or muscle tears, and breast cancer. The Philips 1.5T MRI will improve the image quality for the diagnosis of these diseases and will also provide advanced technological functionality for neurology, oncology, and cardiac software applications used by physicians in making these diagnoses.

  The Philips 1.5T MRI also has improved micro-cooling technology that requires significantly less helium for cooling and allows for hours of high-performance scanning with no impact on image quality, which is highly desirable in a busy hospital radiology department.

- **Improved Patient Experience.**
  - Wide bore. The Philips 1.5T MRI will have a 70 cm "wide bore" aperture, instead of the closed bore on the current 1.5T. A wide bore aperture will lead to numerous clinical benefits, including:
    - Bariatric and claustrophobic patients will now be able to receive their exams on the Philips 1.5T MRI, when clinically indicated. Currently, for this patient population, we must rely on other MRIs, which can cause wait times across the Medical Center's scanners to exceed industry standards for MRI access.
    - The wide bore will enhance patient comfort and fit and reduce patient anxiety for those patients who are uncomfortable in tightly-enclosed spaces. The wide table top available in the wide bore will improve patient comfort and accommodate larger patients. Patients weighing up to 550 lbs. can be comfortably scanned, positioned, and lifted.

- Better in-bore experience. The Philips 1.5T MRI offers an immersive, in-bore experience for headfirst patients through audio and visual distraction. Patients are provided with noise reducing headphones and an entertainment screen. Further, voice guidance can be given through headphones, which helps patients to relax and hold still for the best image quality. This is especially beneficial for pediatric patients. Given the improvements to the MRI experience, we expect a decrease in the need for anesthesia in pediatric patients.
- Shorter breath holds. Certain MRI procedures involving the thoracic or abdominal regions require patients to hold their breaths during imaging. The Philips 1.5T MRI offers reduced acoustic noise for patient comfort. These improvements are especially beneficial for pediatric patients, as they provide a more comfortable scan experience.

D. Overview of Current MRI Space and Need for its Renovation

The McClure Building was initially constructed in 1982, and an addition was constructed in 1987. Room L131 or MRI 2, which currently houses the GE 1.5T MRI, is located in the McClure Lobby Level. Room L131 was originally constructed in 1998 as an addition to the 1987 improvements. Currently, Room L131 is supported by an adjacent MRI tech control room (Room L132) and a non-adjacent, support equipment room (Room L110), which also functions as a breakroom and locker room for staff.

As indicated previously, this Project has two objectives: The first is to replace the outdated GE 1.5T MRI equipment currently housed in Room L131 along with associated room renovations. The second purpose includes:

- Renovation of non-ADA compliant MRI patient bathrooms and changing areas;
- The addition of another MRI patient holding area to accommodate current patient volumes; and
- The conversion of an existing MRI support equipment room (Room L110, which also currently serves as staff break/locker room) into adequate MRI support spaces.

To house the Philips 1.5T MRI and bring the space into compliance with the ADA, significant renovations will be required to the existing McClure MRI rooms. The ADA and the regulations promulgated thereunder set numerous, enforceable standards that places of public accommodation undergoing structural renovations, such as the Medical Center, must meet to make spaces accessible and useable by individuals with disabilities. These regulations are sweeping and affect several elements of the renovation of the MRI patient restrooms and changing rooms. For example, doorway widths and lavatory mirror and sink height requirements are all enumerated in ADA regulations and must be satisfied during the renovation.

Along with the equipment replacement, upgrades to architectural; mechanical heating, ventilation, and air conditioning ("HVAC"); electrical; and plumbing systems will be required

within each room. These upgrades will ensure the equipment MRI rooms have adequate HVAC and meet the current Facility Guidelines Institute's Guidelines for Hospitals and Outpatient Facilities (the "FGI Guidelines").

The following chart outlines the existing and proposed function for each MRI room associated with the Project:

McClure Level L Room Designation	**Existing Room Function**	**Proposed Room Function**
Room L131	MRI main imaging room	*Divide room into two spaces: (1) an upfront MRI main imaging room; and (2) a rear MRI support equipment space*
Room L132	MRI tech control room	*MRI tech control room*
Rooms L107, L120, L121 and L122	Non-ADA compliant, male MRI bathroom and changing space	*ADA compliant, male MRI bathroom and changing space*
Rooms L102, L103, L104 and L105	Non-ADA compliant, female MRI bathroom and changing space	*ADA compliant, female MRI bathroom and changing space*
Room L123	Single MRI patient holding space	*Double MRI patient holding space. A portion of Room L110 will be utilized for this purpose.*
Room L110	MRI support equipment space and staff break / locker room	*Equipment storage alcove; triage room; and staff bathroom, breakroom, and locker room. A portion of the room will be combined with Room L123 to increase patient holding space.*

SECTION III
DESCRIPTION OF PROJECT COMPONENTS

The Project includes the purchase of the Philips 1.5T replacement system and related MRI space renovations, which are more particularly described below:

A. Equipment

To meet its needs for high quality imaging, the Medical Center plans to install a Philips Ingenia Ambition 1.5T X system in its MRI suite located on the lobby level of the McClure building. The costs for the new MRI system, as well as the costs for the furnishings, fixtures and other equipment that will be needed, are included in Table 1 of the CON Financial Tables.

B. Renovations

The facilities renovations for the MRI space will cost approximately $1,151,129, plus an additional $105,760 for architectural and engineering fees. We have also budgeted $21,280 for furnishings and fixtures and other equipment, $3,569 for administrative fees and permits, $57,560 for design and bidding contingency expenses, and $230,220 for construction contingency expenses.

The Project will be completed in six (6) phases. The estimated timeline for completion of Phases 1 through 2 is twelve (12) weeks and then an additional fourteen (14) weeks for Phases 3 through 6, for a total of twenty-six (26) weeks.

A brief summary of the required renovation work is as follows.

Phase 1. Phase 1 of the renovation will include removal of the GE 1.5T MRI in Room L131 and the support equipment in Room L110. Once the equipment is removed from both rooms, renovations will begin in Room L131. Room L131 will be reconfigured to include MRI support equipment in the rear of the room. This reconfiguration will serve to replace the supporting equipment housed in Room L110, which is not connected to Room L131. An uninterrupted power supply will also be installed in Room L130 to support the equipment and protect it from damage that can occur from unexpected power disruptions. Further, the sky light in Room L131 will be removed and infilled. Additionally, the adjoining MRI tech control room, Room L132, will have new equipment installed, but its layout will remain unchanged.

In regard to the construction, first, the existing MRI radio frequency ("RF") copper shielding enclosure within the walls of Room L131 will be removed. During Project planning, the Medical Center engaged Philips and R-Box Testing to conduct independent testing which concluded areas of the existing RF copper shielding enclosure had a high possibility of poor quadrature signals (often referred to as "IQ") due to RF interference, which can cause image artifacts. As a result, it was recommended that a new RF shield enclosure be included in the renovations. Thus, an MRI RF galvanized steel shielding enclosure will be installed in place of the existing RF copper shielding enclosure. Following this, additional upgrades will be performed on the mechanical HVAC, electrical, plumbing, sprinkler systems, conduit, cabling, and duct work. Finally, the improvements will include new architectural finishes such as new flooring, ceiling, walls, and millwork.

Phase 2. This phase includes the installation of the new Philips 1.5T MRI in the reconfigured Room L131. This phase will also include the installation of the Philips support equipment cabinets in the adjoining rear support equipment space and an uninterrupted power supply system in Room L130. Philips has been engaged to install the Philips 1.5T MRI.

Phases 3 and 4. Phases 3 and 4 include the renovation of the MRI male and female bathroom and changing spaces. The proposed reconfiguration will make changes to architectural, mechanical HVAC, electrical, and plumbing systems and meet all current ADA requirements. Phases 3 and 4 will be completed on a staggered schedule to accommodate patient needs during

construction time. Further, a portion of the staff locker room shall be converted to a temporary changing space to accommodate the closure and renovation of the permanent changing spaces.

Phase 5. Phase 5 shall include the conversion of the single MRI patient holding space into two. To complete this phase with adequate space, a portion of Room L110 will be utilized. The proposed MRI patient holding spaces will include new architectural, mechanical HVAC, electrical, plumbing and medical gas system upgrades.

Phase 6. This final phase consists of the renovation and reconfiguration of Room L110. The renovation will include creating an equipment storage alcove, triage room, and staff bathroom, breakroom, and locker room. The renovations will make changes to the architectural, mechanical HVAC, electrical, and plumbing systems.

To maintain existing levels of MRI services during Phases 1- 2, which is when we will be down one MRI scanner, our plan is to extend the hours of operation of the Medical Center's other fixed MRI scanners and add an additional evening shift (approximately 4:30 pm through midnight) to the daily operating schedule of the MRI unit located at the Fanny Allen Campus. Further, through an agreement with the University of Vermont ("UVM"), the UVM academic research MRI will be leased on a per scan basis of $265.00 and utilized after regular business hours, from 4:30 pm through midnight. Based on current MRI utilization, the total cost of the UVM research MRI lease is anticipated to be $119,158. As UVM is willing to accommodate our use of its MRI on a temporary basis, this is an effective way for the Medical Center to continue providing access to MRI services without increasing patient wait times during the first two phases of construction.

Included as attachments to this CON application are the following sets of drawings, which depict the renovation work to occur –

1. Final Drawings, prepared by Philips, depicting the layout and details of the new Philips Ingenia Ambition 1.5T X system; and
2. Schematic-level Drawings, prepared in accordance with GMCB requirements, depicting the proposed renovations and including the layout of the new equipment.

SECTION IV
CONSISTENCY WITH THE HRAP CON STANDARDS

The applicable CON Standards are **bolded** below followed by an explanation as to how the Project is consistent with each standard.

CON STANDARD 1.1: Applicants shall include published GMCB quality measures for services related to a specific application, for the applicant and other hospitals that report on that quality measure. The applicant shall demonstrate how the project will improve or assist in the improvement of the relevant quality measures, if the applicant's score is not above the national or the Vermont average.

There are no quality measures issued by GMCB that are related to MRI. As such, we reviewed national quality measures to ensure MRI utilization at the Medical Center is appropriate. Indeed, quality data from the United States Department of Health and Human Services ("HHS") demonstrates the Medical Center's efforts to prevent over utilization have been successful. For MRI utilization, on an annual basis, HHS tracks data on the percentage of outpatients with lower back pain who had an MRI without first trying more conservative treatment options (e.g., physical therapy). If a high percentage of patients had MRIs before trying more conservative treatments, HHS indicates that the facility may be performing unnecessary MRIs.

According to HHS's medical imaging data for 2016-2017, on average 39.3% of U.S. hospital patients with lower back pain received an MRI before trying more conservative treatments; the average in Vermont for all hospitals was 34.7%; and the average for the Medical Center was 32.4%.[8] Based on the Medical Center's low rates of MRI utilization, we believe the Medical Center's efforts to ensure appropriate utilization, as discussed in further detail in CON Standard 3.5, have been and will continue to be effective.

CON STANDARD 1.6: Applicants seeking to develop a new health care project shall explain how the applicant will collect and monitor data relating to health care quality and outcomes related to the proposed new health care project. To the extent practicable, such data collection and monitoring shall be aligned with related data collection and monitoring efforts, whether within the applicant's organization, other organizations or the government.

The Department of Radiology at the Medical Center implemented a quality assurance and quality improvement program consistent with Joint Commission standard PI 01.01.01, which requires the hospital to collect data to monitor its performance, compile and analyze data, and improve performance on an ongoing basis. The Radiology Quality Committee (the "Committee") meets bi-monthly, and one of its primary purposes is to evaluate and improve the quality of care in the Department of Radiology at the Medical Center. The Committee evaluates and improves patient care and safety by identifying and improving systems or processes that promote quality outcomes and patient safety. The Committee also participates in monitoring activities intended to determine that radiology services rendered were professionally indicated and performed in compliance with applicable standards of care. In addition, for purposes of evaluating and improving the quality of imaging services rendered at the Medical Center, the Committee reviews and acts on quality metric reports. What is more, the Radiology Department, as a whole, collects, examines and reports information and data to investigate and analyze risks, or potential risks, to patient safety and then develops action plans to reduce identified risks.

[8] *See* HHS Hospital Compare Data, Use of Medical Imaging, https://www.medicare.gov/hospitalcompare/profile.html#profTab=5&ID=470003&Distn=1.8&dist=100&loc=05401&lat=44.4776022&lng=-73.2224458 (last visited Mar. 29, 2019).

CON STANDARD 1.8: Applicants seeking to develop a new health care project shall demonstrate, as appropriate, that the applicant has a comprehensive evidence-based system for controlling infectious disease.

The Medical Center is in compliance with Joint Commission requirements on Infection Prevention and Surveillance.

The Medical Center Infection Prevention Team was established in 1984 and, as part of the James M. Jeffords Institute for Quality and Operational Effectiveness, continues to strive to reduce and prevent healthcare-associated infections. A knowledgeable and effective infection prevention team is an important component of a successful infection prevention and control program. The Medical Center has an experienced team with proven success in reducing healthcare-associated infections. The team is led by the hospital epidemiologist and includes members certified in infection prevention. The team's infection prevention activities incorporate the following:

- Collection and analysis of infection data;
- Evaluation of products and procedures;
- Development and review of evidence based policies and procedures;
- Consultation on infection risk assessment, prevention and control strategies including activities related to occupational health, construction, and disaster planning;
- Educational efforts directed at interventions to reduce infection risks;
- Interpretation and implementation of changes mandated by regulatory, accrediting, and licensing agencies;
- Application of epidemiological and quality improvement principles, including activities directed at improving patient outcomes; and
- Participation in related research projects.

CON STANDARD 1.9: Applicants proposing construction projects shall show that costs and methods of the proposed construction are necessary and reasonable. Applicants shall show that the project is cost-effective and that reasonable energy conservation measures have been taken.

The architectural, mechanical HVAC, electrical, and plumbing renovations proposed for this Project are necessary and reasonable to accommodate the installation of the new replacement Philips 1.5T MRI system and redevelopment of inadequate support spaces.

The Medical Center believes that a renovation to existing spaces yields the most cost-effective and reasonable construction option available and is a better alternative than construction of completely new spaces.

Energy conservation measures are discussed in response to CON Standard 1.10, below.

CON STANDARD 1.10: Applicants proposing new health care projects requiring construction shall show such projects are energy efficient. As appropriate, applicants shall show that Efficiency Vermont, or an organization with similar expertise, has been consulted on the proposal.

The Medical Center will work with the Burlington Electric Department during early design to ensure that only the most energy efficient design, systems and products are selected for the Project.[9] The Medical Center anticipates using energy efficient LED lighting to meet general and clinical imaging illumination requirements. The proposed mechanical HVAC equipment will use the best available technology to reduce energy consumption while ensuring a comfortable environment for patients. Additionally, the mechanical HVAC equipment will be commissioned in accordance with requirements from the FGI Guidelines and the standards set forth by the American Association of Healthcare Engineers.

CON STANDARD 1.12: New construction health care projects shall comply with the Guidelines for Design and Construction of Health Care Facilities as issued by the Facility Guidelines Institute (FGI), 2010 edition.

At the outset, we should note that entities that are accredited by the Joint Commission, such as the Medical Center, are required to follow current FGI Guidelines as part of the Joint Commission accreditation process. To accomplish this, necessary modifications will be made to the existing architectural, mechanical HVAC, electrical, and plumbing systems to support the new equipment and reconfigured spaces. Exhibit 1, attached hereto, contains a detailed table showing each relevant FGI Guideline and a description of how the Project will be consistent the guidelines.

CON STANDARD 3.4: Applicants subject to budget review shall demonstrate that a proposed project has been included in hospital budget submissions or explain why inclusion was not feasible.

The cost for this Project was included in the Medical Center's approved capital budget, which was previously submitted to the GMCB. The fiscal year 2019 submission indicated $5.1 million in MRI capital investments would be made during fiscal years 2019 and 2020. This capital, in part, will be used to fund this Project.

CON STANDARD 3.5: Magnetic resonance imaging (MRI) capacity shall not be increased until current capacity is in excess of valid state, regional and/or national benchmarks for medically necessary exams per year and sufficient additional need is demonstrated based on such benchmarks. An applicant proposing a project involving MRI shall provide information on current use, document the effectiveness of the internal program utilized by

[9] Efficiency Vermont does not provide consultative services to Burlington area businesses. Instead, the Burlington Electric Department provides these services.

the applicant to prevent overuse, and verify that the applicant does not have financial incentives in place to encourage MRI utilization.

Project will not increase capacity. This Project simply seeks the replacement of a fully-depreciated, twenty-one-year-old MRI system that has reached the end of its useful life. The replacement of the Medical Center's current 1.5T will not increase capacity but will allow us to *maintain* existing capacity.

MRI protocols protect against overutilization. The Medical Center defines quality of care as the right patient care at the right time and has put into place several safeguards to prevent overutilization. To meet this commitment in the area of MRI, the Medical Center has established the following protocols.

- **All MRI referrals are screened under a radiologist's guidance.** Based on the individual's medical history, including signs and symptoms, orders are reviewed to ensure that MRI is an appropriate procedure for the patient. If, for example, a CT scan would be more appropriate, the radiologist would contact the referring physician to discuss the case and the reasons why CT could be more appropriate care. Once a radiologist determines that MRI is indeed the appropriate test for the patient, the protocol is tailored to meet the specific patient's needs. The MRI scanner used depends upon the protocol that is prescribed, as there are different software options and tesla strengths on each scanner that accommodate different clinical protocols.

- **Insurance pre-authorization for MRIs.** Before any outpatients are scheduled for MRI exams, the Medical Center must obtain pre-authorization from their insurance companies, which serves as a final "check" to ensure that the payors agree with physicians that MRI is a medically necessary service.

- **Adherence to evidence-based guidelines.** The Medical Center physicians utilize evidence-based guidelines in their clinical decision-making and quality assurance review to reduce the risk of repetitive testing and to determine which patients are suitable candidates for MRI. The applicable evidence-based guidelines for MRI are the American College of Radiology's Appropriateness Criteria.

No financial incentives are in place. The Medical Center hereby verifies that it has no financial incentives in place to encourage MRI utilization.

CON STANDARD 3.7: Applicants proposing to replace diagnostic or therapeutic equipment shall demonstrate that existing equipment is fully depreciated, or the cost of the early replacement, including the cost of the remaining depreciation on existing equipment, is less costly than keeping the existing equipment.

The current GE 1.5T MRI was installed in 1998 and is fully depreciated.

CON STANDARD 3.19: An applicant seeking to purchase a piece of diagnostic or therapeutic equipment shall include an analysis of whether other health care system costs

may be reduced through more effective interventions through the use of the equipment. As appropriate, hospitals shall provide scientific evidence supporting the migration of such equipment and technology outside of tertiary care facilities.

As a tertiary hospital serving approximately one million people, the use of diagnostic imaging equipment, such as the Philips 1.5T MRI, is essential in the delivery of high quality patient care to our region. Health care savings within The University of Vermont Health Network or other health care settings would not be driven directly by this equipment replacement which is necessary due to its age. The utilization of an MRI system with improved imaging quality can, however, translate into earlier detection, especially for oncology and neurology patients and, therefore, cost savings over the total patient care time are possible. Moreover, technological improvements in the Philips 1.5T MRI allow for shorter breath hold times, which in turn prevent expensive re-imaging due to patient movement, thus, reducing overall healthcare system costs.

CON STANDARD 3.20: Applications to purchase diagnostic or therapeutic equipment, or to expand facilities to accommodate major medical equipment purchases, shall address the appropriateness of such distribution as compared to population, the availability of appropriately trained personnel, an evaluation of patient need versus convenience, urgent versus non-urgent use, and appropriate protocol to reduce the risk of repetitive testing (both within the facility purchasing the equipment and within the health care system).

This Project is a necessary replacement of the fully depreciated equipment that is being utilized for thousands of procedures every year. The current, well-established standards of patient care and patient selection will not change as a result of this Project and will be followed in the future.

Safeguard procedures have long been in place to prevent unnecessary or duplicative testing and the Medical Center will continue to follow these procedures, which include:

- Duplicative order checks by review of the electronic medical record;
- Utilization of decision support tools within the medical record which assist ordering providers in choosing the right imaging modality;
- Radiologist review to confirm MRI is the best imaging modality for the patient; and
- Obtaining insurance pre-authorization to ensure payors agree with physicians that MRI is a necessary service for an individual patient.

CON STANDARD 3.24: An applicant shall disclose potential financial conflicts of interest between hospitals and physicians and an equipment purchase.

There are no potential financial conflicts of interests between the Medical Center and its physicians related to or created by the Project. As such, CON Standard 3.24 is not applicable to the proposal.

SECTION V
CONSISTENCY WITH 18 V.S.A. § 9437

This Application demonstrates, and the GMCB should find, that the Project complies and is fully consistent with the statutory criteria set forth in 18 V.S.A. § 9437

The statutory language contained in Section 9437 is **bolded** below followed by the Medical Center's explanation of how the Project is consistent with each requirement.

1. The Application is consistent with the HRAP.

As indicated in Section IV, the Project is consistent with each of the HRAP CON standards and all other applicable provisions of the HRAP.

2. The cost of the project is reasonable, because:

A. the applicant's financial condition will sustain any financial burden likely to result from completion of the project;

The Project will not create a financial burden for the Medical Center. The costs of the Project will be paid from available working capital without incurring additional debt. The only incremental cost of the Project is depreciation. Table 3C of the CON Tables shows that in fiscal year 2019, the first full year of operation of the proposed Project, the Medical Center will continue to generate a positive operating margin.

B. the project will not result in an undue increase in the costs of medical care. In making findings under this subdivision, the commissioner shall consider and weigh relevant factors, including:

i. the financial implications of the project on hospitals and other clinical settings, including the impact on their services, expenditures, and charges;

ii. whether the impact on services, expenditures, and charges is outweighed by the benefit of the project to the public; and

The Project involves routine equipment replacement and will not result in *any* increase in the costs of medical care. The Medical Center will not raise its charges for MRI procedures as a result of the Project.

C. less expensive alternatives do not exist, would be unsatisfactory, or are not feasible or appropriate;

Reasonable alternatives to replacing the MRI equipment are not appropriate or feasible. The only alternative to replacing the MRI equipment now would be to delay replacement for a later date. This has the potential to adversely affect our patients as the current GE 1.5T MRI continues to age, negatively affecting its service up-time and image quality, and does not allow us to realize certain clinical benefits, as discussed in detail above. The equipment in the Medical Center's MRI suite must be kept up-to-date and must be fully functional. As a result, there are no other

viable alternatives than to replace the current GE 1.5T MRI, as it has reached the end of its useful life.

3. There is an identifiable, existing, or reasonably anticipated need for the proposed project which is appropriate for the applicant to provide;

The need for this Project is demonstrated throughout this Application, and is specifically addressed in Sections I(B), II(C) and II(D), which are incorporated herein by reference.

4. The project will improve the quality of health care in the state or provide greater access to health care for Vermont's residents, or both;

The Project will enable the Medical Center to maintain the existing high quality of its Radiology services and implement technology and accessibility enhancements to the MRI suite and equipment that will improve the quality of patient care, as explained throughout this Application, particularly in Sections I(B) and II, which are incorporated herein by reference.

Approval of this application is necessary to maintain the Medical Center's high quality of care.

5. The project will not have an undue adverse impact on any other existing services provided by the applicant;

The Project will not have a material impact on any other existing services offered by the Medical Center. All existing services will continue to be provided by the Medical Center as discussed above.

6. The project will serve the public good;

The Project will serve the public good in numerous ways, as stated throughout the application.

8. If the application is for the purchase or lease of new health care information technology, it conforms to the health information technology plan established under section 9351 of this title.

The application does not involve the purchase of health care information technology.

CONCLUSION

Based upon the information contained in this Application, the Medical Center respectfully asks that the Application be APPROVED expeditiously and that a CON for the Project be issued.

Dated at Burlington, Vermont this 1st day of May, 2019

THE UNIVERSITY VERMONT MEDICAL CENTER INC.

By: _____
Steven J. Klein
Director of Legal Affairs &
Assistant General Counsel

By: _____
Amanda S. Angell
Assistant General Counsel

INDEX OF EXHIBITS

Exhibit 1

CON Standard 1.12
Compliance with 2014 FGI Guidelines for Design and Construction of Health Care Facilities
Sections 2.2-3.4 Imaging Services

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
2.2-3.4.1.1	Imaging Services General Application	Space and equipment shall be provided to accommodate the planned imaging services. (1) If interventional or image-guided procedures are performed in the imaging services area, additional provisions for infection prevention, materials and supply distribution, and safety shall be as described in Section 2.2.-3.5 (Interventional Imaging). (2) If nuclear medicine is provided in the imaging services area, spaces used shall also comply with requirements described in Section 2.2-3.6 (Nuclear Medicine).	This guideline is not applicable to this project.
2.2-3.4.1.2	Imaging Services General Location	Beds and stretchers shall have ready access to and from other departments of the institution.	The patient support / transport services department within the hospital provides beds and stretchers ready access to and from other departments of the institution.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
2.2-3.4.1.3	Imaging Services General Radiation protection	Some imaging services require radiation protection. A certified radiation physicist or equally qualified expert representing the owner or appropriate state agency shall specify the type, location, and amount of radiation protection to be installed in accordance with the final approved department layout and equipment selections. (1) Shielded control alcove or room (a) Each examination/procedure room containing non-portable radiation-emitting imaging equipment shall include a fixed shielded control alcove or room to minimize radiation exposure of technologists and others. Movable imaging equipment affixed to rails, tracks, or booms shall not be considered portable. (b) This alcove or room shall include a shielded view window designed to provide a full view of the examination/procedure table and the patient at all times, including a full view of the	Per the proposed layout, a MRI tech control room exists adjacent / outside of the main imaging room and will remain. The control room location meets the Gauss requirements for safe staff use and has a RF shielded view window designed to provide a full view of the imaging table and the patient at all times. No magnetic shielding is necessary or included at this time.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		patient when the table is tilted or the chest x-ray is in use. (2) Radiation protection requirements shall be incorporated into the specifications and the building plans.	
2.2-3.4.1.4	Imaging Services General Special design elements	(1) Floor (a) Floor structure shall meet the imaging equipment manufacturer's load requirements. (b) Floor finishes shall be selected to conform to imaging equipment technical requirements (e.g., electrostatic dissipation), infection control requirements, and service limitations (e.g., no powered floor cleaners in an MRI scanner room). (2) Ceiling (a) Where general diagnostic procedures are performed, use of a lay-in type ceiling shall be permitted. (b) Where invasive procedures are performed, ceiling assemblies shall provide infection control equal to that required for	Static dissipative flooring is being proposed for this project. This is not classified as a procedure room so the ceiling and door openings guidelines are not applicable to this project.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		interventional radiology rooms. (3) Door openings. Procedure rooms shall have entrance door openings that comply with Section 2.1-7.2.2.3 (Doors and door hardware).	
2.2-3.4.4.1	Imaging Services Magnetic Resonance Imaging (MRI) Facilities General	The MRI suite and scanner rooms shall be sized and configured in compliance with the manufacturer's technical specifications.	The proposed layout of the MRI imaging and equipment support rooms were developed by Philips Healthcare to be sized and configured in compliance with their own manufacturer's technical specifications.
2.2-3.4.4.2	Imaging Services Magnetic Resonance Imaging (MRI) Facilities MRI scanner room space requirements	(1) The MRI scanner room shall be large enough to accommodate the clearances in the manufacturer's technical specifications. (2) The MRI scanner room shall have a minimum clearance of 4 feet (122 centimeters) on all sides of the gantry assembly or table. The door swing shall not encroach on these minimum clearances.	The proposed layout of the MRI scanner / imaging room was developed by Philips Healthcare to be large enough to accommodate the clearances with their own manufacturer's technical specifications. The proposed layout of the MRI scanner / imaging room meets the minimum clearance of 4-feet on all sides of the gantry assembly and table. Additionally, the proposed door layout does not encroach on this minimum clearance requirement.
2.2-3.4.4.3	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Planning the configuration of the MRI suite	(1) Suites for MRI equipment shall be planned to conform to the four-zone screening and access control protocols identified in the current edition of the American College of Radiology's "Guidance Document for Safe MR Practices."	All of these guidelines are met in the existing MRI Department / room layout and will be maintained.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		(2) MRI suites as well as spaces around, above, and below (as applicable) shall be designed and configured to facilitate adherence to U.S. Food and Drug Administration requirements established to prevent unscreened individuals from entering the 5-gauss (0.5 millitesla) volume around the MRI equipment and to minimize electromagnetic or radiofrequency interference to, or from, other equipment. (3) The layout shall include provisions for the following functions: (a) Patient interviews and clinical screening (b) Physical screening (c) Ferromagnetic detection and warning systems (d) Access control (e) Accommodation of site-specific clinical and operational requirements such as image-guided procedures, emergent imaging, or general anesthesia support	

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		(f) Containment of non-MRI-safe objects outside restricted MRI safety zones (g) Storage (patient lockers) for patient belongings and non-MRI-safe items (4) A control vestibule visible from the control room shall be located outside the MRI scanner room so that patients, health care personnel, and other employees must pass through it before entering the scanning area and control room. This room shall be outside the restricted areas of the MRI's magnetic field; see Section 2.2-3.4.4.3 (5). (5) Any area in which the magnetic field strength is equal to or greater than 5 gauss (0.5 millitesla) shall be physically restricted by the use of key locks or pass-key locking systems.	
2.2-3.4.4.4	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Superconducting MRI	Cryogen venting, emergency exhaust, and passive pressure relief systems shall be provided in accordance with the equipment manufacturer's technical specifications.	The Helium Exhaust Pipe is not required with this new MRI System. All other / any venting, exhaust and relief systems have been provided in accordance with Philips Healthcare's technical specifications as necessary.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
2.2-3.4.4.5	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Hand-washing station	Hand-washing stations shall be provided that are directly accessible to the MRI scanner room.	A hand-washing sink currently exists in the MRI scanner / imaging room and will be maintained. Additional hand-washing sinks exist within the vicinity of the MRI scanner / imaging room and will also be maintained.
2.2-3.4.4.6	Imaging Services Magnetic Resonance Imaging (MRI) Facilities MRI control room	(1) A control room shall be provided with a full view of the patient and all activity in the MRI room. (a) The operator's console shall be positioned so the operator has a full view of the approach and entrance to the MRI scanner room. (b) Where there is an outward-swinging door, in the open position the door shall not obstruct the view of the entry opening from the operator's console. (2) Control rooms shall be permitted to serve more than one MRI scanner room. (3) Space for emergency patient stabilization or resuscitation shall be provided near the control room but outside the 5-gauss line.	All of these MRI tech control room guidelines are met in the existing MRI tech control room layout and will be maintained.
2.2-3.4.4.7	Imaging Services Magnetic Resonance Imaging (MRI) Facilities	This area or room shall comply with the requirements in Section 2.2-3.5.3	The MRI Department does contain Patient Holding spaces that do meet the FGI guidelines for Patient Holding. However, this

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
	Pre-procedure patient care area room	(Interventional Imaging-Pre-Procedure and Recovery Patient Care Areas).	specific guideline is not applicable to this project because this is not classified as a procedure room.
2.2-3.4.4.8	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Computer room	(1) At least one computer room shall be provided. (2) Computer rooms shall be permitted to serve more than one MRI scanner.	The MRI tech control room also serves as a computer room as it has additional computers for staff.
2.2-3.4.4.9	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Equipment installation requirements	(1) Power conditioning and/or uninterruptable power supplies shall be provided as indicated by the MRI manufacturer's power requirements and specific facility conditions. (2) Magnetic shielding shall be provided at those sites where magnetic field hazards or interferences are not adequately controlled through facility planning (i.e., by physical distance).	Power conditioning and an uninterruptable power supply is proposed as part of Philips Healthcare's equipment package. Additionally, no magnetic shielding is proposed or needed for this project as magnetic field hazards or interferences are adequately controlled through physical distance.
2.2-3.4.4.10	Imaging Services Magnetic Resonance Imaging (MRI) Facilities Special design elements for the MRI scanner room	(1) General (a) Ferromagnetic materials that may become detached or otherwise interfere with the operation of the MRI scanner shall not be used in MRI scanner rooms.	All of these special design elements for the MRI scanner / imaging room guidelines are met in the existing MRI scanner / imaging room and will be maintained.

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		(b) The MRI scanner room shall be located and/or shielded to avoid radiofrequency interference from elevators or other mechanical-electrical equipment. (2) Architectural details (a) The floor structure shall be designed to support the weight of MRI scanner equipment, minimize disturbance to the MRI magnetic field, and mitigate disruptive environmental vibrations. (b) Entry doors to MRI scanner rooms shall swing outward from inside the room or provide alternative means of assuring proper door function in the event of a quench. (c) MRI rooms shall be marked with a lighted sign with a red light to indicate that the magnet is always on. (d) Acoustic control shall be provided to mitigate the ambient noise emitted by the MRI scanner. For requirements, see Table 1.2-6	

FGI Guideline Section Number	*FGI Guideline Section Title*	*FGI Requirement*	*How Addressed by the Proposed Project*
		(Design Criteria for Minimum Sound Isolation Performance Between Enclosed Rooms).	

Exhibit 2

PLEASE PROVIDE ASSUMPTIONS

The University of Vermont Medical Center

MRI Room 2 Replacement

	Yr 1	Yr 2	Yr 3
Table 1			
Project's capital cost is $2.86M; capital for this project is reserved in the FY19 capital budget			
Table 2			
Funding Sources - Our current plan is that this would be funded through working capital. However, upon approval of the project, if more favorable financing options were presented to us that would not increase the overall cost of the project, we may decide to pursue such an option.			
INCOME STATEMENT (Table 3)			
There is no new revenue as a result of this project.	-	-	-
Other Operating Expenses include:			
• Year 1 - Use of UVM Research MRI scanner during 12 week construction period.	119,158	-	-
• Year 1 - elimination of original equipment service contract/1st year of new contract is $0 "warranty period"	(141,600)		
• Year 2 and 3 - reduction in equipment service contract	-	(13,968)	(13,968)
• Note: No training cost as training is covered under the contract and will be performed during normal operating hours.			
Depreciation in years 1-3 over a 5 year schedule	262,618	262,618	262,618
BALANCE SHEET (Table 4)			
Capital for this project is reserved in the FY19 capital budget.			
CASH FLOW			
REVENUE SOURCE-PAYER (Table 6)			
There is no new revenue as a result of this project.			
UTILIZATION (Table 7)			
No new procedures or volume growth are projected, other than what has already been budgeted, since this is simply an equipment replacement project.			
STAFFING (Table 8)			
There are no additional FTE's or increased employee hours needed for this replacement.			
STATISTICS			

NOTE: When completing this table make entries in the shaded fields only.

The University of Vermont Medical Center
MRI Room 2 Replacement
TABLE 1
PROJECT COSTS

Construction Costs		
1. New Construction		
2. Renovation		$1,151,129
3. Site Work		
4. Fixed Equipment		1,288,994
5. Design/Bidding Contingency		$57,560
6. Construction Contingency		$230,220
7. Construction Manager Fee		
8. Other (please specify)		-
Subtotal	$	2,727,903
Related Project Costs		
1. Major Moveable Equipment		
2. Furnishings, Fixtures & Other Equip.		$21,280
3. Architectural/Engineering Fees		$105,760
4. Land Acquisition		
5. Purchase of Buildings		
6. Administrative Expenses & Permits		$3,569
7. Debt Financing Expenses (see below)		-
8. Debt Service Reserve Fund		-
9. Working Capital		-
10. Other (please specify)		-
		-
		-
Subtotal	$	130,609
Total Project Costs	**$**	**2,858,512**

Debt Financing Expenses		
1. Capital Interest	$	-
2. Bond Discount or Placement Fee		-
3. Misc. Financing Fees & Exp. (issuance costs)		-
4. Other		-
Subtotal	$	-
Less Interest Earnings on Funds		
1. Debt Service Reserve Funds	$	-
2. Capitalized Interest Account		-
3. Construction Fund		-
4. Other		-
Subtotal	$	-
Total Debt Financing Expenses	**$**	**-**
feeds to line 7 above		

NOTE: When completing this table make entries in the shaded fields only.

The University of Vermont Medical Center

MRI Room 2 Replacement

TABLE 2

DEBT FINANCING ARRANGEMENT, SOURCES & USES OF FUNDS

Sources of Funds

1. Financing Instrument	Bond			
a. Interest Rate	0.0%			
b. Loan Period		To:		
c. Amount Financed			$	-
2. Equity Contribution				-
3. Other Sources				
a. Working Capital				2,858,512
b. Fundraising				-
c. Grants				-
d. Other				-
Total Required Funds			**$**	**2,858,512**

Uses of Funds

Project Costs (feeds from Table 1)		
1. New Construction	$	-
2. Renovation		1,151,129
3. Site Work		-
4. Fixed Equipment		1,288,994
5. Design/Bidding Contingency		57,560
6. Construction Contingency		230,220
7. Construction Manager Fee		-
8. Major Moveable Equipment		-
9. Furnishings, Fixtures & Other Equip.		21,280
10. Architectural/Engineering Fees		105,760
11. Land Acquisition		-
12. Purchase of Buildings		-
13. Administrative Expenses & Permits		3,569
14. Debt Financing Expenses		-
15. Debt Service Reserve Fund		-
16. Working Capital		-
17. Other (please specify)		-
Total Uses of Funds	**$**	**2,858,512**

Total sources should equal total uses of funds.

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

INCOME STATEMENT

Table 3A

WITHOUT PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Yr 1 2019	Proposed Yr 2 2020	Proposed Yr 3 2021
REVENUES						
INPATIENT CARE REVENUE	776,281,792	825,621,016	866,403,293	866,403,293	866,403,293	866,403,293
OUTPATIENT CARE REVENUE	1,147,602,729	1,226,011,556	1,252,177,067	1,252,177,067	1,252,177,067	1,252,177,067
OUTPATIENT CARE REVENUE - PHYSICIAN	697,080,498	621,170,124	635,922,416	635,922,416	635,922,416	635,922,416
CHRONIC/SNF PT CARE REVENUE	27,181,176	31,096,264	31,222,039	31,222,039	31,222,039	31,222,039
SWING BEDS PT CARE REVENUE	-	-	-			
GROSS PATIENT CARE REVENUE	2,648,146,194	2,703,898,960	2,785,724,813	2,785,724,813	2,785,724,813	2,785,724,813
DISPROPORTIONATE SHARE PAYMENTS	17,474,390	13,016,392	10,592,241	10,592,241	10,592,241	10,592,241
BAD DEBT FREE CARE	(42,292,297)	(47,705,376)	(48,965,750)	(48,965,750)	(48,965,750)	(48,965,750)
DEDUCTIONS FROM REVENUE	(1,430,720,235)	(1,533,660,475)	(1,666,738,531)	(1,666,738,531)	(1,666,738,531)	(1,666,738,531)
NET PATIENT CARE REVENUE	1,192,608,052	1,135,549,501	1,080,612,774	1,080,612,774	1,080,612,774	1,080,612,774
FIXED PROSPECTIVE PAYMENTS AND RESERVES	18,510,923	118,487,009	192,847,272	192,847,272	192,847,272	192,847,272
NET PATIENT CARE REV & FIXED PAYMENTS & RESERVES	1,211,118,975	1,254,036,509	1,273,460,046	1,273,460,046	1,273,460,046	1,273,460,046
OTHER OPERATING REVENUE	102,701,941	109,480,250	105,693,036	105,693,036	105,693,036	105,693,036
TOTAL OPERATING REVENUE	1,313,820,916	1,363,516,759	1,379,153,082	1,379,153,082	1,379,153,082	1,379,153,082
OPERATING EXPENSE						
SALARIES NON MD	419,350,487	428,584,103	441,769,904	441,769,904	441,769,904	441,769,904
FRINGE BENEFITS NON MD	132,006,117	119,584,248	125,471,878	125,471,878	125,471,878	125,471,878
FRINGE BENEFITS MD	27,010,679	29,740,096	31,449,290	31,449,290	31,449,290	31,449,290
PHYSICIAN FEES SALARIES CONTRACTS & FRINGES	155,179,685	179,329,483	172,174,147	172,174,147	172,174,147	172,174,147
HEALTH CARE PROVIDER TAX	66,889,902	69,819,963	72,734,280	72,734,280	72,734,280	72,734,280
DEPRECIATION AMORTIZATION	48,073,712	48,958,761	52,791,794	52,791,794	52,791,794	52,791,794
INTEREST - LONG/SHORT TERM	14,003,164	13,668,325	16,796,030	16,796,030	16,796,030	16,796,030
OTHER OPERATING EXPENSE	382,726,377	427,704,337	426,721,734	426,721,734	426,721,734	426,721,734
TOTAL OPERATING EXPENSE	1,245,240,122	1,317,389,315	1,339,909,058	1,339,909,058	1,339,909,058	1,339,909,058
NET OPERATING INCOME (LOSS)	68,580,794	46,127,444	39,244,024	39,244,024	39,244,024	39,244,024
NON-OPERATING REVENUE	21,191,258	25,154,357	32,931,772	32,931,772	32,931,772	32,931,772
EXCESS (DEFICIT) OF REVENUE OVER EXPENSE	89,772,052	71,281,801	72,175,796	72,175,796	72,175,796	72,175,796
Operating Margin %	5.2%	3.4%	2.8%	2.8%	2.8%	2.8%
Bad Debt & Free Care%	1.6%	1.8%	1.8%	1.8%	1.8%	1.8%
Compensation Ratio	58.9%	57.5%	57.5%	57.5%	57.5%	57.5%
Capital Cost % of Total Expenses	5.0%	4.8%	5.2%	5.2%	5.2%	5.2%

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

INCOME STATEMENT

Table 3B

PROJECT ONLY

	2017	2018	2019	Proposed Yr 2	Proposed Yr 2	Proposed Yr 3
	Actual	**Actuals**	**Budget**	**2019**	**2020**	**2021**
REVENUES						
INPATIENT CARE REVENUE						
OUTPATIENT CARE REVENUE						
OUTPATIENT CARE REVENUE - PHYSICIAN						
CHRONIC/SNF PT CARE REVENUE						
SWING BEDS PT CARE REVENUE						
GROSS PATIENT CARE REVENUE	-	-	-	-	-	-
DISPROPORTIONATE SHARE PAYMENTS						
BAD DEBT FREE CARE						
DEDUCTIONS FROM REVENUE						
NET PATIENT CARE REVENUE	-	-	-	-	-	-
FIXED PROSPECTIVE PAYMENTS AND RESERVES						
NET PATIENT CARE REV & FIXED PAYMENTS & RESERVES						
OTHER OPERATING REVENUE						
TOTAL OPERATING REVENUE	-	-	-	-	-	-
OPERATING EXPENSE						
SALARIES NON MD						
FRINGE BENEFITS NON MD						
FRINGE BENEFITS MD						
PHYSICIAN FEES SALARIES CONTRACTS & FRINGES						
HEALTH CARE PROVIDER TAX						
DEPRECIATION AMORTIZATION				262,618	262,618	262,618
INTEREST - LONG/SHORT TERM						
OTHER OPERATING EXPENSE				(22,442)	(13,968)	(13,968)
TOTAL OPERATING EXPENSE	-	-	-	240,176	248,650	248,650
NET OPERATING INCOME (LOSS)	-	-	-	(240,176)	(248,650)	(248,650)
NON-OPERATING REVENUE						
EXCESS (DEFICIT) OF REVENUE OVER EXPENSE	-	-	-	(240,176)	(248,650)	(248,650)

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

Note: This table requires no "fill-in" as it is populated automatically

INCOME STATEMENT

Table 3C

WITH PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Yr 2 2019	Proposed Yr 2 2020	Proposed Yr 3 2021
REVENUES						
INPATIENT CARE REVENUE	776,281,792	825,621,016	866,403,293	866,403,293	866,403,293	866,403,293
OUTPATIENT CARE REVENUE	1,147,602,729	1,226,011,556	1,252,177,067	1,252,177,067	1,252,177,067	1,252,177,067
OUTPATIENT CARE REVENUE - PHYSICIAN	697,080,498	621,170,124	635,922,416	635,922,416	635,922,416	635,922,416
CHRONIC/SNF PT CARE REVENUE	27,181,176	31,096,264	31,222,039	31,222,039	31,222,039	31,222,039
SWING BEDS PT CARE REVENUE	-	-	-	-	-	-
GROSS PATIENT CARE REVENUE	2,648,146,194	2,703,898,960	2,785,724,813	2,785,724,813	2,785,724,813	2,785,724,813
DISPROPORTIONATE SHARE PAYMENTS	17,474,390	13,016,392	10,592,241	10,592,241	10,592,241	10,592,241
BAD DEBT FREE CARE	(42,292,297)	(47,705,376)	(48,965,750)	(48,965,750)	(48,965,750)	(48,965,750)
DEDUCTIONS FROM REVENUE	(1,430,720,235)	(1,533,660,475)	(1,666,738,531)	(1,666,738,531)	(1,666,738,531)	(1,666,738,531)
NET PATIENT CARE REVENUE	1,192,608,052	1,135,549,501	1,080,612,774	1,080,612,774	1,080,612,774	1,080,612,774
FIXED PROSPECTIVE PAYMENTS AND RESERVES	18,510,923	118,487,009	192,847,272	192,847,272	192,847,272	192,847,272
NET PATIENT CARE REV & FIXED PAYMENTS & RESERVES	1,211,118,975	1,254,036,509	1,273,460,046	1,273,460,046	1,273,460,046	1,273,460,046
OTHER OPERATING REVENUE	102,701,941	109,480,250	105,693,036	105,693,036	105,693,036	105,693,036
TOTAL OPERATING REVENUE	1,313,820,916	1,363,516,759	1,379,153,082	1,379,153,082	1,379,153,082	1,379,153,082
OPERATING EXPENSE						
SALARIES NON MD	419,350,487	428,584,103	441,769,904	441,769,904	441,769,904	441,769,904
FRINGE BENEFITS NON MD	132,006,117	119,584,248	125,471,878	125,471,878	125,471,878	125,471,878
FRINGE BENEFITS MD	27,010,679	29,740,096	31,449,290	31,449,290	31,449,290	31,449,290
PHYSICIAN FEES SALARIES CONTRACTS & FRINGES	155,179,685	179,329,483	172,174,147	172,174,147	172,174,147	172,174,147
HEALTH CARE PROVIDER TAX	66,889,902	69,819,963	72,734,280	72,734,280	72,734,280	72,734,280
DEPRECIATION AMORTIZATION	48,073,712	48,958,761	52,791,794	53,054,412	53,054,412	53,054,412
INTEREST - LONG/SHORT TERM	14,003,164	13,668,325	16,796,030	16,796,030	16,796,030	16,796,030
OTHER OPERATING EXPENSE	382,726,377	427,704,337	426,721,734	426,699,292	426,707,766	426,707,766
TOTAL OPERATING EXPENSE	1,245,240,122	1,317,389,315	1,339,909,058	1,340,149,234	1,340,157,708	1,340,157,708
NET OPERATING INCOME (LOSS)	68,580,794	46,127,444	39,244,024	39,003,848	38,995,374	38,995,374
NON-OPERATING REVENUE	21,191,258	25,154,357	32,931,772	32,931,772	32,931,772	32,931,772
EXCESS (DEFICIT) OF REVENUE OVER EXPENSE	89,772,052	71,281,801	72,175,796	71,935,620	71,927,146	71,927,146
Operating Margin %	5.2%	3.4%	2.8%	2.8%	2.8%	2.8%
Bad Debt & Free Care%	1.6%	1.8%	1.8%	1.8%	1.8%	1.8%
Compensation Ratio	58.9%	57.5%	57.5%	57.5%	57.5%	57.5%
Capital Cost % of Total Expenses	5.0%	4.8%	5.2%	5.2%	5.2%	5.2%

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

Balance Sheet

WITHOUT PROJECT

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
ASSETS						
CURRENT ASSETS						
CASH & INVESTMENTS	150,422,000	144,114,453	173,729,640	173,729,640		
PATIENT ACCOUNTS RECEIVABLE, GROSS	175,607,000	174,372,916	177,501,874	177,501,874		
LESS: ALLOWANCE FOR UNCOLLECTIBLE ACCTS	(28,266,000)	(31,266,914)	(35,283,363)	(35,283,363)		
DUE FROM THIRD PARTIES	8,366,000	35,561,930	28,167,133	28,167,133		
OTHER CURRENT ASSETS	109,575,000	72,776,310	70,705,259	70,705,259		
TOTAL CURRENT ASSETS	415,704,000	395,558,695	414,820,543	414,820,543	-	-
BOARD DESIGNATED ASSETS						
FUNDED DEPRECIATION	535,974,000	556,641,589	504,582,109	504,582,109		
ESCROWED BOND FUNDS	4,902,000	69,388,853	67,351,583	67,351,583		
OTHER	64,306,000	-	-			
TOTAL BOARD DESIGNATED ASSETS	605,182,000	626,030,442	571,933,692	571,933,692	-	-
PROPERTY, PLANT, AND EQUIPMENT						
LAND, BUILDINGS & IMPROVEMENTS	685,331,000	728,237,403	850,078,592	850,078,592		
CONSTRUCTION IN PROGRESS	72,329,000	149,143,354	31,809,512	31,809,512		
MAJOR MOVABLE EQUIPMENT	357,300,000	373,857,799	472,060,562	472,060,562		
FIXED EQUIPMENT	-	-	-			
TOTAL PROPERTY, PLANT AND EQUIPMENT	1,114,960,000	1,251,238,556	1,353,948,666	1,353,948,666	-	-
LESS: ACCUMULATED DEPRECIATION						
LAND, BUILDINGS & IMPROVEMENTS	(337,973,000)	(361,534,334)	(391,137,809)	(391,137,809)		
EQUIPMENT - FIXED	-	-	-	-		
EQUIPMENT - MAJOR MOVEABLE	(281,136,000)	(305,752,405)	(328,459,974)	(328,459,974)		
TOTAL ACCUMULATED DEPRECIATION	(619,109,000)	(667,286,739)	(719,597,783)	(719,597,783)	-	-
TOTAL PROPERTY, PLANT AND EQUIPMENT, NET	495,851,000	583,951,817	634,350,883	634,350,883	-	-
OTHER LONG-TERM ASSETS	63,743,000	70,184,983	69,283,898	69,283,898		
TOTAL ASSETS	**1,580,480,000**	**1,675,725,937**	**1,690,389,016**	**1,690,389,016**	**-**	**-**
LIABILITIES AND FUND BALANCE						
CURRENT LIABILITIES						
ACCOUNTS PAYABLE	38,511,000	45,467,802	26,822,193	26,822,193		
SALARIES, WAGES AND PAYROLL TAXES PAYABLE	66,520,000	92,393,020	96,924,777	96,924,777		
ESTIMATED THIRD-PARTY SETTLEMENTS	2,740,000	18,096,920	18,059,575	18,059,575		
OTHER CURRENT LIABILITIES	56,313,000	44,528,795	42,357,960	42,357,960		
CURRENT PORTION OF LONG-TERM DEBT	16,980,000	18,476,206	17,089,511	17,089,511		
TOTAL CURRENT LIABILITIES	181,064,000	218,962,743	201,254,016	201,254,016	-	-
LONG-TERM DEBT						
BONDS & MORTGAGES PAYABLE	474,245,000	472,646,118	430,754,926	430,754,926		
CAPITAL LEASE OBLIGATIONS	-	-	-			
OTHER LONG-TERM DEBT	-	-	-			
TOTAL LONG-TERM DEBT	474,245,000	472,646,118	430,754,926	430,754,926	-	-
OTHER NONCURRENT LIABILITIES	31,847,000	14,121,247	13,453,348	13,453,348		
TOTAL LIABILITIES	**687,156,000**	**705,730,108**	**645,462,290**	**645,462,290**	**-**	**-**
FUND BALANCE	893,324,000	969,995,829	1,044,926,726	1,044,926,726		
TOTAL LIABILITIES AND FUND BALANCE	**1,580,480,000**	**1,675,725,937**	**1,690,389,016**	**1,690,389,016**	**-**	**-**

MRI Room 2 Replacement

Balance Sheet

PROJECT ONLY

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
ASSETS						
CURRENT ASSETS						
CASH & INVESTMENTS				(2,858,512)		
PATIENT ACCOUNTS RECEIVABLE, GROSS						
LESS: ALLOWANCE FOR UNCOLLECTIBLE ACCTS						
DUE FROM THIRD PARTIES						
OTHER CURRENT ASSETS						
TOTAL CURRENT ASSETS	-	-	-	(2,858,512)	-	-
BOARD DESIGNATED ASSETS						
FUNDED DEPRECIATION						
ESCROWED BOND FUNDS						
OTHER						
TOTAL BOARD DESIGNATED ASSETS	-	-	-	-	-	-
PROPERTY, PLANT, AND EQUIPMENT						
LAND, BUILDINGS & IMPROVEMENTS				1,569,518		
CONSTRUCTION IN PROGRESS						
MAJOR MOVABLE EQUIPMENT						
FIXED EQUIPMENT				1,288,994		
TOTAL PROPERTY, PLANT AND EQUIPMENT	-	-	-	2,858,512	-	-
LESS: ACCUMULATED DEPRECIATION						
LAND, BUILDINGS & IMPROVEMENTS						
EQUIPMENT - FIXED						
EQUIPMENT - MAJOR MOVEABLE						
TOTAL ACCUMULATED DEPRECIATION	-	-	-	-	-	-
TOTAL PROPERTY, PLANT AND EQUIPMENT, NET	-	-	-	2,858,512	-	-
OTHER LONG-TERM ASSETS						
TOTAL ASSETS	**-**	**-**	**-**	**-**	**-**	**-**
LIABILITIES AND FUND BALANCE						
CURRENT LIABILITIES						
ACCOUNTS PAYABLE						
SALARIES, WAGES AND PAYROLL TAXES PAYABLE						
ESTIMATED THIRD-PARTY SETTLEMENTS						
OTHER CURRENT LIABILITIES						
CURRENT PORTION OF LONG-TERM DEBT						
TOTAL CURRENT LIABILITIES	-	-	-	-	-	-
LONG-TERM DEBT						
BONDS & MORTGAGES PAYABLE						
CAPITAL LEASE OBLIGATIONS						
OTHER LONG-TERM DEBT						
TOTAL LONG-TERM DEBT	-	-	-	-	-	-
OTHER NONCURRENT LIABILITIES						
TOTAL LIABILITIES	**-**	**-**	**-**	**-**	**-**	**-**
FUND BALANCE						
TOTAL LIABILITIES AND FUND BALANCE	**-**	**-**	**-**	**-**	**-**	**-**

MRI Room 2 Replacement

Note: This table requires no "fill-in" as it is populated automatically

Balance Sheet

WITH PROJECT

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
ASSETS						
CURRENT ASSETS						
CASH & INVESTMENTS	150,422,000	144,114,453	173,729,640	170,871,128	-	-
PATIENT ACCOUNTS RECEIVABLE, GROSS	175,607,000	174,372,916	177,501,874	177,501,874	-	-
LESS: ALLOWANCE FOR UNCOLLECTIBLE ACCTS	(28,266,000)	(31,266,914)	(35,283,363)	(35,283,363)	-	-
DUE FROM THIRD PARTIES	8,366,000	35,561,930	28,167,133	28,167,133	-	-
OTHER CURRENT ASSETS	109,575,000	72,776,310	70,705,259	70,705,259	-	-
TOTAL CURRENT ASSETS	415,704,000	395,558,695	414,820,543	411,962,031	-	-
BOARD DESIGNATED ASSETS						
FUNDED DEPRECIATION	535,974,000	556,641,589	504,582,109	504,582,109	-	-
ESCROWED BOND FUNDS	4,902,000	69,388,853	67,351,583	67,351,583	-	-
OTHER	64,306,000	-	-	-	-	-
TOTAL BOARD DESIGNATED ASSETS	605,182,000	626,030,442	571,933,692	571,933,692	-	-
PROPERTY, PLANT, AND EQUIPMENT						
LAND, BUILDINGS & IMPROVEMENTS	685,331,000	728,237,403	850,078,592	851,648,110	-	-
CONSTRUCTION IN PROGRESS	72,329,000	149,143,354	31,809,512	31,809,512	-	-
MAJOR MOVABLE EQUIPMENT	357,300,000	373,857,799	472,060,562	472,060,562	-	-
FIXED EQUIPMENT	-	-	-	1,288,994	-	-
TOTAL PROPERTY, PLANT AND EQUIPMENT	1,114,960,000	1,251,238,556	1,353,948,666	1,356,807,178	-	-
LESS: ACCUMULATED DEPRECIATION						
LAND, BUILDINGS & IMPROVEMENTS	(337,973,000)	(361,534,334)	(391,137,809)	(391,137,809)	-	-
EQUIPMENT - FIXED	-	-	-	-	-	-
EQUIPMENT - MAJOR MOVEABLE	(281,136,000)	(305,752,405)	(328,459,974)	(328,459,974)	-	-
TOTAL ACCUMULATED DEPRECIATION	(619,109,000)	(667,286,739)	(719,597,783)	(719,597,783)	-	-
TOTAL PROPERTY, PLANT AND EQUIPMENT, NET	495,851,000	583,951,817	634,350,883	637,209,395	-	-
OTHER LONG-TERM ASSETS	63,743,000	70,184,983	69,283,898	69,283,898	-	-
TOTAL ASSETS	**1,580,480,000**	**1,675,725,937**	**1,690,389,016**	**1,690,389,016**	**-**	**-**
LIABILITIES AND FUND BALANCE						
CURRENT LIABILITIES						
ACCOUNTS PAYABLE	38,511,000	45,467,802	26,822,193	26,822,193	-	-
SALARIES, WAGES AND PAYROLL TAXES PAYABLE	66,520,000	92,393,020	96,924,777	96,924,777	-	-
ESTIMATED THIRD-PARTY SETTLEMENTS	2,740,000	18,096,920	18,059,575	18,059,575	-	-
OTHER CURRENT LIABILITIES	56,313,000	44,528,795	42,357,960	42,357,960	-	-
CURRENT PORTION OF LONG-TERM DEBT	16,980,000	18,476,206	17,089,511	17,089,511	-	-
TOTAL CURRENT LIABILITIES	181,064,000	218,962,743	201,254,016	201,254,016	-	-
LONG-TERM DEBT						
BONDS & MORTGAGES PAYABLE	474,245,000	472,646,118	430,754,926	430,754,926	-	-
CAPITAL LEASE OBLIGATIONS	-	-	-	-	-	-
OTHER LONG-TERM DEBT	-	-	-	-	-	-
TOTAL LONG-TERM DEBT	474,245,000	472,646,118	430,754,926	430,754,926	-	-
OTHER NONCURRENT LIABILITIES	31,847,000	14,121,247	13,453,348	13,453,348	-	-
TOTAL LIABILITIES	**687,156,000**	**705,730,108**	**645,462,290**	**645,462,290**	**-**	**-**
FUND BALANCE	893,324,000	969,995,829	1,044,926,726	1,044,926,726	-	-
TOTAL LIABILITIES AND FUND BALANCE	**1,580,480,000**	**1,675,725,937**	**1,690,389,016**	**1,690,389,016**	**-**	**-**

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

PAYER REVENUE REPORT

WITHOUT PROJECT

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
Commercial						
Hospital	760,033,886	797,958,479	831,452,227			
Physician	343,487,742	312,368,106	324,645,957			
Total Revenue	1,103,521,627	1,110,326,585	1,156,098,184	-	-	-
Allowances - Hospital	0	0	0			
Allowances - Physicians	-153,313,935	-136,611,581	-155,787,688			
Free Care	-17,770,112	-18,396,010	-16,349,945			
Bad Debt	-24,522,185	-29,309,366	-25,878,324			
Net Payer Revenue	710,486,580	716,702,764	703,477,244	-	-	-
Fixed Prospective Payment & Reserves	0	258,784	45,848,553			
Total Net Payer Revenue & Fixed Prospective Payment	710,486,580	716,961,547	749,325,797	-	-	-
Reimbursement Rate - Commercial	64%	65%	65%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Commercial	59%	57%	59%	#DIV/0!	#DIV/0!	#DIV/0!
Medicaid						
Hospital	301,398,046	325,227,854	331,359,947			
Physician	118,349,757	105,306,562	103,422,818			
Total Revenue	419,747,803	430,534,416	434,782,765	-	-	-
Allowances - Hospital	-236,550,376	-264,326,170	-267,693,155			
Allowances - Physicians	-99,446,401	-89,535,564	-88,310,872			
Free Care	0	0	-338,736			
Bad Debt	0	0	-86,000			
Graduate Medical Education Payments-Phys.	19,133,338	19,611,328	19,602,108			
Graduate Medical Education Payments-Hosp	10,312,172	10,388,672	10,397,892			
Net Payer Revenue	113,196,536	106,672,682	108,354,002	-	-	-
Fixed Prospective Payment & Reserves	18,510,923	32,117,548	28,703,494			
Total Net Payer Revenue & Fixed Prospective Payment	131,707,459	138,790,230	137,057,496	-	-	-
Reimbursement Rate - Medicaid	31%	32%	32%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicaid	11%	11%	11%	#DIV/0!	#DIV/0!	#DIV/0!
Medicare						
Hospital	889,633,764	959,542,503	986,990,223			
Physician	235,242,999	203,495,456	207,853,641			
Total Revenue	1,124,876,763	1,163,037,959	1,194,843,865	-	-	-
Allowances - Hospital	-591,084,241	-705,947,219	-762,529,863			
Allowances - Physicians	-182,341,976	-157,933,077	-167,811,970			
Free Care	0	0	0			
Bad Debt	0	0	-2,870,413			
Net Payer Revenue	351,450,545	299,157,663	258,189,288	-	-	-
Fixed Prospective Payment & Reserves	0	86,110,678	118,295,224			
Total Net Payer Revenue & Fixed Prospective Payment	351,450,545	385,268,340	376,484,512			
Reimbursement Rate - Medicare	31%	33%	32%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicare	29%	31%	30%	#DIV/0!	#DIV/0!	#DIV/0!
Disproportionate Share Payments	17,474,390	13,016,392	10,592,241			
Total Payer Revenue						
Hospital	1,951,065,696	2,082,728,836	2,149,802,398			
Physician	697,080,498	621,170,124	635,922,416			
Total Revenue	2,648,146,194	2,703,898,960	2,785,724,813	-	-	-
Allowances - Hospital	-1,025,063,432	-1,179,580,253	-1,284,828,001			
Allowances - Physicians	-435,102,312	-384,080,222	-411,910,530			
Free Care	-17,770,112	-18,396,010	-20,131,012			
Bad Debt	-24,522,185	-29,309,366	-28,834,737			
Disproportionate Share Payments	17,474,390	13,016,392	10,592,241			
Graduate Medical Education Payments_Phys.	19,133,338	19,611,328	19,602,108			
Graduate Medical Education Payments-Hosp	10,312,172	10,388,672	10,397,892			
Net Payer Revenue	1,192,608,052	1,135,549,501	1,080,612,774	-	-	-
Fixed Prospective Payment & Reserves	18,510,923	118,487,009	192,847,272			
Total Net Payer Revenue & Fixed Prospective Payment	1,211,118,975	1,254,036,509	1,273,460,046			
Reimbursement Rate - All Payers	46%	46%	46%	#DIV/0!	#DIV/0!	#DIV/0!

PAYER REVENUE REPORT

PROJECT ONLY

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
Commercial						
Hospital						
Physician						
Total Revenue				-	-	-
Allowances - Hospital						
Allowances - Physicians						
Free Care						
Bad Debt						
Net Payer Revenue				-	-	-
Fixed Prospective Payment & Reserves						
Total Net Payer Revenue & Fixed Prospective Payment						
Reimbursement Rate - Commercial	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Commercial	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Medicaid						
Hospital						
Physician						
Total Revenue				-	-	-
Allowances - Hospital						
Allowances - Physicians						
Free Care						
Bad Debt						
Graduate Medical Education Payments-Phys.						
Graduate Medical Education Payments-Hosp						
Net Payer Revenue				-	-	-
Fixed Prospective Payment & Reserves						
Total Net Payer Revenue & Fixed Prospective Payment						
Reimbursement Rate - Medicaid	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicaid	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Medicare						
Hospital						
Physician						
Total Revenue				-	-	-
Allowances - Hospital						
Allowances - Physicians						
Free Care						
Bad Debt						
Net Payer Revenue				-	-	-
Fixed Prospective Payment & Reserves						
Total Net Payer Revenue & Fixed Prospective Payment						
Reimbursement Rate - Medicare	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicare	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Disproportionate Share Payments						
Total Payer Revenue						
Hospital						
Physician						
Total Revenue				-	-	-
Allowances - Hospital						
Allowances - Physicians						
Free Care						
Bad Debt						
Disproportionate Share Payments						
Graduate Medical Education Payments-Phys.						
Graduate Medical Education Payments-Hosp						
Net Payer Revenue				-	-	-
Fixed Prospective Payment & Reserves						
Total Net Payer Revenue & Fixed Prospective Payment						
Reimbursement Rate - All Payers	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Note: This table requires no "fill-in" as it is populated automatically

PAYER REVENUE REPORT

WITH PROJECT

	2017 Actual	2018 Actuals	2019 Budget	2019 Proposed Year 1	2020 Proposed Year 2	2021 Proposed Year 3
Commercial						
Hospital	760,033,886	797,958,479	831,452,227	0	0	0
Physician	343,487,742	312,368,106	324,645,957	0	0	0
Total Revenue	1,103,521,627	1,110,326,585	1,156,098,184	0	0	0
Allowances - Hospital	0	0	0	0	0	0
Allowances - Physicians	-153,313,935	-136,611,581	-155,787,688	0	0	0
Free Care	-17,770,112	-18,396,010	-16,349,945	0	0	0
Bad Debt	-24,522,185	-29,309,366	-25,878,324	0	0	0
Net Payer Revenue	710,486,580	716,702,764	703,477,244	-	-	-
Fixed Prospective Payment & Reserves	0	258,784	45,848,553	0	0	0
Total Net Payer Revenue & Fixed Prospective Payment	710,486,580	716,961,547	749,325,797	0	0	0
Reimbursement Rate - Commercial	64%	65%	65%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Commercial	59%	57%	59%	#DIV/0!	#DIV/0!	#DIV/0!
Medicaid						
Hospital	301,398,046	325,227,854	331,359,947	0	0	0
Physician	118,349,757	105,306,562	103,422,818	0	0	0
Total Revenue	419,747,803	430,534,416	434,782,765	0	0	0
Allowances - Hospital	-236,550,376	-264,326,170	-267,693,155	0	0	0
Allowances - Physicians	-99,446,401	-89,535,564	-88,310,872	0	0	0
Free Care	0	0	-338,736	0	0	0
Bad Debt	0	0	-86,000	0	0	0
Graduate Medical Education Payments-Phys.	19,133,338	19,611,328	19,602,108	0	0	0
Graduate Medical Education Payments-Hosp	10,312,172	10,388,672	10,397,892	0	0	0
Net Payer Revenue	113,196,536	106,672,682	108,354,002	0	0	0
Fixed Prospective Payment & Reserves	18,510,923	32,117,548	28,703,494	0	0	0
Total Net Payer Revenue & Fixed Prospective Payment	131,707,459	138,790,230	137,057,496	0	0	0
Reimbursement Rate - Medicaid	31%	32%	32%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicaid	11%	11%	11%	#DIV/0!	#DIV/0!	#DIV/0!
Medicare						
Hospital	889,633,764	959,542,503	986,990,223	0	0	0
Physician	235,242,999	203,495,456	207,853,641	0	0	0
Total Revenue	1,124,876,763	1,163,037,959	1,194,843,865	0	0	0
Allowances - Hospital	-591,084,241	-705,947,219	-762,529,863	0	0	0
Allowances - Physicians	-182,341,976	-157,933,077	-167,811,970	0	0	0
Free Care	0	0	0	0	0	0
Bad Debt	0	0	-2,870,413	0	0	0
Net Payer Revenue	351,450,545	299,157,663	258,189,288	0	0	0
Fixed Prospective Payment & Reserves	0	86,110,678	118,295,224	0	0	0
Total Net Payer Revenue & Fixed Prospective Payment	351,450,545	385,268,340	376,484,512	0	0	0
Reimbursement Rate - Medicare	31%	33%	32%	#DIV/0!	#DIV/0!	#DIV/0!
Payer Mix - Medicare	29%	31%	30%	#DIV/0!	#DIV/0!	#DIV/0!
Disproportionate Share Payments	17,474,390	13,016,392	10,592,241	0	0	0
Total Payer Revenue						
Hospital	1,951,065,696	2,082,728,836	2,149,802,398	0	0	0
Physician	697,080,498	621,170,124	635,922,416	0	0	0
Total Revenue	2,648,146,194	2,703,898,960	2,785,724,813	0	0	0
Allowances - Hospital	-1,025,063,432	-1,179,580,253	-1,284,828,001	0	0	0
Allowances - Physicians	-435,102,312	-384,080,222	-411,910,530	0	0	0
Free Care	-17,770,112	-18,396,010	-20,131,012	0	0	0
Bad Debt	-24,522,185	-29,309,366	-28,834,737	0	0	0
Disproportionate Share Payments	17,474,390	13,016,392	10,592,241	0	0	0
Graduate Medical Education Payments-Phys.	19,133,338	19,611,328	19,602,108	0	0	0
Graduate Medical Education Payments-Hosp	10,312,172	10,388,672	10,397,892	0	0	0
Net Payer Revenue	1,192,608,052	1,135,549,501	1,080,612,774	0	0	0
Fixed Prospective Payment & Reserves	18,510,923	118,487,009	192,847,272	0	0	0
Total Net Payer Revenue & Fixed Prospective Payment	1,211,118,975	1,254,036,509	1,273,460,046	0	0	0
Reimbursement Rate - All Payers	45%	42%	39%	#DIV/0!	#DIV/0!	#DIV/0!

The University of Vermont Medical Center

MRI Room 2 Replacement

UTILIZATION PROJECTIONS--TABLE 7

WITHOUT PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Yr 1 2019	Proposed Yr 2 2020	Proposed Yr 3 2021
Inpatient Utilization						
Acute Beds (Staffed)	397	392	392			
Acute Admissions	19,496	19,763	19,489			
Acute Patient Days	109,972	112,183	110,941			
Acute Average Length Of Stay	5.64	5.68	5.69			
Outpatient						
All Outpatient Visits	1,687,789	1,688,216	1,791,157			
Physician Office Visits	2,819,321	737,642	794,950			
Ancillary						
All Operating Room Procedure	40,073	39,438	40,017			
All Operating Room Cases	17,295	17,338	17,729			
Emergency Room Visits	60,182	59,820	59,979			
Cat Scan Procedures	48,269	50,665	49,054			
Magnetic Resonance Image Exams	19,262	20,819	19,762			
Nuclear Medicine Procedures	6,297	6,829	6,400			
Radiology - Diagnostic Procedures	180,642	182,234	182,473			
Laboratory Tests	2,506,098	2,522,585	2,463,080			
Adjusted Statistics						
Adjusted Admissions	67,658	65,784	63,677			
Adjusted Days	381,205	373,316	362,458			

PROJECT ONLY

	2017 Actual	2018 Actuals	2019 Budget	Proposed Yr 1 2019	Proposed Yr 2 2020	Proposed Yr 3 2021
Inpatient Utilization						
Acute Beds (Staffed)						
Acute Admissions						
Acute Patient Days						
Acute Average Length Of Stay						
Outpatient						
All Outpatient Visits						
Physician Office Visits						
Ancillary						
All Operating Room Procedure						
All Operating Room Cases						
Emergency Room Visits						
Cat Scan Procedures						
Magnetic Resonance Image Exams						
Nuclear Medicine Procedures						
Radiology - Diagnostic Procedures						
Laboratory Tests						
Adjusted Statistics						
Adjusted Admissions						
Adjusted Days						

Note: This table requires no "fill-in" as it is populated automatically

WITH PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Yr 1 2019	Proposed Yr 2 2020	Proposed Yr 3 2021
Inpatient Utilization						
Acute Beds (Staffed)	397	392	392	-	-	-
Acute Admissions	19,496	19,763	19,489	-	-	-
Acute Patient Days	109,972	112,183	110,941	-	-	-
Acute Average Length Of Stay	6	6	6	-	-	-
Outpatient						
All Outpatient Visits	1,687,789	1,688,216	1,791,157	-	-	-
Physician Office Visits	2,819,321	737,642	794,950	-	-	-
Ancillary						
All Operating Room Procedure	40,073	39,438	40,017	-	-	-
All Operating Room Cases	17,295	17,338	17,729	-	-	-
Emergency Room Visits	60,182	59,820	59,979	-	-	-
Cat Scan Procedures	48,269	50,665	49,054	-	-	-
Magnetic Resonance Image Exams	19,262	20,819	19,762	-	-	-
Nuclear Medicine Procedures	6,297	6,829	6,400	-	-	-
Radiology - Diagnostic Procedures	180,642	182,234	182,473	-	-	-
Laboratory Tests	2,506,098	2,522,585	2,463,080	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
Adjusted Statistics						
Adjusted Admissions	67,658	65,784	63,677	-	-	-
Adjusted Days	381,205	373,316	362,458	-	-	-

THE UNIVERSITY OF VERMONT MEDICAL CENTER

MRI Room 2 Replacement

STAFFING REPORT - TABLE 8

WITHOUT PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Year 1 2019	Proposed Year 2 2020	Proposed Year 3 2021
PHYSICIAN FTEs	**576.7**	**612.8**	**601.3**	**601.3**		
TRAVELERS	70.8	92.1	-			
Residents & Fellows	333.1	340.3	343.6	343.6		
MLPs	212.2	211.4	230.9	230.9		
Non-MD FTEs	5,529.8	5,665.7	6,333.3	6,333.3		
TOTAL NON-MD FTEs	**6,075.0**	**6,217.3**	**6,907.8**	**6,907.8**	**-**	**-**

Note: Mid-Level Providers and Residents are now included in Non-MD Employees, prior to 2013 Actual they were included in Physician FTEs

STAFFING REPORT - TABLE 8

PROJECT ONLY

	2017 Actual	2018 Actuals	2019 Budget	Proposed Year 1 2019	Proposed Year 2 2020	Proposed Year 3 2021
PHYSICIAN FTEs						
TRAVELERS						
Residents & Fellows						
MLPs						
Non-MD FTEs						
TOTAL NON-MD FTEs	**-**	**-**	**-**	**-**	**-**	**-**

Note: Mid-Level Providers and Residents are now included in Non-MD Employees, prior to 2013 Actual they were included in Physician FTEs

Note: This table requires no "fill-in" as it is populated automatically

STAFFING REPORT - TABLE 8

WITH PROJECT

	2017 Actual	2018 Actuals	2019 Budget	Proposed Year 1 2019	Proposed Year 2 2020	Proposed Year 3 2021
PHYSICIAN FTEs	**576.7**	**612.8**	**601.3**	**601.3**	**-**	**-**
TRAVELERS	70.8	92.1	-	-	-	-
Residents & Fellows	333.1	340.3	343.6	343.6	-	-
MLPs	212.2	211.4	230.9	230.9	-	-
Non-MD FTEs	5,529.8	5,665.7	6,333.3	6,333.3	-	-
TOTAL NON-MD FTEs	**6,075.0**	**6,217.3**	**6,907.8**	**6,907.8**	**-**	**-**

Note: Mid-Level Providers and Residents are now included in Non-MD Employees, prior to 2013 Actual they were included in Physician FTEs

Exhibit 3

NOTE: ALL OF THE INFORMATION CONTAINED WITHIN THIS DRAWING SHOULD BE CONSIDERED PROVISIONAL AND IS SUBJECT TO CHANGE.

PHILIPS

Healthcare

www.healthcare.philips.com

Final Site Preparation Support Document

The equipment components shown in this drawing package are based on the current proposed purchase and are subject to change if modifications are made to the configuration.

Revision History

Note for Architects and/or Contractors: If revisions are listed, these drawings must be thoroughly reviewed so that all changes can be incorporated into your project

Rev.	Date	Revision Descriptions	By
A	6/22/2018	Updated System to show Ingenia Ambition 1.5T	BN
B	12/18/2018	AN/AL/A1/AD6/AD7/AD8/SL/S1/SD4/SD5/SD6/SD7/EL2/E1/E2/ED2/CHK2 - Created Final Site Preparation Support Document. Added patient in-bore, MRXperion Injector, Flextrak, Elastography, Patient Observation Camera and monitor.	BN

Table of Contents

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
Drawing Number
N-EAS180390 B
Date Drawn: 12/18/2018
Quote: 1-1KQ3QVA Rev. 8
Order: 6600420761.010000
6600420761.020000

C1

General Specifications

1. Responsibility
The customer shall be solely responsible, at their expense for preparation of site, including any required structural alterations. The site preparation shall be in accordance with plans and specifications provided by Philips. Compliance with all safety electrical and building codes relevant to the equipment and its installation is the sole responsibility of customer. The customer shall advise Philips of conditions at or near the site which could adversely affect the carrying out of the installation work and shall ensure that such conditions are corrected and that the site is fully prepared and available to Philips before the installation work is due to begin. The customer shall provide all necessary plumbing, carpentry work, or conduit wiring required to attach and install products ready for use.

2. Permits
Customer shall obtain all permits and licenses required by federal, state/provincial or local authorities in connection with the construction, installation and operation of the products and related rules, regulations, shall bear any expense in obtaining same or in complying with any ordinances and statutes.

3. Asbestos and Other Toxic Substances
Philips assumes no hazardous waste (i.e., PCB's in existing transformers) exists at the site. If any hazardous material is found, it shall be the sole responsibility of the customer to properly remove and dispose of this material at its expense. Any delays caused in the project for this special handling shall result in Philips time period for completion being extended by like period of time. Philips assumes that no asbestos material is involved in this project in any ceilings, walls or floors. If any asbestos material is found anywhere on the site, it shall be the customer's sole responsibility to properly remove and/or make safe this condition, at the customer's sole expense.

4. Labor
In the event local labor conditions make it impossible or undesirable to use Philips' regular employees for such installation and connection, such work shall be performed by laborers supplied by the customer, or by an independent contractor chosen by the customer at the customer's expense, and in such case, Philips agrees to furnish adequate engineering supervision for proper completion of the installation.

5. Schedule
The general contractor should provide Philips with a schedule of work to assist in the coordination of delivery of Philips supplied products which are to be installed by the contractor and delivery of the primary equipment.

6. Extended Installation or Turnkey Work by Philips
Any room preparation requirements for Philips equipment indicated on these drawings is the responsibility of the customer. If an extended installation or turnkey contract exists between Philips and the customer for room preparation work required by the equipment represented on these drawings, some of the responsibilities of the customer as depicted in these drawings may be assumed by Philips. In the event of a conflict between the work described in the turnkey contract workscope and these drawings, the turnkey contract workscope shall govern.

(14.0)

Ambient Experience Requirements

Supply Configuration: Single Phase, 3 wire power, neutral and ground

Nominal Line Voltage: 110 - 240 VAC, 60 Hz.

Circuit Breaker: 15 Amps, 110V
Dedicated neutral circuit required

(14.0)

Minimum Site Preparation Requirements

A smooth efficient installation is vital to Philips and their customers. Understanding what the minimum site preparation requirements are will help achieve this goal. The following list clearly defines the requirements which must be fulfilled before the installation can begin.

1. Walls to be painted or covered, baseboards installed, floors to be tiled and/or covered, ceiling shall have grid tiles and lighting fixtures installed and operational.

2. Doors and windows, especially radio frequency shielding, installed and finished with locksets operational.

3. All electrical convenience, conduit, raceway, knockouts, cable openings, chase nipples, and junction boxes installed and operational.

4. Incoming mains power operational and connected to room MR mains breaker.

5. 115V convenience outlets operational.

6. All support structure correctly installed. All channels, pipes, beams and/or other supporting devices should be level, parallel, and free of lateral or longitudinal movements.

7. All contractor supplied cables pulled and terminated.

8. A dust-free environment in and around the procedure room.

9. All HVAC (heating, ventilating and air conditioning) installed and operational as per specifications.

10. Architectural features such as computer floor, wood floor, casework, bulkheads, installed and finished.

11. All plumbing installed and finished.

12. Clear door openings and pathway leading up to and into the exam room are recommended to be 48" (1220mm) W x 84" (2135mm) H. Minimum 40" (1000mm) W x 81" (2050mm) H, contingent on an 8' - 0" (2440mm) corridor width.

13. The magnet is the only system part that in most cases cannot be transferred through the door of the RF enclosure. A special opening to allow its installation in the enclosure must therefore be made available. The recommended transfer opening dimensions are 7' - 10 $\frac{1}{2}$" (2400mm) H x 8' - 3" (2500mm) W.
Refer to Sheet AD2 for transport dimension details.

14. Internet access is required to be available in the control area prior to system delivery for Web FSE access. Refer to Sheet EL of the final drawing package for details.

15. Remote Service Diagnostics - Medical imaging equipment to be installed by Philips Medical is equipped with a service diagnostic feature which allows for remote and on site service diagnostics. To establish this feature, a RJ45 type ethernet 10/100/1000 Mbit network connector must be installed as shown on plan. Access to customer's network via their remote access server is needed for Remote Service Network (RSN) connectivity. All cost with this feature are the responsibility of the customer.

Note
Once Philips has moved equipment into the suite and started the installation, the contractor shall schedule his work around the Philips installation team on site.

(14.0)

Electrical Requirements

Supply Configuration:	3 phase, 3 wire power, unity ground, and bonded ground
Nominal Line Voltage:	480 VAC, 60 Hz
Branch Power Requirement:	80 kVA
Circuit Breaker:	3 pole, 100 Amps (480 VAC)

Note:
For voltages other than 480 VAC: **PDU-MRPT2 must be ordered**
Circuit Breaker size for PDU-MRPT2: 3 pole, 225 Amps (208 VAC)

Note: It is absolutely required to have the MDU connected to hospital power the first day of magnet delivery.
Refer to sheet ED1 of final drawing package for complete electrical requirements.

(18.0)

HVAC Requirements for General Equipment Locations

Heating, ventilation, air conditioning requirements concern all rooms (equipment room, magnet room, and control room) and must be maintained 24 hours a day, 7 days a week.

Examination Room
Temperature: 65° to 71° Fahrenheit (18° to 22° Celsius)
Maximum Temperature Rate of Change: 9° Fahrenheit (5° Celsius) per 10 minutes
Humidity: 40% to 70%, non-condensing
Air Conditioning Capacity: **7507 btu/hr (2.2 kW)**
- Energy dissipated in the examination room will be removed from the room by an additional air exhaust system
- Gradient coil heat dissipation (3400 to 51200 btu/hr [1 to 15 kW]) will be removed via liquid cooling of the gradient coil.
- Exam room temperature and humidity specifications are critical for the MR and must be met at all times. No exceptions are allowed.

Equipment Room
Temperature: 59° to 75° Fahrenheit (15° to 24° Celsius)
- The temperature of the conditioned air that enters the room must not be less than 42° Fahrenheit (6° Celsius) below the mean room temperature.

Maximum Temperature Rate of Change: 9° Fahrenheit (5° Celsius) per 10 minutes
Humidity: 30% to 70%, non-condensing
Air Conditioning Capacity:
- At Standby: 20473 btu/hr (6kW)
- Peak Dissipation Scanning: **27297 Btu/hr (8 kW)**

Note: Full Load UPS heat dissipation may increase peak dissipation by 11,600 Btu/hr (3.4 kW)

Control Room
Temperature: 64° to 75° Fahrenheit (18° to 24° Celsius)
Maximum Temperature Rate of Change: 9° Fahrenheit (5° Celsius) per 10 minutes
Humidity: 30% to 70%, non-condensing
Air Conditioning Capacity: **2047 Btu/hr (0.6 kW)**

Ambient Experience (Patient In-bore Solution)
Temperature: 32° to 104° Fahrenheit (0° to 40° Celsius)
Humidity: 10% to 80%, non-condensing
- Patient In-bore Monitor is mounted outside of RF cage. PIB monitor may need special heating/coolling to maintain required temperature.

Refer to Sheet MP1 of final drawing package for completed HVAC requirements.

* Heat load indicated above and on Sheet MP1 will be less than the sum of the peak dissipation shown on Sheet AL due to the fact that not all cabinets will run peak heat loads at the same time. Sheet AL shows the peak dissipation for each cabinet measured individually.

(18.0)

PHILIPS

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
Drawing Number
N-EAS180390 B
Date Drawn: 12/18/2018
Quote: 1-1KQ3QVA Rev. 8
Order: 6600420761.010000
6600420761.020000

AN

Equipment Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional item furnished by Philips
H Furnished by RF Enclosure Supplier and Installed by RF Enclosure Supplier
J Furnished by Philips and Installed by Rigging Company

	Equipment Designation	Description	Max. Gauss	Weight (lbs)	Heat Load (btu/hr) *	Detail Sheet
A	IBC	In-Bore Connect Computer	50	15	132	AD6
A	ATSW	AE Touch Screen Elo 1515L (Wall mounted)	-	10.6	102	AD6
A	USB	USB Extender (located under counter)	-	2	51	-
A	ATS	AE Touch Screen Elo 1515L	-	10.6	102	AD6
A	PIB	Patient In-Bore Solution Monitor	100	97	853	AD6
A	DVD	USB DVD Player	-	-	-	AD6
A	RAD	Resoundant Active Driver	50	53	-	AD7
D	POC	Patient Observation Camera	150	3	---	AD7
D	POM	Patient Observation Monitor	150	3	---	AD7
A	FT	HA FlexTrak	---	113	---	AD8
A	XI	MRXperion Injector	---	94	---	AD8
A	XD	Injector Display Control Unit	---	17.6	675	AD8
A	XPS	iCBC Power Supply Unit	50	6	660	AD8

Equipment Legend

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J Furnished by Philips and Installed by Rigging Company

	Equipment Designation	Description	Max. Gauss	Weight (lbs)	Heat Load (btu/hr) *	Detail Sheet
A	SR	Storage Rail	---	---	-	AD5
A	OT	Operator's Table	-	220	0	AD3
D	ERB	Emergency Run-Down Button (Qty. = 2)	-	3	0	AD3
J	MAG	Magnet Assembly	-	8157	6800	AD3
A	PS	Patient Support (MT)	-	573	1025	AD3
A	GAC	Gradient Amplifier 787 Double Cabinet	150	2015	27900	AD4
A	DACC	Data Acquisition and Control Cabinet	50	875	3400	AD4
D	LCC	Liquid Cooling Cabinet	150	719	4095	AD4
D	ACCC	Air Cooled Cryo-cooler	150	243	19108	AD4
D	MDU	Mains Distribution Unit	150	605	1700	AD4
A	SFB	System Filter Box with Covers	70	175	3400	AD4
B	CBS	Circuit Breaker (For System)	50	t.b.d.	t.b.d.	
A	SACU	System Air Cooling Unit	50	55	340	AD5
A	EA	e-Alert	-	1	0	
A	SP	Service Platform	-	t.b.d.	0	AD6
A	FC	Flex Caddy Coil Cart	-	t.b.d.	0	AD5
F	BCP	Backup Power Connection Panel	150	605	t.b.d.	AD6
G	UPS	25 kVA UPS Cabinet	5	1135	11564	AD7
G	BC	Battery Cabinet	5	880	---	AD7
G	FAF	FA Series Three Phase Filter	30	210	---	AD7
G	RSP	Remote Status Panel (for UPS; If ordered)		12	50	AD7

*** Heat load indicated is peak dissipation for each cabinet measured individually. Peak room heat dissipation as indicated on Sheet AN and MP1 will be less than the sum of each individual cabinet in a given room due to the fact that not all cabinets will run peak heat loads at the same time.**

PHILIPS

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
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N-EAS180390 B
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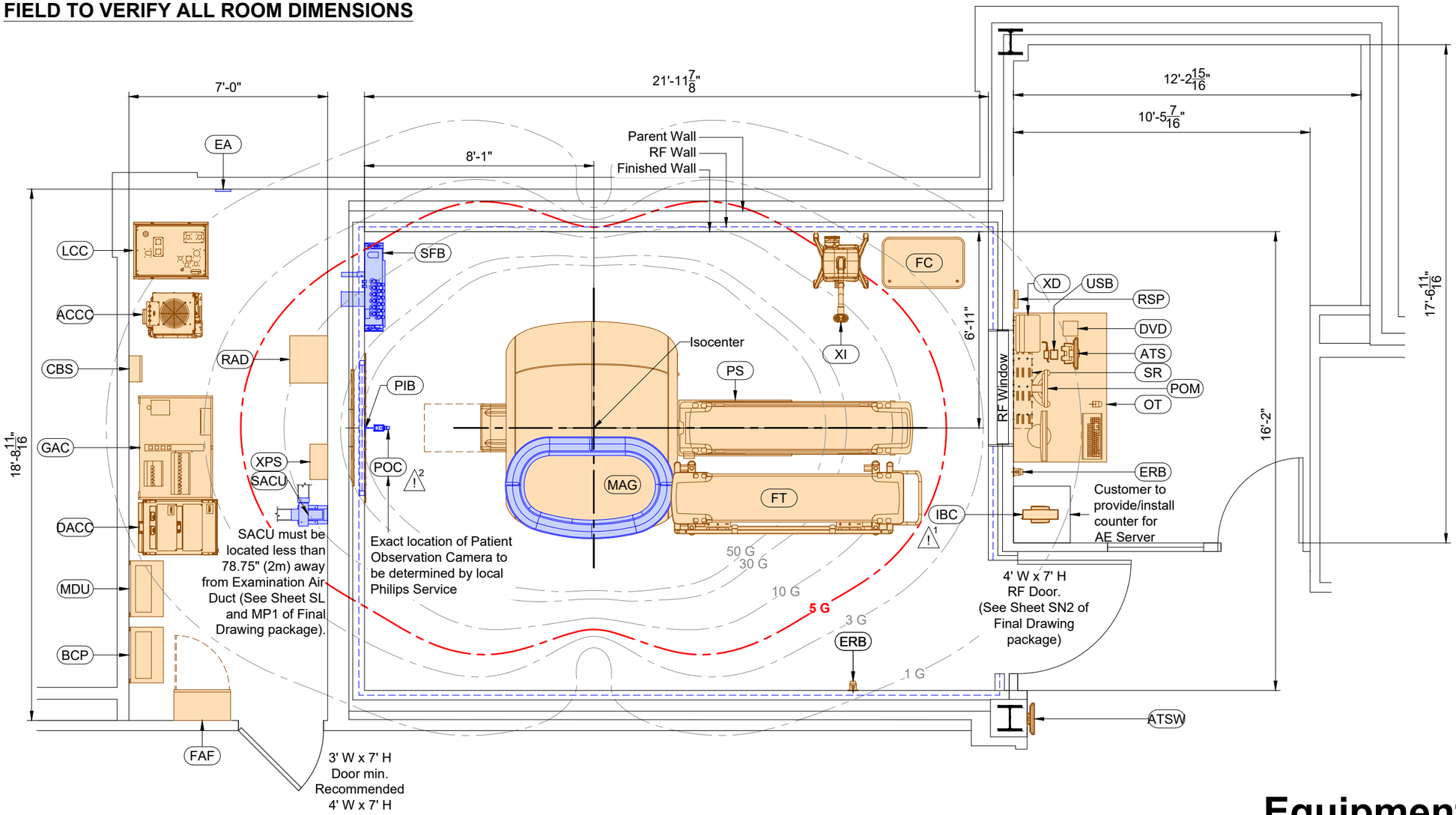
660042076l.020000

AL

FIELD TO VERIFY ALL ROOM DIMENSIONS



Planning Issues and Considerations

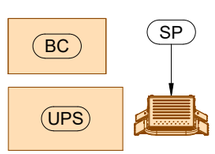
1. Customer provided counter must be able to support the In-Bore Connect Computer's, "IBC", weight and size. It must also provide adequate ventilation and space for service area (see sheet AD6 of Final Drawing Package for details).
2. "POC" is required to be outside the 150 Gauss Field. Philips Service must verify that exact placement of equipment does not exceed maximum fringe field requirements.

* It is absolutely required to have the MDU connected to hospital power the first day of magnet delivery.

* All floor support below the magnet including floor reinforcement and beams must be verified to meet the requirements shown on the SN1 page of the final drawing package.

* If metal is needed inside the Examination room for air ducts, suspended ceiling, wall construction, cabinets, etc; they must be non-ferromagnetic. This is to avoid potential image quality issues and missile effects due to attraction forces of the magnetic field.

Verify location with Customer and local Philips Project Manager.



KKT Chiller to be located at least 208" away from magnet's isocenter

Controlled Zone
Exclusion zone for persons with cardiac pacemakers or other electrical implants - Magnet field exceeds 5 Gauss (0.5 mT).

Reported Ceiling Heights from finished floor to bottom of :
Deck above : Unknown
RF Ceiling : Unknown
Exam Room Suspended Ceiling: Unknown
Equipment Room Ceiling: Unknown

Equipment Layout

1/4" = 1'-0"

Ceiling Height Guide

Equipment Room:	10' - 6" (3200mm)	Recommended
	9' - 2" (2795mm)	***Minimum****
Exam Room Suspended Ceiling:	8' - 3 1/4" (2520mm)	***Required***
Exam Room RF Ceiling:	9' - 9" (2970mm)	Recommended
Control Room:	9' - 10" (3000mm)	Recommended
	7' - 3" (2200mm)	***Minimum***

* Ceiling Heights outside the minimum dimensions may be possible. These Ceiling Heights must be reviewed and approved.

0 1' 2' 4' 8'
0 .5m 1m 2m

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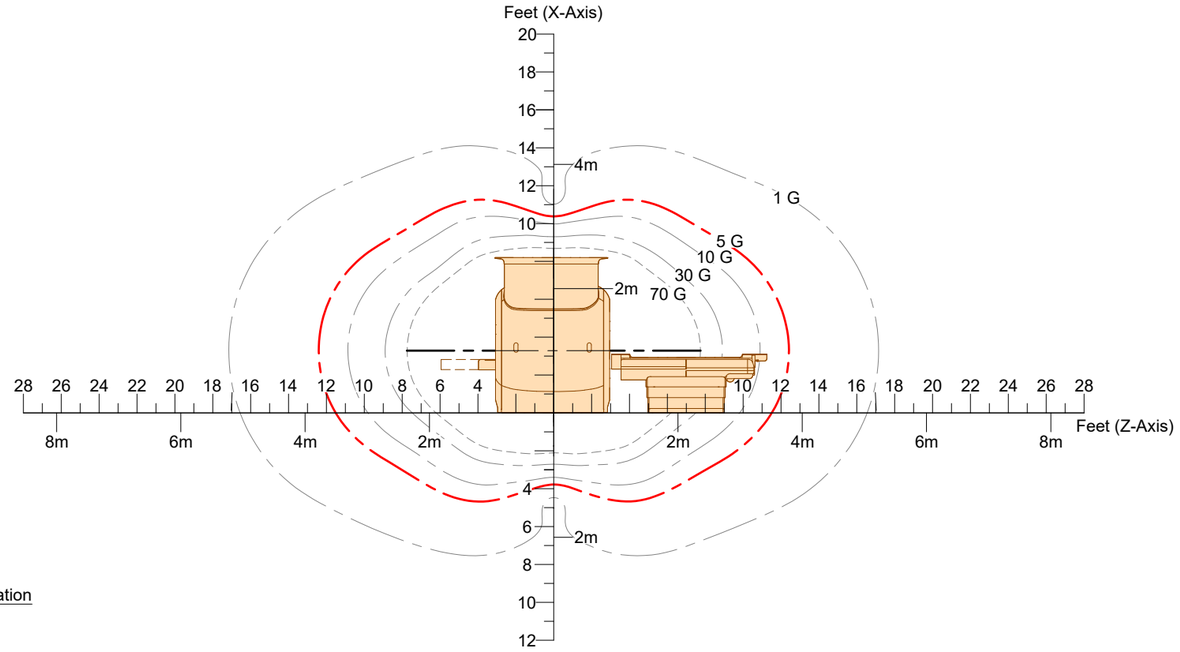
A1

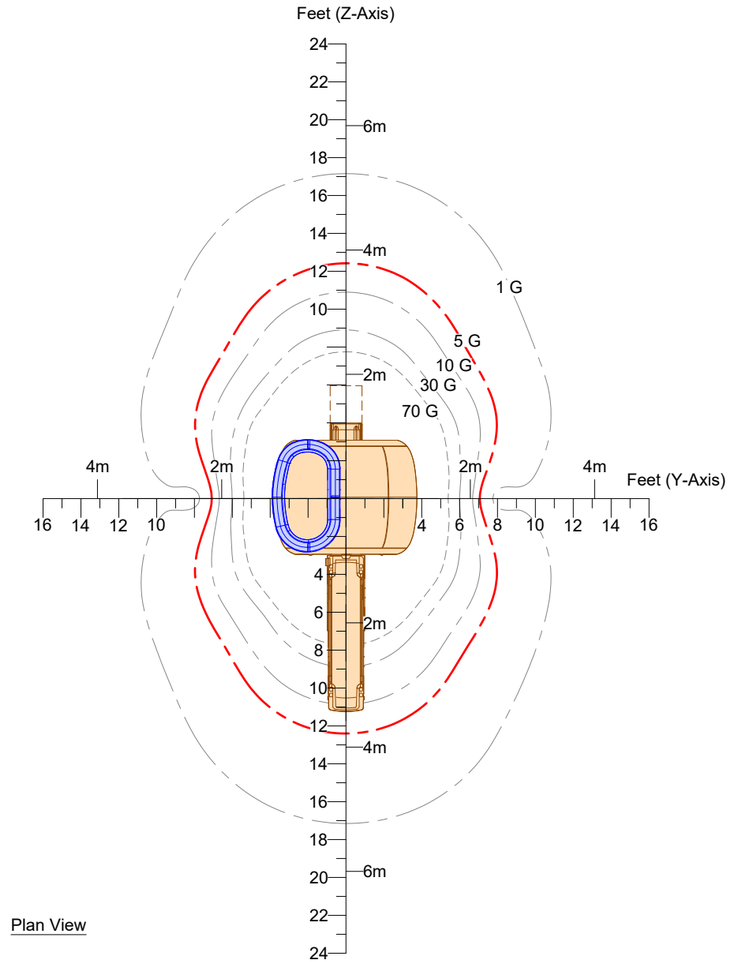
Detail - Magnetic Field Plot, without Magnet Shielding

(Static fringe field shown / Not to scale)



Side Elevation

(14.0)



Plan View

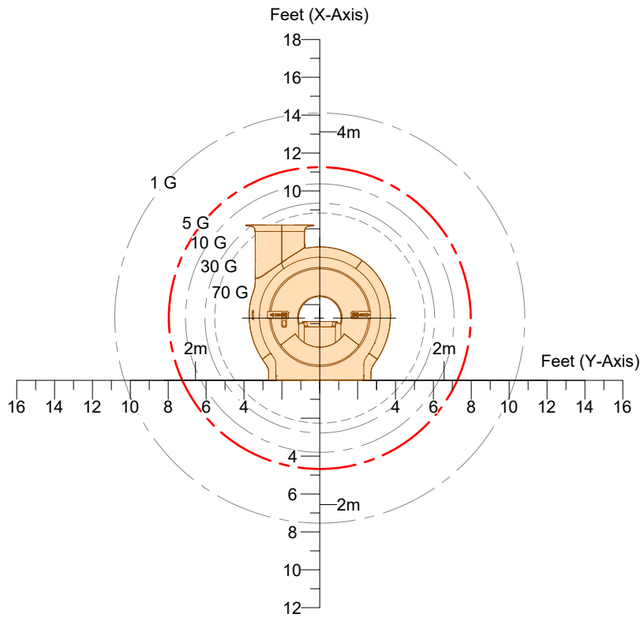
(18.0)

Typical Maximum Fringe Field

Equipment	
≤ 1.0 G (0.1 mT)	Nuclear Camera, PET Scanners, Linear Accelerators, Electron Microscopes, Gamma Camera, **Image Intensifiers**, Blood Chemistry Analyzers, Cyclotrons, X-ray CT Scanner with photo multipliers and **CRT Monitors**
2.0 G (0.2 mT)	CT Scanners manufactured after 2003
2.5 G (0.25 mT)	CT Scanners manufactured prior to 2003, Power and Main Distribution Transformers, and Ultrasound Machines
5.0 G (0.5 mT)	Neurostimulators, Biostimulation Devices, Power Conditioners, Flat Detectors, Video Monitor (monochrome), and **Pacemakers**
10.0 G (1.0 mT)	Computers, Tape Storage, Disc Drivers, HVAC Equipment, X-Ray Tubes, Emergency Generators, Food Prep Areas, Chillers, Telephone Switching, Credit Cards, Analog Watches and Clocks, Fuel Storage Tanks, ECG Equipment with LCD Display, and Motors/Pumps > 5 HP
15.0 G (1.5 mT)	Film Processors and Cardiac Recorders
25.0 G (2.5 mT)	Flat Panel (LCD) Monitors, Ultrasound with LCD
50.0 G (5.0 mT)	Laser Imagers, Telephones, X-Ray Electronics, Metal Detectors
100.0 G (10.0 mT)	Oxygen Monitor Sensor

Note:
The fringe field limits above are provided for preliminary planning purposes and represent the approximate exposure to magnet field acceptable for the type of instrument. It is the responsibility of the customer to have the vendor of the equipment in question set acceptable magnet field limits for proper operation of their equipment.

Valid for equipment located outside the RF Enclosure. In the examination room only MRI compatible equipment can be used. For specifications consult the supplier of the equipment. (16.0)



Front Elevation

(14.0)

Notes:

1. The fringe field diagrams indicated have been empirically confirmed under unobstructed, greenfield conditions. Actual environmental parameters at this site may influence the true extent of the fringe field and affect the accuracy of the field shown.
2. Isocenter in the X-Axis is 39.53" (1004mm) above finished floor.
3. Magnet shielding requirements are to be determined on a site by site basis. If additional shielding is required, consult with Philips Service. The customer accepts full responsibility for all cost associated with additional magnet shielding.
4. Due to variability in the orientation of the site with respect to the earth's magnetic field and construction of the site, the tolerances in Table 1 should be taken into account.

Table 1- Fringe Field Tolerances

Fringe Field	Tolerance
1 Gauss	± 2' - 8" (± 800mm)
5 Gauss	± 8" (± 200mm)
10 Gauss	± 4" (± 100mm)

(14.0)

PHILIPS

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Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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AD1

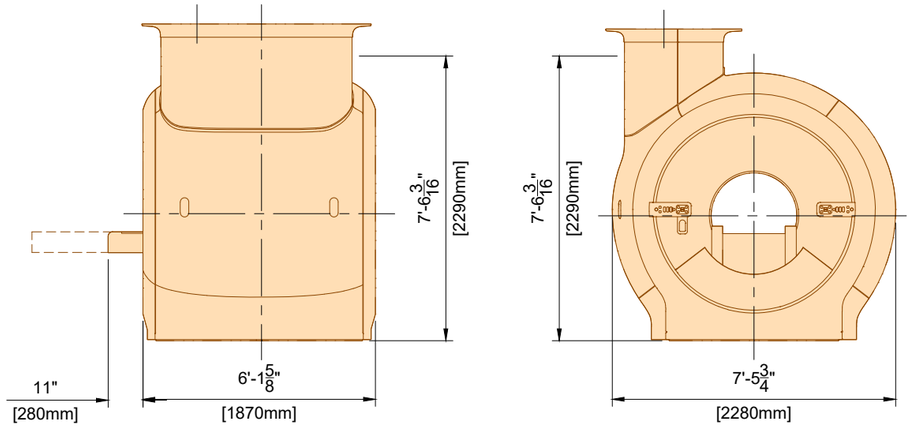
03.23.17

Detail - Magnet Rigging - Pre-assembled Magnet

Magnet assembly dimensions including transport frame and wheels	Length	Width	Height
Pre-assembled magnet assembly including covers	6' - 1 $\frac{1}{2}$" (1870mm)	7' - 6" (2280mm)	
If transport width is > 7' - 6" (2280mm)			7' - 6 $\frac{1}{4}$" (2290mm)
If transport width < 7' - 6" (2280mm) *			7' - 7 $\frac{1}{4}$" (2320mm)

* If transport width is < 7' - 6" (2280mm), the magnet needs to be transported sideways. Now the height increases due to a different location of the wheels under the magnet.

Note: Part of the patient support that is sticking out at the rear of the assembly has to be removed on site. This is a 15 minute job.



(14.0)

Detail - Magnet Rigging - With Covers Locally Removed

Magnet assembly dimensions including transport frame and wheels	Length	Width	Height
Pre-assembled magnet assembly with covers removed	6' - 0" (1820mm)	6' - 3 $\frac{1}{2}$" (1920mm)	
If transport width is > 6' - 4 $\frac{3}{8}$" (1940mm)			7' - 6 $\frac{1}{4}$" (2290mm)
If transport width < 6' - 4 $\frac{3}{8}$" (1940mm) *			7' - 7 $\frac{1}{4}$" (2320mm)

* If transport width is < 6' - 4 $\frac{3}{8}$" (1940mm), the magnet needs to be transported sideways. Now the height increases due to a different location of the wheels under the magnet.

(18.0)

General Delivery and Rigging Notes

1. Additional height for protective floor covering, and/or other site-specific restrictions must be added to the transport height.
2. All magnets are delivered pre-assembled.
3. The transport beams, wheels and hydraulic lifting tool will be delivered by the Transport and Installation team. An additional order is not needed.
4. It is the rigger's responsibility to provide a spreader bar if a crane will be used.
   a. Rigging is customer/contractor's responsibility unless specific arrangements have been made with Philips Sales/Service.
   b. Assembled magnet weight is 8157 lbs (3700kg).
   c. Transport via wall: A height of 7' - 10 $\frac{1}{2}$" (2400mm) and a width of 7' - 6 $\frac{9}{16}$" (2300mm) is recommended.
      Transport via roof: A length of 8' - 3" (2500mm) and width of 8' - 3" (2500mm) is recommended.
      Openings with smaller dimensions are possible, but are site situation depended. The tables above provide the minimum dimensions of the magnet assembly.
   d. The absolute minimum transport height is (2920mm)

Additional lifting detail to be provided upon request.

(18.0)

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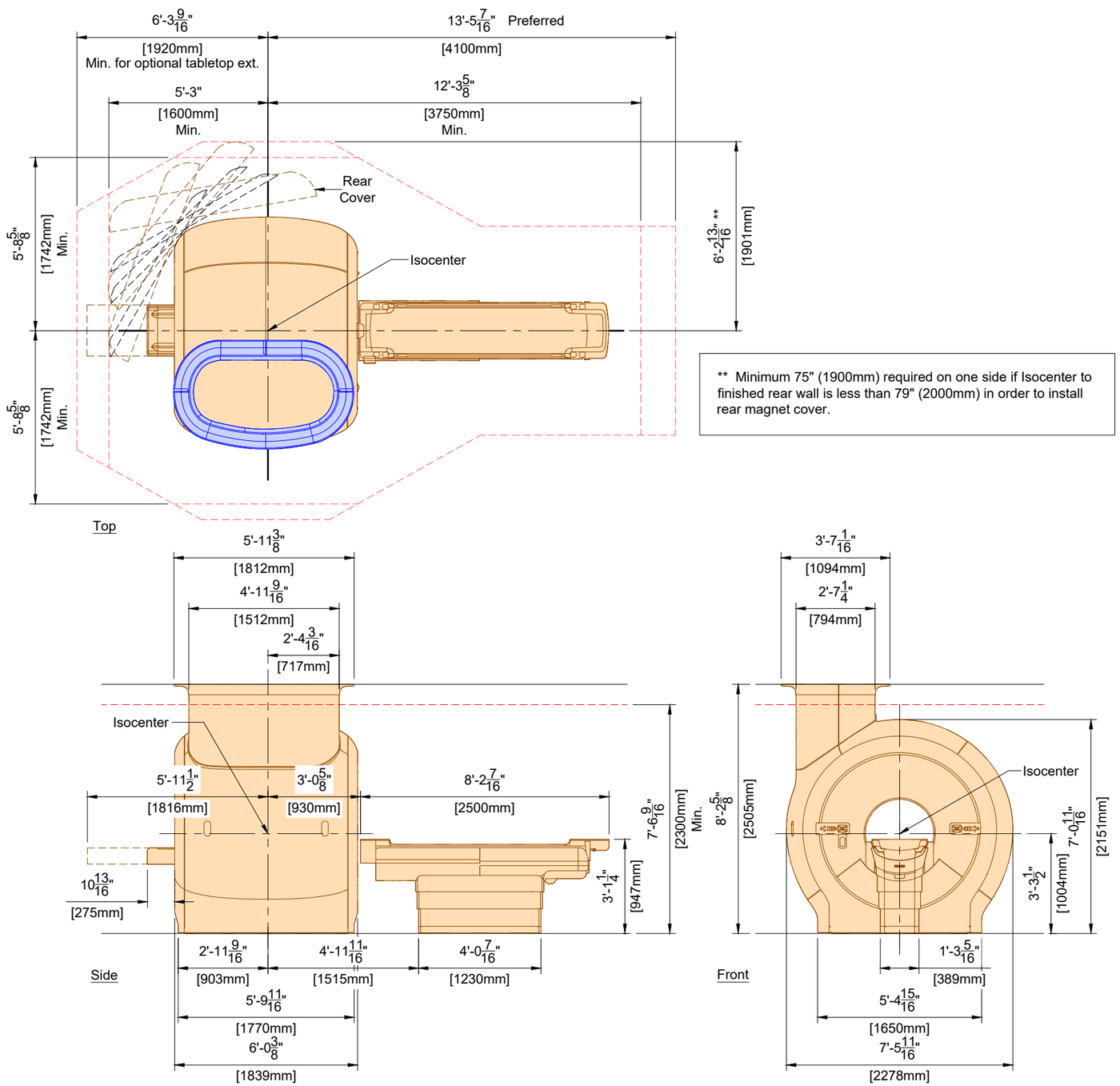
AD2



** Minimum 75" (1900mm) required on one side if Isocenter to finished rear wall is less than 79" (2000mm) in order to install rear magnet cover.

* For gradient coil, 3400 - 51200 btu/hr removed via water cooling system.

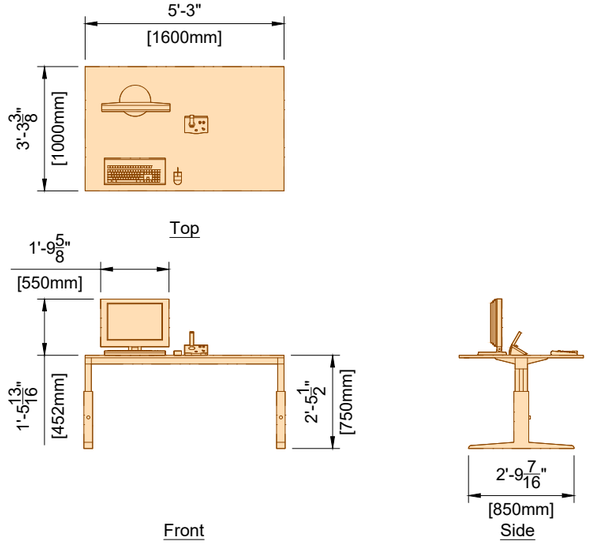
Maximum Patient Weight: 551 lbs (250 kg).

(18.0)

	Magnet Assembly	
MAG	Weight	Heat Dissipation
	8157 lbs	6800 btu/hr *

(14.0)

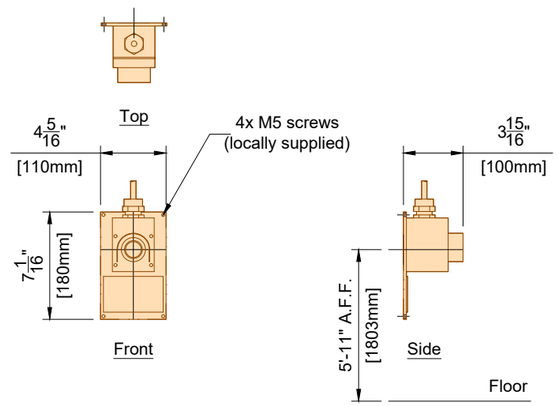
	Patient Support (MT)	
PS	Weight	Heat Dissipation
	573 lbs	1025 btu/hr



* Maximum distance between Monitor/Keyboard and Storage Rail is 1' - 8" (510mm) if Operator Console table is not ordered

(14.0)

	Operator's Table	
OT	Weight	Heat Dissipation
	220 lbs	0 btu/hr



(14.0)

	Emergency Run-Down Button	
ERB	Weight	Heat Dissipation
	3 lbs	0 btu/hr

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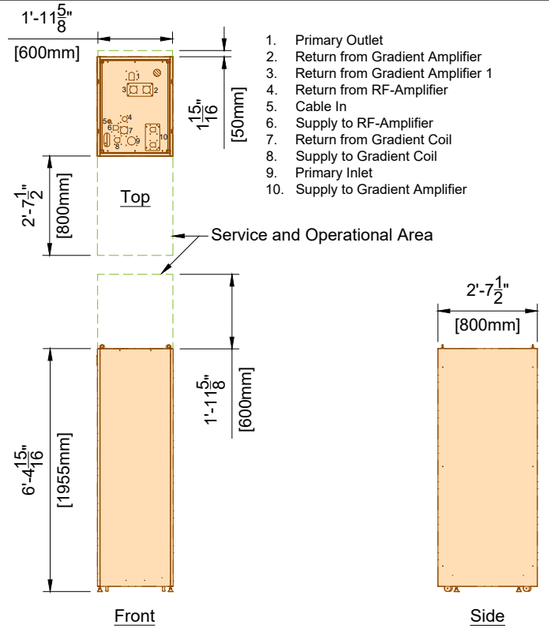
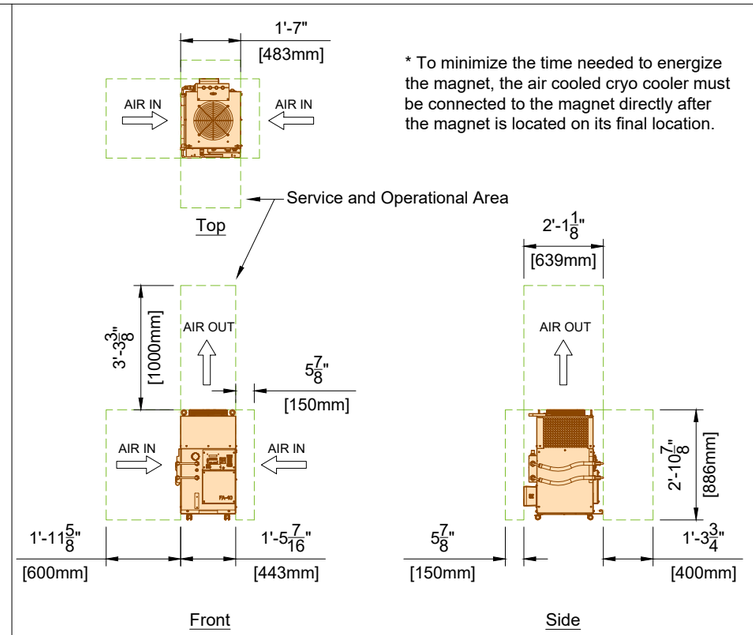
AD3



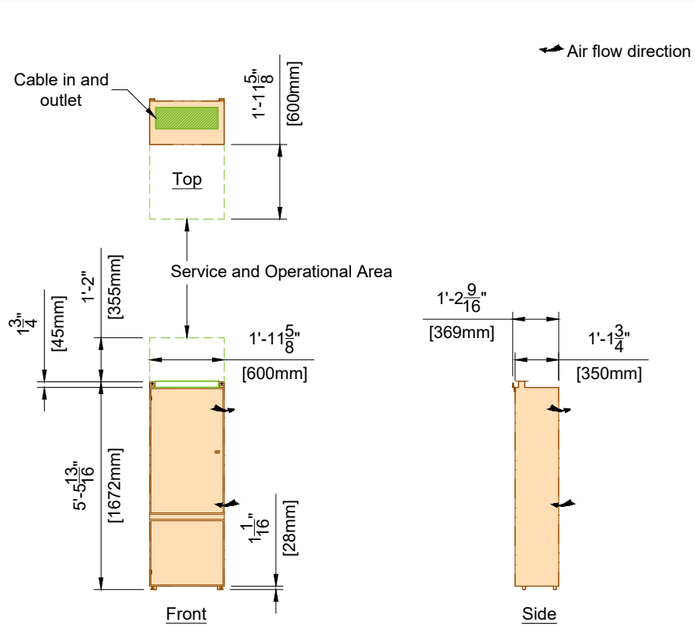
(18.0)

LCC	Liquid Cooling Cabinet	
	Weight	Heat Dissipation
	719 lbs	4095 btu/hr



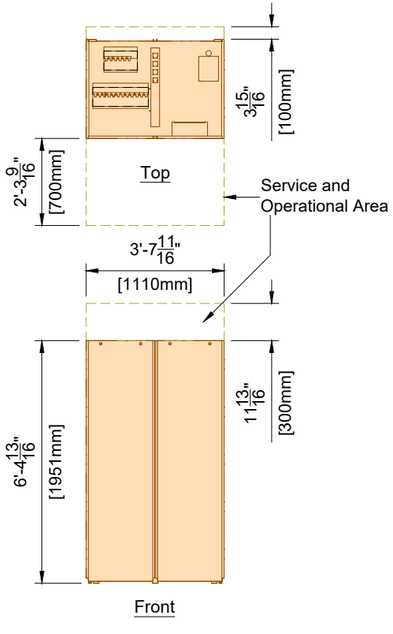
(18.0)

ACCC	Air Cooled Cryo Cooler	
	Weight	Heat Dissipation
	243 lbs	19108 btu/hr



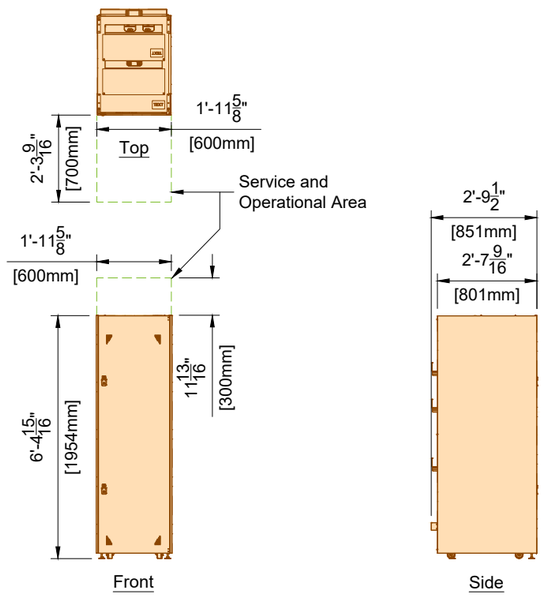
(14.0)

MDU	Mains Distribution Unit - 480V, 60Hz	
	Weight	Heat Dissipation
	605 lbs	1700 btu/hr



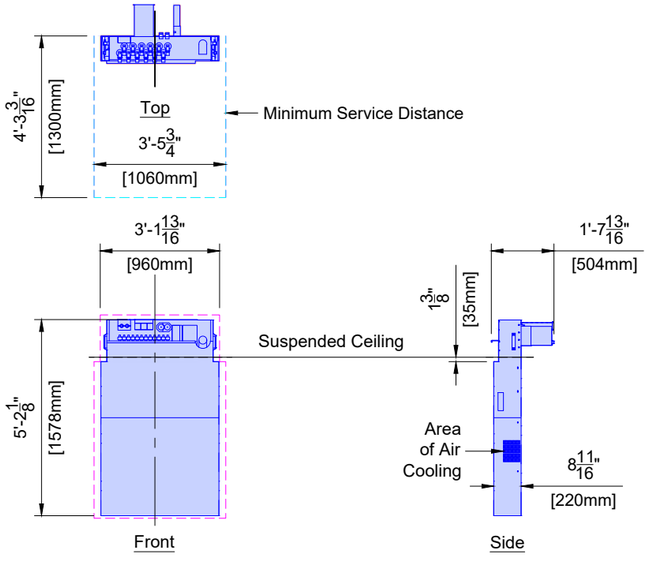
(14.0)

GAC	Gradient Amplifier 787 Double Cabinet	
	Weight	Heat Dissipation
	2015 lbs	27900 btu/hr



(18.0)

DACC	Data Acquisition and Control Cabinet	
	Weight	Heat Dissipation
	875 lbs	3400 btu/hr



(14.0)

SFB	System Filter Box	
	Weight	Heat Dissipation
	175 lbs	3400 btu/hr

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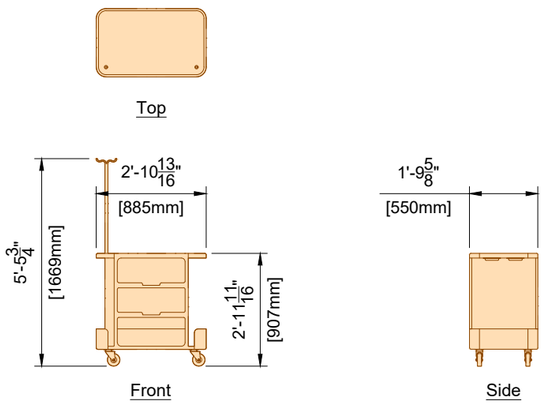
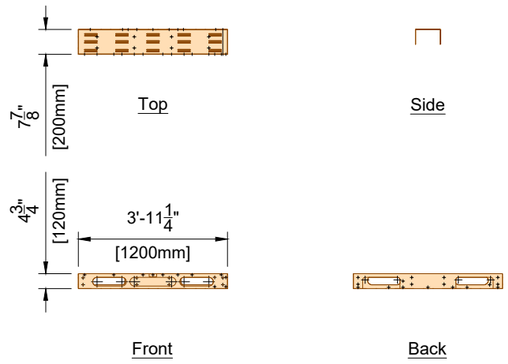
AD4



(14.0)

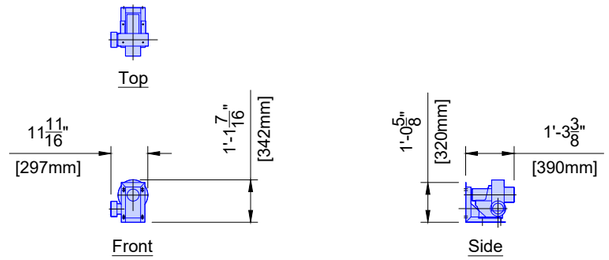
	Flex Caddy Coil Cart	
FC	Weight	Heat Dissipation
	t.b.d.	0 btu/hr



* For Mounting methods, see SD4 Page.

(16.0)

	Storage Rail	
SR	Weight	Heat Dissipation
	- lbs	- btu/hr



(14.0)

	System Air Cooling Unit	
SACU	Weight	Heat Dissipation
	55 lbs	340 btu/hr

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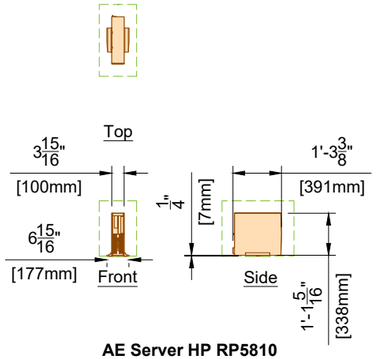
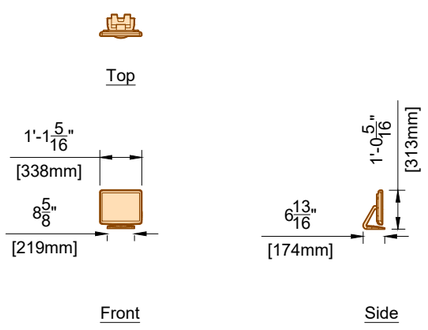
AD5



AE Server HP RP5810

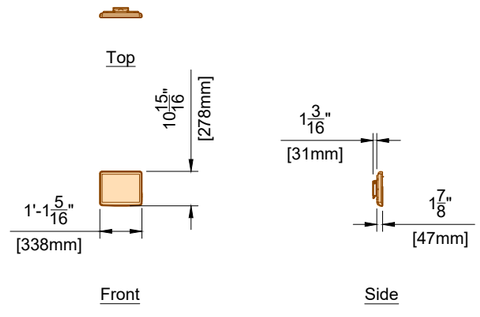
(17.0)

IBC	In-Bore Connect Computer	
	Weight	Heat Dissipation
	15 lbs (6.8 kg)	132 Btu/hr (39 W)



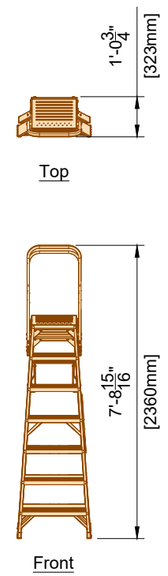
(15.0)

ATS	AE Touch Screen	
	Weight	Heat Dissipation
	10.6 lbs	102 btu/hr



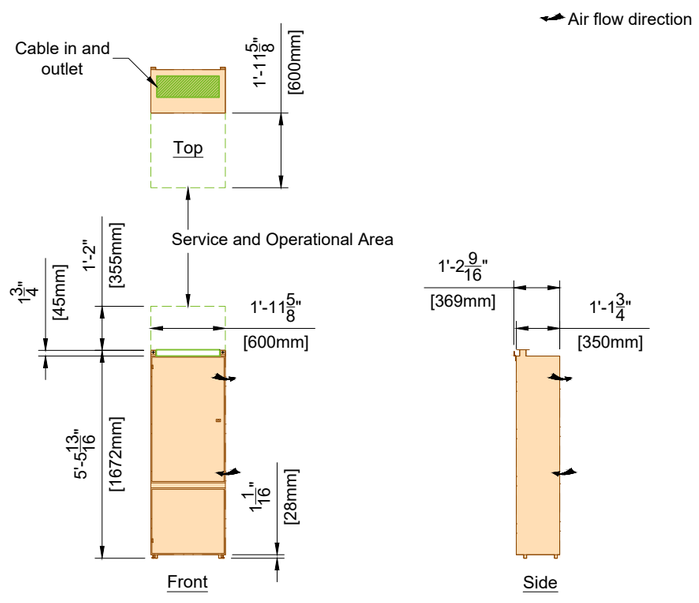
(15.0)

ATSW	AE Touch Screen (Wall Mounted)	
	Weight	Heat Dissipation
	10.6 lbs	102 btu/hr



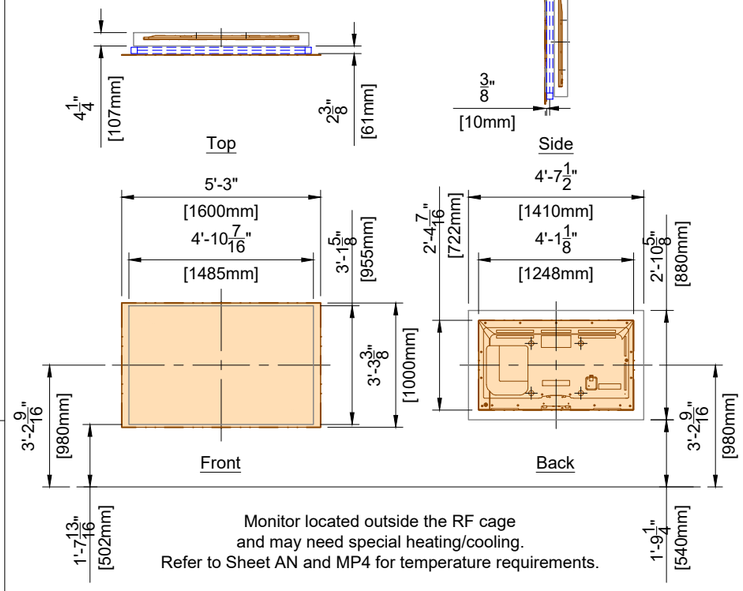
(18.0)

SP	Service Platform	
	Weight	Heat Dissipation
	t.b.d.	0 btu/hr



(18.0)

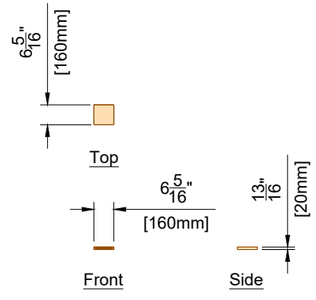
BCP	Backup Power Connection Panel	
	Weight	Heat Dissipation
	605 lbs	t.b.d.



Monitor located outside the RF cage
and may need special heating/cooling.
Refer to Sheet AN and MP4 for temperature requirements.

(15.0)

PIB	Patient In-Bore Monitor	
	Weight	Heat Dissipation
	97 lbs	853 btu/hr



(17.0)

DVD	DVD Writer	
	Weight	Heat Dissipation
	97 lbs	853 btu/hr

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Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
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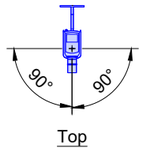
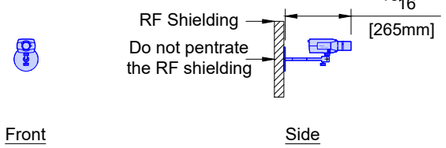
6600420761.020000

AD6

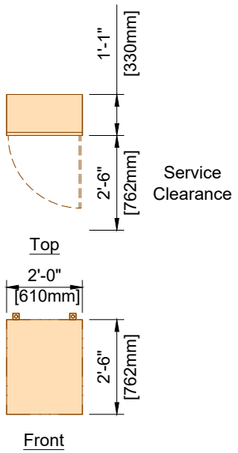
Scale $\frac{1}{2}$" = 1'





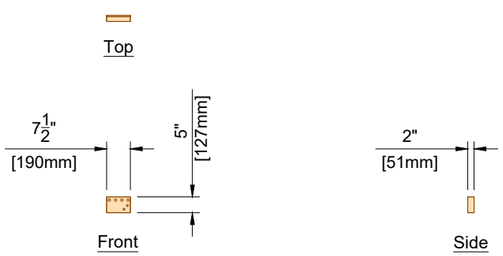
(14.0)

POC	Patient Observation Camera	
	Weight	Heat Dissipation
	3 lbs	0 btu/hr



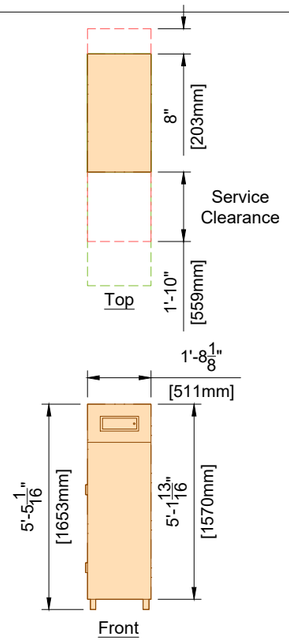
(14.0)

FAF	FA Series Three Phase Filter	
	Weight	Heat Dissipation
	210 lbs	0 btu/hr



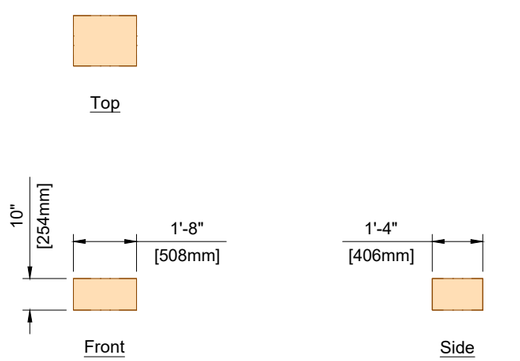
(15.0)

RSP	Remote Status Panel (for UPS)	
	Weight	Heat Dissipation
	12 lbs	50 btu/hr



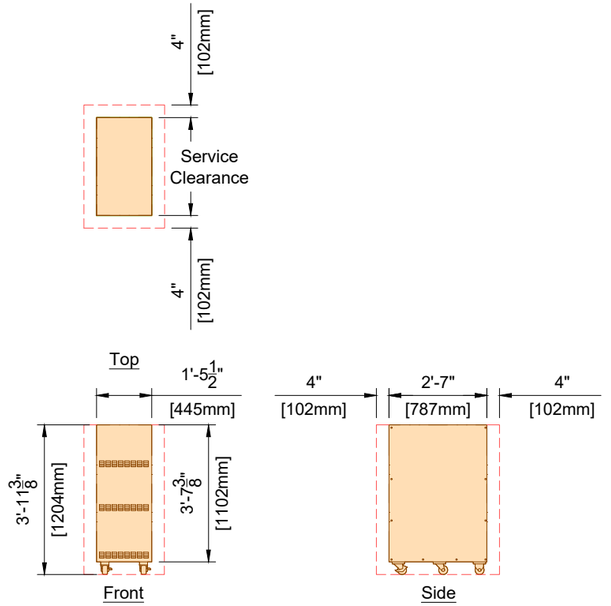
(17.0)

UPS	25 kVA UPS Cabinet	
	Weight	Heat Dissipation
	1,135 lbs	11564 btu/hr



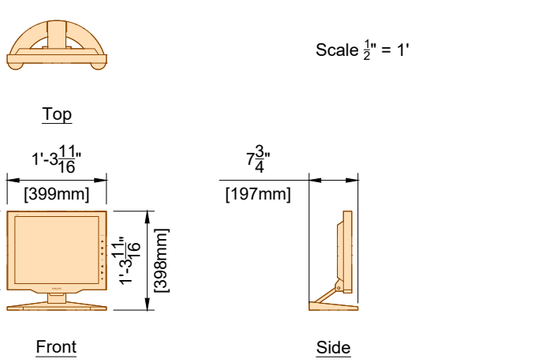
(15.0)

RAD	Resoundant Active Driver	
	Weight	Heat Dissipation
	53 lbs	- btu/hr



(17.0)

BC	Battery Cabinet	
	Weight	Heat Dissipation
	880 lbs	0 btu/hr



(14.0)

POM	Patient Observation Monitor	
	Weight	Heat Dissipation
	3 lbs	0 btu/hr

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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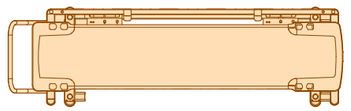
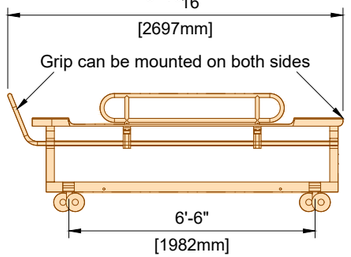
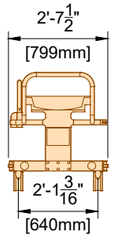
AD7



Top



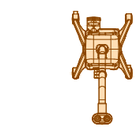
Front



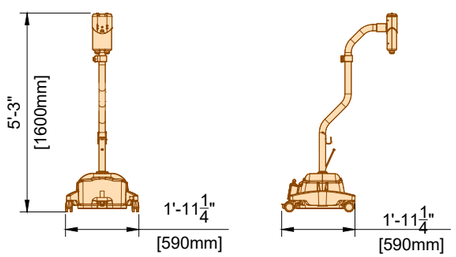
Side

(14.0)

	HA FlexTrak	
FT	Weight	Heat Dissipation
	113 lbs	- btu/hr



Top

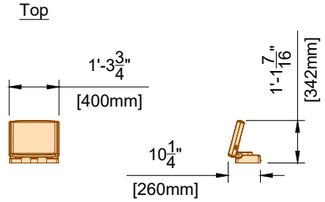


Front Side

(17.0)

	MRXperion Injector	
XI	Weight	Heat Dissipation
	94 lbs	- btu/hr

Top

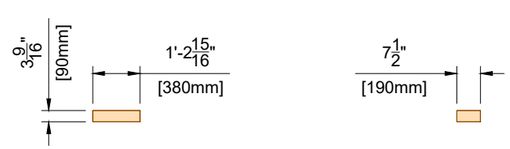


Front Side

(17.0)

	Injector Display Control Unit	
XD	Weight	Heat Dissipation
	17.6 lbs	675 btu/hr

Top



Front Side

(17.0)

	iCBC Power Supply Unit	
XPS	Weight	Heat Dissipation
	6 lbs	660 btu/hr

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com

Drawn By: Brandon Nidiffer

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AD8

Magnet Field Homogeneity Explained

Image quality is dependant on the homogeneity and stability of the magnetic field (B0). The homogeneity of B0 can be distorted by static ferromagnetic objects such as floor reinforcement (rebar, structural beams, etc.). The stability of the magnetic field (B0) can be disrupted by moving ferromagnetic objects (cars, trains, elevators, etc.). These can cause variations of B0 which will produce image artifacts such as ghosting.

Electromagnetic fields such as current in power lines, motors, generators, and transformers can also cause B0 variation. The magnitude of the variation will decrease as the source gets farther away from the magnet. As such, there are minimum required distances to the magnet for every type of disturbance, depending upon its properties (weight, current, etc.). Disturbances measured in the Z-axis (direction of the patient table) are most critical for image quality.

Solutions for sites violating requirements will depend on the source of disturbance and construction of the site. To help identify potential disturbances, sources can be classified into seven categories:

1. Static ferromagnetic objects (beams, stirrups, rebar, etc.)
2. Moving ferromagnetic objects (cars, trucks, etc.)
3. Moving magnetized objects
4. Electrically Powered Rail Systems (trains, trams, subways)
5. Electromagnetic fields (power lines, transformers, motors)
6. Static magnetic fields (other magnets)
7. Coherent and non-coherent vibrations

1. Static Ferromagnetic Objects - (see Figure 1)

a. Floor Reinforcement (i.e. rebar, stirrups, etc.):
For the square area of 9' - 10" x 9' - 10" (3 m x 3 m) symmetrically around magnet isocenter, ferromagnetic reinforcement must be:
- **NOT allowed** between the finished floor level and 1-15/16" (50mm) below the finished floor level.
- **NO greater** than 25 kg/m^2 average concentration between 1-15/16" (50mm) and 9-13/16" (250mm) below the floor slab, Ferromagnetic reinforcement in this area must be evenly distributed. Reinforcement below 9-13/16" (250mm) can be ignored.

b. Ferromagnetic beams perpendicular to the Z-axis of the magnet must be located at least 9-13/16" (250mm) below the finished floor level.

c. All other ferromagnetic beams must be located at least 1' - 11-5/8" (600mm) below the finished floor level.

d. Substantial ferro-magnetic objects or structures outside of the RF enclosure must be located at a minimum of 8' - 3" (2.5m) from magnet isocenter.

e. Inside the Examination Room, all metal must be non-ferromagnetic. This is to avoid potential image quality issues and missile effects due to attraction forces of the magnet field.

2. Moving Ferromagnetic and Magnetized Objects - (see Figure 2)

a. Minimum Distances: Ferromagnetic objects such as trucks, cars, and trolleys can be magnetized by the Earth's magnetic field and by the magnet's fringe field. Figure 2 shows the minimum distances moving ferromagnetic objects must be from isocenter.

b. Minimum Distances: Some ferromagnetic objects are magnetized because of high currents repeatedly entering the fringe field of the magnet (e.g. elevators). The safety distance for these objects can be calculated by multiplying their weight by 10 and using the chart in Figure 2.

3. Electrically Powered Rail Systems - (see Table 1)

a. Minimum Distances: Electric trains, tramways, and subways are typically powered by electrical traction. For railways with overhead power lines, the current through the power lines (and the returning current through the rails) will induce high magnetic field variations that will extend over a large region. These fields will have a small variation in the direction perpendicular to the power lines. Therefore, B0 variation depends on the distance from the power line to the isocenter, the current, and the angle between the power line and the magnet's Z-axis (0° is parallel to Z-axis). Table 1 shows the minimum distance allowed for electrically powered rail systems versus current and its angle to the magnet Z-axis.

4. Electromagnetic Fields - (see Table 2)

a. Minimum Distances: Currents in power lines, large transformers or electric motors near an MR system can affect the stability of the magnetic field since they also produce electromagnetic fields. Table 2 shows the minimum distances allowed.

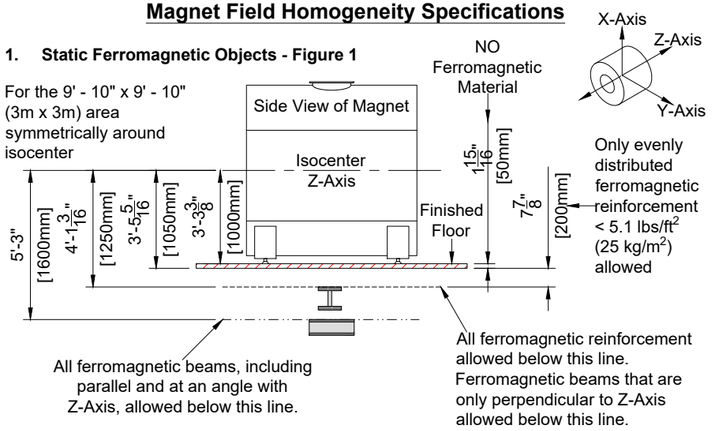
5. Static Magnetic Fields - (see Table 3)

a. Minimum Distances: If an MR system is installed next to another MR system, ensure that the strength of the magnet field from the other system does not exceed the specified values at isocenter of the future system. If the field is between certain values, then the magnet must be re-shimmed when the other system's field goes on or off. Table 3 shows the maximum gauss field allowed.

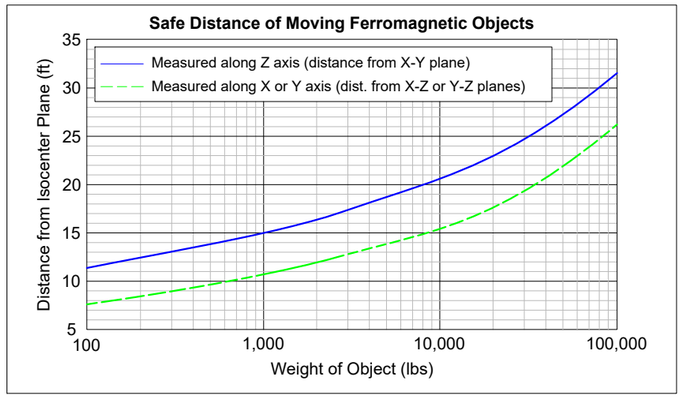
Possible Counter Measures:
If minimum distances are not met, image quality problems are likely to occur. B0 variations can be measured at various angles to find the most optimum angle to site the future Z-axis of the MR system if the distances or the angle to the isocenter are not exactly known. If minimum distances are not met, contact local Philips service to test and evaluate the site.

Magnet Field Homogeneity Specifications

1. Static Ferromagnetic Objects - Figure 1



2. Moving Ferromagnetic Objects - Figure 2



3. Moving Magnetized Objects
For magnetized objects (because of high currents or repeatedly entering the fringe field of the magnet, e.g. elevators), multiply the weight by 10 to obtain a safety distance from Figure 2.

4. Electrically Powered Rail Systems - Table 1

Distance (ft) for Electrically Powered Subway and Trains *	Angle (degrees), 0° is parallel to Z-Axis						
	0°	15°	30°	45°	60°	75°	90°
Current = 750 Amps	46' (14m)	62' (19m)	69' (21m)	75' (23m)	79' (24m)	82' (25m)	82' (25m)
Current = 2000 Amps	59' (18m)	105' (32m)	115' (35m)	125' (38m)	131' (40m)	135' (41m)	135' (41m)

* Note that for short distances, the weight of the trains must also be considered.

5. Electromagnetic Fields - Table 2

Object with Electromagnetic Field	Safety Distanced from Magnet Isocenter (in)
Power Line	8.8 √ Amperage (A)
Transformer	15.5 √ Power (kVA)
Motor/Generator	36 √ Power (kVA)

6. Static Magnet Fields - Table 3

Allowed Field Strength of Another MR System at Magnet Isocenter	
Field Strength of Other System *	**Result**
< 0.5 Gauss (0.05 mT)	Always Possible
> 0.5 Gauss (0.05 mT) AND < 3 Gauss (0.3 mT)	Re-shimming Required
> 3 Gauss (0.3 mT)	Not Allowed

* Note that these values are for Philips magnets only.

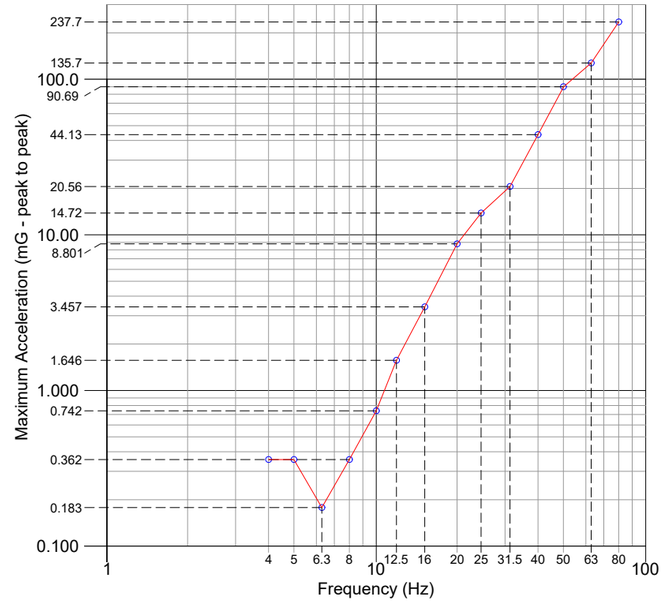
Magnetic Field Homogeneity - Vibration Specifications

7. Coherent and Non-Coherent Vibrations

a. Mandatory Floor Vibration Testing: Floor vibrations can affect the stability of the magnetic field which leads to poor image quality. In order to evaluate the acceptance of a site, environmental testing is mandatory. Measurements are to be completed by local Philips service and evaluations are completed by Philips Site Planning department. Contact local Philips service to arrange an environmental test and evaluation.

b. Specifications:
- Coherent Vibration: Coherent vibrations have a signal with a constant amplitude and frequency. Typical sources are electrical powered motors, air handling systems, etc. These vibrations provide a constant disturbance during the entire measurement period (scan). Coherent signals result in distinct artifacts which are the main source of image quality problems. However, disturbing sources can typically be handled once the source is found. Solutions involve re-balancing, isolating on springs, or re-installing the source on vibration pads.
- Non-Coherent Vibration: Non-coherent vibrations can be categorized into pulse, transient, or noise-like vibrations. Pulse and transient vibrations are single events, and will decrease in a short time. Noise-like vibrations have no specific frequency and are broadband. Typical noise-like vibrations are caused by vehicular traffic, people walking, or the resonance of the building structure. These sources are difficult to eliminate. Furthermore, the building structure can have a negative response on the vibration induced. The only possible solution is to change the construction of the building (i.e. isolate MR floor slab). In this case, the customer must consult with a third party vibration and structural engineer.
- Settings for Fast Fourier Transformer Analyzer shown in table below:

Maximum Allowed Acceleration in Terts Band



Acceleration [m/s2] rms vs Frequency Scale (Hz)					
Acceleration	Frequency	Acceleration	Frequency	Acceleration	Frequency
0.001256	4.0	0.005709	12.5	0.153029	40.0
0.001256	5.0	0.011990	16.0	0.314500	50.0
0.000637	6.3	0.030520	20.0	0.470690	63.0
0.001256	8.0	0.051033	25.0	0.824273	80.0
0.002573	10.0	0.071302	31.5		

c. Third Party Consultation: Third party vibrations pads are not allowed under the feet of the magnet. All other third party solutions to external vibration disturbances (i.e. pneumatic isolated floors, etc.) must be designed to encompass the whole exam room floor and must meet all of the MR system's specifications (vibration specification, shimming requirements, proximity of ferromagnetic material, etc.). In addition, long term affects (such as creeping), must be considered since the magnet's relationship with the patient table is extremely critical. Philips does not review or approve any third party designed solutions.

(18.0)

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Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
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66004207761.020000

SN1

03.23.17

MRI Support Notes

1. Door(s)

For convenient and safe transport of patients on trolleys, and for installation and maintenance actions, a minimum clearance of 48" W x 84" H (1220mm W x 2130mm H) is recommended. Smaller doors may hinder facility staff in getting access to the patient and in transferring the patient to a place where life saving actions can be performed in an emergency situation. For safety reasons the door(s) should comply with the following:

a. To be opened or closed within 3 sec., and with a force < 22.5 lbs (100 N).
b. Manual operator action required to close the door (not automatic).
c. Threshold no more than 0.8" (20mm), or 2.4" (60mm) if provided with ramps no
d. Steeper than 10%.
e. Simple to operate.
f. A power-assisted door must, in the event of a failure, be opened within 10 seconds with a force no greater than 56.2 lbs (250 N).
g. The design of the door posts should be such that they are not damaged by typical contact with patient gurneys.

2. Magnet Transfer Opening

The magnet is the only system part that in most cases cannot be transferred through the door of the RF enclosure. A special opening to allow its installation in the enclosure must therefore be made available. **Refer to Sheet AD2** for required dimensions. The underside of the magnet transfer opening should be flush with the floor. If building constraints make this impossible, the RF enclosure supplier must deliver ramp(s) with slopes no steeper than 5% and a maximum height of 4.75" (120mm). The location of the transfer opening will naturally be site dependent. It should, however, comply with the following conditions:

a. Preferably be accessible through existing hospital corridor(s), provided these meet other other necessary requirements (i.e. floor loading, corridor width and height).
b. It should be accessible from outside through a wall or the roof.

If re-opening of magnet transfer opening is needed, it must be possible for Philips service to re-open the magnet transfer opening without invalidating the RF enclosure guarantee. Should specialist servicing be required, this should be done only by the RF shielding manufacturer's own personnel and any special tools used should be supplied by the RF shielding manufacturer.

3. RF Viewing Window

The recommended window size is 48" W x 40" H (1200mm W x 1000mm H) with the window base no more than 39" (1000mm) above finished floor level. The minimum window size is 36" W x 24" H (900mm x 600mm H). The transparency of window material (i.e. the mesh) must be better than:

a. 30% for an angle between 40 and 140°.
b. 50% for an angle between 70 and 110°.

The windowpane must be made of tempered safety glass. The window material must have an attenuation factor less than 2 in the light color range of 2600 to 4200 K. Moreover, it must cause no color change in the transmitted light to allow the operator to get an accurate impression of the patient's complexion. The window shielding material (mesh) must be sandwiched between two panes of glass. All parts of the window (e.g. the mesh) that contribute to the attenuation must be made of non ferro-magnetic material. For optional sound damping the two window panes should have a different thickness (e.g. 0.24" and 0.31" [6 and 8mm]).

4. Floor - Covering Material

To avoid electrostatic discharge problems, the floor must have a resistively of less than 1 x 10^9 Ω / square or it must comply with NEN EN IEC 61340-4. Verify local codes before installing any flooring that is not rated as static dissipative.

5. Foundation of Magnet and Patient Support

Shocks and vibrations up to 0.1 g, in all directions, have to be anticipated. The friction between magnet and floor will normally be great enough to keep the magnet in place (friction factor > 0.1) so no fixing measures are required unless in a seismic area. The patient support is subject to forces induced by operators and patients. To prevent tilting, the patient support must be fastened to the floor.

6. Suspension Provisions

The provisions for system wiring and suspended ceiling are not part of the RF enclosure delivery by Philips. However, fixing points for the suspension of these items must be available in the enclosure ceiling. Requirements are determined by the local situation. In addition, suspension points for the lighting, air-conditioning equipment, etc. maybe required. Finally, the suspension provisions must not affect RF enclosure integrity. The responsibility for ensuring this integrity lies with the manufacturer of the RF enclosure.

(18.0)

General Equipment Support Notes

1. General

The customer shall be solely responsible, at their expense, for preparation of the site, including any required structural alterations. The site preparation shall be in accordance with this plan and specifications, the architectural/construction drawings, and in compliance with all safety and building codes. The customer shall be solely responsible for obtaining all construction permits from jurisdictional authority.

2. Equipment Anchorage

Philips provides, with this plan and specifications, information relative to equipment size, weight, shape, anchoring hole locations and forces which may be exerted on anchoring fasteners. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings, information regarding the approved method of equipment anchoring to floors, walls and/or ceiling of the building. Any anchorage test required by local authority shall be the customer's responsibility. Stud type anchor bolts should not be specified as they hinder equipment removal for service.

3. Floor Loading and Surface

Philips provides, with this plan and specifications, information relative to size, weight and shape of floor mounted equipment. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings confirmation of the structural adequacy of the floor upon which the equipment will be placed. Any load test required by local authority, shall be the customer's responsibility. The floor surface upon which Philips equipment and floor plates are to be placed/anchored shall be super flat and level to within +0" / - $\frac{1}{8}$" (2.5mm).

4. Ceiling Support Apparatus (If Applicable)

Philips provides, with this plan and specifications, information relative to size, weight and shape of ceiling supported equipment. The customer shall be solely responsible, through the engineer of record for the building, to provide on the architectural/construction drawings, information regarding the approved method of structural support apparatus, fasteners and anchorage to which Philips will attach equipment. Any anchorage and/or load test required by local authority shall be the customer's responsibility.

The structural support apparatus surface to which Philips equipment is to be attached, shall have horizontal equipment attachment surfaces parallel, square and level to within plus or minus $\frac{1}{16}$" (2mm) for the area the system covers.

Contractor to clearly mark Philips equipment longitudinal centerline on bottom of each structural support.

Any drilling and/or tapping of holes required to attach Philips equipment to the structural support apparatus shall be the responsibility of the customer.

Fasteners/anchors (i.e., bolts, spring nuts, lock and flat washers) and strip closures shall be provided by the customer.

5. Suspended Ceiling

Special requirements for the suspended ceiling within the RF enclosure:

a. It must be constructed from non-ferrous material. Tiles composed of high recycle metal composition (ie. USG490) are not allowed as they often contain ferrous ferromagnetic metal.
b. It is recommended to have sound damping
c. No hanging objects such as spot lamps are to hang lower than 8' - 3 $\frac{1}{4}$" (2520mm) in order to give clearance for the removal of the magnet covers for servicing.
d. The access panel or opening in the ceiling to enable a cold head change shall comply with specifications given on SD1.
e. Ceiling grid hangers must be made of non-ferromagnetic material and must be insulated.
f. Any loose hardware or tools should not be installed or left above suspended ceiling. If the hardware vibrates it could cause image quality issues and if it is ferrous it could eventually end up inside the magnet gantry.

- To avoid spikes, (non ferromagnetic) metal e.g. aluminum strips, aluminum light fixtures, air handling grids etc. must be connected to the RF-enclosure grounding point. Beware of metal-on-metal connections where two metal parts rub against one another. This could cause image artifacts.
- In case of aluminum strips used for the suspended ceiling grid; each individual strip must be connected. In case aluminum tiles, each individual tile must be connected to the RF-enclosure grounding point.
- It is allowed to connect all individual parts to each other and finally to the RF-enclosure grounding point.
- For good electrical connection of the grounding wire a tooth washer is required.
- Before connection is made, coating / insulating finishing must be removed.
- The volume above the suspended ceiling above the magnet and service area must be free of obstacles for service activities. No third party equipment / installations are allowed here.
- The impedance between any conductive part and the central PE bus-bar/terminal must not exceed 100 mW.

6. Lighting

Lighting fixtures shall be placed in such a position that they are not obscured by any equipment or its movement, nor shall they interfere with Philips ceiling service clearances. Such lighting fixture locations shall be the sole responsibility of the customer. Recommend plastic conduit when it does not interfere/violate with local codes.

7. Ceiling Obstructions

There shall be no obstructions that project below the finished ceiling in the area covered by ceiling suspended equipment travel (if applicable).

8. Floor Obstructions

There shall be no obstructions on the floor (sliding door tracks, etc.) in front of the Philips technical cabinets. Floor must be clear to allow cabinets to be pulled away from the wall for service.

9. Seismic Anchorage (For Seismic Zones Only)

All seismic anchorage hardware, including brackets, backing plates, bolts, etc., shall be supplied and installed by the customer/contractor unless otherwise specified within the support legend on these drawings.

Installation of electronic cabinets to meet seismic anchorage requirements must be accomplished using expansion type (HILTI HDI, or eq.) anchor/bolt systems to facilitate the removal of a cabinet for maintenance. Do not use threaded rod/adhesive anchor systems for the cabinets. Consult with Philips regarding any anchor system issues.

10. Sprinkler System

All sprinkler pipes and sprinkler heads inside the RF-enclosure to be made of non-ferrous material. The sprinkler pipe must enter the RF-enclosure via one feedthrough and must not branch off into multiple pipes. Sprinkler heads must be located outside of the magnet's body.

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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SN2

MRI Safety

1. Safety with Magnetic Fields
It is the responsibility of the customer to satisfy the following safety requirements:

a. Controlled Zone:
- During the siting of a Philips MR system, a controlled access area around the MR system must be defined where the field strength will exceed 5 Gauss (0.5 mT). Warning signs "CAUTION" - Magnetic field permanently switched on" should be used to indicate this area. The area must be clearly visible, e.g. by markings on the floor, barriers or other means to control access to this area by unauthorized persons.
- Persons having pacemakers, neuro-stimulators, insulin pumps or similar devices, or implants of ferromagnetic material (i.e. surgical clips, artificial cardiac valves, prostheses or metal splinters) must stay outside the controlled access zone.
- The security procedures at the entrances of the examination room should prevent prohibited objects from being brought into the examination room. Metal detection equipment can be used.
- No medical gas containers may be brought into the exam room area unless it has been determined that the container is made of non-ferrous material. Special non-ferrous containers are available from liquid gas suppliers and must be appropriately labeled.
- Ferromagnetic objects, such as scissors, tools, gas bottles, vacuum cleaners and stretchers, must be kept outside the examination room. Such objects will be pulled to the magnet, and may cause injury to patients and staff, or may damage the equipment.
- Magnetic shielding requirements to minimize the controlled zone, or contain it within the exam room are to be determined on a site by site basis. If additional shielding is required, consult with Philips service. The customer accepts full responsibility for all costs associated with additional magnetic shielding.

b. Emergency Magnet Run-down:
- The MR system is provided with two magnet emergency run-down remote push buttons to terminate the magnetic field. This should only be used in case of an emergency.
- If in a medical emergency, non MRI-safe instruments must be used, the patient must be removed from the examination room first.
- In case of a deliberate quench (magnet run-down) by the operator to implement life supporting and other safety procedures, the magnet field strength at the isocenter is reduced to a value below 200 G (20 mT) within 30 seconds.

2. Safety Zones
MRI safety guidelines recommend that facilities be zoned to ensure patient safety. It is the sole responsibility of the customer to regulate and/or restrict staff and patient flow within the MR environment as necessary. MR safety zones are described as follows:

Zone I - Entrance to facility, reception and waiting areas. No restrictions to patient access.
Zone II - Patient holding area and/or dressing rooms. Patient access may be restricted, or staff supervision may be required.
Zone III - MR control area and equipment room. Accessible only by authorized or properly trained MR personnel. It is recommended that a card-key locking device be used to gain access to these areas.
Zone IV - Scanner room. This area should be accessible solely from Zone III, and access to the scanner room should be observed and control by authorized MR personnel. It is recommended that a warning light be illuminated at all times, with a 24-hour backup power system in the event of a power outage.

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Safety Marking Plate

An Examination / RF-door provide access to high static magnetic fields and RF-fields.

To guard against accidents and injuries to patients and others as well as damage to the MR scanner, warning signs are required to exclude:
- People who may have pace makers, implants, neuro-stimulators, etc.
- Ferromagnetic objects to avoid missile effects.
- Sensitive electronic devices.

The safety marking plate should be placed to be viewed if the door is closed, but especially also if the door is opened. Due to that, it is better to locate the sign near the door frame and not on the door.

An alternative is to locate adhesive signs on the floor in front of the door.

Presence of a safety marking plate will be checked as a part of the installation procedure and hand over. Is is not allowed to bring the magnet on field if safety marking plates are not installed.

Please check with local code and consult local end-users and safety-officers about the layout of Safety Marking Plate and if possible multiple languages are needed.

Please contact local Philips Project Manager for sample.

(14.0)

RF Enclosure Requirements

1. RF Shielding Effectiveness
The room has to be built and tested to the following specifications that apply to all parts of the shielded enclosure, including seams, doors, windows, vents and mechanical penetrations:

Values Measured Analogue to MIL-STD-285		
H Field	0 MHz - 10 MHz	Irrelevant
	10 MHz - 15 MHz	90 dB
	15 MHz - 130 MHz	100 dB
E Field and Plane Wave	5 MHz - 130 MHz	100 dB

These requirements are valid for Philips parts not installed and are subject to the following:
a. The RF shielding is completely installed.
b. Foundation provisions for the magnet and patient support are installed.
c. Protective earth wiring (inside and outside the RF Enclosure) is installed.
d. All components/equipment to be located inside the enclosure are installed and operational (including all external facilities and their interfaces to systems inside the enclosure, excluding Philips parts).
e. All RF enclosure feedthrough frames covered with blind plates (provided by RF vendor).

2. RF Enclosure Materials

a. Copper RF Enclosures:
Philips recommends copper RF enclosures due to its shielding effectiveness, long term stability, flexible design capabilities, availability, and cost.

b. Ferrous Material RF Enclosures:
RF enclosures made of ferrous material may be acceptable, but are subject to restrictions:
- The floor of the RF Enclosure must be made of non-ferrous material (i.e. copper) within a 9' - 10" x 9' - 10" (3m x 3m) box from magnet isocenter.
- The total combined thickness of the ferrous material must achieve the specified shielding effectiveness with the magnetic field on.
- All walls must be at least 63" (1600mm) from magnet isocenter. The walls do not need to be symmetrically located around isocenter.
- The RF enclosure must not vibrate. This can introduce B0 variations, especially at the RF enclosure ceiling.

c. Aluminum RF Enclosures:
Aluminum RF enclosures are acceptable, but require special attention. Over time, a layer of aluminum oxide will form. This causes electrical contact between RF enclosure parts to degrade, especially around doors, feedthroughs, and windows. As such, extra measures (such as special coating) must be taken. Also, the RF enclosure quality between moving contact points (doors) will rapidly degrade. To reduce degradation, a thin sheet of brass can be used between such surfaces. If the connection is made by an appropriate screw connection, the electrical resistance between the brass and the aluminum must be less than 10 Ohms. The use of gaskets for the door, in addition to the issues mentioned above must not degrade the RF enclosure such that it no longer meets the shielding requirements. Therefore, Philips strongly recommends the use of "finger stocks".

3. Environmental Conditions
The shielding must operate effectively and not suffer damage under the following conditions:

Temperature Range		50° to 104° F (10° to 40° C)	
Humidity		20% to 90% non-condensing	
Air Pressure		7.25 to 16.0 PSI (50 to 110 kPa)	
Frequency		Drip	
Mechanical Vibration		**Mechanical Shocks**	
Water/Damp/Liquid	0 - 150 Hz	G-Value	0 - 0.1 g
G-Value	0 - 0.1 g	Pulse Duration	6 - 10 ms

These conditions also apply for the system wiring, ducts, gas exhausts and other interface provisions. During and shortly after installation, the shielding may be subject to extreme conditions due to construction activities. Power loss or temperature control failure can also cause extreme environmental conditions. Local earthquake regulations must be followed. Special measures may be required to fasten the magnet and patient support to the building.

4. Reliability / General Policy
a. Specifications listed are MANDATORY REQUIREMENTS for the proper functionality of the MR system.
b. Philips accepts no responsibility for correct operation of the RF enclosure. The performance of the MR system is only guaranteed if mandatory requirements are met.
c. The RF enclosure effectiveness must be tested by the RF vendor, and the results accepted by Philips. If requested by the customer, a Philips representative can be present to witness the testing. The shielding effectiveness must be tested according to the following codes and standards applicable to the extent indicated:
   - MIL-STD-285: Method of attenuation measurements for electromagnetic shielding enclosures for electronic test purposes.
   - MIL-STD-220A: Standard of safety of electromagnetic interference filters.
   - UL 1283: Standard for safety of electromagnetic interference filters.
d. The shielding must be designed for 100% operation throughout the year.
e. There must be a a gap between the RF Shield and finished wall in the exam room to ensure proper shielding grounding and isolation.
   - The gap prevents contractors from accidentally puncturing the shield with screws or nails.
   - The gap will ensure the shield stays electrically isolated except for approved connections

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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SN3

Acoustical Noise and Vibration Forces

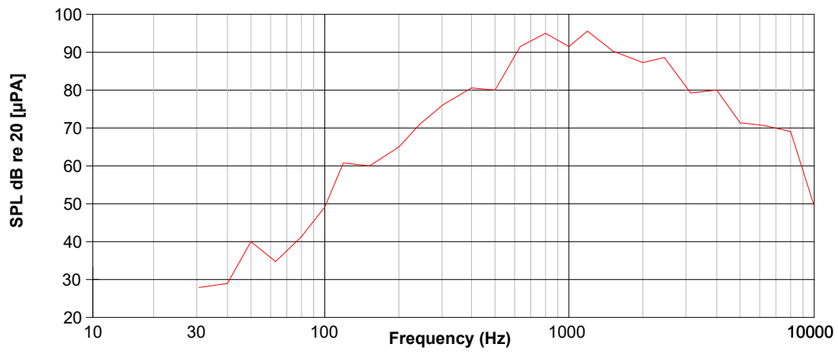
Acoustical noise produced is related to clinical use and the gradient system applied. During scanning acoustical noise originates from the gradient coil. Acoustical noise can vary.

To avoid possible acoustical nuisance the worst case situations must be considered for site design.
The use of sound absorbent materials in the examination room is required.

Below a figure that shows peak hold SPL of each of > 30 clinical scans made.

Note: There is no individual/single scan that produces this SPL for the frequencies displayed.

Dynamic Forces Applied to floor in $\frac{1}{3}$ Octave Bands, envelop of all sequences



To avoid possible acoustical nuisance the worst case situations must be considered for site design. The use of sound absorbent materials in the examination room is required. It is recommended to make the wall between the examination and control room of two panels. Sound absorbent materials can be mounted between these panels. Some RF Enclosure suppliers already use double-panel walls, one panel for RF shielding and one panel for room finishing. Contact an architect to determine which of the following acoustical noise means can be provided, if needed. Depending on the building construction additional acoustical noise suppression to the same floor level or to other floor levels can be achieved via the following means:

- Additional brick wall between the RF enclosure and technical/operator room or other room. Thickness: $4\frac{3}{8}$" to $4\frac{3}{4}$" (110mm to 120mm). Specific weight: 1.8, 250 kg/m2 R'w > 52 dB
- A double wooden wall (0.08" x 0.50" [2mm x 12.5mm] thick) with 3.15" (80mm) thick mineral fiber material in between, type W-w according DIN 18165 Teil 1.
- The RF door and RF window can be assembled to a construction with sufficient attenuation for acoustical noise:
- RF door : R'w > 32 dB
- RF window : R'w > 40 dB (panes of different thickness)
- The ceiling inside the RF-Enclosure can be finished with a 4" (100 mm) thick mineral fiber material, type W-w according DIN 18165 Teil 1.
- Avoid openings from examination room to other rooms (except needed openings to technical room).

Additional acoustical contact noise suppression can be achieved via the following means:

- Free standing RF enclosure.
- No other coupling to the building than the floor of the RF-Enclosure.
- All other interfaces off the RF enclosure to the building (wall and ceiling) must be de-coupled for to avoid noise (flexible connection of air conditioning pipes etc.).

Typical Acoustical Noise Levels*

39.37" (1m) from equipment room cabinet	75 dBA
39.37" (1m) from Operator's Console	40 dBA

Acoustical Noise Suppression

Sound Absorption Coefficient of Materials to be Used	
Suspended Ceiling - Control and Equipment Room	> 0.6
Main Frequency to be Attenuated	600 to 1000 Hz

* Maximum levels can increase by 4 dBA during various sequences and do not include noise produced by third party equipment.

* The SACU is normally installed inside the equipment room. Anticipate 72 dBA acoustical noise generated by the SACU. Never install SACU in the Operators or Reporting Room.

(18.0)

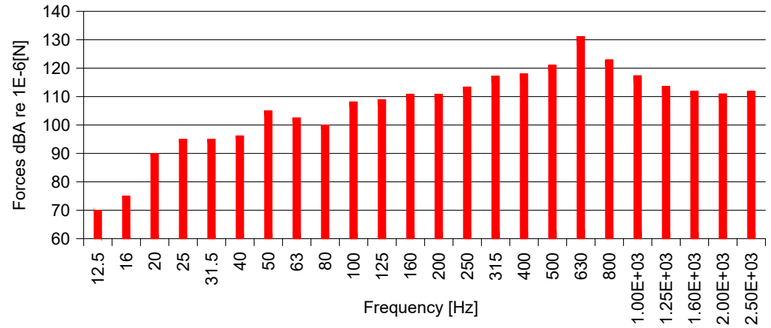
Contact Noise

Due to mechanical vibration of the scanner during clinical use the building floor can start to vibrate and transport the acoustic energy through the floor to surrounding areas. This energy in the hospital structure will generate acoustic noise in the adjoining spaces. Depending on the building structure the energy can travel across large areas.

If needed an acoustic consultant can investigate if the contact noise could be a problem.

Below a figure that shows peak hold of each of > 30 clinical scans made. This is no representation of one individual clinical protocol, but an envelope of cumulative forces.

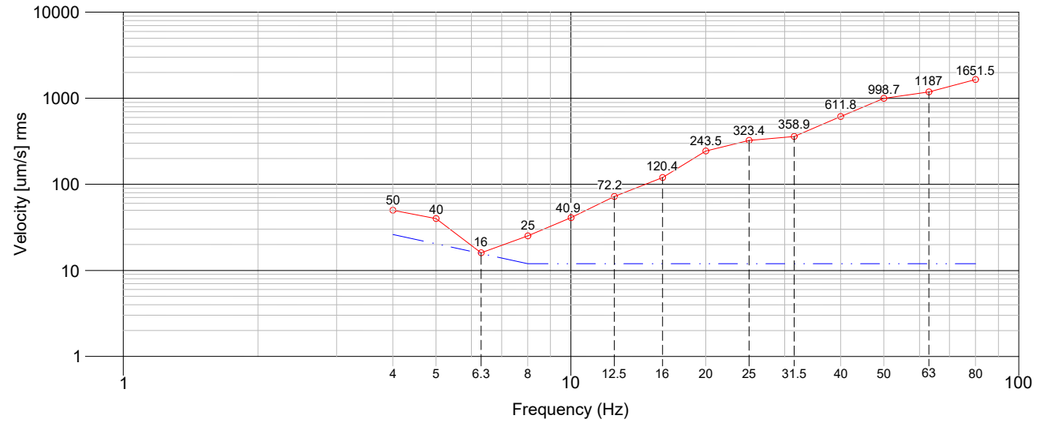
Forces acting on floor



Third party delivered vibration pads are no longer allowed. Philips Healthcare newly designed vibration pads are now delivered and shall be used. Typical contact noise reduction is 20 dB compared to Achieva systems. Use of third party pads could interfere with the vibration specification of the magnet and the shimming of the magnet due to sinking. Weak pads can also affect the correct alignment of the magnet and patient table.

(14.0)

Typical floor design in relation to MR Vibration Requirements



Vibration of the site has the ability to affect the stability of the magnetic field and because of this image quality.

A typical example of a good floor design is a so called VC-C type. Above you find a figure of the floor design in relation to the vibration requirements of the MR system

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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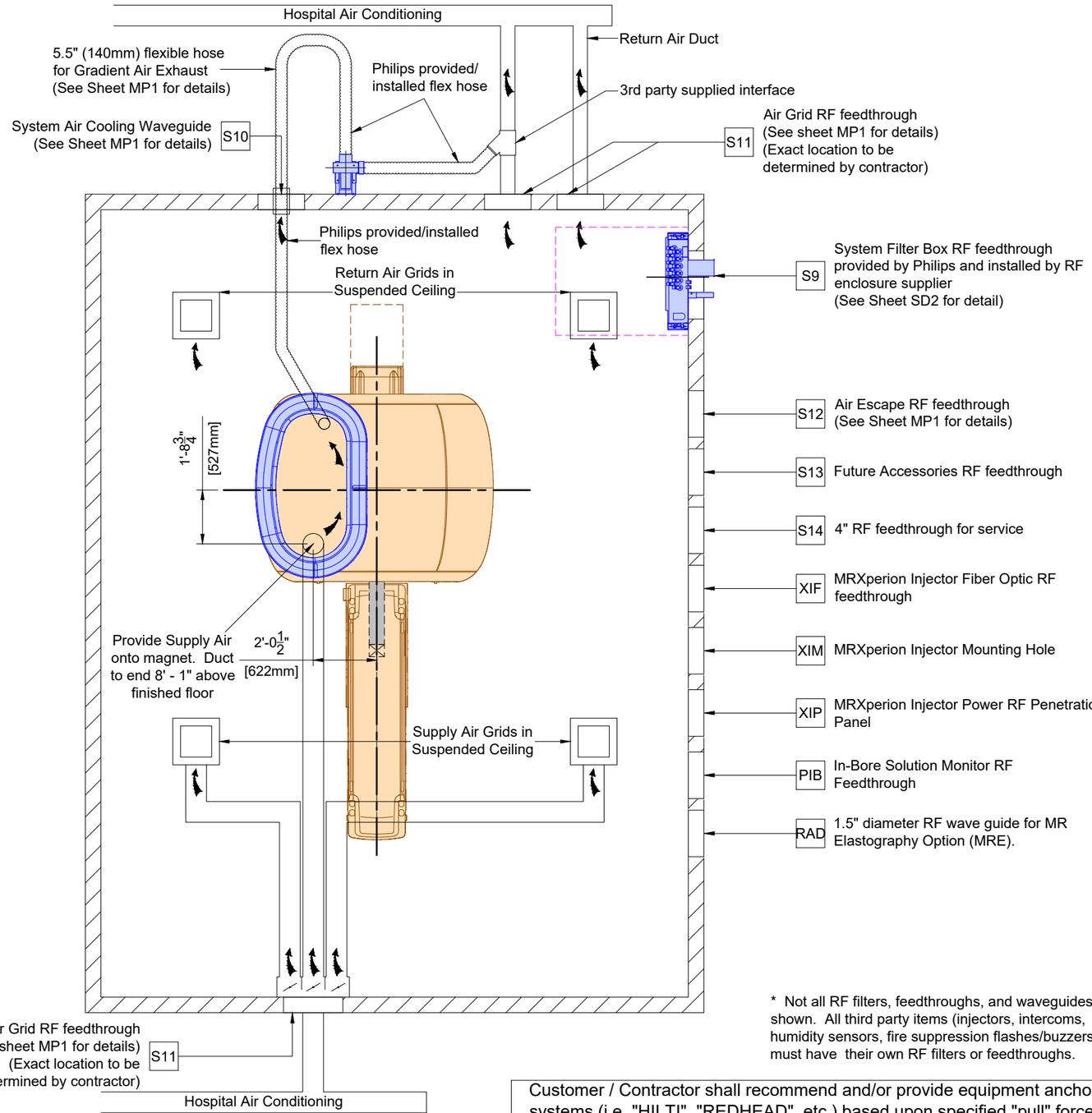
SN4

Waveguide/Feedthrough Summary

For reference only. Exact locations to be determined by customer/contractor/RF Vendor



* Not all RF filters, feedthroughs, and waveguides are shown. All third party items (injectors, intercoms, humidity sensors, fire suppression flashes/buzzers, etc.) must have their own RF filters or feedthroughs.

Customer / Contractor shall recommend and/or provide equipment anchoring systems (i.e. "HILTI", "REDHEAD", etc.) based upon specified "pull" forces and wall/ceiling composition.

Floor & Wall Support Legend

A Furnished and installed/anchored by Philips (exceptions may exist, see Note 2)
B Furnished and installed by customer/contractor and installed/anchored by customer/contractor
C Furnished by Philips and installed by RF Enclosure Supplier
D Furnished by Philips and installed/anchored by contractor
E Existing
F Future
G Optional
H Furnished by RF Enclosure Supplier and installed by RF Enclosure Supplier

	Item Number	Description	Detail Sheet
H	S1	Aluminum magnet support pads (4x) by RF enclosure supplier.	SD1
H	S2	Aluminum patient support pads (2x) by RF enclosure supplier.	SD1
B	S3	Limited floor reinforcement/ferrous materials area, 9' - 10" x 9' - 10" (3m x 3m).	S1 / SN1
B / H	S4	No false ceiling (tile or grid) in this area, 28" x 56" (700mm x 1400mm). This service area must be clear of obstructions from top of magnet to 10' - 0" above finished floor except for the Supply Air exhaust duct. (See Waveguide/Feedthrough Summary for the location of duct).	SD1
B / H	S5	Removable ceiling area 23.75" x 46" (600mm x 1170mm) for servicing equipment. Grid work must be easily removed for access.	SD1
B	S6	Wall anchorage for Mains Distribution Unit. Not to penetrate RF shield.	
B	S7	Wall anchorage for Emergency Run-Down Button mounted 71" (1805mm) A.F.F. Not to penetrate RF shield.	AD3
B / H	S8	Opening in suspended ceiling for ceiling speakers - exact location to be determined. (Not shown on plan)	SD1
H	S9	System Filter Box RF feedthrough (frame to mount System Filter Box must be flush with finished wall).	SD2
H	S10	System Air Cooling Waveguide, 6.25" (160mm) dia., do NOT use honeycomb-type wave guide. Must be located < 78.75" (2m) from exam room air out duct - exact location to be determined by customer.	SD3 / MP1
H	S11	Air Grid RF feedthrough for conditioned air entering/exiting exam room - exact location to be determined. (Not shown on plan)	MP1
H	S12	Air Escape RF feedthrough (optional - for pressure balancing between magnet room and adjacent room) - exact location and size to be determined. (Not shown on plan)	MP1
H	S13	12" (300mm) x 12" (300mm) RF panel with 3" (75mm) diameter waveguide for future accessories - exact location to be determined. (Not shown on plan)	
B	S14	4" diameter RF feedthrough for service. Feedthrough to be located allowing the most direct route between magnet and MDU.	
B	SR	Storage Rail Mounting (Mounting option to be determined. Reference SD4 page.)	SD4
F	BCP	Wall anchorage for Backup Power Connection Panel. Not to penetrate RF shield.	
B	FAF	Wall anchorage for FA Series Three Phase Filter.	-
B	ATSW	Anchorage for Touch Screen Monitor.	SD5
B / H	PIB	In-Bore Solution Monitor RF Feedthrough (See Sheet SD9 for detail for the opening sizes in the RF and finished wall). InBore interface frame will be installed by RF enclosure supplier.	SD6 / SD7
H	RAD	1.5" diameter RF wave guide for MR Elastography Option (MRE). (Recommended minimum height of waveguide is 2' - 3 9/16" (700mm) A.F.F.)	-
H	XIF	MRXperion Injector Fiber Optic RF feedthrough. 1" Dia., location t.b.d. by RF enclosure supplier to provide the best cable path between XI and XD (not shown).	
H	XIM	MRXperion Injector Mounting Hole. 2 1/2" Dia., location t.b.d. by RF enclosure supplier to provide the best cable path between XI and XPS (not shown).	SD4
A	XIP	MRXperion Injector Power RF Penetration Panel (not shown). Bayer to provide and install filter panel on to XIM.	

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Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
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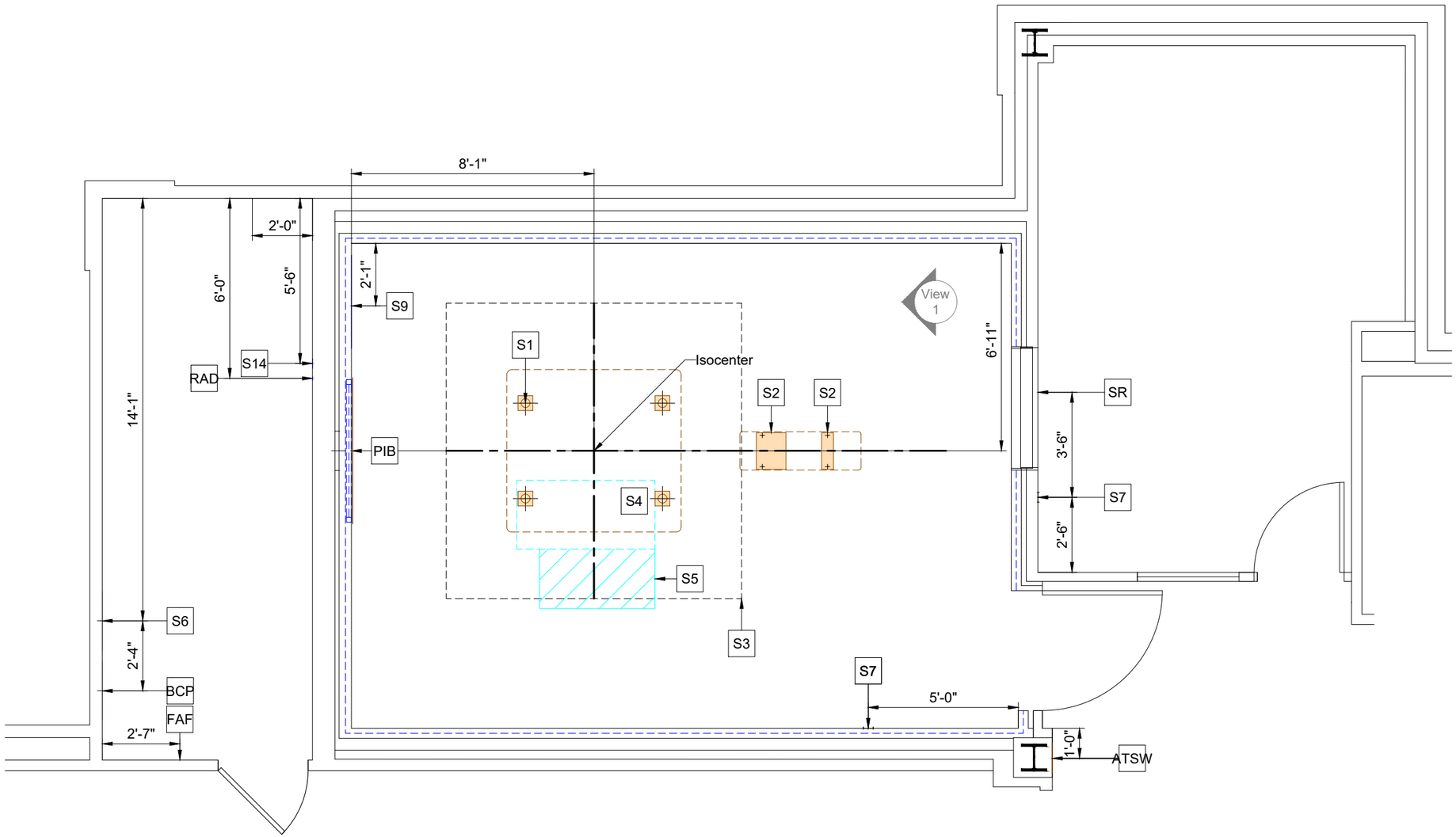

Support Layout

1/4" = 1'-0"

Ceiling Height Guide

Equipment Room:	10' - 6" (3200mm)	Recommended
	9' - 2" (2795mm)	***Minimum****
Exam Room Suspended Ceiling:	8' - 3 ¼" (2520mm)	***Required***
Exam Room RF Ceiling:	9' - 9" (2970mm)	Recommended
Control Room:	9' - 10" (3000mm)	Recommended
	7' - 3" (2200mm)	***Minimum***

* Ceiling Heights outside the minimum dimensions may be possible. These Ceiling Heights must be reviewed and approved.

0 1' 2' 4' 8'

0 .5m 1m 2m

All wall anchorages are dimensioned to centerlines.

* All floor support below the magnet including floor reinforcement and beams must be verified to meet the requirements shown on the SN1 page of the final drawing package. The "S3" box shows the critical area below the magnet.

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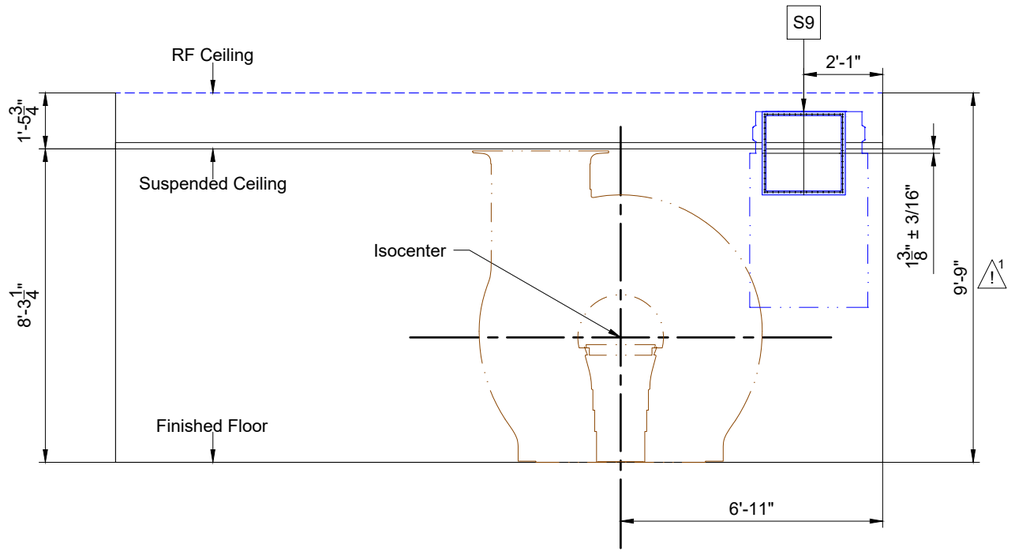
S1

Detail - System Filter Box RF Feedthrough (View 1)



Note:
Wall and location shown are preferred/recommended. If there are existing obstructions, alternate routing plans, more suitable options, please consult with your Philips Project Manager to investigate a more suitable location and have these details revised.

S9

General Notes:
RF and Suspended ceiling heights are shown using the best data available at the time. If actual or planned heights differ, please consult with your Philips Project Manager to have these details revised.

Planning Issues and Considerations

1 General Ceiling Heights shown. Plans must be revised to reflect the site specific ceiling heights.

Gradient Exhaust Waveguide for System Air Cooling Unit (SACU) location to be determined based on final location of SACU. SACU must be located less than 78.75" (2m) away from Examination Air Out Duct (See Sheet MP1).

S10

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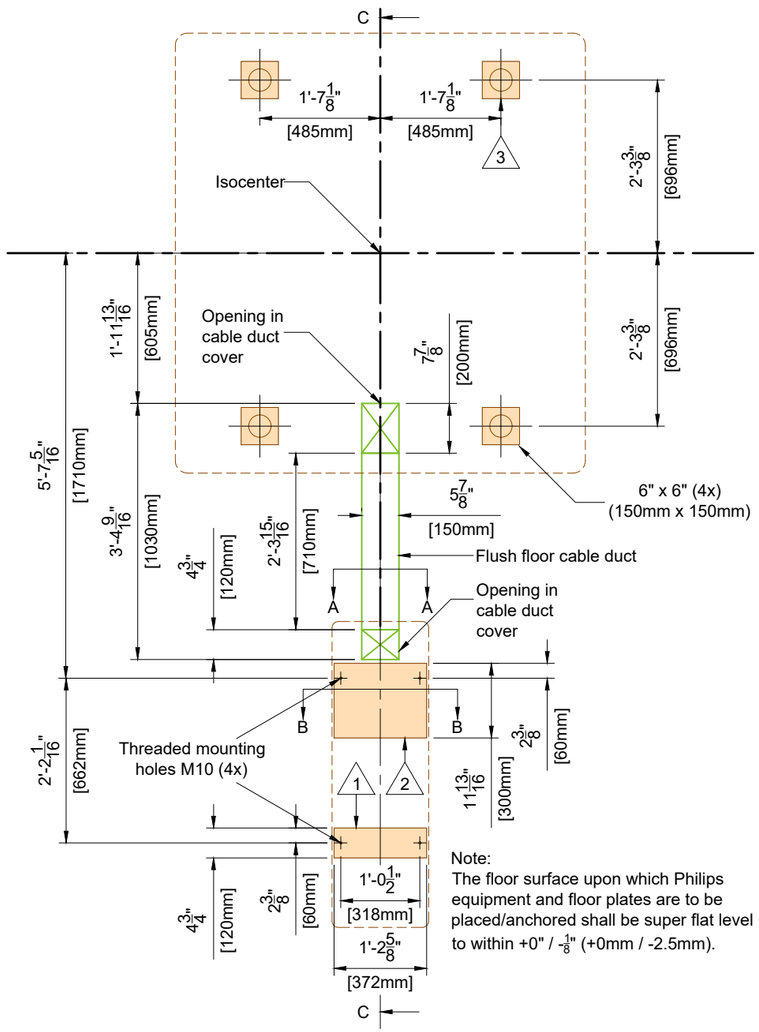
S2

Detail - Magnet and Patient Support

(Not to scale)



Note:
The floor surface upon which Philips equipment and floor plates are to be placed/anchored shall be super flat level to within +0" / -1/8" (+0mm / -2.5mm).

Floor Pads - Minimum Thickness

Pad 3	0.4" (10mm) for stainless steel for 0.6" (15mm) for aluminum
Pad 1 & 2	0.6" (15mm) for stainless steel or aluminum

Floor Pads - Floorload Forces

	Pad 1 & 2	Pad 3
Horizontal	900 lbs (4 kN)	340 lbs (1.5 kN)
Upwards	2250 lbs (10 kN) per bolt or 3600 lbs (16 kN) per pad	N/A
Downwards	560 lbs (2.5 kN) per pad	2810 lbs (12.5 kN) per foot 10115 lbs (45 kN) in total for 4 feet

Threaded mounting holes must have at least 0.6" (15mm) thread. Bolts must be electrically isolated and anchored through the RF floor to a medium that can support above mentioned forces.

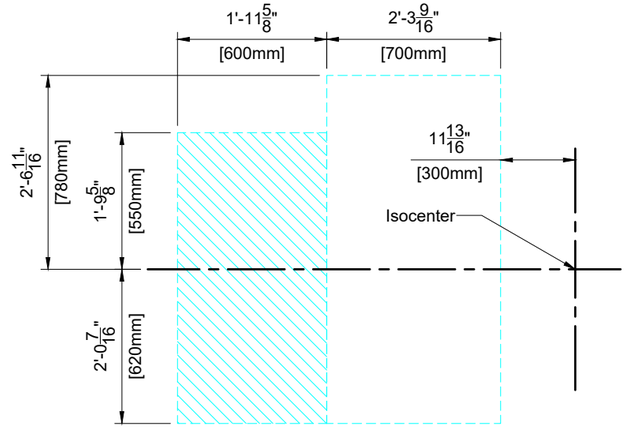
Customer / Contractor shall recommend and/or provide equipment anchoring systems (i.e. "HILTI", "REDHEAD", etc.) based upon specified "pull" forces and wall/ceiling composition.

S1 S2 FR1

(14.0)

Detail - Suspended Ceiling Magnet Service Area

(Not to scale)



Removable suspended ceiling in this area.
Grid work must be easily removed for access.

Clear opening in suspended ceiling.
No tiles or grid work in this area.

S4 S5

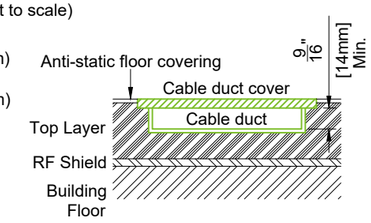
(14.0)

Detail - Cross Section A-A

(Not to scale)

Cable Duct Cover Requriements

1. 1 cover with length of 27.94" (710mm)
2. Pressure force: 2000N
3. Max. bending-through: 0.02" (0.4mm)
4. Removable
5. Smooth and well rounded edges
6. Non-magnetic material
7. Flush with finished floor

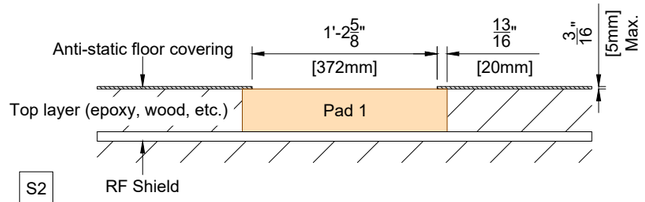


FR1

(14.0)

Detail - Cross Section B-B

(Not to scale)



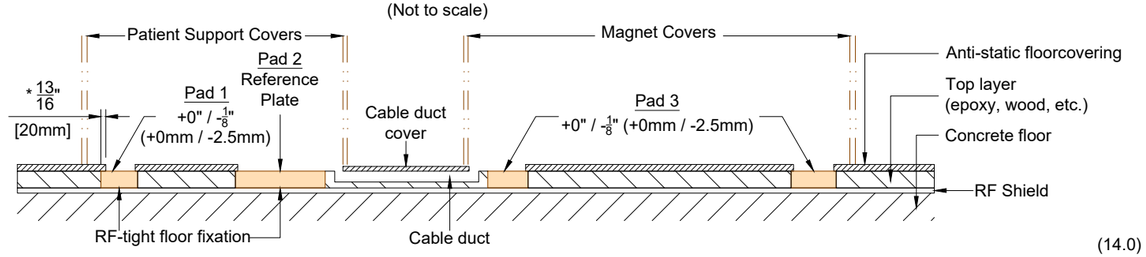
S2

(14.0)

* The magnet and patient table mounting plates must be covered with 0.80" (20mm) overlapping final floor covering. The magnet feet must not be placed on the floor covering but directly on the floor plates.

Detail - Cross Section C-C

(Not to scale)

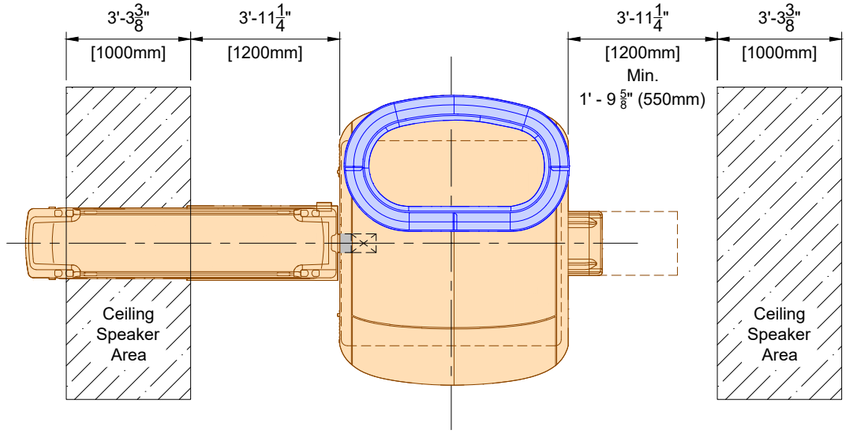


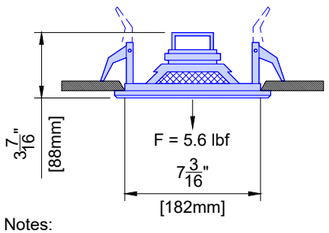
S1 S2

(14.0)

Detail - Ceiling Speakers in Exam Room

(Not to scale)





Notes:
1. Two communication speakers are supplied by Philips. Customer/contractor to flush mount one speaker on each side in the suspended ceiling.
2. Speaker wires provided by Philips.
3. Speakers must be located outside 100 Gauss field.
4. If gypsum or glass wool tiles are used, reinforced backing plates are recommended.
5. If tiles are removed for service, it is recommended to add a mechanical connection (fibre) between the speaker and the RF ceiling to avoid the speaker from moving due to attraction forces.

S8 CS

(18.0)

PHILIPS

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Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
Drawing Number
N-EAS180390 B
Date Drawn: 12/18/2018
Quote: 1-1KQ3QVA Rev. 8
Order: 6600420761.010000
6600420761.020000

SD1

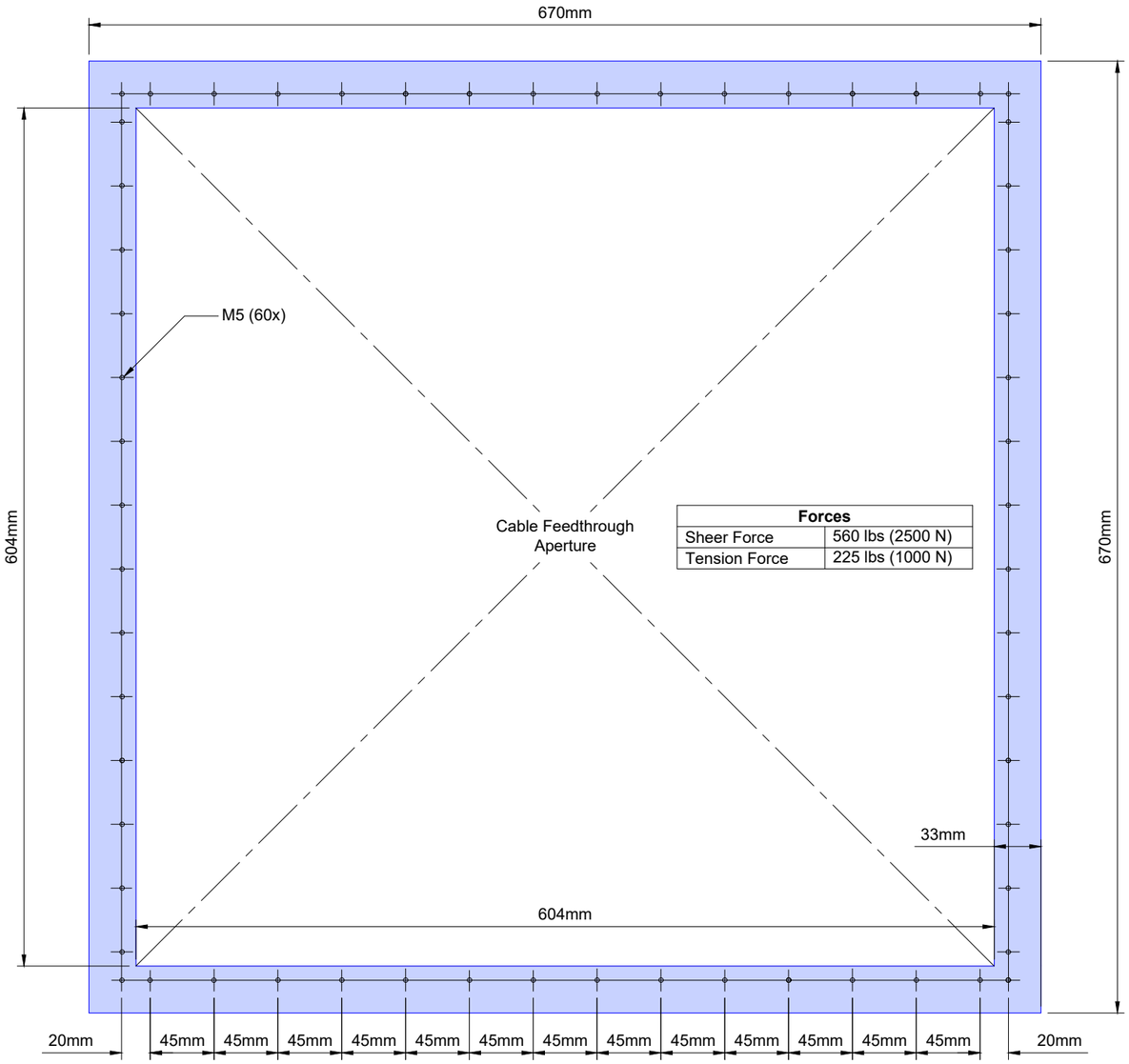
Detail - System Filter Box - RF Feedthrough

(Not to scale)

Notes:

1. 60 M5 threaded holes included 60 stainless steel screws (10mm L) and washers (M5) to be provided by RF Enclosure supplier.
2. Mounting holes to be unblocked to ensure screws can fully penetrate frame. Leave a minimum 5mm clearance around mounting holes.
3. Cable feedthrough reinforcement/height adaptation dimensions to be determined by RF Enclosure supplier.
4. Mounting Frame to be flush with finished wall.
5. Mounting Frame to be flush with finished wall.
   a. *Aluminum shield + intermediate layer + copper or brass RF-frame by the RF-enclosure supplier.
   b. *Galvanized shield + intermediate layer + copper or brass RF-frame by the RF-enclosure supplier
   c. Copper shield + copper or brass RF-frame by the RF-enclosure supplier.

* For an aluminum or galvanized steel RF shielding material you need an intermediate metal to avoid galvanic corrosion between the brass/copper RF frame and the RF enclosure material. This it the responsibility of the RF enclosure supplier.



Forces	
Sheer Force	560 lbs (2500 N)
Tension Force	225 lbs (1000 N)

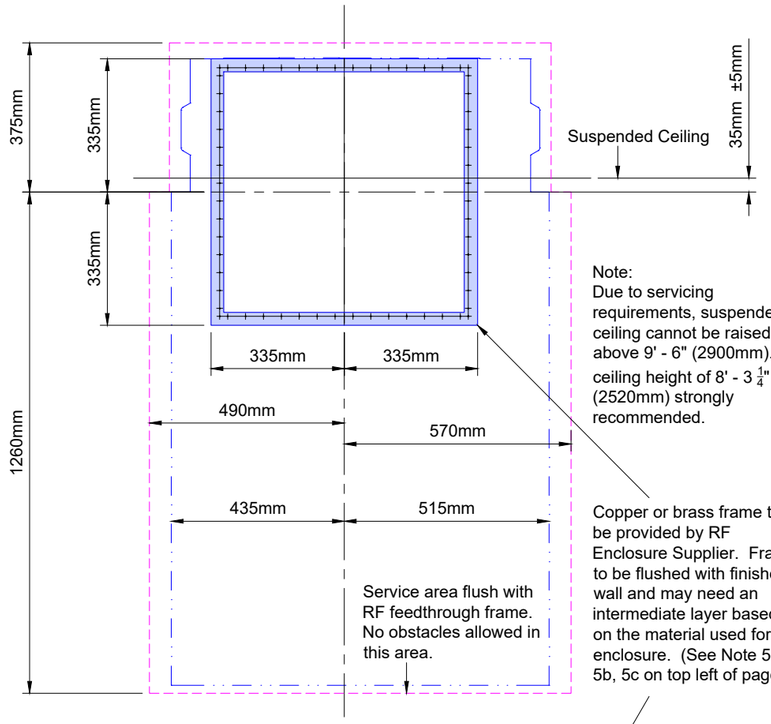
Dimensions shown are to be used on all sides of panel.

S9

(18.0)

Detail - System Filter Box - Service Clearance

(Not to scale)



Note:
Due to servicing requirements, suspended ceiling cannot be raised above 9' - 6" (2900mm). A ceiling height of 8' - 3 $\frac{1}{4}$" (2520mm) strongly recommended.

Copper or brass frame to be provided by RF Enclosure Supplier. Frame to be flushed with finished wall and may need an intermediate layer based on the material used for RF enclosure. (See Note 5a, 5b, 5c on top left of page)

View from Exam Room side of penetration.

S9

(18.0)

Detail - System Filter Box - Cross Section

(Not to scale)

Frame thickness to be determined by space between RF wall and finished wall

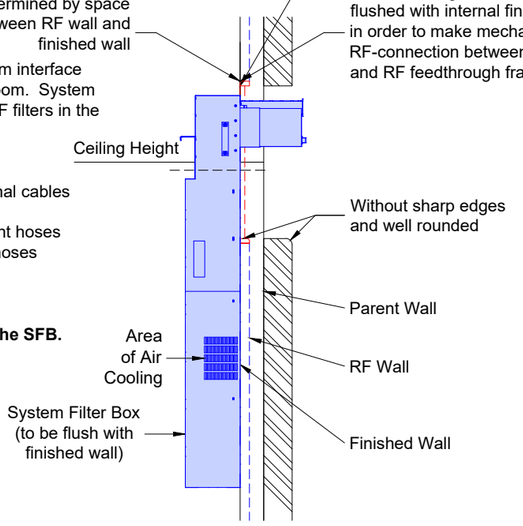
RF feedthrough needs to be flushed with internal finishing in order to make mechanical RF-connection between SFB and RF feedthrough frame.

The System Filter Box (SFB) is the MR system interface between equipment room and examination room. System cables are mounted and connected via the RF filters in the SFB.

The SFB consists of the following parts:

1. Feed through for System power and signal cables
2. Feed through for helium gas lines
3. Feed through for gradient coil and coolant hoses
4. Feed through for the patient ventilation hoses
5. Feed through for HOS filters
6. System Filter Box covers

* **No Third-Party cables allowed through the SFB.**



S9

(18.0)

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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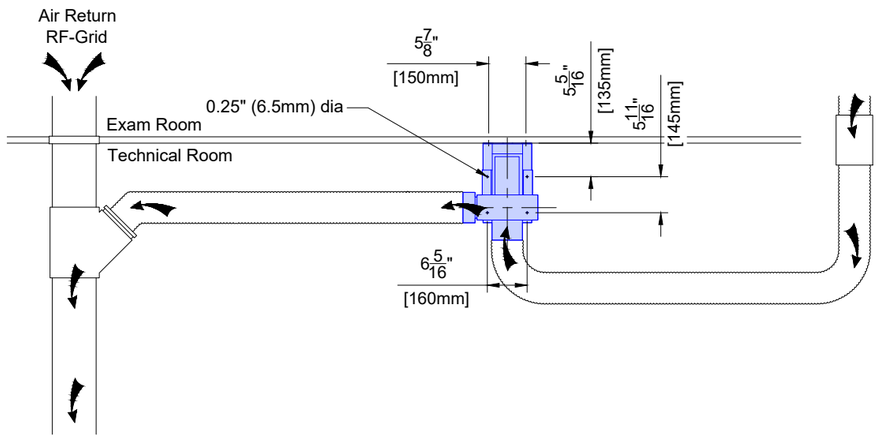
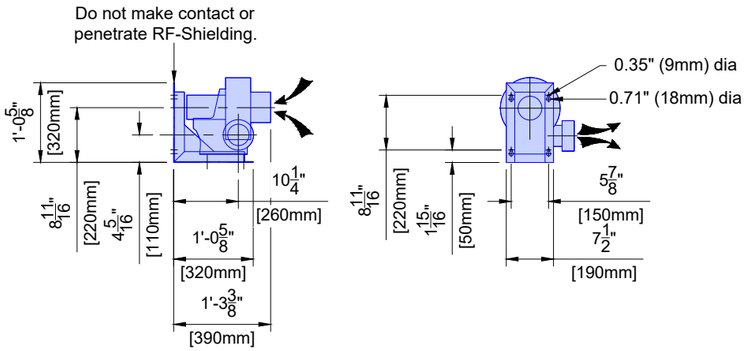
6600420761.020000

SD2

Detail - System Air Cooling Unit Mounting

(Not to scale)





(18.0)

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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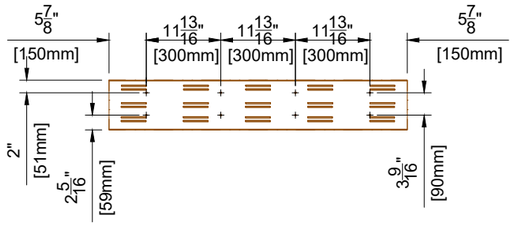
6600420761.020000

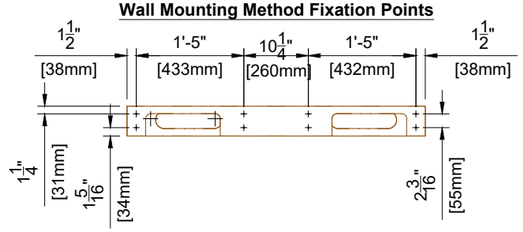
SD3

Detail - Storage Rail Mounting

Counter/Table Mounting Method Fixation Points



Wall Mounting Method Fixation Points



Mounting Methods

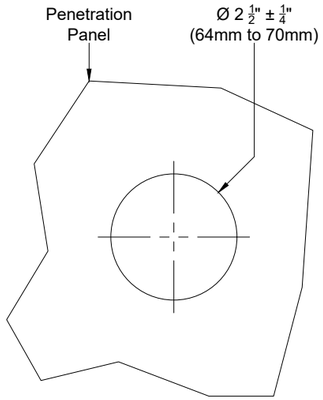
1. Mounted to wall using 8 fixation points*.
2. Mounted to underside of counter/table using 8 fixation points*.
3. Suspended from counter/table using clamps
   a. Clamps (provided by Philips) can only be used when counter/table thickness is 1 1/8" (28mm) or less.

* Fixation points have a 1/4" (6mm) diameter

SR

(16.0)

Detail - MRXperion Mounting Hole



Mounting Hole Specifications

- 2 1/2" ± 1/4" (64mm to 70mm) mounting hole using a 2 5/8" (67mm) max drill diameter.
- Do not use a 2 3/4" (70mm) drill, as the final hole dimension may end up oversized.

XIM

(17.0)

Project Details
Drawing Number
N-EAS180390 B
Date Drawn: 12/18/2018
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Order: 6600420761.010000
6600420761.020000

SD4

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

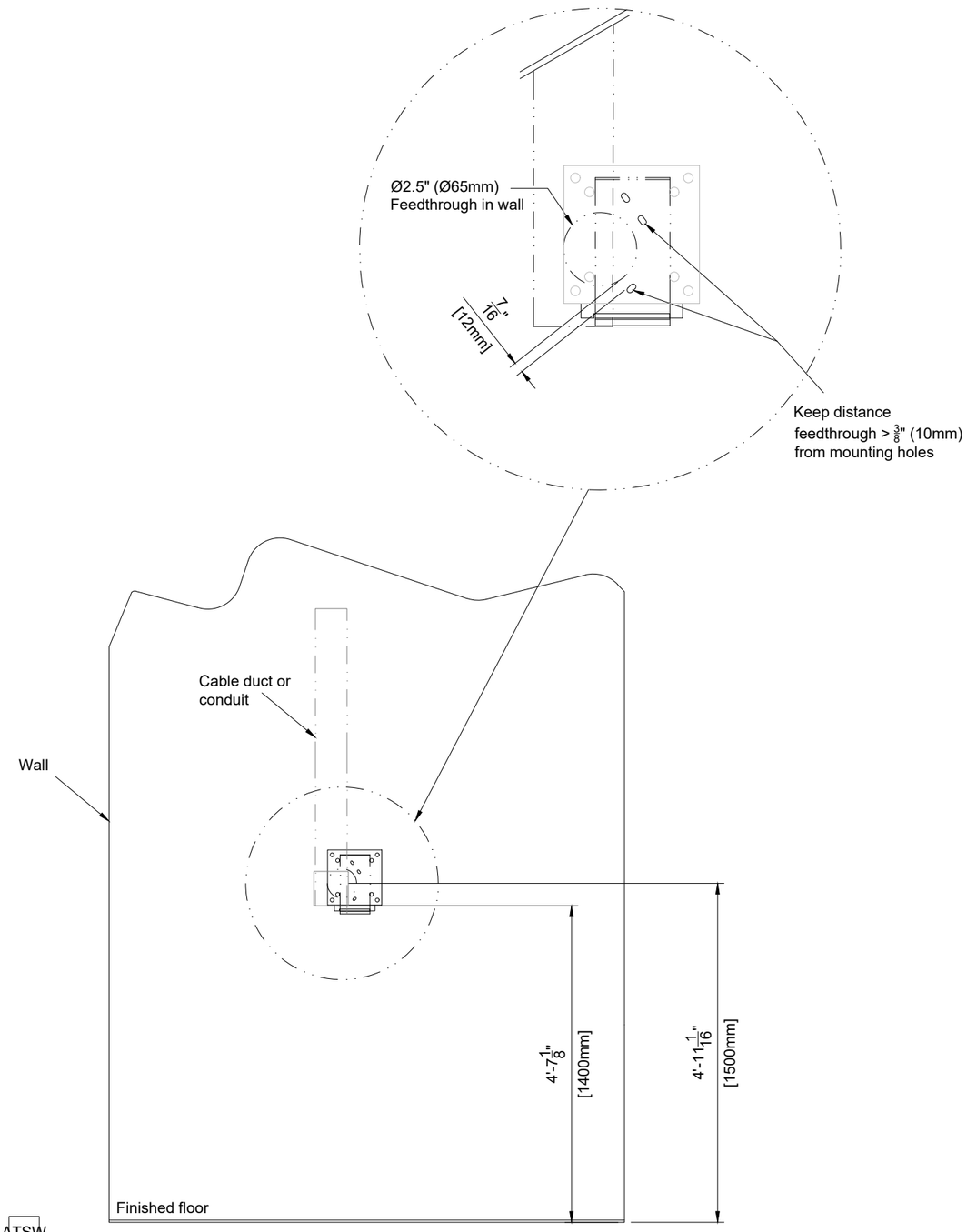
Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Provisional

PHILIPS

Detail - Wall Mounting for Touch Screen Monitor Elo 1515L

(Not to scale - Not site specific)

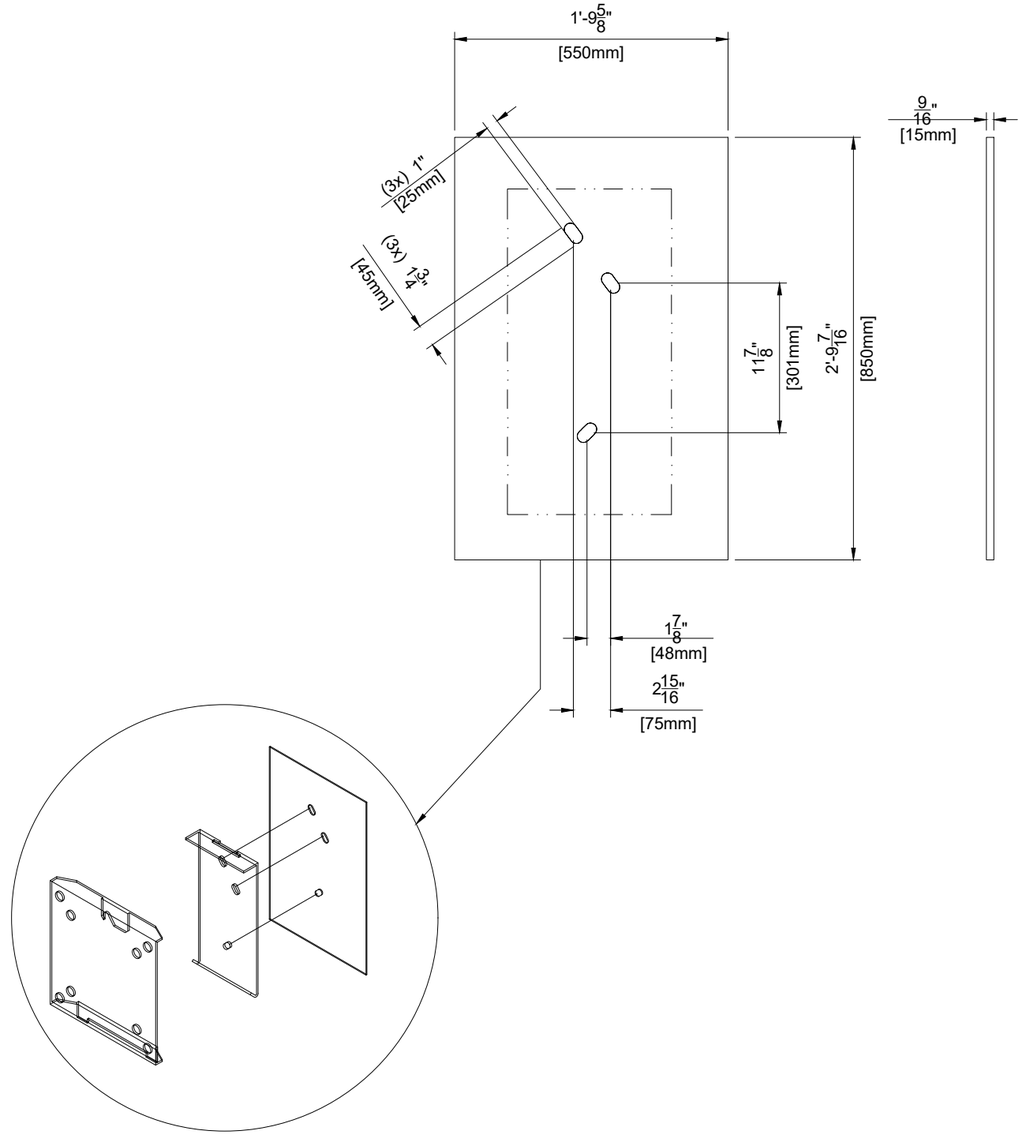


ATSW

(14.0)

Detail - Wall Mounting Template for Touch Screen Monitor Elo 1515L

(Not to scale)



ATSW

(14.0)

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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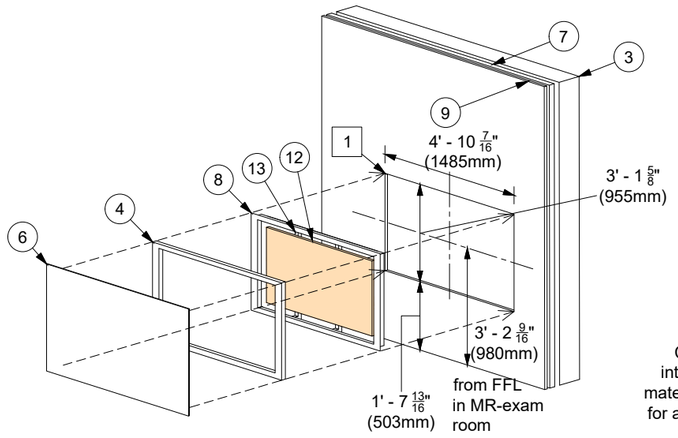
Order: 660042076l.010000
660042076l.020000

SD5

Detail - Patient In-Bore Solution Wall Mounting Frame

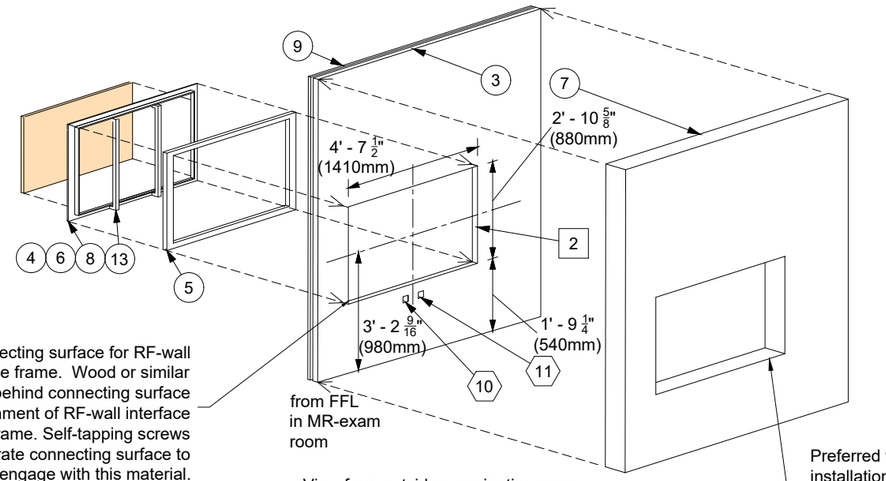
(Not to scale)

Exam Room Wall Window Opening



View from inside examination area

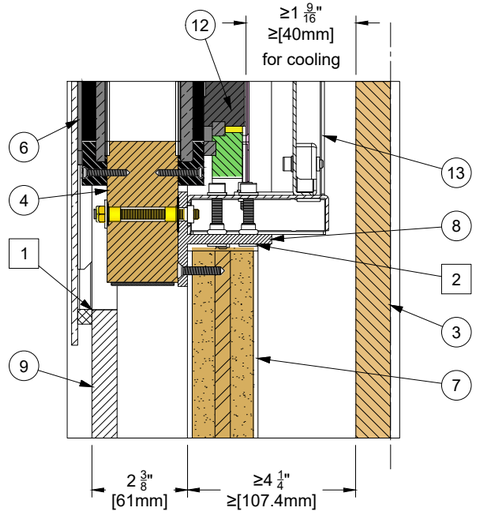
RF Wall Window Opening



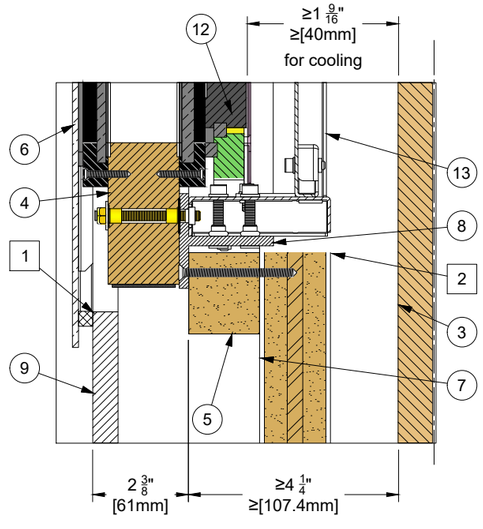
Connecting surface for RF-wall interface frame. Wood or similar material behind connecting surface for attachment of RF-wall interface frame. Self-tapping screws penetrate connecting surface to engage with this material.

View from outside examination area
(Rear side of RF-cage)

Preferred way of installation and servicing of the Inbore flatscreen:
Make a hole in the structural wall behind the RF-wall with the same dimensions as the hole in the RF-wall-opening.



Requirements for wall with Inbore solution
(without optional RF adaptive frame)



Requirements for wall with Inbore solution
(with optional RF adaptive frame)

Item list:

Resp	No	Description	Qty
B	1	Wall opening in finished wall	1
B	2	Wall opening in RF-wall	1
E	3	Structural wall behind RF-wall	1
A/C	4	RF-window	1
B	5	RF-wall adaptive frame (optional)	1
A	6	Inbore decorative bezel	1
E	7	RF-wall	1
C	8	Aluminium T-frame for mounting RF window	1
E	9	Finished wall inside examination room	1
B	10	AE Power outlet 120 VAC (Philips dedicated)	2
B	11	AE Network connection 100Mbps, RJ45	1
A	12	Display 55"	1
A	13	Mounting plate for 55" display	1

Responsibilities:

A	Delivered and installed by Philips
B	Delivered and installed by customer
C	Delivered by Philips and installed by customer
D	Delivered by customer and installed by Philips
E	Existing

Works symbology
- Construction works
- Electrical works
- Mechanical works
- Equipment works

(15.0)

PIB

SD6

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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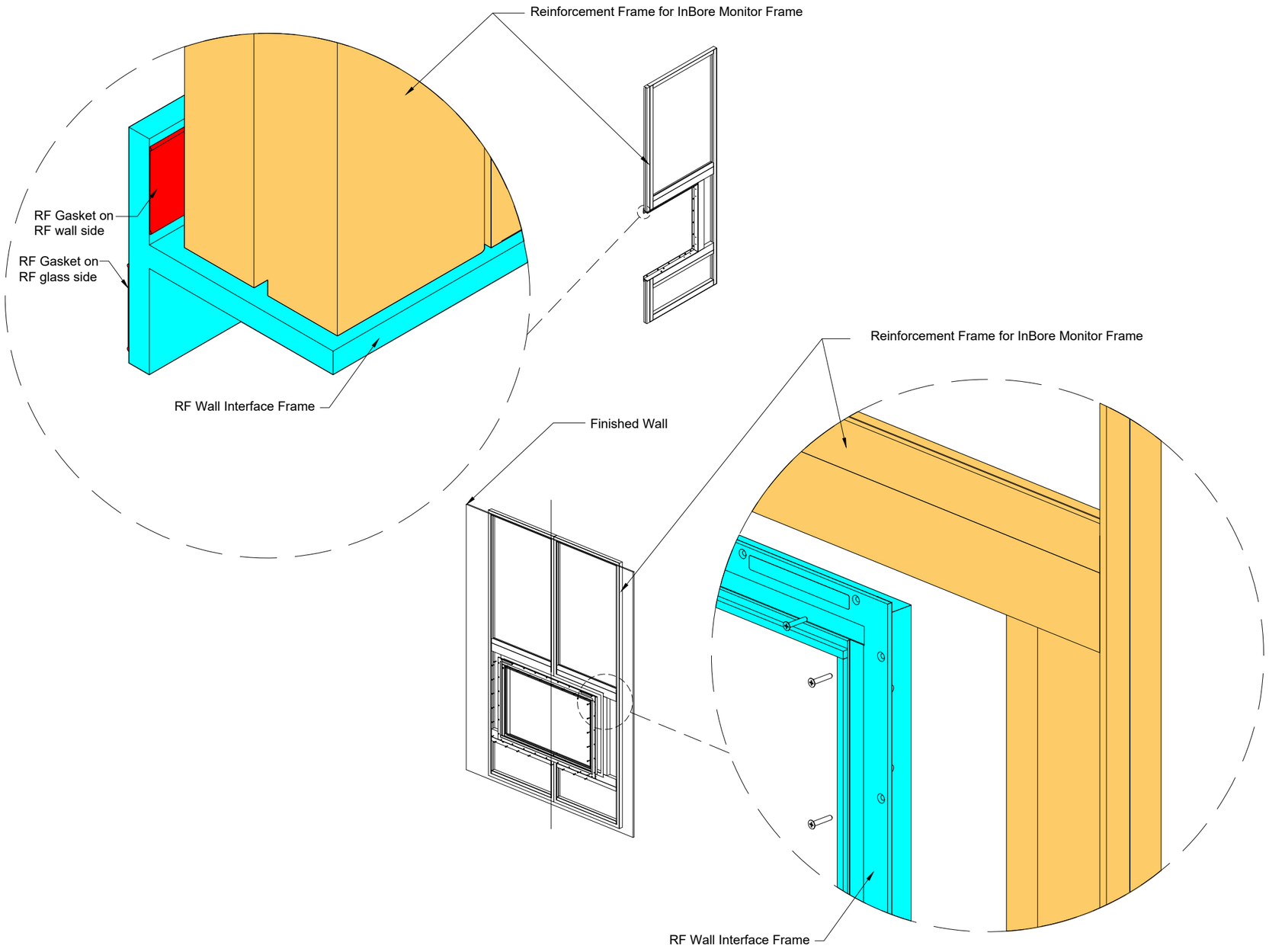
6600420761.020000

Detail - Patient In-Bore Solution Wall Interface Frame

(Not to scale)



PIB

(15.0)

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

PHILIPS

Provisional

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Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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660042076l.020000

SD7

03.23.17

General Electrical Information

1. General
The customer shall be solely responsible, at thier expense, for preparation of the site, including any required electrical alterations. The site preparation shall be in accordance with this plan and specifications, the architectural/construction drawings and in compliance with all safety and electrical codes, the customer shall be solely responsible for obtaining all electrical permits from jurisdictional authority.

2. Materials and Labor
The customer shall be solely responsible, at its expense, to provide and install all electrical ducts, boxes, conduit, cables, wires, fittings, bushings, etc., as separately specified herein.

3. Electrical Ducts and Boxes Outside the RF Enclosure
Electrical ducts and boxes shall be accessible and have removable covers. Floor ducts and boxes shall have watertight covers. Ducts shall be divided into as many as three separate channels by metal dividers, separately specified herein, to separate wiring and/or cables into groups as follows: Group a: power wiring and/or cables. Group b: signal and/or data and protective ground wiring and/or cables. Group c: x-ray high voltage cables. The use of 90° ells is not acceptable. On ceiling duct and wall duct use 45° bends at all corners. All intersecting points in duct to have cross over tunnels supplied and installed by contractor to maintain separation of cables.

4. Conduit Outside RF Enclosure
Conduit point-to-point runs shall be as direct as possible. Empty conduit runs used for cables may require pull boxes located along the run. Consult with Philips. A pull wire or cord shall be installed in each conduit run. All conduits which enter duct prior to their termination point must maintain separation from other cables via use of dividers, cross over tunnels, or flex conduit supplied and installed by contractor from entrance into duct to exit from duct. Maximum conduit lengths shown on these plans are calculated from electrical box entrance to electrical box entrance. Any conduit installed below grade must be water tight.

5. Conduits Inside RF Enclosure
Conduits point-to-point runs shall be as direct as possible. Conduits to be made of non-ferromagnetic material and to be installed securely. If aluminum flex conduit is used, it needs to be secured so that it is not touching any other metal in the room. Common items that loose flex might rub against are ceiling grids and hangers, HVAC ducts, Ladder Tray, and cryogen gas lines. Metal-on-metal situations can cause artifacts that make patient images un-diagnostic.

6. Conductors / Earth Conductor
All conductors, separately specified, shall be 75° C stranded copper, rung out and marked. Do not use metal conduit or raceway as a ground conductor. The earth conductor for the MRI system must be dedicated and totally separate from the conduit, raceway, or structural ground. This is required to maintain the MR system "Quiet Ground" as permitted by NFPA 99. The earth conductor to be the same size as incoming phase conductor wires.

7. Disconnecting Means
A disconnecting means shall be provided as separately specified.

8. Grounding
Grounding must conform with current requirements for electrically susceptible patient areas. See Article 517, National Electrical code.

9. Lighting and Wall Sockets Inside the RF Enclosure
Incandescent AC lamps with reinforced filaments or quartz (halogen) lamps are acceptable. The use of linear fluorescent lamps, compact fluorescent lamps (CFL), energy saving lamps, electronic light dimmers and low voltage track lighting are strictly prohibited to avoid RF interference.

- LED light fixtures are acceptable inside the RF enclosure, only if, they are non-ferrous low voltage DC LED light fixtures with their electronics (driver, power supply, power source, convertor) outside the RF enclosure. It is the LED supplier's responsibility to ensure their LED solution will not cause any interference for the magnet. If for whatever reason the LEDs negatively influence the magnet, the LED lighting supplier must be responsible for removing or correcting the issue.

The magnetic field may shorten the lifetime of the light bulb. For patient comfort, avoid direct light above the patient support and the rear of the magnet. A spotlight with a separate switch to assist the doctor during intervention procedures is recommended. Two lighting levels (separate control) are required around the magnet:

a. 200 lux for patient examination
b. 500 lux for servicing

Wall outlets should be located inside the RF enclosure for use of MRI compatible third party equipment. A duplex outlet (20 Amp) and a light with switch for servicing purposes must be provided above the suspended ceiling in the RF enclosure in the vicinity of the magnet turret. The location of the light switch must be reachable by the engineer when he/she opens the removable part of the suspended ceiling.

(14.0)

RF Enclosure Electrical Notes

1. Mains Safety Switches - Mains safety switches may be installed inside the RF enclosure. Installation must follow all local regulations. There are no RF filters in the System Filter Box provided for this purpose.

2. Door Open / Closed Switch - Each door into the exam room must be provided with a switch that signals the open/closed status of the door to the system. The switch(es) must be mounted (mechanically or electrically) outside the RF enclosure and have a contact that closes when the door is closed. Switches must be wired in series with screened cable, and the wire must be rated at a minimum of 30 V DC, 100 mAmps. Use Grainger item 4B811, Telemecanique model XCKJ10541 or equivalent.

3. Protective Earth - The RF enclosure requires one central protective earth (PE) bus-bar/terminal. This PE point must be connected to the Hospital Earth Ground supplied near the Hospital Mains by a conductor at least #1 AWG. Refer to sheet ED1 for details. The central PE bus-bar/terminal must be located as close as possible to the earth point inside the System Filter Box (< 39.4" [< 1000mm]) and there cannot be any seams in the shielding between the two points. The MR system parts connect to the earth point inside the System Filter Box while all other items, (facilities heating and water supply, receptacles, etc.) must be connected to the central PE bus-bar/terminal. The following requirements apply:

a. The impedance between any conductive part and the central PE bus-bar/terminal cannot exceed 100 mOhms.
b. All PE conductors used must be at least #8AWG. An earth leakage switch is not required.
c. For optimum shielding performance, "loops" inside the RF enclosure must be minimized.
d. A galvanic isolation layer between the RF enclosure and the building is recommended. Local regulations or the the RF vendor may require the enclosure be isolated from the building.
e. Isolated in this context means DC impedance greater than 3 kOhms.

4. Auxiliary Electrical Filters - Any electrical interconnection, that are not part of the MR system entering the RF enclosure requires an electrical filter. These filters may give rise to earth leakage currents in the RF enclosure, which could present a safety hazard. For complete safety, the total of all the earth leakage currents generated by all auxiliary electrical filters must not exceed 5 mAmps. If necessary, use an isolation transformer with the filters to minimize the effects of current leakage. Electrical filters are to be placed near the System Filter Box and they should be easily accessible. Beware of metal-on-metal connections that can occur near electrical filters which can cause imaging issues for the system. All 3rd party items (injectors, intercoms, humidity sensors, fire suppression flashers/buzzers, Invivo Esys, etc.) must have their own RF filters or feedthroughs. The filters and feedthrough of the PHILIPS System Filter Box cannot be used for these 3rd party items. RF Enclosure provider to verify that they have installed enough RF Filters for all the 3rd party items

(14.0)

General Electrical Notes

1. The contractor will supply and install all breakers, shunt trips and incoming power to the breakers. The exact location of the breakers and shunt trips will be determined by the architect/contractor.
2. The contractor shall supply and install all pull boxes, raceways, conduit runs, stainless steel covers, etc. Conduit/raceways must be free from burrs and sharp edges over its entire length. A Greenlee pull string/measuring tape (part no. 435, or equivalent) shall be provided with conduit runs.
3. All pre-terminated, cut to length cables, will be supplied and installed by Philips service. All cables to the breakers, will be supplied and installed by the contractor, subject to local arrangements.
4. Electrical raceway shall be installed with removable covers. The raceway should be accessible for the entire length. In case of non-accessible floors, walls and ceilings, an adequate number of access hatches should be supplied to enable installation of cabling. Approved conduits may be substituted. All raceways must be designed in a manner that will not allow cables to fall out of the raceway when the covers are removed. In most cases, this will require above-ceiling raceway to be installed with the covers removable from the top. Any raceway system(s) illustrated in these drawings are based on length of furnished cables, and any changes in routing could exceed maximum allowable length. Conduit or raceway above ceiling must be kept as near to finished ceiling as possible.
5. Conduit sizes shall be verified by the architect, electrical engineer or contractor, in accordance with local or national electrical codes, whichever govern. Conduit sizes shown on these plans are minimum sizes. This is based on fill factor and cable connector size. Substituting smaller conduits is not permitted.
6. Convenience outlets are not illustrated. Their number and location are to be specified by the customer/architect.
7. All sections of raceway and conduit shall be grounded with an independent #6 AWG green wire that is to be attached using solderless lugs. All ceiling mounted structural support members and ceiling plates shall also be grounded. All grounding connections, terminals, etc. shall be installed in a manner to provide accessibility for inspection, maintenance, repair, etc.

(14.0)

Electrical Power Distribution Requirement Notes

Electrical power distribution at the facility shall comply with:

- Utilization voltages per ANSI C84.1 - 1982 range A.
- ANSI / NFPA 70 - National Electrical Code
  - Article 250 - Grounding
  - Article 517 - Healthcare facilities
- ANSI / NFPA 99 - Healthccare facilities
- NEMA standard XR9 - Power supply guideline for x-ray machines

Phase conductors to be sized for instantaneous voltage drop per NEC 517 - 73 and Philips recommendations.

On sites without a PDU (typical case for 480V branch supply), the ground conductor for the power feeder shall be the same size as the phase conductor wires. The separate ground wire connections from building steel to the ground busbar shall be sized per NEC at a minimum of #1 AWG.

On sites with a Universal PDU-MRPT2 (typical case for branch power other than 480V), the ground conductor for the power feeder shall be the same size as the phase conductor wires.

(14.0)

Power Quality Guidelines

1. Power supplied to medical imaging equipment must be separate from power feeds to air conditioning, elevators, outdoor lighting, and other frequently switched or motorized loads. Such loads can cause waveform distortion and voltage fluctuations that can affect MR image quality.
2. Equipment that utilizes the facility power system to transmit control signals (especially clock systems) may interfere with medical imaging equipment, thus requiring special filtering.
3. Static UPS systems, Series filters, Power conditioners, and Voltage regulators provide a high impedance, nonlinear voltage source, which may affect image quality. Do not install such devices at the mains supply to medical imaging equipment without consulting Philips installation or service personnel.
4. Line impedance is the combined resistance and inductance of the electrical system and includes the impedance of the power source, the facility distribution system, and all phase conductors between the source and the imaging equipment. Philips publishes recommended conductor sizes based on equipment power requirements, acceptable voltage drops, and assumptions about the facility source impedance. The minimum conductor size is based on the total line impedance and NEC requirements. Unless impedance calculations are performed by an electrical engineer, the recommended values must be used.

(14.0)

Hospital Mains Switch

According to IEC, the hospital mains switch:

- shall switch all 3 phases simultaneously.
- shall be capable of being locked in the OFF position.
- shall comply with creepage distance and air clearance as specified in IEC 61058 -1 for Mains Transient Voltage of 4 kV.
- shall have an actuator that comply with IEC 60447.

(14.0)

PHILIPS

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

Project Details
Drawing Number
N-EAS180390 B
Date Drawn: 12/18/2018
Quote: 1-1KQ3QVA Rev. 8
Order: 6600420761.010000
6600420761.020000

EN

Electrical Legend

A Furnished and installed by Philips
B Furnished by customer/contractor and installed by customer/contractor
C Installed by customer/contractor
D Furnished by Philips and installed by contractor
E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
B	CR1	4" (100mm) H x 24" (600mm) W non-ferro magnetic cable ladder tray mounted above suspended ceiling from "SFB" to behind magnet. "CR1" must be between 13' (4m) and 30' (9m) in length and divided into 3 compartments: 8" (200mm) W, 10" (250mm) W, and 6" (150mm) W. Cable tray must be non-ferro magnetic material, such as aluminum or glass-reinforced plastic (GRP). GRP material is recommended and wooden trays are not allowed. Must be a minimum of 2" (50mm) above the top of suspended ceiling.	
B	CR2	Upper Tray - 4" (100mm) H x 18" (460mm) W cable ladder tray mounted 4" (100mm) above "CR3", from "SFB" to above equipment cabinets. "CR2" must be at least 10' (3m) in length and divided into 2 compartments. Maximum cable weight will be 34 lbs/linear foot.	ED2
B	CR3	Lower Tray - 4" (100mm) H x 18" (460mm) W cable ladder tray mounted 7' - 6" (2285mm) a.f.f. to bottom of tray, from "SFB" to above equipment cabinets. "CR3" must be at least 10' (3m) in length.	ED2
B	R1	12" (300mm) W x 4" (100mm) H cable ladder tray mounted from "CR3" to "MDU".	ED2
B	R2	8" (200mm) W x 2" (50mm) H cable ladder tray mounted from "CR3" to "ACCC".	ED2
F	R3	12" (300mm) W x 4" (100mm) H cable ladder tray mounted from "CR3" to "BCP".	ED2
B	FR1	Flush mounted floor duct. Refer to Sheet SD1 for details.	SD1
B	JB	10" (250mm) W x 10" (250mm) H x 6" (150mm) D wall box with removable screw-type coverplate. Surface mounted above "CR2".	
B	SR	10" (250mm) W x 10" (250mm) H x 6" (150mm) D wall box with removable screw-type coverplate. Surface mounted near Storage Rail "SR".	
B	CBS	480V, 3 phase, 100 Amp circuit breaker. See Sheet ED1 for details.	ED1
D	CS	Flush mounted ceiling speakers. (Not shown on plan)	SD1
B	ERB	2" (50mm) W x 4" (100mm) H x 2" (50mm) D wall box with removable screw-type coverplate. Flush mounted 70" (1800mm) above finished floor to bottom of box.	
B	DS	RF Door Open Switch - 120 V, 5 Amp switch limited to open when door is open. Mounted in upper corner on strike side of entry door. Use Grainger item 4B811, Telemecanique model XCKJ10541 or equivalent.	
D	SFB	Wall mounted System Filter Box.	
B	ISL	Incandescent Service Light (AC, 500 lux) above finished ceiling.	EN

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	Item Number	Description	Detail Sheet
B	LS	Electrical switch for service light (ISL) above finished ceiling.	
B	WS	Wall Socket (duplex, single phase) above finished ceiling. See Sheet EN for details.	EN
B	CZ	Patient comfort zone. No direct lighting in this area.	
B	S	120V/20A dedicated duplex outlet for service in the equipment room and control room. Additional outlets may be desired by customer or required by code. (Not shown on plan)	
B	N1	RJ45 type ethernet 10/100/1000 Mbit network connector. Access to customer's network via their remote access server is needed for Remote Service Network (RSN) connectivity.	N1
B	N2	RJ45 type ethernet 10/100/1000 Mbit network connector with access to customer's network. Locate within 10' of network. Network fiber optic and ethernet cabling, connectors, wall boxes, patch panels, etc. are the responsibility of the purchaser. Philips assumes no responsibility for procurement, installation, or maintenance of these components.	N1
B	e	RJ45 type ethernet 10/100/1000 Mbit network connector with internet access for Philips Field Service Engineer connectivity to on-line system documentation.	
B	EA	e-Alert box. Final location of "EA", to be determined and installed by Philips.	
B	N3	RJ45 type ethernet 10/100/1000 Mbit network connector with access to customer's network. Locate within 9' - 10" of "EA". Network fiber optic and ethernet cabling, connectors, wall boxes, patch panels, etc. are the responsibility of the purchaser. Philips assumes no responsibility for procurement, installation, or maintenance of these components.	N1
B	EA	120V/20A dedicated duplex outlet for "EA".	

See E1 - E2 sheets for conduit and raceway requirements.

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Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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EL1

Electrical Legend

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G Optional

	Item Number	Description	Detail Sheet
D	FAF	FA Series Three Phase Filter	ED1
D	UPS	25 kVA UPS Cabinet	ED1
D	BC	Battery Cabinet	ED1
B	RSP	Remote Status Panel (wall mounted in the control area) - 4" (105mm) W x 4" (105mm) H x 4" (105mm) D pull box with removable screw-type cover plate, flush mounted. Exact height to be determined. Location shown is recommended and may be changed - verify relocation with local Philips Service.	ED1
B	RSP	120V/20A dedicated duplex outlet for RSP (Remote Status Panel). To be located within 5' (1525mm) from RSP.	
B	N4	RJ45 type ethernet 10/100/1000 Mbit network connector. Access to customer's network via their remote access server is needed for Remote Eye.	
B	IBC	4" (100mm) W x 4" (100mm) H x 4" (100mm) D wall box with removable screw-type cover plate, flush mounted. Location as shown or near AE Small Form Factor Cabinet.	
B	PIBS	Electrical switch to power off Patient In-Bore Solution Monitor. Location shown is recommended and may be changed - verify relocation with local Philips Service.	
B	PIB	Patient In-Bore Solution Monitor. 4" (100mm) W x 4" (100mm) D wall box located behind the monitor and outside the RF cage.	
B	AUD	4" (100mm) W x 4" (100 mm) H x 4" (100 mm) D wall box with removable screw-type coverplate. "AUD" flush mounted 12" A.F.F. to bottom of box. Locate "AUD" as shown or near location of Storage Rail.	
B	ATSW	8" (200mm) W x 8" (200mm) H x 4" (100mm) D wall box flush mounted to wall located 57" (1450mm) A.F.F. with grommet opening in face plate 2.5" (60mm) off center 1" (25mm) from center. Duplex main outlet located inside the wall box.	
B	ATS	4" (100mm) W x 4" (100mm) H x 4" (100mm) D wall box with removable screw-type cover plate, surface mounted 12" (300mm) A.F.F. to bottom of box. Location shown is recommended and may be changed - verify relocation with local Philips Service.	
B	A_W	120V/20A dedicated duplex outlet for ATSW. Outlet to be located inside ATSW wall box.	
B	A_T	120V/20A dedicated quad outlet for ATS, USB Extenders, and DVD.	
B	AE	120V/20A dedicated duplex outlet for Patient In-Bore Solution Monitor (To be located outside the RF cage), Ambient Experience Cabinet, and external audio source.	

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E Existing
F Future
G Optional

	Item Number	Description	Detail Sheet
B	R2	2" (50mm) W x 2" (50mm) D cable ladder tray mounted from "CR3" to "RAD".	
B		120V/20A dedicated duplex outlet for RAD (Resoundant Active Driver). To be located within 20' (6100mm) of RAD.	
B	F	120V/20A dedicated duplex outlet for "XD" and iCBC Power Supply Unit ("XPS"). To be located within 10' (3050mm) of equipment ("XPS"/"XD").	

See E1 - E2 sheets for conduit and raceway requirements.

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Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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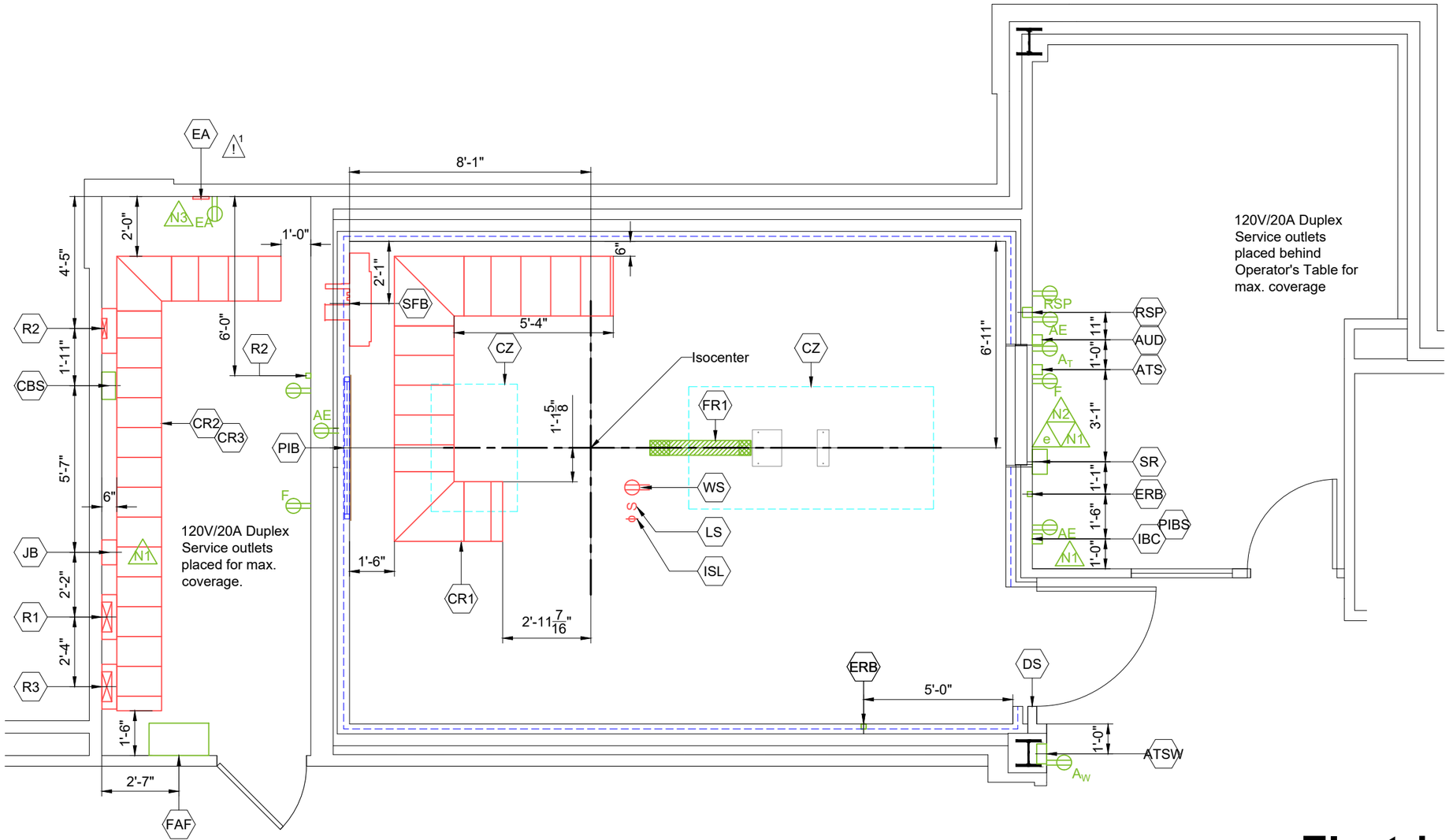
EL2



All risers and circuit breakers are dimensioned to centerlines.

Final location of e-Alert "EA", to be determined and installed by Philips.

BC

N4 UPS

Verify Location with Customer
and local Philips Project Manager

Electrical Layout

1/4" = 1'-0"

Ceiling Height Guide

Equipment Room:	10' - 6" (3200mm)	Recommended
	9' - 2" (2795mm)	***Minimum****
Exam Room Suspended Ceiling:	8' - 3 1/4" (2520mm)	***Required***
Exam Room RF Ceiling:	9' - 9" (2970mm)	Recommended
Control Room:	9' - 10" (3000mm)	Recommended
	7' - 3" (2200mm)	***Minimum***

* Ceiling Heights outside the minimum dimensions may be possible. These Ceiling Heights must be reviewed and approved.

0 1' 2' 4' 8'

0 .5m 1m 2m

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E1

03.23.17

Conduit Required

General Notes

1. All conduit runs must take most direct route point to point.
2. All conduit runs must have a pull string.

A Conduit supplied/installed by contractor - Philips cables installed by Philips
B Conduit supplied/installed by contractor - Philips cables installed by contractor
C Conduits and cables supplied and installed by contractor
D Conduit existing - cables supplied and installed by Philips
E Conduit existing - cables supplied by Philips and installed by contractor
F Conduit existing - cables supplied and installed by contractor
G Optional equipment, verify with local Philips Service

* **P** Power (AC)
D Power (DC)
G Ground
S Signal
H High Tension
C Cooling Hose
A Air Supply Hose

	Conduit			Conduit Quantity	Cable Type (*)	Minimum Conduit Size	Maximum Conduit Length	Special Requirements
	Run No.	From	To					
C	1	Hosp. Power	RF Filters	Per N.E.C.	P	Per N.E.C.	Per N.E.C.	See ED1 sheet for more information.
C	2	Hosp. Power	CBS	Per N.E.C.	P	Per N.E.C.	Per N.E.C.	See ED1 sheet for more information.
A	3	ERB	"SFB"	1	P	$\frac{3}{4}$"	80'	ERB in control room.
A	4	ERB	"SFB"	1	P	$\frac{3}{4}$"	49'	ERB in exam room.
C	5	"DACC"	DS	1	S	1"	75'	
A	6	SR	JB	1	S	3"	65'	Conduits to be routed outside RF enclosure.
A	7	SR	JB	1	P	2"	65'	Conduits to be routed outside RF enclosure.
A	8	"SACU"	"LCC"	1	P	$1\frac{1}{2}$"	45'	Cable to routed from "SACU" to "JB" to "CR3" to "LCC". Conduit not needed if "SACU" is close enough for cable to be directly routed onto "CR3". Refer to Sheet MP1 for more details.
C	9	CBS	FAF	1	(P)	Per N.E.C.	25'	See ED1 sheet for more information.
C	10	FAF	MDU	1	(P)	Per N.E.C.	25'	See ED1 sheet for more information.
C	11	MDU	UPS	2	(P)	Per N.E.C.	Per N.E.C.	See ED1 sheet for more information.
C	12	UPS	BC	2	(P)	Per N.E.C.	Per N.E.C.	See ED1 sheet for more information.
B	13	RSP	UPS	1	(P)	1 1/2"	90'	Remote Status Panel (for UPS; If ordered).
A	14	ATSW	IBC	1	S	2"	65'	For DVI Connection between wall mounted Touch Screen and IBC.
A	15	ATSW	IBC	1	S	1"	98'	For USB Extender of wall mounted Touch Screen.
A	16	IBC	PIB	1	S	2"	72'	For DVI Connection between IBC and In-Bore Solution Monitor.
A	17	IBC	PIB	1	S	1"	328'	For Network Connection between IBC and In-Bore Solution Monitor.
B	18	"POC"	"SFB"	1	(P/S)	1"	49.2'	"POC" = Patient Observation Camera "SFB" = System Filter Box
B	19	"SFB"	"POM"	1	(S)	1"	98.4'	"POM" = Patient Observation Monitor
B	20	SR	JB	1	(P/S)	1"	See Note	Fiber optic cable to be routed from "XI" to "XD" through Injector Fiber Optic RF feedthrough (See Sheet SL). Recommended conduit length to be a maximum of 40' (12m).

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Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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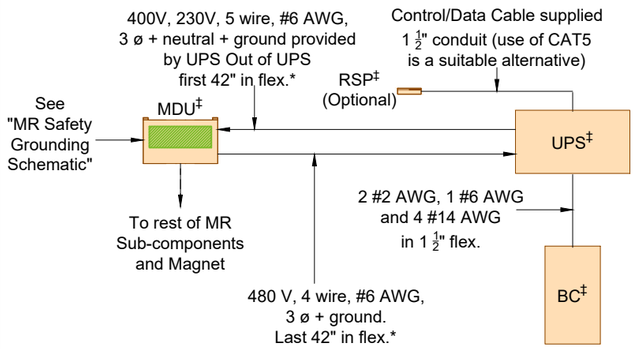
E2

Diagram - Mid-Tier UPS wiring

(Not to scale)



Note:

* Incoming power has a neutral, DO NOT connect line to MDU

For UPS purchased from PHILIPS, refer to Installation and Operation manual from the manufacturer for all detailed specification and installation requirements. Wiring and circuit sizes at supply and load side of UPS to meet UPS requirements and verified by contractor to meet building conditions and local codes.

Maximum Cable Length per Wire Size

(Based on 20° C copper ambient temperature)

< 95'	#1 AWG
< 119'	#1/0 AWG
< 150'	#2/0 AWG
< 190'	#3/0 AWG
< 242'	#4/0 AWG
< 283'	250 MCM
< 340'	300 MCM

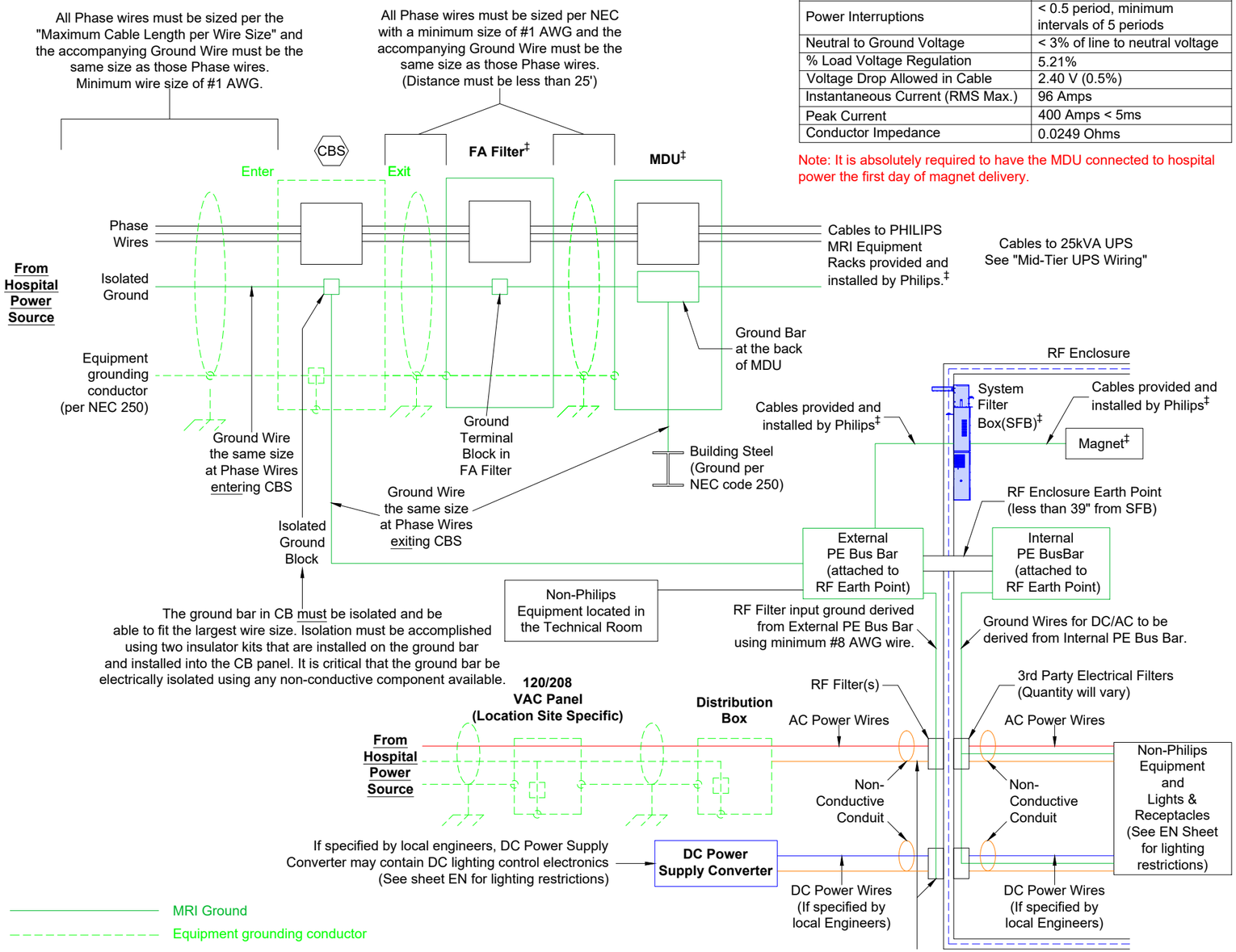
The ground conductor for the power feeder shall be the same size as the phase conductor wires. Ground conductor must be dedicated and totally separate from conduit, raceway, or structural ground. (17.0)

Diagram - MR Safety Grounding Schematic

(Not to scale)

Notes:

1. All items shown are to be provided and installed by contractor unless otherwise specified.
2. Philips provided equipment designated with ‡.
3. All ground conductors for power feeders must be the same size as the phase conductor wires.
4. All non-power feeder ground wires must be sized per NEC without going below the minimum size shown.
5. Universal PDU - MRPT2 (not shown) must be ordered if incoming voltage other than 480 VAC is utilized.
6. All wires and conduits must be insulated per NEC.
7. For additional notes, see Sheet EN (section "RF Enclosure Electrical Notes").



Power Quality Requirements into MDU

Branch/Max. Power Required	80 kVA
Supply Configuration	3 Phase + Ground
Nominal Input Voltage	480 VAC
Circuit Breaker (3ϕ, 60 Hz, 3 pole)	100 Amps
Mains Impedance	< 0.150 Ohms
Distortion Power Factor	> 0.9
Cos phi	> 0.98
Total Harmonic Distortion (THD)	< 45%
K-factor	< 10
Crest Factor	< 3
Power Interruptions	< 0.5 period, minimum intervals of 5 periods
Neutral to Ground Voltage	< 3% of line to neutral voltage
% Load Voltage Regulation	5.21%
Voltage Drop Allowed in Cable	2.40 V (0.5%)
Instantaneous Current (RMS Max.)	96 Amps
Peak Current	400 Amps < 5ms
Conductor Impedance	0.0249 Ohms

Note: It is absolutely required to have the MDU connected to hospital power the first day of magnet delivery.

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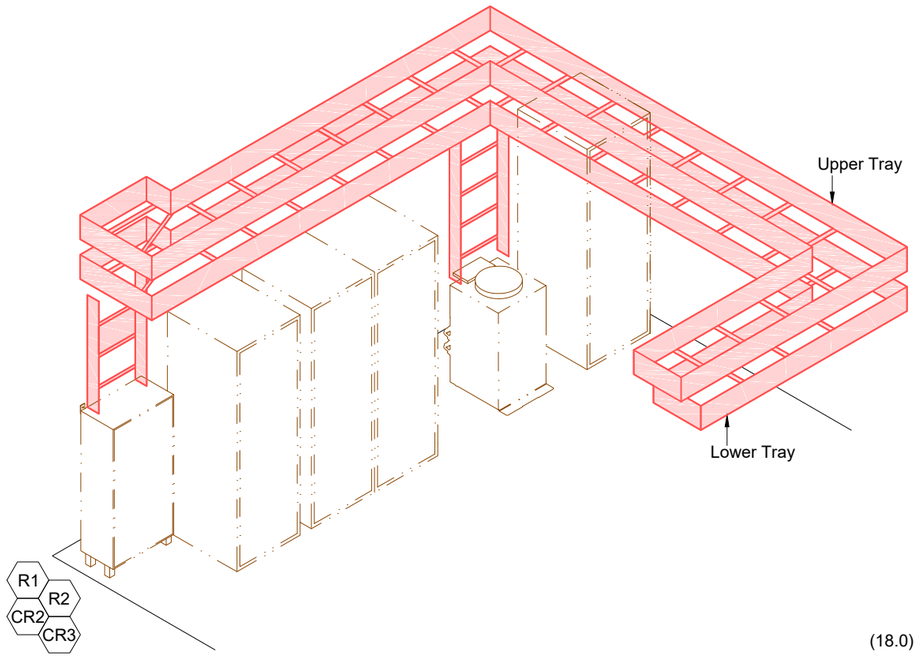
ED1

Detail - Equipment Room Isometric

(Not to scale - Not site specific)



(18.0)

USB Extender for Touch Screen Monitor

The USB Extender is required for each Touch Screen Monitor located >18' away from Ambient Experience SFF Cabinet.

It is composed of two units:

a. LEX - Local Unit:
   - Located within 5m of the AE Server.
   - Receives power from the AE server via USB connection.

b. REX - Remote Unit:
   - Located within 5m of the Touch Screen Monitor.
   - Receives power from the supplied 5 VCD power supply unit.
   - Installed inside ATSW junction box for the wall mounted Touch Screen Monitor, or on/under desk/counter for the Touch Screen Monitor in the control room.

c. LEX and REX connected via a UTP (Cat 5e or better) cable.

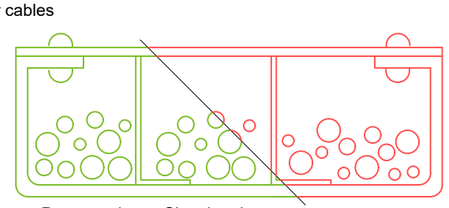
(15.0)

Detail - Cable Trough Divisions Outside of RF Enclosure (Or as directed by local code)

(Not to scale)

Ducts must be separated by metal barriers into three sections.

1. Power cables and ground cables can be run together.
2. Signal cables and data cables can be run together but must be separated from power cables.
3. Video cables must be run separately from all other cables.
4. It is important that all cables are placed in the appropriate through and at no given point do any cables from division cross with cables from another. Trough separation must be continuous from the beginning to the end of the run.
5. Trough or ducts: Steel with steel dividers grounded per local code.
6. Contractor to provide cable restraints in all troughs.
7. Low cable duct is for signal cables.
8. High cable duct is for:
   - Gradient cables (not allowed to route patient ventilation hose in gradient cable section)
   - RF send cable
   - Helium Gas Lines
   - Hoses for gradient coil cooling liquid
   - Power cables



CR2 CR3

(14.0)

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Project Manager: Andrew Marshall
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ED2

Air Conditioning Requirements

1. Equipment Room Specifications

Ambient Requirements *	
Temperature	59° - 75° F (15° - 24° C)
Maximum Temperature Change	9° F (5° C) per 10 min.
Relative Humidity	30% to 70%, no condensation
Total Heat Dissipation to Air	
Dissipation Standby	20473 btu/hr (6 kW)
Peak Dissipation Scanning	**27297 btu/hr (8 kW)**
* Requirements given are specified at the cabinet air intake. ** The temperature of the conditioned air that enters the room must not be less than 42° Fahrenheit (6° Celsius) below the mean room temperature.	

Note: Full Load UPS heat dissipation may increase peak dissipation by 11,600 Btu/hr (3.4 kW)

a. The MR system heat dissipation is dependant on the type and duration of the acquisition. Therefore, actual heat dissipation will vary greatly. Equipment room air conditioning provided at average heat dissipation will result in dangerously high temperatures during peak loads, causing permanent damage and voiding system warranty. As such, air conditioning must be designed to handle peak loads.
b. Heat dissipation of an optional chiller, if installed in the equipment room, is not included.
c. A slight air overpressure is recommended to avoid dust build-up.
d. The HVAC system must be designed around equipment cabinet air flow/circulation. Modifying the room layout is allowed only after consulting the HVAC provider to avoid "hot spots".
e. Pollution: The equipment room is equipped with highly technical medical electronics. To avoid any potential failures due to pollution, dust containment should be considered (despite individual system parts having air filters). Ceilings walls and floors must be sealed to prevent dust particles from releasing into the air. Special attention shall also be considered when there is a cement floor slab under raised computer floors. Before the delivery of any equipment and after any construction, the site must be cleaned before turning on the MR system. The air conditioning system must be equipped with 90% less than 10 micron particles and 80% less than 5 micron particles filters.

2. Control Room Specifications

a. Comfort depends on local practice and preferences. For this reason, it is the responsibility of the customer to define the appropriate conditions of the control room for human comfort.

Ambient Requirements		
Temperature	For human comfort	64° - 75° F (18° - 24° C)
	Required for X-ray films	59° - 86° F (15° - 30° C)
	MRI Equipment	50° - 95° F (10° - 35° C)
Maximum Temperature Change		9° F (5° C) per 10 min.
Relative Humidity		30% to 70%, no condensation
Total Heat Dissipation to Air		
Dissipation Standby		2047 btu/hr (0.6 kW)

3. Exam Room Specifications

Scan procedures involves the emission of RF energy. This can raise patient temperature. The amount of energy absorption (Specific Absorption Rate) is directly related to the ambient conditions. Therefore, the ambient requirements for the exam room are mandatory for safety.

Ambient Requirements	
Temperature ***	65° - 71° F (18° - 22° C) Preferred for patient comfort: 70° F (21° C)
Maximum Temperature Change	9° F (5° C) per 10 min.
Relative Humidity ***	40% to 70%, no condensation
Total Heat Dissipation to Air	
Dissipation **	7507 btu/hr (2.2 kW)
** Gradient coil heat dissipation (3400 - 51200 btu/hr [1 - 15 kW]) will be removed by liquid cooling. *** Exam room temperature and humidity specifications are critical for the MR and must be met at all times. No exceptions are allowed.	

a. The air under the suspended ceiling must be routed via an air grill (opening) in the suspended ceiling to the void above the suspended ceiling but remain inside of the RF enclosure.
b. A slight overpressure is required to avoid dust penetration
c. The air exchange rate in the examination room (under the suspended ceiling) must minimally be 5 times per hour at a minimum air flow of 235 CFM (400 m^3/h). The air inflow under the suspended ceiling must disperse evenly to ensure comfort and avoid "hot spots". Additional 235 CFM (400 m^3/h) must be supplied above the suspended ceiling in the top covers near the magnet shroud.
d. The conditioned air must enter the examination room through RF feedthrough wave guides.
e. If a dedicated HVAC system is used in the exam room, it is recommended that a system be designed to provide malfunction warnings, since excessive over/under temperatures or high/low relative humidity may damage the MR system.
f. The air flow through the magnet assembly must always be maintained while the system is in use.
g. Installation of Temperature and Humidity sensors in the RF-enclosure can be a problem due to the RF-filters required for each electrical cable entering and leaving the RF-enclosure and possible electrical interference. Best solution is to locate the sensors directly outside the RF Enclosure in the HVAC air return.
h. Smoke / fire detection system to be installed according to local code, fire and smoke detection common for medical devices and equipment with corresponding power rating. The use of these detectors inside the RF-enclosure is limited due to possible RF-interferences. A possible alternative is to install the detection device inside the air out / return duct located outside the RF-enclosure. Another alternative is to install an Aspirating Smoke Detector.
i. Smoke detection, temperature sensing, thermostats, humidity sensors, fire suppression duct control units, fire flashers/buzzers/annunciators and O2 Sensors, etc. inside exam room, MUST have a MR compatibility certification document. They must have NO INTELLENGENCE: No micro-processor control, no oscillators, no stepper motors, and no source of clock signal at all. If they do, and there is no MR compatibility certificate, it means that the device is disqualified for use inside the RF room.
j. System Air Cooling Unit
- Heat from the magnet gradient coil will be removed via the SACU (System Air Cooling Unit). The SACU and ventilation hose are delivered by Philips.
- The necessary 6.25" (160mm) System Air Cooling waveguide is to be provided by the RF enclosure supplier.
- 235 CFM (400 m3/ /h) of the inlet air will be directed through the magnet shroud. This will be pulled through the magnet by the SACU via the Gradient Exhaust RF Feedthrough and a Philips provided 5.5" hose (140mm).
- The exhaust air from the SACU must be directed back into the return air by a customer/contractor provided interface.

(18.0)

Additional Exam Room Air Feedthrough Requirements

1. Air Escape RF Feedthrough

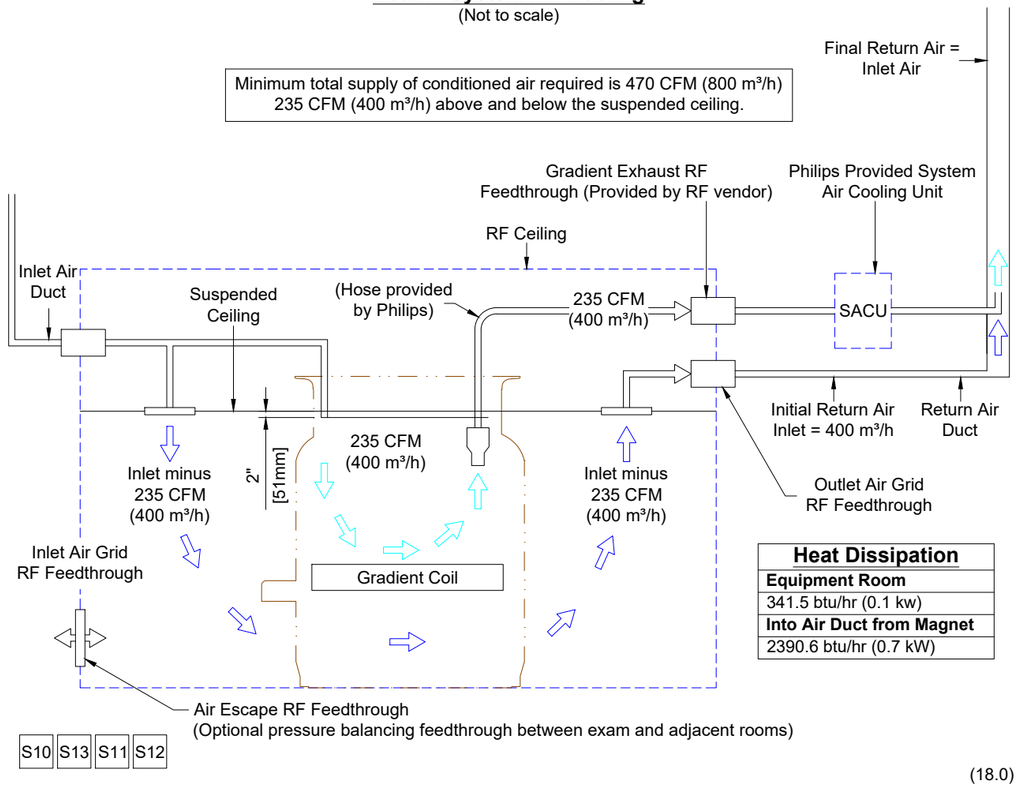
To ease the opening and closing of exam room entry doors, and prevent ceiling tiles from shifting when doors are opened or closed, an optional pressure balancing feedthrough can be installed between the exam room and adjacent room. Placing this feedthrough at the control room wall may lead to an increase in noise and affect comfort level.

S12

(18.0)

Detail - System Air Cooling

(Not to scale)



Heat Dissipation
Equipment Room
341.5 btu/hr (0.1 kw)
Into Air Duct from Magnet
2390.6 btu/hr (0.7 kW)

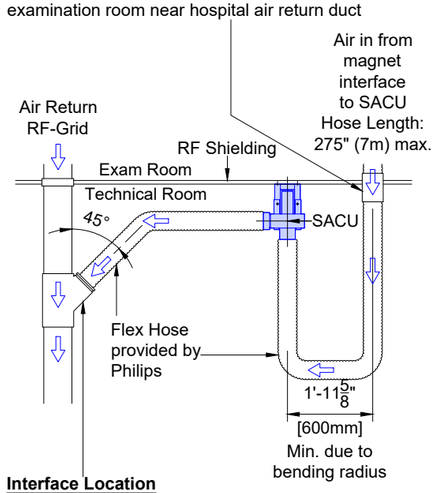
S10 S13 S11 S12

(18.0)

Detail - System Air Cooling Unit - Air Flow

(Not to scale)

RF Feedthrough
Philips supplied hose through
Wave guide inner diameter min. 6.3" (160mm)
Typical location above suspended ceiling of examination room near hospital air return duct



Interface Location

Third party supplied 5" (127mm) outer diameter interface.
Hose Length: 78.7" (2m) max. distance from SACU
Airflow: 235 CFM (400 m^3/h)
Heat Load: 2390 btu/hr (0.7 kW) during scanning

(16.1)

PHILIPS

Provisional

Project
Ingenia Ambition 1.5T X
Fletcher Allen Health Care
Burlington, MA
Room 2

Philips Contacts
Project Manager: Andrew Marshall
Contact Number: (802) 923-6500
Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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6600420761.020000

MP1

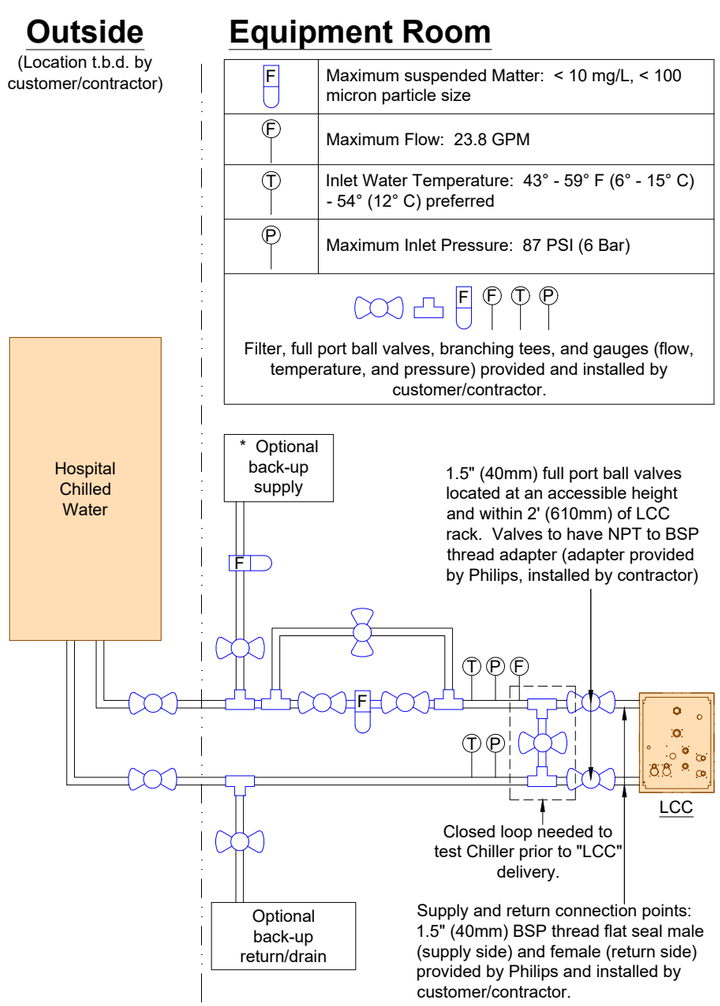
Mechanical / Plumbing Layout

**** All piping to be minimum 1.5" (40mm) schedule 80 PVC or copper piping with long radius bends, provided and installed by customer/contractor. All Full port ball valves and branching tees to be provided and installed by customer/contractor.**

Customer/contractor to insulate all piping to prevent condensation and to minimize heat gain from ambient air.

All flow, temperature, and pressure gauges shown on the diagram below are required and must be installed prior to chiller and magnet delivery.

Customer/contractor to supply and install flow, temperature, and pressure gauges for troubleshooting and monitoring purposes.



*** If a chilled water system is used, it is the customer/contractor responsibility to meet all codes concerning the dumping of glycol. The amount of glycol (by volume) drained during a switch-over is the total volume of piping between the chiller and MR equipment (LCC) multiplied by the concentration.**

**** Customer supplied and/or installed items shown bold. ****

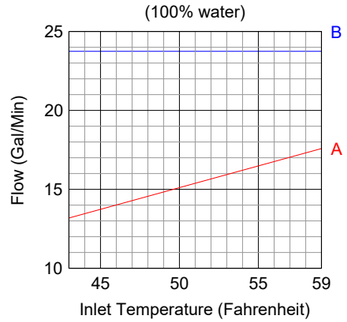
(18.0)

Mechanical / Plumbing Notes

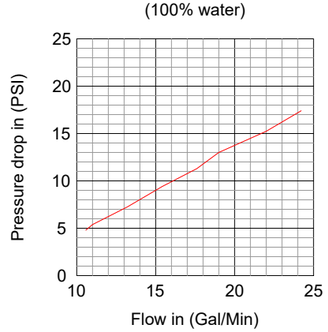
1. Liquid cooling is required 24 hours / 7 days a week. It is the customer/contractor's responsibility to ensure the water source meets the Primary Coolant, Flow, and Pressure Drop Requirements below. Failure of the cold water distribution system will result in a shutdown of the MR system. If Water cooled cryo cooler fails, the Air cooled cryo cooler would need to take over cooling of the magnet but clinical use is not possible.
2. Primary Coolant Requirements to the Liquid Cooling Cabinet (LCC):

Inlet Water Quality	Potable Distilled Water
Inlet Water Acidity	6.0 - 8.0 pH
$CaCO_3$	< 250 ppm
Hardness	< 14 (degrees German hardness)
Chlorine	< 200 ppm
Maximum Suspended Matter	< 10 mg/L, <100 micron particle size
Inlet Water Temperature	43° - 61° F (6° - 16° C), 54° F (12° C) preferred
Maximum Flow	23.8 GPM
Maximum Inlet Pressure	87 PSI (6 Bar)
Inlet Water Temperature Stability	± 3.6° F (± 2° C) per 10 minutes
Ethylene Glycol Concentration	MRI Chiller: Minimum 35% - Maximum 50%. Hospital Chilled Water: Minimum 0% - Maximum 50%.
Heat Dissipation to Liquid	17,061 - 153,550 btu/hr (5 - 45 kW)

3. Flow Requirements to the Liquid Cooling Cabinet (LCC):
   - Flow in gallons per minute versus inlet temperature in Fahrenheit of the chilled water needs to fall into the area on or between curves A and B for each of the graphs in order to maintain enough cooling capacity.
   - Maximum flow not to be exceeded to avoid temperature instability in the secondary circuit.
   - If needed due to local requirements, it is allowed to use a mixture of maximum 50% of Glycol. Make sure that the supplier of the chilled water calculates the correct flow needed.



4. Pressure drop through Liquid Cooling Cabinet (LCC):
   - If needed due to local requirements, it is allowed to use a mixture of maximum 50% of Glycol. Make sure that the supplier of the chilled water calculates the correct flow needed.



5. It is recommended to provide a water back-up system in case the cold water supply to the LCC is down (due to servicing or failure) to reduce the amount of liquid helium evaporating. Clinical use/scanning is not possible on tap/domestic water because it does not meet cooling requirements. Maximum allowed time of tap/domestic water cooling is 2 weeks.
6. A minimum 66 gallon (250 liter) water buffer in the chilled water system is recommended to be installed to smooth out the dynamic behavior of the MR heat load. A dedicated MR chiller can accommodate this requirement. Contact Philips for more information. (18.0)

PHILIPS

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Project Manager: Andrew Marshall
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Email: andrew.marshall@philips.com
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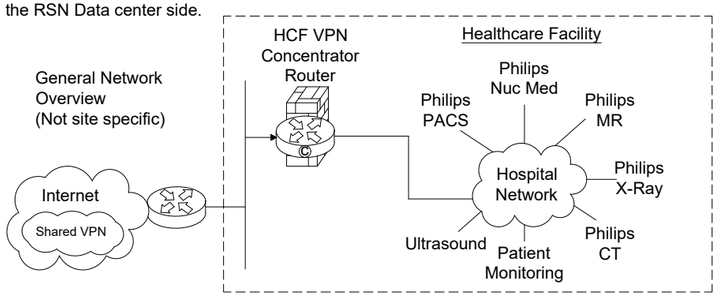
MP2

Philips Healthcare Remote Services Network (RSN)

Secure broadband connection required for Philips remote technical support, diagnostics, and applications assistance

Broadband Site-to-Site Connectivity (Preferred)
This connectivity method is designed for customers who prefer a connection from the RSN Data Center to the Health Care Facility (HCF) utilizing their existing VPN equipment.

Connectivity Details:
- A Site-to-Site connection from the RSN data center's Cisco router will be established to the HCF's VPN concentrator.
- The VPN Tunnel will be an IPSEC, 3DES encrypted Tunnel using IKE as standard, but alternative standards are also available, such as AES, MD5, SHA, Security Association lifetime and Encryption Mode.
- Every system that we will be servicing remotely will have a static NAT IP that we configure on the RSN Data center side.

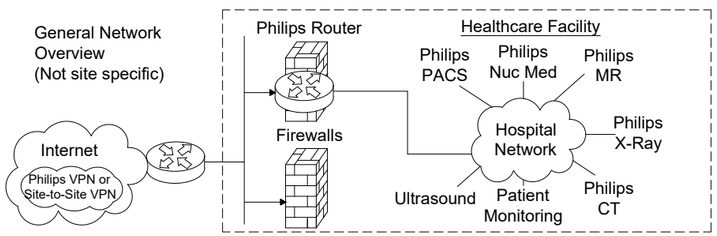


Action Required by Hospital:
- Review and approve connection details.
- Complete appropriate Site Checklist.
- Configure and allow Site-to-Site access prior to setting up connectivity depending on the access criteria that the HCF decides to implement (ex: Source IP filtering, destination IP filtering, NAT assignment, etc.).
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to the designed IP provided by Philips.

Broadband Router Installed at Health Care Facility
This connectivity method is designed for customers who have a dedicated high speed connection for Philips equipment.

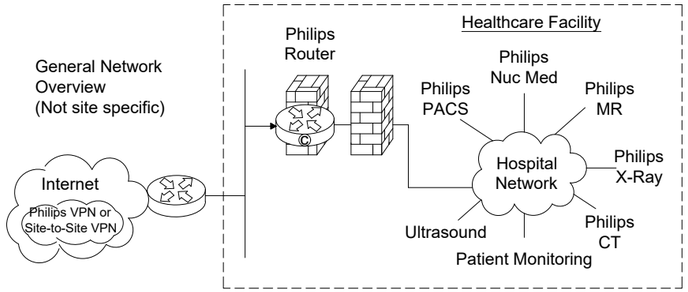
Connectivity Details:
- An RSN Cisco 1711 or 1712 router will be preconfigured and installed at the HCF by Philips in conjunction with the HCF IT representative.
- The VPN Tunnel will be an IPSEC, 3DES encrypted Tunnel using IKE and will be established from the RSN-DC and terminated at the RSN Router on-site.
- One to One NAT is used to limit access to Philips equipment only.
- Router Config and IP auditing is enabled for Customer IT to view via website 24/7.
- Dedicated DSL connections are also supported.

Option 1: Parallel to HCF Firewall Connectivity Method
This connectivity method is designed for customers who prefer a Philips RSN Router installed on site utilizing all the security features provided and managed by Philips.



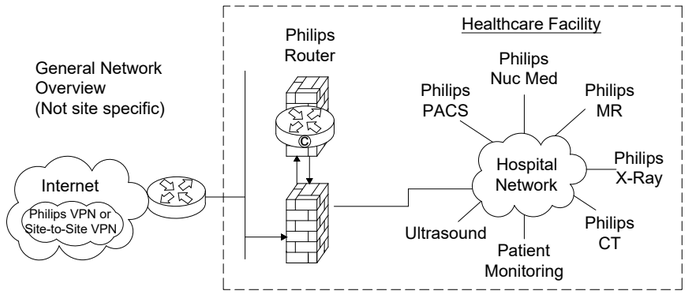
Action Required by Hospital:
- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.

Option 2: Back End Connected to the HCF Firewall Connectivity Method
This connectivity method is designed for customers who prefer a Philips RSN Router installed on site by setting up an IP-Based policy allowing access thru existing HCF Firewall to Philips equipment.



Action Required by Hospital:
- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.
- Configure and allow on the firewall on the DASHED line interface access between the IP address allocated by the hospital to the Philips internal Ethernet router interface and the target modality IP address.

Option 3: Router Installed Inside the HCF's DZM
This connectivity method is designed for customers who prefer the RSN Router installed inside and existing, or new DMZ, allowing access to Philips equipment.



Action Required by Hospital:
- Assign a fixed public IP Address from the ISP to be configured on the Philips router. This is the DOTTED link on the picture connected to the firewall.
- Assign a Back end IP for the Philips router on the Hospital Network.
- Complete appropriate Site Checklist.
- Route traffic from within the hospital network with destination addresses 192.68.48.0/22 to internal Philips router Ethernet interface. This is the DASHED line connected to the firewall.
- Configure and allow on the firewall on the DASHED line interface IPSec protocol communication by opening protocol 500, 50, 51, 47 and port 23 + TACACS. Traffic should be between external IP Address located on the Philips router and the RSN Data center IP address 192.68.48/24 and IP address AOSN TACAS.
- Configure and allow on the firewall on the DASHED line interface access between the IP address allocated by the hospital to the Philips internal Ethernet router interface and the target modality IP address.

(14.0)

System Network Information

IMPORTANT NOTE:
It is the customer's responsibility to coordinate with the local Philips Engineer to provide ALL required network information and install ALL required network and cabling & drops according to Philips specifications PRIOR to the scheduled installation start date. Failure to do so may delay system installation and jeopardize the customer hand over date.

MRI Scanner		
	Default	**Hospital Preference**
AE Title:	MR1	
Port Number:	104 >= R2.6.3 3010 < R2.6.3	
IP Address:		
Subnet Mask:		
Default Gateway:		

Extended Work Station (EWS)		
	Default	**Hospital Preference**
AE Title:	EWS1	
Port Number:	3010	
IP Address:		

Hospital Network				
	RIS	**PACS (STORE)**	**PACS (Q/R)**	**DICOM PRINTER**
AE Title:				
Port Number:				
IP Address:				

RSN Ports	
Application	**Port**
Field Service Framework for MR	4440 and 80 (TCP)
McAfee ePolicy Orchestrator	80 (TCP)
Remote Desktop Sharing (Lots/To)	5900 (TCP)
Secure FTP (Passive)	22 (TCP)
Telnet SSH2	22 (TCP)
Philips Service Agent (Outbound)	443 (TCP)

(14.0)

PHILIPS

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Fletcher Allen Health Care
Burlington, MA
Room 2

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Email: andrew.marshall@philips.com
Drawn By: Brandon Nidiffer

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N1

Site Readiness Checklist

Instructions:
- This form is to be used by Project Manager and Customer/Contractor.
- Information is used to develop and determine site ready date.
- Items listed are go/no go items for delivery unless noted as delay only items.
- Items listed with ** are critical to magnet and site readiness and may cause significant cost and delay to site readiness if not addressed properly.
- Items identified as delay items must be completed after hours or on weekends. These items cannot be accomplished while installation is in progress and must be completed within 2 days of installation start or they may stop installation.

General Requirements

- ☐ Customer site preparation verified in general against the Philips Final Site Planning drawings.
- ☐ Site is safe to work: i.e. no open mains, no slippery floors, no sharp edges and no hazardous goods on site.
- ☐ Existing equipment is dismantled and moved from the site.
- ☐ Handover between Project Manager and Installation crew done: update on site layout, names, telephone numbers, additional hardware and other open items. Escalation procedures communicated.
- ☐ Permits and inspections completed by applicable governing authorities. Method statement available and safety instructions attended (if required).
- ☐ ****Climate equipment is installed and operational: humidity, temperature and dust conditions are according the Site Planning drawings.All pre-cabling identified on Philips drawings has been installed.**
- ☐ All network cabling, drops installed according to Philips specifications. (Including hardcopy cameras). Network connection point available as well as contact details for facility IT.
- ☐ Common electrical power (e.g. house wiring, lighting, etc.) completed and functional.
- ☐ Cable conduit and ducts installed and clean. Duct covers in place but not finally closed. Cable opening are clear, without sharp edges.
- ☐ Cable ducts and feedthroughs available according to site drawings and incl. pull strings if applicable. Point to point cable lengths verified and enough space to store overlength.
- ☐ Construction resource scheduled to finish transport opening (e.g. sheet rock, studding, sanding, painting, etc.) Not later than 2 days after SID.
- ☐ Floors are finished and covered with protective covering (scratch protection).
- ☐ Walls finished including painting. Cabinets and casework installed.
- ☐ Backing support as required for wall mounted equipment.
- ☐ Ceiling lights installed. Ceilings installation completed.
- ☐ Rooms have been cleaned.
- ☐ Rooms are lockable and keys/alarm codes are provided. Access is arranged including permission for after-hours as well as storage for tools. Sufficient storage space Min. 18 sqm = min. 195 sqft.
- ☐ Coordination with all the third party vendors is done for the UPS, additional equipment, finishing the transport opening and waste removal.
- ☐ Optional Local requirements.
- ☐ RSN Surveys completed and submitted. RSN Connectivity to be established prior to the end of the installation.
- ☐ No other construction works needed other than required to complete the site after magnet bring in and rigging. No dust generating activities allowed anymore.

Rigging

- ☐ Access route for Magnet and system parts route are prepared as committed, checked for size, max floor load and all obstacles removed. Check executed on weather conditions; Project Manager to decide on optional plan.
- ☐ Rigging Tools, Installations tools as required, general tools and ladders present.

Control Room

- ☐ Electrical / Mechanical / Network / Millwork completed.

Equipment Room

- ☐ ****Mains and PE available and according to norms mentioned in Site Planning drawing. Resources are scheduled to connect facility mains to gMDU. Not later than 2 days after SID.**
- ☐ Chiller operational, water plumbing and required valves installed, tested, free of air and leaks, flushed and ready for use. Facility water connections are prepared for LCC connections. Not later than 2 days after SID.
- ☐ **Magnet connected to the cryo cooler within 8 days after the magnet has left the factory.**

Exam Room

- ☐ Ceiling ladder trays, service light and switch, installed and operational.
- ☐ Service clearance area above magnet in place and unobstructed.
- ☐ Ceiling grid, functional lighting, sprinklers, etc. installed (ceiling tile may be excluded around the magnet and System Filter Box (SFB). Sprinklers, lighting, HVAC ducts and all other 3rd party items above suspended ceiling positioned correctly.
- ☐ Sheet rock hung, taped, sanded, and primed (except for transport opening).
- ☐ Finished floor that avoids electrostatic discharge problems installed.
- ☐ All metal e.g. aluminum strips, aluminum light fixtures, air handling grids, supports etc. must be connected to the central RF-enclosure grounding point using a tooth washer. The impedance between any conductive part and the central PE bus-bat/terminal must not exceed 100 mΩ.
- ☐ All loose ferromagnetic materials have been removed from the examination room (required prior to system ramping - approximately Day 3 of installation).

Items Specific for the MRI Systems

- ☐ ****Ferromagnetic reinforcement and structural beams specifications on Site Planning drawings must be met.**
- ☐ Environmental Survey completed (Required for 3.0T and applicable for 1.5T if known disturbances are near the magnet).
- ☐ Magnetic shielding installed if applicable.
- ☐ Gradient air cooling available and operational according to specifications. (Only applicable for Achieva, Multiva and Ingenia CX)
- ☐ RF enclosure grounding connected to the facility earth point. Responsibility of the local electrical contractor.
- ☐ RF enclosure supplier planned to close up the RF cage. Including cable ducts, ceiling, floor finishing, wave guides, walls, PE, lights and electricity. Ceiling may be left open around the magnet, SFB and cable duct. Not later than 2 days after SID. Door opens smoothly.
- ☐ RF Enclosure hand over, certification tests (attenuation measurements, floor levelness and magnet footprint) and sign off by the Project Manager planned; PRD document to be used for RF enclosure hand over.

Site Requirements/Readiness - Signature
Approved for Delivery

Customer/Contractor	Date	Project Manager (Philips)	Date

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CHK1

Ambient Checklist
(InBore Connect)

Installation Item	Philips Supply	Philips Install	Shielding Vendor Supply	Shielding Vendor Install	Contractor Supply	Contractor Install	Notes
Basic							
RF Cage, door, window			X	X			
AE RF cage filter and mounting plate	X			X			
AE shelf					X	X	
AFF power cable termination					X	X	
Floor covering					X	X	
Floor island					X	X	
Exam room walls (including projection wall)					X	X	
Rounded corners					X	X	
All conduits/boxes/trays specified for AE cables					X	X	
External audio input cable	X	X					
AE audio output cable to MR system	X	X					
Wireless access point (optional)	X	X					
Mains electrical outlet for IBC					X	X	
Power outlet for external audio source					X	X	
Grounding straps (Philips supplied AL ceiling)	X			X			
Power outlets for AE power adapters					X	X	
Grounding straps (Shield vendor supplied AL ceiling)			X	X			
Cabinets							
Coil cabinet(s) (optional)	X					X	

Installation Item	Philips Supply	Philips Install	Shielding Vendor Supply	Shielding Vendor Install	Contractor Supply	Contractor Install	Notes
InBore Monitor	X	X					
Opening in finished examination room wall centered on iso-center on rear wall						X	
Opening in RF wall for the RF wall interface frame centered on iso-center on rear wall				X			
Electrically conductive material around opening in RF wall			X	X			
RF Wall interface frame	X			X			
RF Window	X	X		X			
Glass Bezel	X	X					
Local mains power supplied behind the RF Wall					X	X	
Conduit runs from SFF to behind InBore monitor and junction box location					X	X	
Power cable for InBore Monitor	X	X					
Network cable for InBore Monitor	X	X					
Distance between structural outside wall and RF wall > 50mm					X		
Power switch for InBore Monitor in technical room					X	X	
Patient head coil mirror	X						
Heating/cooling behind InBore monitor					X	X	
Touchscreen							
Touch Screens (wall and desk)	X	X					
Cables from SFF to touchscreens	X	X					
Power outlet for desk touchscreen					X	X	
Power for wall touchscreen and USB Extender					X	X	Located in junction box
Touchscreen power adapter (desk or wall)	X	X					
Touchscreen wall mount	X	X					
Junction box for both touchscreens					X	X	

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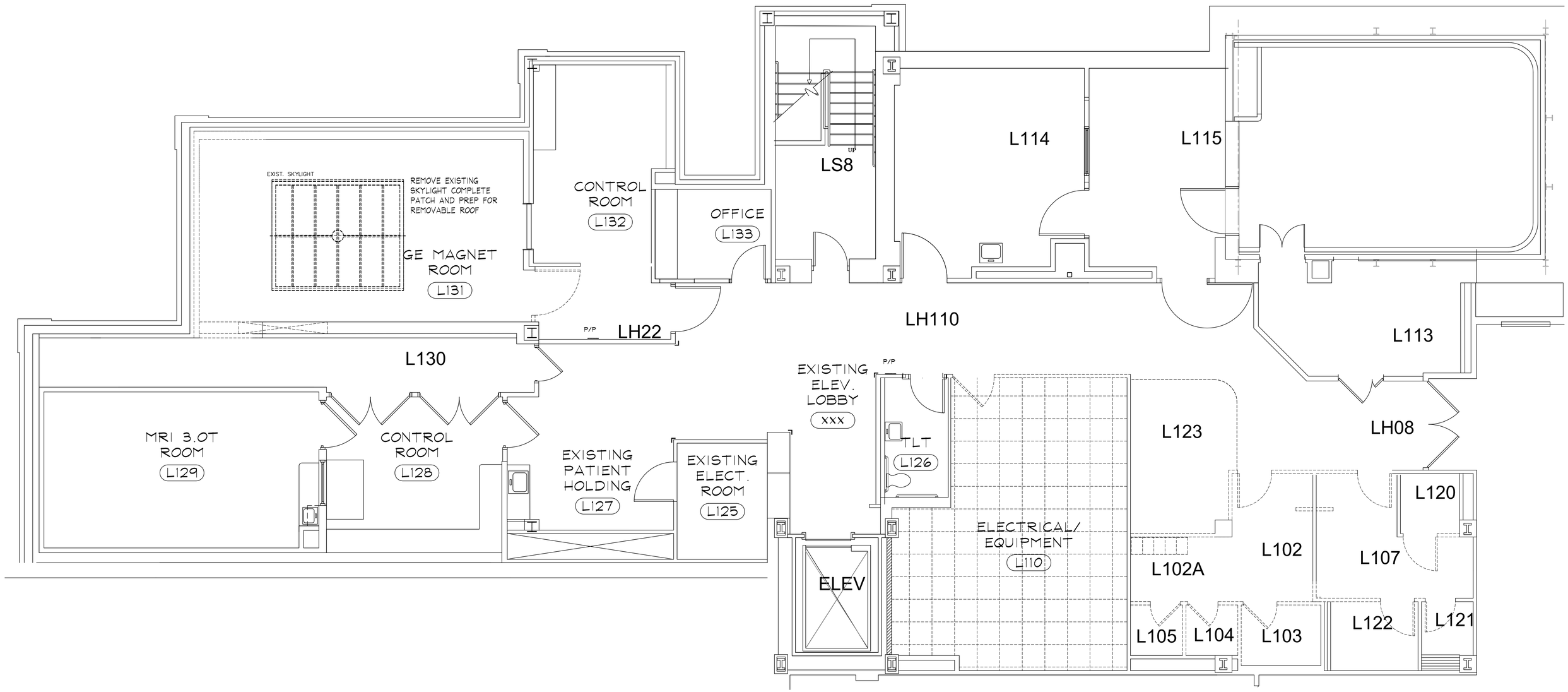
CHK2



1 **DEMOLITION FLOOR PLAN**
SCALE – 1/4" = 1'-0"

ALL ITEMS SHOWN AS DASHED LINES SHALL BE REMOVED. UVMMC TO DECLARE ITEMS FOR SALVAGE AND STORAGE OR REUSE.

ISSUED FOR DD SIGN OFF
11/1/2018

THE University of Vermont MEDICAL CENTER

Rev # - REVISION -

PROJECT NAME AND ADDRESS

UVMMC - McCLURE LL
MRI #2 REPLACEMENT

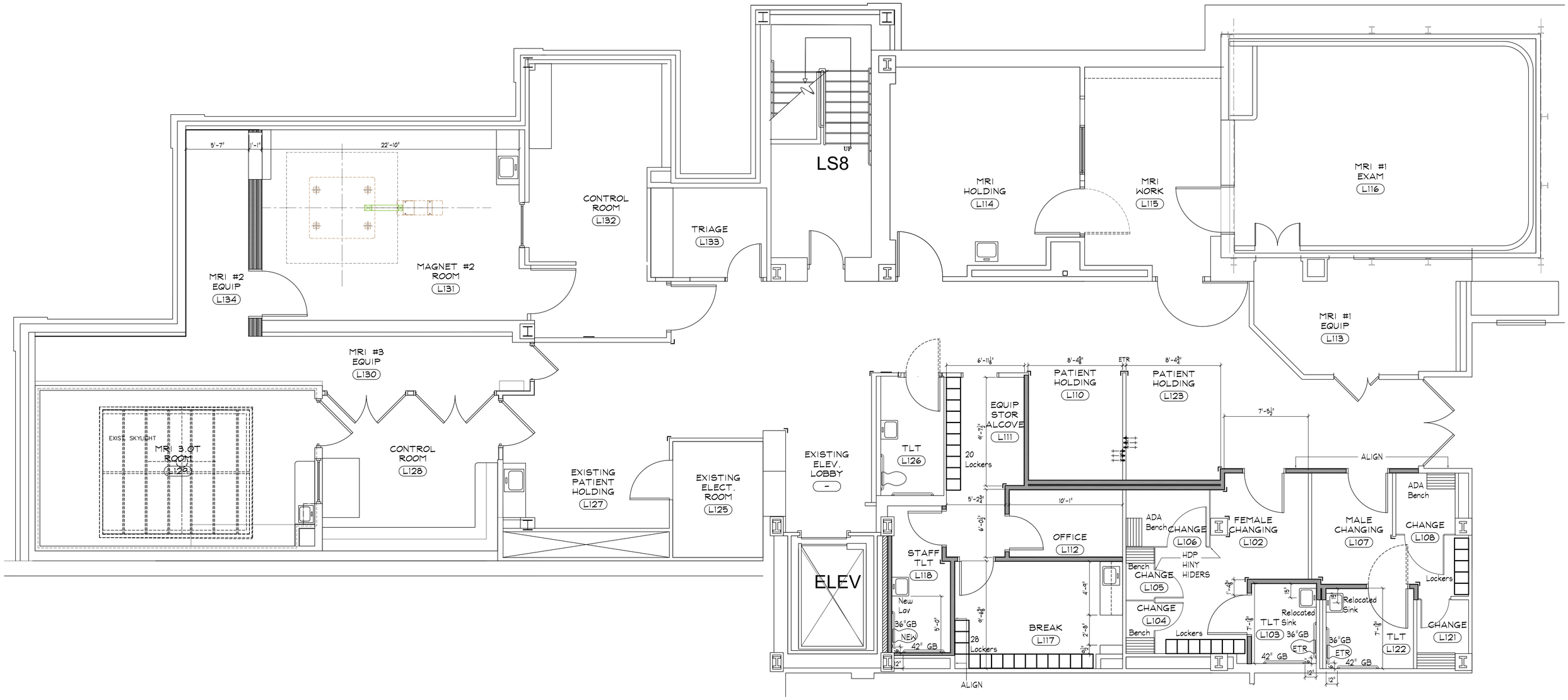
111 Colchester Avenue, Burlington, VT

Joseph Architects
25 Crossroad
Waterbury, Vermont 05676
Tel. 802-244-5220
Fax. 802-806-1010
www.JosephArchitects.com

DRAWING NAME

DEMOLITION FLOOR PLAN

DRAWN BY	DATE
J.G.	2018/11/06
PROJECT NUMBER	SHEET
18-145	DD-A1



1 **NEW WORK FLOOR PLAN**
SCALE – 1/4" = 1'-0"

SHADED WALLS INDICATE NEW PARTITIONS. UNSHADED ARE EXISTING TO REMAIN.
D/F/H SHOWN IN SHADED WALLS ARE INTENDED TO BE NEW.

CHANGE BOOTHS ARE SHOWN WITH TOILET PARTITION SYSTEM EQUIVALENT TO HINY HIDERS BY SANTANA – HIGH DENSITY PLASTIC

ISSUED FOR DD SIGN OFF
11/1/2018

THE University of Vermont MEDICAL CENTER

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MRI #2 REPLACEMENT

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Joseph Architects
25 Crossroad
Waterbury, Vermont 05676
Tel. 802-244-5220
Fax 802-806-1010
www.JosephArchitects.com

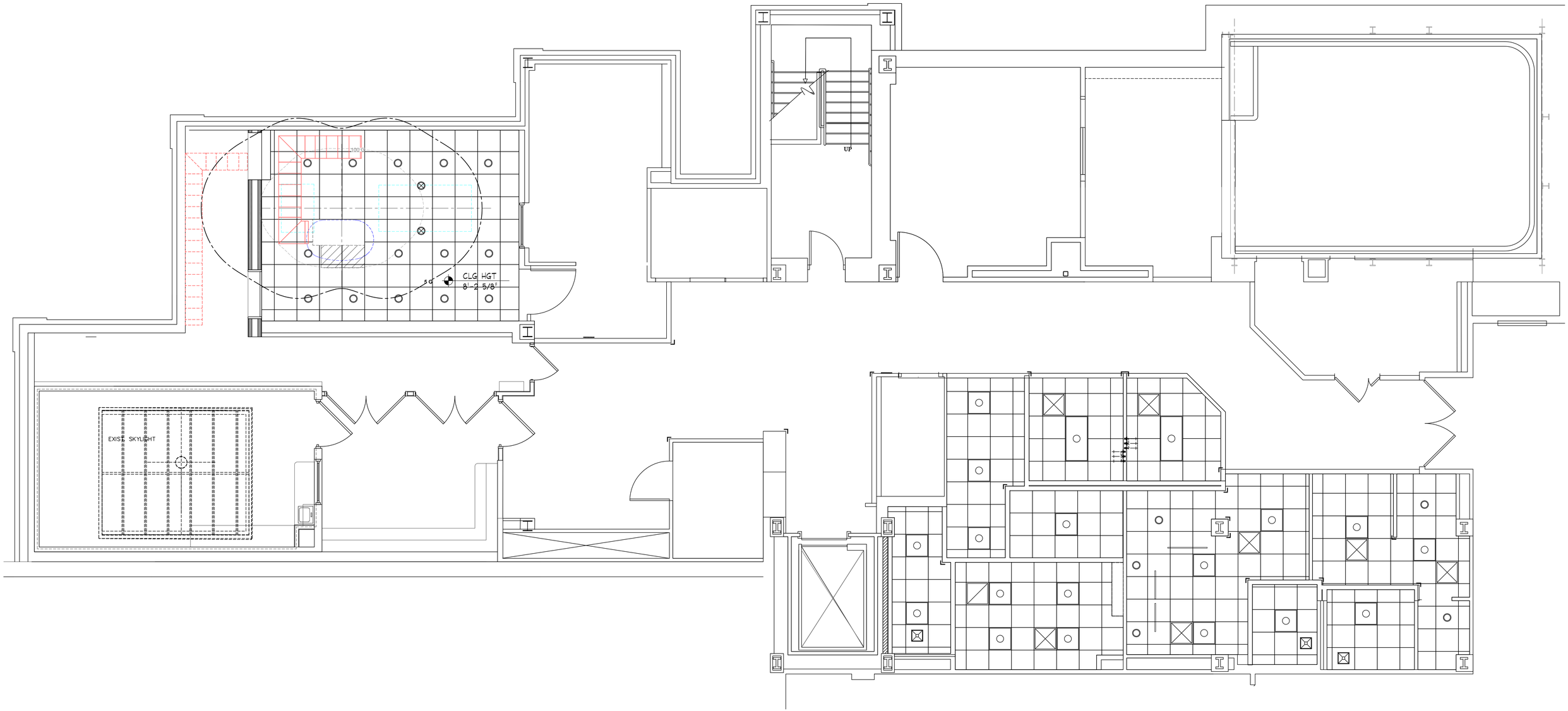
DRAWING NAME

NEW WORK FLOOR PLAN

J.G. DRAWN BY | 2018/11/06 DATE

18-145 PROJECT NUMBER | SHEET

DD-A2



1 **DEMOLITION FLOOR PLAN**
SCALE – 1/4" = 1'-0"

MAGNET ROOM SKYLIGHT SHALL BE REMOVED. NEW ACCT COMPLETE INTTERIOR.

CONTRACTOR TO PROVIDE REMOVABLE ROOF HATCH AT FORMER SKYLIGHT OPENING.

ISSUED FOR DD SIGN OFF
11/1/2018

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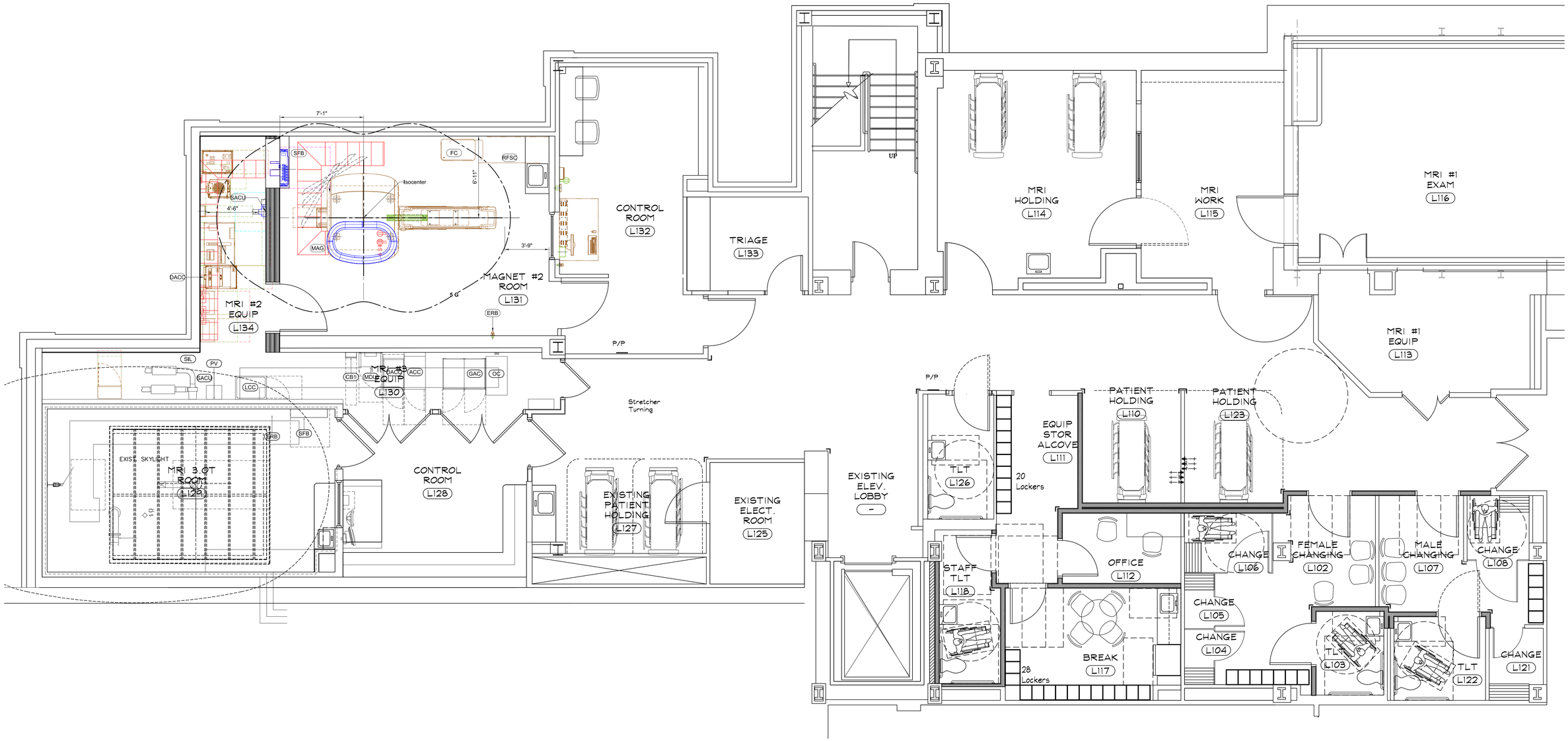
Tel. 802-244-5220
Fax 802-806-1010
www.JosephArchitects.com

DRAWING NAME

REFLECTED CEILING PLAN

J.G. DRAWN BY	2018/11/06 DATE
18-145 PROJECT NUMBER	SHEET DD-A3



1 **EQUIPMENT COORDINATION FLOOR PLAN**
SCALE – 1/4" = 1'-0"

ALL ITEMS SHOWN ARE FOR COORDINATION PURPOSES. ALL PHILIPS EQUIPMENT SHALL BE COORDINATED WITH PHILIPS SITE SPECIFIC DRAWINGS.

FF&E SYMBOLS ARE PLACE HOLDERS ONLY! THEY ARE NOT INTENDED TO REPRESENT THE ACTUAL FF&E. CONTRACTOR TO COORDINATE WITH ACTUAL OWNER FURNISHED FF&E.

ISSUED FOR DD SIGN OFF
11/1/2018

THE University of Vermont MEDICAL CENTER

Rev # - REVISION -

PROJECT NAME AND ADDRESS

UVMMC - McCLURE LL
MRI #2 REPLACEMENT

111 Colchester Avenue, Burlington, VT

Joseph Architects
25 Crossroad
Waterbury, Vermont 05676
Tel. 802-244-5220
Fax 802-806-1010
www.JosephArchitects.com

DRAWING NAME

EQUIPMENT
COORDINATION
PLAN

DRAWN BY	DATE
J.G.	2018/11/06
PROJECT NUMBER	SHEET
18-145	DD-A4