GE Healthcare

gehealthcare.com

Technical Publication

Direction 5115585-100
Revision 9

GE Healthcare
Revolution XR/d-2X Pre-Installation Manual

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IMPORTANT PRECAUTIONS

LANGUAGE

WARNING

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

- **CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.**
- **SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.**
- **NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.**
- **LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.**

WARNUNG

- **DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.**
- **FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.**
- **VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH ZU RATE GEZOGEN UND VERSTANDEN WURDE.**
- **WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.**

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEHC SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEHC RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL’APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL’ADDETTO ALLA MANUTENZIONE, ALL’UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

警告

このサービスマニュアルには英語版しかありません。
ＧＥＭＳ以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

本维修手册仅存有英文本。
非 GEMS 公司的维修员要求非英文本的维修手册时，
客户需自行负责翻译。
未详细阅读和完全了解本手册之前，不得进行维修。
忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write “Damage In Shipment” on ALL copies of the freight or express bill BEFORE delivery is accepted or “signed for” by a GE representative or hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

Call Traffic and Transportation, Milwaukee, WI (414) 785 5052 or 8*323 5052 immediately after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section S of the Policy And Procedures Bulletins.

14 July 1993

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. In addition, electrical feeds into the Power Distribution Unit shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE Healthcare personnel. The products involved (and the accompanying electrical installations) are highly sophisticated, and special engineering competence is required. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE’s electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE’s field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

IMPORTANT...X-RAY PROTECTION

X-ray equipment, if not properly used, may cause injury. Accordingly, the instructions herein contained should be thoroughly read and understood by everyone who will use the equipment before you attempt to place this equipment in operation. The General Electric Company, Healthcare Group, will be glad to assist and cooperate in placing this equipment in use.

Although this apparatus incorporates a high degree of protection against x-radiation other than the useful beam, no practical design of equipment can provide complete protection. Nor can any practical design compel the operator to take adequate precautions to prevent the possibility of any persons carelessly exposing themselves or others to radiation.

It is important that anyone having anything to do with x-radiation be properly trained and fully acquainted with the recommendations of the National Council on Radiation Protection and Measurements as published in NCRP Reports available from NCRP Publications, 7910 Woodmont Avenue, Room 1016, Bethesda, Maryland 20814, and of the International Commission on Radiation Protection, and take adequate steps to protect against injury.

The equipment is sold with the understanding that the General Electric Company, Healthcare Group, its agents, and representatives have no responsibility for injury or damage which may result from improper use of the equipment.

Various protective materials and devices are available. It is urged that such materials or devices be used.

OMISSIONS & ERRORS

Customers, please contact your GE Sales or Service representatives.

GE personnel, please use the GEHC iTrak (PQR) Process to report all omissions, errors, and defects in this publication.

Revision History

Revision	Date	Reason for change
1	August 5, 2004	Initial Draft
2	November 1, 2004	M3 release
3	February 24, 2005	Added System Cable Information and Seismic Calculations (J. Peterson). Updated wire size tables in Chapter 4, Section 1.2 (PQR 13031075).
4	April 5, 2005	Edited 'Room Power Supply' drawing to remove room light connections from Figure 4-1, page 37
5	May 18, 2005	Added notice for CCC certified power/ground cables for China to Chapter 4, Section 1.2.
6	April 28, 2006	PQR 13043256 - System Power Statement added to specify that only WYE Power connections be used in Generator Power Specifications (Section 1.2.1.1 on Page 34). Updated floor loading requirements in Section 2.2.1. Updated minimum ceiling height to 108 inches. Updated room power supply drawing.
7	October 27, 2006	Updated digital detector humidity and temperature specifications. 10/5/2006, changed 'shunt' trip references to 'under voltage' references.
8	September 24, 2007	Updated Chapter 1, Sections 7 & 8, Tables 1-1 & 1-2 to change X-ray control function to Magic PC. Changed Magic PC part number from 5261130 to 5271403.
9	18JUN2009	Updated table height travel lower limit to 575 mm in Table 5-1 and Figure 5-5.

List of Effected Pages

PAGES	REVISION	PAGES	REVISION
1 through 114	9		

Preface
Publication Conventions

Standardized conventions for representing information is a uniform way of communicating information to a reader in a consistent manner. Conventions are used so that the reader can easily recognize the actions or decisions that must be made. There are a number of character and paragraph styles used in this publication to accomplish this task. Please become familiar with them before proceeding forward.

It is important that you read and understand hazard statements, and not just ignore them.

Section 1.0 - Safety & Hazard Information

Proper product safety labeling allows a person to safely use or service a product. The format and style for safety communications reflected in this publication represents the harmonization of IEC/ ISO 3864 and ANSI Z535 standards.

Within this publication, different paragraph and character styles are used to indicate potential hazards. Paragraph prefixes, such as hazard, caution, danger and warning, are used to identify important safety information. Text (Hazard) styles are applied to the paragraph contents that are applicable to each specific safety statement.

1.1 Hazard Messages

Any action that will, or could potentially cause personal injury will be preceded by the safety alert symbol and an appropriate signal word. The safety alert symbol is the triangle with an exclamation mark within it. It is always used next to the signal word to indicate the severity of the hazard. Together, they are used to indicate a hazard exists.

Signal words describe the severity of possible human injuries that may be encountered. The alert symbol and signal word are placed immediately before any paragraph they affect. Safety information includes:

1.) Signal Word - The seriousness level of the hazard.
2.) Symbol or Pictorial - The consequence of interaction with the hazard.
3.) Word Message:
    a.) The nature of the hazard (i.e. the type of hazard).
    b.) How to avoid the hazard.

The safety alert symbol is not used when an action can only cause equipment damage.

1.2 Text Format of Signal Words

DANGER - INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THIS SIGNAL WORD IS TO BE LIMITED TO THE MOST EXTREME SITUATIONS.

WARNING - INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

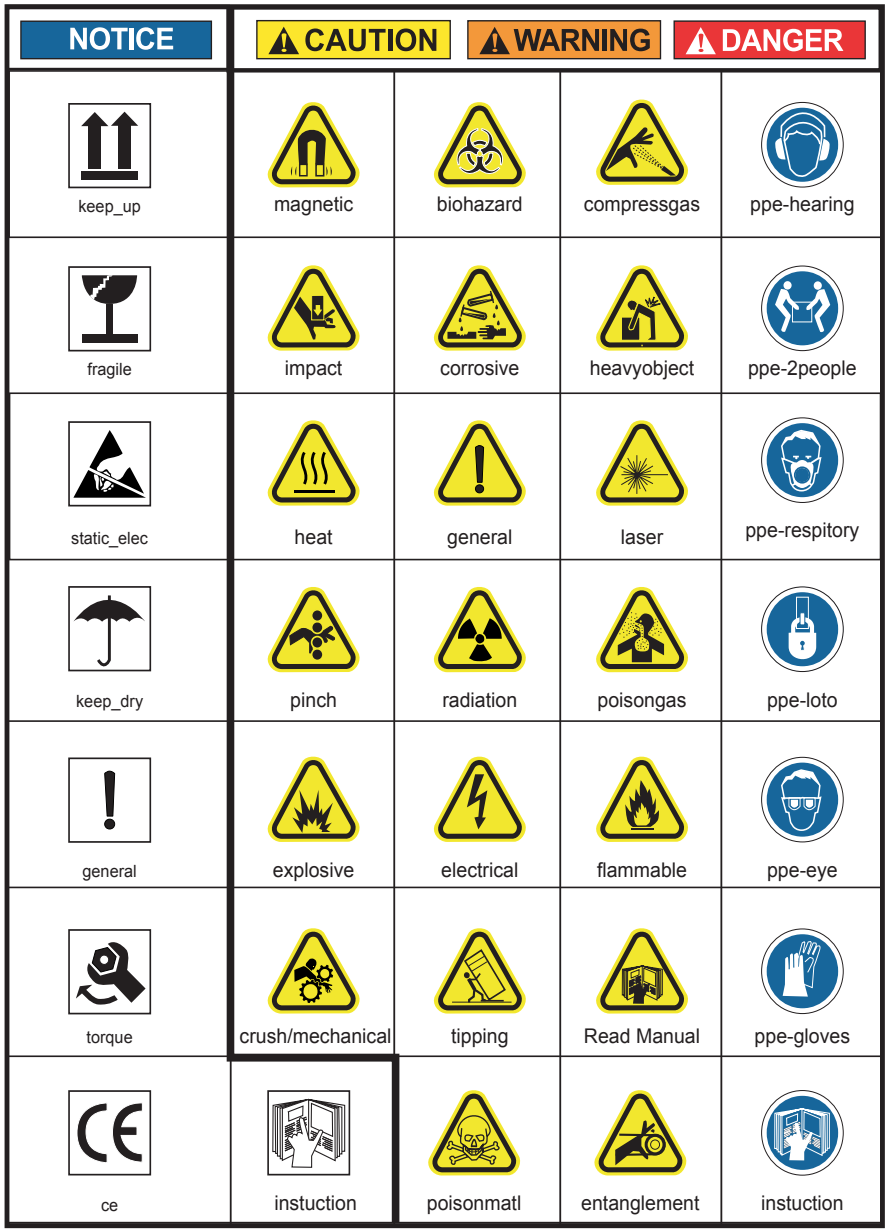
Caution - Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE - Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property. This signal word is associated directly with a hazard or hazardous situation and is used in place of 'DANGER,' 'WARNING,' or 'CAUTION.' It can include:

- **Destruction of a disk drive**
- **Potential for internal mechanical damage, such as to a X-ray tube**

1.3 Symbols and Pictorials Used

The following Symbols and Pictorials may be used in this publication. These graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm.



Section 2.0 - Publication Conventions

2.1 General Paragraph and Character Styles

Prefixes are used to highlight important non-safety related information. Paragraph prefixes (such as Purpose, Example, Comment or Note) are used to identify important but non-safety related information. Text styles are also applied to text within each paragraph modified by the specific prefix.

EXAMPLES OF PREFIXES USED FOR GENERAL INFORMATION:

Purpose: Introduces and provides meaning as to the information contained within the chapter, section or subsection (such as used at the beginning this chapter, for example).

Note: Conveys information that should be considered important to the reader.

Example: Used to make the reader aware that the paragraph(s) that follow are examples of information possibly stated previously.

Comment: Represents "additional" information that may or may not be relevant to your situation.

2.2 Page Layout

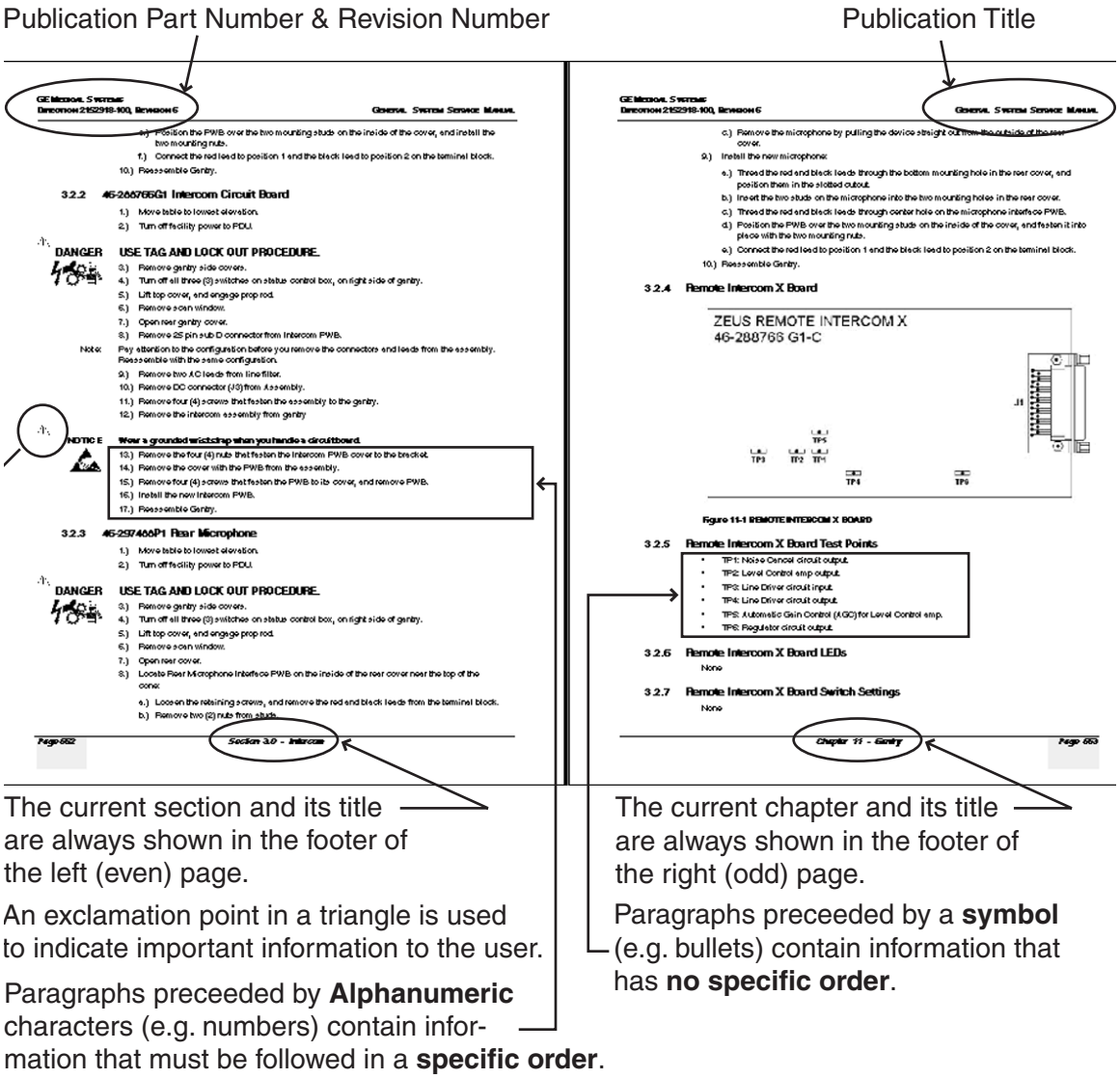


Figure 0-1 Revolution XR/d System Component Identification

Headers and footers in this publication are designed to allow you to quickly identify your location. The document part number and revision number appear in every header on every page. Odd numbered page footers indicate the current chapter, its title and current page number. Even numbered page footers show the current section and its title, as well as the current page number.

2.3 Computer Screen Output/Input Text Character Styles

Within this publication, mono-spaced character styles (fonts) are used to indicate computer text that is either screen input or output. Mono-spaced fonts, such courier, are used to indicated text direction. When you type at your keyboard, you are generating computer input. Occasionally you will see the math operator “greater-than” and “less-than” symbols used to indicate the start and finish of variable output. When reading text generated by the computer, you are reading it as computer generated output. In addition to direction, characters are italicized (e.g. *italics*) to indicate information specific to your system or site.

Example: Fixed Output

This paragraph's font represents computer generated screen "fixed" output. Its output is fixed from the sense that it does not vary from application to application. It is the most commonly used style used to indicate filenames, paths and text that do not change from system to system. The character style used is a fixed width such as courier.

Example: Variable Output

This paragraph's font represents computer screen output that is "variable". It is used to represent output that varies from application to application or system to system. Variable output is sometimes found placed between greater-than and less-than operators for clarification. For example: <variable_ouput> or <3.45.120.3>. In both cases, the < and > operators are not part of the actual input.

Example: Fixed Input

This paragraph's font represents fixed input. It is computer input that is typed-in via the keyboard. Typed input that does not vary from application to application or system to system. Fixed text the user is required to supply as input. For example: cd /usr/3p

Example: Variable Input

This paragraph's font represents computer input that can vary from application to application or system to system. With variable text, the user is required to supply system dependent input or information. Variable input sometimes is placed between greater-than and less-than operators. For example: <variable_input>. In these cases, the (<>) operators would be dropped prior to input. For example: **ypcat hosts | grep *<3.45.120.3>* would be typed into the computer as**

ypcat hosts | grep *3.45.120.3*

without the greater-than and less-than operators.

2.4 Buttons, Switches and Keyboard Inputs (Hard & Soft Keys)

Different character styles are used to indicate actions requiring the reader to press either a hard or soft button, switch or key. Physical hardware, such as buttons and switches, are called hard keys because they are hard wired or mechanical in nature. A keyboard or on/off switch would be a hard key. Software or computer generated buttons are called soft keys because they are software generated. Software driven menu buttons are an example of such keys. Soft and hard keys are represented differently in this publication.

Example: Hard Keys

A power switch **ON/OFF** or a keyboard key like **ENTER** is indicated by applying a character style that uses both over and under-lined bold text. This is a hard key.

Example: Soft Keys

Whereas the computer MENU button that you would click with your mouse or touch with your hand uses over and under-lined regular text. This is a soft key.

Table of Contents

Chapter 1 - Introduction

Section 1.0 - Objective and Scope of this Manual

This document is intended as a guide and informational resource for planning and properly preparing a location for the installation of a Revolution XR/d system.

Section 2.0 - Avoiding Unnecessary Expenses and Delays

To avoid unnecessary expenses and delays, use the “Pre-Installation” checklist located in Chapter 7 to determine if you are ready for the installation to begin. Once you believe that your room/location is ready for installation to begin, complete the “Pre-Installation” checklist. The checklist is an important tool that helps verify that nothing has been missed. The checklist summarizes the preparations and allows you to record a permanent record of the activities that have taken place.

Section 3.0 - An Overview of the Pre-Installation Process

Pre-installation is a co-operative effort between the customer/purchaser and GE Medical Systems (GEMS). Complete the checklists contained in this manual. They are an important part of the pre-installation process. The checklists summarize the required preparations and verify the completion of the pre-installation procedures.

Figure 1-1 outlines the information in this document and its place in the pre-installation process.

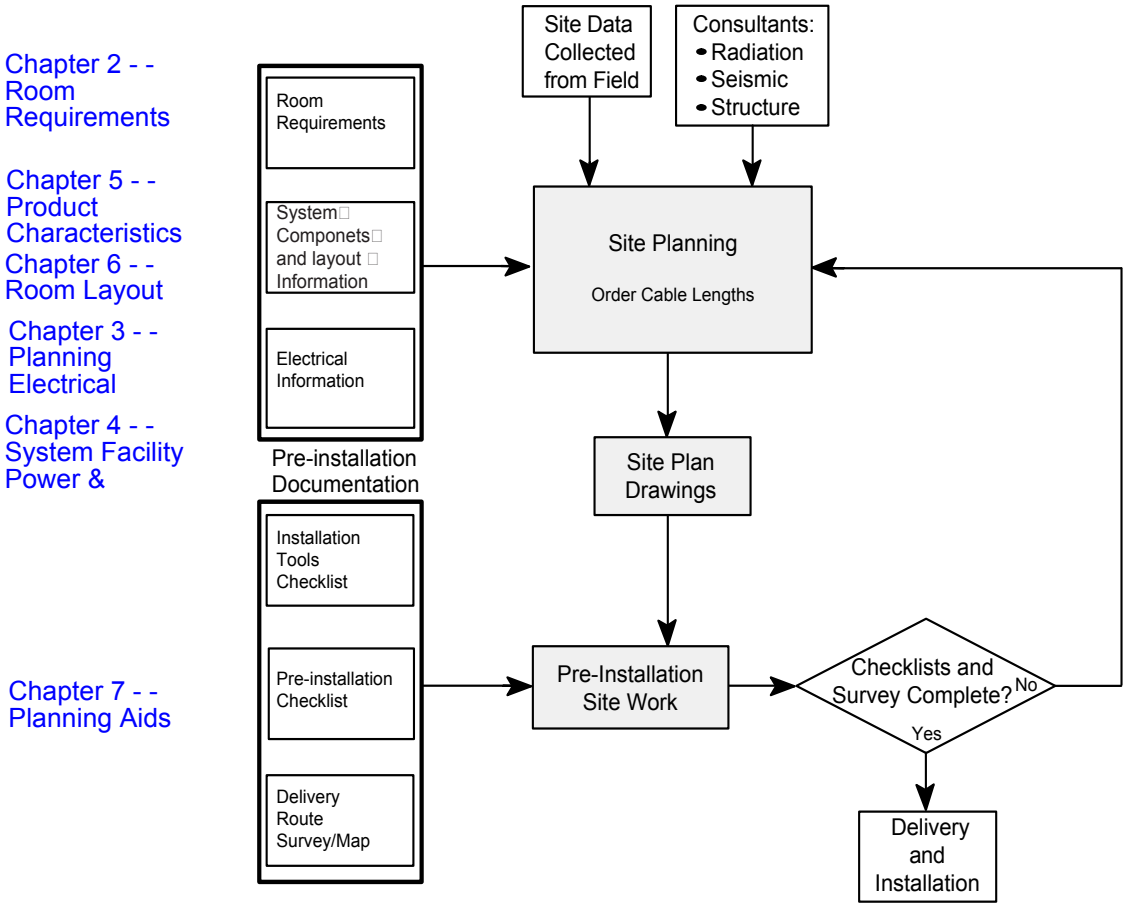


Figure 1-1 Pre-Installation Overtable

Section 4.0 - Responsibility of Purchaser/Customer

To ensure that the installation of a Revolution XR/d System meets the purchaser or Customer expectations, it is important to determine who will take responsibility for various items in the course of the system installation process. To aid you in determining these responsibilities, review the following checklists with the customer and assign responsibilities as appropriate:

- Tools and Equipment Checklist (see page 81)
- Pre-Installation Checklist (see page page 83)
- Networkflow Audit Checklist (sent by installation specialist to local FE prior to installation)

Section 5.0 - Contract Changes

Be sure to inform the customer that the cost of any alterations or modifications not specified in the sales contract are the responsibility of the customer.

Section 6.0 - Responsibilities of the Purchaser

The purchaser is responsible for completion of “Pre-Installation”. This includes the procurement and installation of all required materials and services to get the room ready for installation of the product. This responsibility includes providing:

- A clean and safe work environment for installation of the product (finished floor, ceiling, walls, and proper room lighting).
- A location suitable for the installation of the product. See Chapter 2 - - Room Requirements.
  - Suitable support structures in the floor, walls, or ceiling necessary for the mounting of the product and/or its components.
  - Installation of conduit, ducts and/or raceways necessary to route cables safely. See Chapter 4 - - System Facility Power & Grounds and Chapter 5 - - Product Characteristics.
  - Electrical power and grounds of specified quality and reliability. See Chapter 4 - - System Facility Power & Grounds.
    * Electrical power of the required voltage, including an emergency-off safety switch in the room. Power and ground cables to the PDU.
    * Properly installed and sized junction boxes, including covers and fittings at locations required and called out in architectural drawings.
- A location suitable for operation of the product. See Chapter 6 - - Room Layout.
- Installation of non-electric services.

Section 7.0 - What You Will Receive (System Components)

The XR/d - 2X system may consist of the following main components (See Figure 1-2, Table 1-1, and Table 1-2):

- Elevating Table with Digital Detector, Conditioner and Power Supply
- Digital Imaging, JEDI X-ray Generator sub-system and Power Unit (1 System Cabinet)
- Overhead Tube Support (OTS)
- Digital Detector Wall Stand with tilting receptor, AEC and removable grid
- Workstation with 2 Monitors, Keyboard, Mouse, RCIM, and Bar Code Reader

The XR/d - 2X System can include the following free standing components, which can be purchased as options: Extended Wall Stand Stretcher

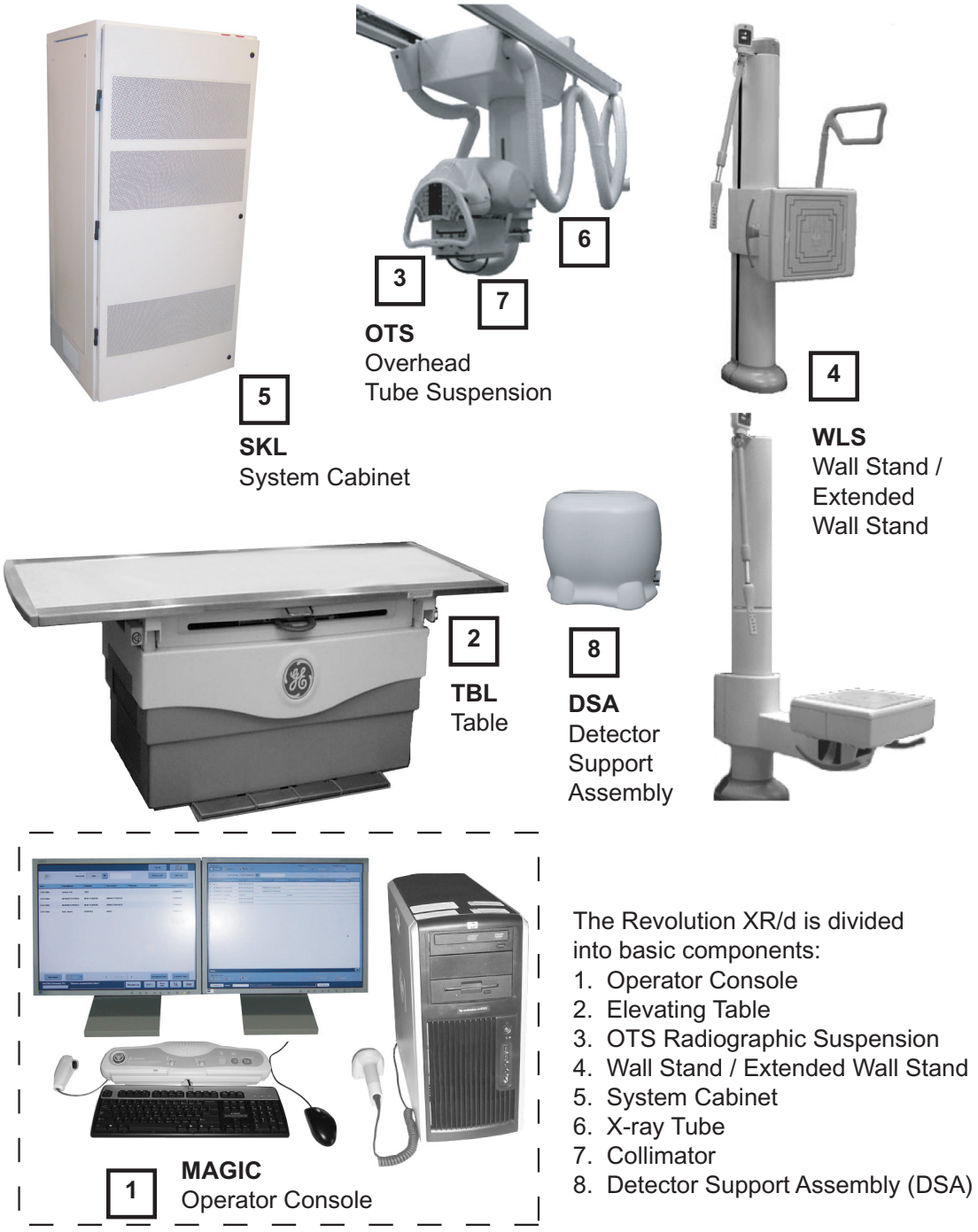


Figure 1-2 Revolution XR/d System Component Identification

Item	Component	Model Number
1	Operator Console • Magic PC and Mouse • LCD Monitors (2) • RCIM • Keyboard • Bar Code Reader	 • 5117866-2 or 5271403 • 2349792 • 2383880 • 2275756 • 2399877
2	Table Table Top	2351505 2382307
3	OTS - Overhead Tube Suspension	2269647
4	Wall Stand or Extended Wall Stand	2291655 2291655-5
5	System Cabinet	5115763 (single IDC) 2406453 (dual IDC)
5a	JEDI Generator, 65, 80 kW	Jedi 80 RD 1T
5b	Image Display Computer (IDC)	2375961
6a	MX 100-09 X-ray Tube Casing	46-155400G46
6b	Maxiray 100 X-ray Tube Insert; Focal Spots 0.6 - 1.25; 12.5°	2336058
7	Beam Limiting Device (Collimator)	2266999

Table 1-1 Revolution XR/d System Component Identification

Section 8.0 - HHS Compliance Compatibility List

Product Category	Product Description	Model Number
Master X-ray Control - Console	Magic PC	5271403*
X-ray Generator	JEDI Generator	Jedi 80 RD 1T
X-ray Tube Housing (Casing)	MX-100	46-155400G46
Beam Limiting Device (Collimator)	AL01C Auto Collimator	2266999
41cm Digital Detector	Digital Radiographic Detector	2200286
Table	Table	2351505
Wall Stand	Wall Stand	2291655
Extended Wall Stand	Extended Wall Stand	2291655-5
Extended Wall Stand Stretcher (optional)	Stretcher	2389323

Table 1-2 HHS Compliance Compatibility List

The OTS console (UIF) is not a certified component. However, it is HHS sensitive. Refer to the service manual for replacement procedure.

Note: *The Magic PC part number 5271403 Manufactured On or After August 17, 2007 is the Master X-ray Control - Console. For all previous system configurations, the Jedi Generator is the Master Control.

Chapter 2 - Room Requirements

Section 1.0 - Environmental Requirements

1.1 Relative Humidity and Temperature

Product or Component	RELATIVE HUMIDITY (Non-Condensing)				TEMPERATURE			
	IN-USE		STORAGE		IN-USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Digital Detector	10%	70%	10%	80%	50° F (10° C)	95° F (35° C)	41° F (5° C)	113° F (45° C)
Wall Stand / Extended Wall Stand	20%	80%	5%	95%	50° F (10° C)	104° F (40° C)	-40° F (-40° C)	158° F (70° C)
Table TBL	20%	85%	20%	95%	50° F (10° C)	104° F (40° C)	0° F (-18° C)	158° F (70° C)
Extended Wall Stand Stretcher (optional)	20%	95%	20%	95%	50° F (10° C)	104° F (40° C)	0° F (-18° C)	158° F (70° C)
OTS	20%	85%	20%	95%	50° F (10° C)	104° F (40° C)	0° F (-18° C)	158° F (70° C)
System Cabinet SKL1	20%	80%	5%	95%	59° F (15° C)	95° F (35° C)	-40° F (-40° C)	158° F (70° C)
Maxiray 100-09 X-ray Tube (RAD)	-	-	-	-	0	104° F (40° C)	-20° F (-29° C)	104° F (40° C)
Operator Console:								
PC Tower	8%	85%	8%	90%	40° F (5° C)	95° F (35° C)	-40° F (-40° C)	140° F (60° C)
LCD Monitor	30%	80%	10%	85%	41° F (5° C)	95° F (35° C)	-14° F (-10° C)	140° F (60° C)

Table 2-1 Environmental Requirements (Relative Humidity & Temperature)

Limits for rates of change:

In-Use	Storage
< 10 degree C / hour	< 20 degree C / hour
< 30% / hour	< 30% / hour

Note: STORAGE values only refer to equipment that is still in shipping containers. If the equipment is partially or completely installed, refer to IN-USE values.

1.2 Atmospheric Pressure

Product or Component	ATMOSPHERIC PRESSURE			
	IN-USE		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Digital Detector	70 kPa	102.5 kPa	70 kPa	102.5 kPa
Digital Support Assy. (DSA)	70 kPa	102.5 kPa	11.5 kPa	106.2 kPa
Wall Stand / Extended Wall Stand (WLS)	70 kPa	106 kPa	12 kPa	106 kPa
Table (TBL)	69 kPa	106 kPa	48 kPa	106 kPa
Extended Wall Stand Stretcher (optional)	69 kPa	106 kPa	48 kPa	106 kPa
Overhead Tube Suspension (OTS)	69 kPa	106 kPa	48 kPa	106 kPa
System Cabinet (SKL)	70 kPa	101.7 kPa	11.5 kPa	101.7 kPa
Operator Console:				
PC Tower	71 kPa	101.3 kPa	35 kPa	101.3 kPa
LCD Monitor	58 kPa	101.3 kPa	21 kPa	101.3 kPa
Total System Limits	**71 kPa**	**101.3 kPa**	**70 kPa**	**101.3 kPa**

Table 2-2 Environmental Requirements - (Altitude & Atmospheric Pressure)

Limits for rates of change:

In-Use	Storage
< 1.8 hPA / hour	< 76 hPA / hour

Note: STORAGE values only refer to equipment that is still in shipping containers. If the equipment is partially or completely installed, refer to IN-USE values.

1.3 Heat Output

The continuous and peak power consumption of this system is as follows:

- 4.3 kW Continuous Power
- 9kW Peak Power (Duration is 22 seconds maximum)

Note: Heat dissipation by X-ray tube not included.

PRODUCT OR COMPONENT	HEAT OUTPUT (BTU/hr.)	
	STANDBY	IN-USE
Wall Stand / Extended Wall Stand total (conditioner + power supply + detector)	820 BTU/h	7170 BTU/h
Table total (conditioner + power supply + detector)	1100 BTU/h	7450 BTU/h
OTS & Collimator	500 BTU/h	1500 BTU/h
System Cabinet	2457 BTU/h	3276 BTU/h
Operator Console:		
PC Tower	1207 BTU/h	3151 BTU/h
LCD Monitors (2)	14 BTU/h (2)	390 BTU/h (2)
Total System Output	**6098 BTU/h**	**22937 BTU/h**

Table 2-3 Heat Outputs by Component

1.4 Acoustic Output

COMPONENT	SOUND OUTPUT (dBA)	
	IN-USE (measured 1m from any point in system)	**STAND-BY** (measured 1m from any point in system)
System	< 60	< 55

Table 2-4 REVOLUTION XR/D ACOUSTIC OUTPUT

1.5 Light Specification

The monitor screens are adjusted for an optimum ambient light level of 50 lux.

1.6 Radiation Protection

Because X-ray equipment produces radiation, special precautions may need to be taken or special site modifications may be required. The General Electric Company does not make recommendations regarding radiation protection. It is the purchasers responsibility to consult a radiation physicist for advice on radiation protection in X-ray rooms.

Section 2.0 - Structural Requirements

2.1 Door Size Requirements

Minimum door sizes also apply to hallway and elevator. See Chapter 5 “- Product Characteristics” on page 45., for additional details.

Door Height: The minimum door height to accommodate the System Cabinet on its dolly is 198 cm (78 in). If the wall mounting bracket is unbolted from the top of the cabinet, the minimum required door height is 191 cm (75 in).

Door Width: The minimum door width to accommodate the Table is:

- International shipment: 137 cm (54 in) [crated] or 940 cm (37 in) [uncrated].
- Domestic shipment: 110 cm (44 in) [crated] or 940 cm (37 in) [uncrated].
- The minimum door width is calculated based on a straight-in approach requiring a 2.5 m (8 ft) wide corridor. Minimum widths will change based on narrower corridors.S

2.2 Floor Requirements

The preferred method of installing the table is to use the provided floor anchors.

2.2.1 Floor Requirements when using provided Floor Anchors

⚠ CAUTION

Potential for Injury and/or Equipment Damage: Anchors must be a minimum of 150mm from any concrete edge including ducts and cracks. In addition, the general condition of the concrete in the immediate mounting area should be inspected to ensure that anchors will be set in good quality concrete.

The Table Assembly is placed on the floor, which must accept the weight and the weight/area defined in 3-2.

- The weight of the complete table is 344 kg (758 lb.).
- The ground surface must be approximately level.
- The Revolution XR/d Table system must be attached to the floor.

The floor bearing the Revolution XR/d - 2X system must be concrete and the thickness to be determined by a Structural Engineer to properly support the equipment loads. The supplied anchors require a minimum embedment of 80 mm (3.15 in.) into the concrete. If the floor thickness is less than 4 inches, it is recommended that the unit be secured using a through-bolt method with a reinforcement plate on the back side.

2.2.2 Pan-Type Floor Construction Requirement

For pan-type floor construction, steel channels must be designed by a local structural engineer to span floor joists. See Figure 2-1.

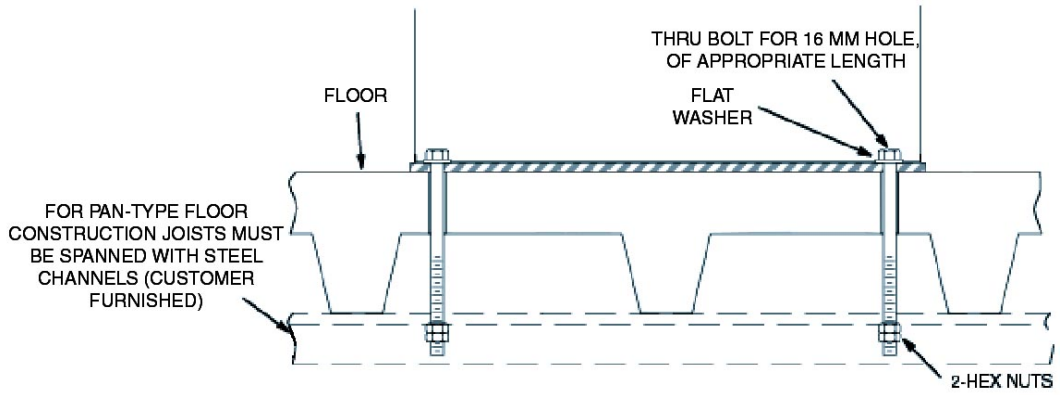


Figure 2-1 Thru-Bolt Floor Mounting (Pan-Type Floor Construction)

2.3 Ceiling Requirements

Stationary rails are designed for top (ceiling) mounting. Rails can be ordered and are supplied in 4 inches (10.2 cm) increments between 134 inches (3.4 m) and 222 inches (5.64 m), plus a 228 inches (5.79 m) length totaling 24 different sizes. The choice of length depends on room size, configuration and the possible presence of obstructions.

Complete details of room dimensions must be known when planning an installation. Work with the architect or building engineer and obtain approval from the customer before proceeding with the layout plan.

Methods of support that will permit attachment to structural steel or through bolts in concrete construction should be favored. Do not use anchors in direct tension.

Each rail has mounting holes on 26 inches (66 cm) centers with the first hole located 2 inches (5.1 cm) from the rail end. The last hole is located either 2 inches (5.1 cm) or 4 inches (10.2 cm) from the other end with a variable space of less than 26 inches (66 cm) between it and the second last hole.

Specifications	CEILING
Recommended	2900 mm (114 in.)
Minimum	2745 mm (108 in.)

Table 2-5 Recommended and Minimum Room Height

⚠ CAUTION

Potential for Injury and/or Equipment Damage:

Rails are mounted on 1/2 inches (12.7 mm) bolts. Maximum load per bolt is 350 lbs. (159 kg); however, each mounting bolt must not "pull-out" or otherwise fail under a vertically downward "dead" load of 1,400 lbs. (636 kg).

Referring to the layout drawings, the +/- 1/8 inches (3 mm) requirement for parallelism of the stationary rail is critical. Therefore, great care must be exercised in locating the mounting points. Figure 2-2 and Figure 2-3 outline requirements that the stationary rail mounting interface must meet.

For low ceiling height, the stationary rails may be mounted directly to the ceiling slab or to flush-mounted Unistrut or similar structure. For higher rooms in which a false ceiling is to be used, the stationary rails may be attached to rigid vertical members hung from the ceiling slab. A supplementary channel may be secured to the bottom of the vertical members to facilitate provision for mounting holes. A Unistrut system or equivalent is a convenient type of support to employ. Refer to Figure 2-3.

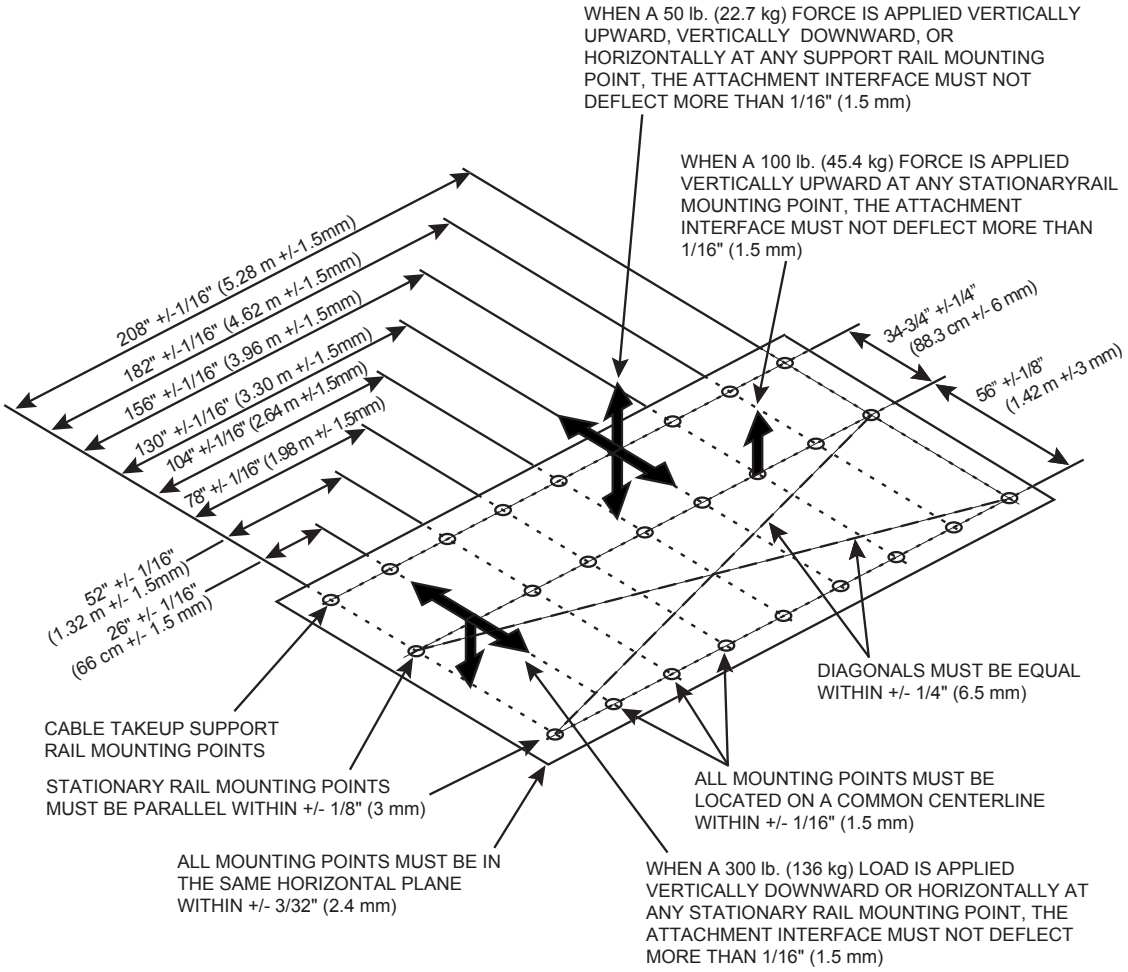


Figure 2-2 Specifications for a Typical 17 foot**-10** inch **(5.44 m)** Stationary Rail Mounting Interface (Both Rails Ceiling Mounted)

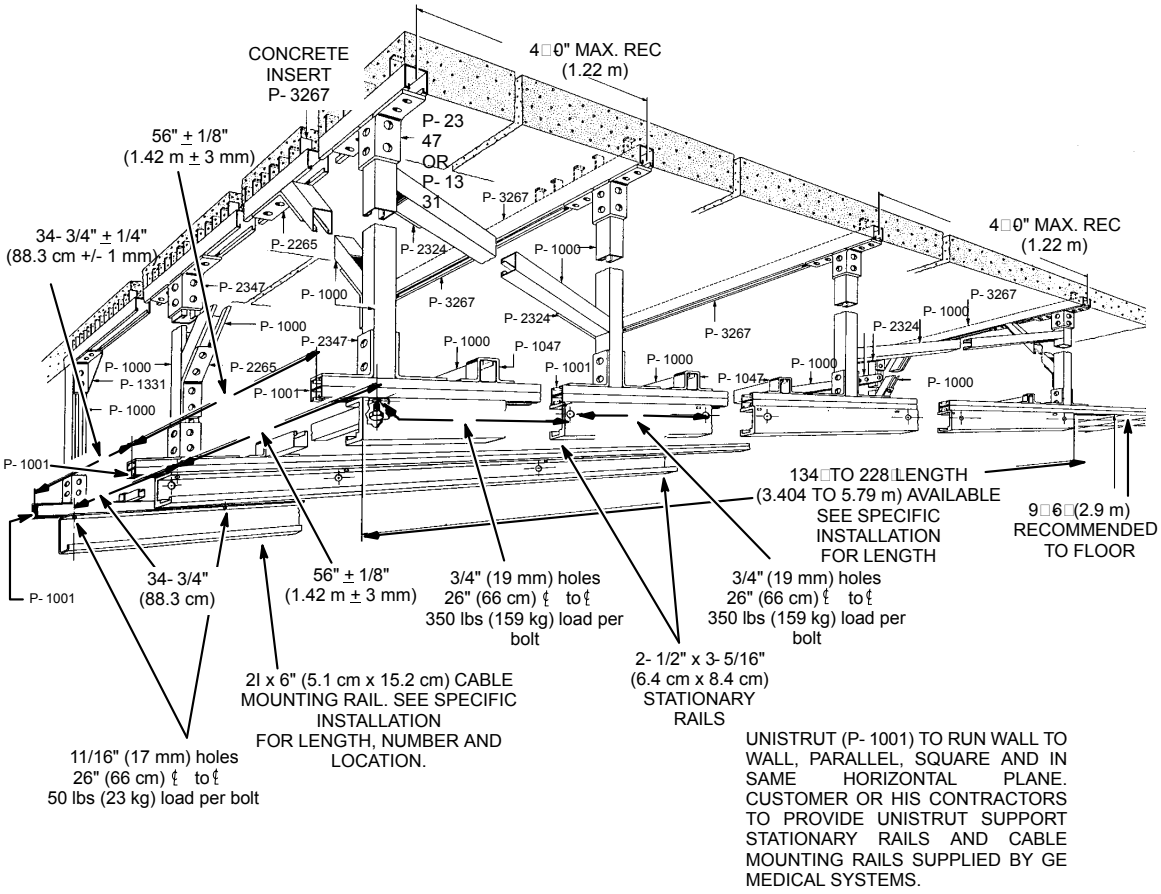


Figure 2-3 Suggested UNISTRUT Structure for OTS Suspension

2.3.1 Wall Requirements

In addition to providing wall space for the System Cabinet, a 1 meter (3 ft) space must be available within the exam room to hang the image quality phantom carrier.

2.3.2 Seismic Requirements

For seismic calculations and seismic anchoring methods (slab-on-grade and upper floor), See Chapter 9 “- Seismic Calculations” on page 95.

Chapter 3 - Planning Electrical Connections

Section 1.0 - Routing Cables

1.1 General

High voltage and power cables must be separated from other cables. Use a separate trough in the duct system, or use a separate conduit. Minimize cable length between the line disconnect and the System Cabinet power unit to reduce voltage regulation problems and wiring costs.

For information about the cables supplied with your system, please refer to Chapter 8 - - System Cable Information.

1.2 Conduit

Separate conduits must be used for power and signal wires. These wires must be kept separated from each other.

Using conduit imposes some important considerations when used with this system. Of primary concern, the majority of cables used are pre-terminated. Pre-termination greatly simplifies interconnection but makes cable-pulling difficult because of the added dimensions of the connectors.

Conduit must be large enough to pass the cable and connector through with all other cables already in the conduit. Also, the size of conduit chosen must allow for future growth. There is the possibility of additional cables being added later as the system is developed and options are added.

The use of conduit is recommended for cables running overhead between rooms, especially when a diagonal run provides the shortest cable path.

1.3 Electrical Ducts

It's important that electrical ducts have separate compartments for power and signal wires. These wires must be kept separated from each other for proper system operation.

Electrical ducts have advantages, when used with a single room or two adjacent rooms. Electrical ducts combine cabling in a neat and functional appearance, with accessibility and room for expansion.

1.4 Power Distribution

Revolution XR/d system power distribution consists of two major components that must either be customer supplied or GE Medical Systems supplied. These are:

- Feeder power from Hospital distribution center to the XR/d System Cabinet load power unit (SKL).
- Power distribution from the XR/d System Cabinet load power unit (SKL) to all the components in the XR/d system room.

Usually the feeder power from the Hospital distribution center is customer supplied and the power distribution within the XR/d system is supplied by GEMS.

Note: Additional Reference Material Exists

For hospital facility feeder power and ground requirements to the XR/d system power unit, refer to: Chapter 4 - - System Facility Power & Grounds.

For XR/d system power distribution from the System cabinet power unit, refer to Revolution XR/d MIS Map, Direction 5115589-100, *Revolution XR/d System Drawings (Schematics, MIS Map, MIS Charts)*. This information is also present in this manual; see Chapter 8 - - System Cable Information.

Section 2.0 - Hospital Network and Phone Connections

2.1 Broadband Network Connection

Revolution XR/d systems are equipped with Broadband fast Ethernet hardware for Service diagnostics. XR/d systems equipped with Digital Imaging are capable of placing electronic images on the Hospital image Ethernet Network. It is the purchasers responsibility to provide the Ethernet connection (rated at 100Mb/sec transfer rate for optimal performance) within 3 feet (0.91 meters) of the Operator Console. If a Broadband connection is not used, customer must provide a dedicated telephone connection within 3 feet (0.91 meters) of the Operator Console for use with a modem.

The network connection is made at the Operator Console.

- 100BaseT network connection is preferred
- 10BaseT network connection is acceptable

Note: If using GE PACS LITE BOX software, the GE PACS LITE BOX software revision must be 6.1d02 or greater. Older versions will not work with the XR/d system.

For DICOM information, refer to: Revolution XR/d Acquisition Workstation Conformance Statement for DICOM V3.0.

2.2 Phone Line(s) - Voice and Optional Modem

Phone line(s) must be installed within 3 feet (0.91 meters) of the Operator Console and be operational prior to installation.

- (1) - Voice line
- (1) - Analog line (for modem use if broadband connection is not present)

Section 3.0 - Master Interconnect System (MIS)

System interconnect cables are described in MIS (Master Interconnect System) documents shipped with the system. These documents specify all interconnections between components within the system and its options.

Note: Additional Reference Material Exists

For specific Revolution XR/d system interconnect maps and connection details, please refer to the following Service Manual: Direction 5115589-100, *Revolution XR/d System Drawings (Schematics, MIS Map, MIS Charts).* This information is also present in this manual; see Chapter 8 - - System Cable Information.

Chapter 4 - System Facility Power & Grounds

Section 1.0 - Introduction

The purpose of this chapter is to ensure that the product is properly powered and grounded, thus ensuring the proper operation of the product installed. The information in this chapter should be adhered to, unless there are written deviations approved by GE Medical Systems.

This chapter gives the sizes and procedures on how to power and ground your system. If these power and grounding instructions are not adhered to, proper operation cannot be guaranteed. Any cost associated and found to be a result of non-conformity, as stated in this chapter, may result in additional cost charged back to the institution and/or their contractor.

NOTICE

All Revolution XR/d system and sub-system power connections shall be made *ONLY* to power outlets that are connected to the Revolution XR/d system.

All Revolution XR/d system component power connections must be made in accordance with the Revolution XR/d MIS Map, Direction 5115589-100, *Revolution XR/d System Drawings (Schematics, MIS Map, MIS Charts).* This information is also present in this manual; see Chapter 8 - - System Cable Information.

1.1 Power Quality

The electrical power, from its origination to the system, must adhere to the wire size and transformer sizes as prescribed in the installation drawings. The feeder voltage-drops, as well as the supplying power, must be within the given parameters. Sizing for feeder is usually calculated for a maximum of 2% voltage drop at the minimum voltage range. The actual feeder sizing may vary from the installation drawing for a facilities voltage.

Calculate feeder losses before you begin. Total feeder losses must be calculated to ensure that the losses are less than those specified in the installation drawings. Calculating the recommended minimum transformer sizing for feeding a system ensures the transformer losses are less than half of the maximum regulation for the system.

Regulation is the calculated voltage losses for the entire power distribution system (No-Load Voltage minus Full-Load Voltage) divided by the no-load voltage minus the system losses (Full-Load Voltage):

$$\text{Regulation} = \frac{\text{NoLoadVoltage} - \text{FullLoadVoltage}}{\text{FullLoadVoltage}} \times 100$$

In the X-ray room, there must be a lockable facility power disconnect. It must be installed electrically before the equipment, for the purpose of locking out the power. This must be done before service to the high voltage system is performed.

1.2 Electrical Requirements

NOTICE

In China, all cables used to provide system power and ground must be CCC certified.

All system components obtain their power from the Power Distribution Unit (PDU) in the System Cabinet. **Providing power and ground wires to the PDU are the responsibility of the customer.** As an aid, wire sizes for various lengths of the power supply cable are shown in the following tables.

1.2.1 Generator Electrical Requirements

Note: Under Voltage trip circuit breaker required.

The main circuit breaker supplied by the customer must be sized in accordance to local regulations and have remote (under voltage) trip.

1.2.1.1 Generator Power Specifications

NOTICE

Potential for Equipment Damage.

Only WYE connected power source are currently permitted, due to current system (generator) design.

Input Voltage	380/400/415/440/460/480 VAC 3-Phase and ground without neutral.
Daily Voltage variations	+/- 10% (VAC) In this range, the generator will operate without any de-rating in accuracy.
Nominal line frequency (Hz)	50 Hz / 60 Hz
Daily frequency variation (Hz)	+/- 3%
Line Impedance	The apparent line impedance guaranteed by the customer should be equal or less than the values indicated below, according to the voltage value and the commercial power of the generator. **Voltage range (V) Line Impedance (ohms)** **3 phase 65KW 80KW** 380 0.118 0.096 400 0.131 0.100 415 0.138 0.113 440 0.154 0.125 480 0.185 0.150 Note: 400-480 VAC impedance values are based on IEC 601-2-7 standard. Values are interpolated from values in standard.
Inrush current	1000 Amps

Table 4-1 Generator Power Specifications - JEDI

HV cable type	USA: 22mm DSI (<= 165 pF/m) HV cable connector = Federal standard
Ground wire	Same as power cable

Table 4-1 Generator Power Specifications - JEDI

1.2.1.2 65kW Generator Wire Sizes & kVA Load Characteristics

- Calculations based upon nominal voltage, wire size in AWG.
- Recommended feeder sizes from distribution transformer to the power cabinet.
- Neutral must be terminated inside the main disconnect panel and not at any GE cabinet.
- The grounding conductor ( ) will be of same size as the feeder wires with a 1/0 minimum. This ground will run from equipment back to the facility power source / main grounding point and always travel in the same conduit with the feeders and neutral.
- * minimum wire size for circuit breaker, based on recommended overcurrent protection.

WIRE RUN LENGTH	INPUT VOLTAGE (VAC)					
	342-418 380	360-440 400	373-456 420	396-484 440	414-506 460	432-528 480
15m (50 ft.)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)
30m (100 ft.)	3 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)	* 4 (1/0)
46m (150 ft.)	2 (1/0)	2 (1/0)	2 (1/0)	3 (1/0)	3 (1/0)	4 (1/0)
61m (200 ft.)	1/0 (1/0)	1 (1/0)	1 (1/0)	2 (1/0)	2 (1/0)	2 (1/0)
77m (250 ft.)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1 (1/0)	1 (1/0)	1 (1/0)
92m (300 ft.)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)	1/0 (1/0)
107m (350 ft.)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)
122m (400 ft.)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)
138m (450 ft.)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)

Table 4-2 JEDI Generator 3-Phase 65 kW - Minimum Wire Size

Item	Specification					
Phase	Three Phase					
Nominal line voltage (VAC)	380	400	420	440	460	480
Voltage range (VAC)	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%
Momentary line current (Amps)	147	140	133	127	122	117
Continuous line current (Amps)	7	6.7	6.2	6	5.7	5.5
Power demand (kVA)	97	97	97	97	97	97
Line frequency (Hz)	47/53 Hz and 57/63 Hz					

Table 4-3 JEDI Generator 3-Phase 65 kW - kVA Load Characteristics

1.2.1.3 80kW Generator Wire Sizes & kVA Load Characteristics

- Calculations based upon nominal voltage, wire size in AWG.
- Recommended feeder sizes from distribution transformer to the power cabinet.
- Neutral must be terminated inside the main disconnect panel and not at any GE cabinet.
- The grounding conductor ( ) will be of same size as the feeder wires with a 1/0 minimum. This ground will run from equipment back to the facility power source / main grounding point and always travel in the same conduit with the feeders and neutral.
- * minimum wire size for circuit breaker, based on recommended overcurrent protection.

WIRE RUN LENGTH	INPUT VOLTAGE (VAC)					
	342-418 380	360-440 400	373-456 420	396-484 440	414-506 460	432-528 480
15m (50 ft.)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
30m (100 ft.)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
46m (150 ft.)	1/0 (1/0)	1 (1/0)	1 (1/0)	* 2 (1/0)	* 2 (1/0)	* 2 (1/0)
61m (200 ft.)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)	1 (1/0)	1 (1/0)
77m (250 ft.)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)	1/0 (1/0)	1/0 (1/0)
92m (300 ft.)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)	2/0 (2/0)	2/0 (2/0)
107m (350 ft.)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)	3/0 (3/0)
122m (400 ft.)	350M (350M)	300M (300M)	250M (250M)	4/0 (4/0)	4/0 (4/0)	3/0 (3/0)
138m (450 ft.)	400M (400M)	350M (350M)	300M (300M)	250M (250M)	250M (250M)	4/0 (4/0)

Table 4-4 JEDI Generator 3-Phase 80 kW - Minimum Wire Size

Item	Specification					
Phase	Three Phase					
Nominal line voltage (VAC)	380	400	420	440	460	480
Voltage range (VAC)	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%	+/-10%
Momentary line current (Amps)	190	180	170	163	156	150
Continuous line current (Amps)	7	6.7	6.2	6	5.7	5.5
Power demand (kVA)	125	125	125	125	125	125
Line frequency (Hz)	47/53 Hz and 57/63 Hz					

Table 4-5 JEDI Generator 3-Phase 80 kW - kVA Load Characteristics

1.2.2 Recommended Wall “Circuit-Breaker” Ratings

Power / Voltage	65 kW	80 kW
380 V	74 A / 600 V	95 A / 600 V
400 V	70 A / 600 V	90 A / 600 V
415 V	67 A / 600 V	85 A / 600 V
440 V	64 A / 600 V	82 A / 600 V
460 V	61 A / 600 V	78 A / 600 V
480 V	59 A / 600 V	75 A / 600 V

Table 4-6 Wall Breaker Parameter (Theoretical Current Values)

1.2.3 Wiring Electrical Power and Disconnects

This section provides additional data regarding power circuits the customer must provide, and internal electrical circuits necessary to supply the correct power to the Revolution XR/d system. Figure 4-1 shows the room power supply installed.

1.2.3.1 Room Power Supply

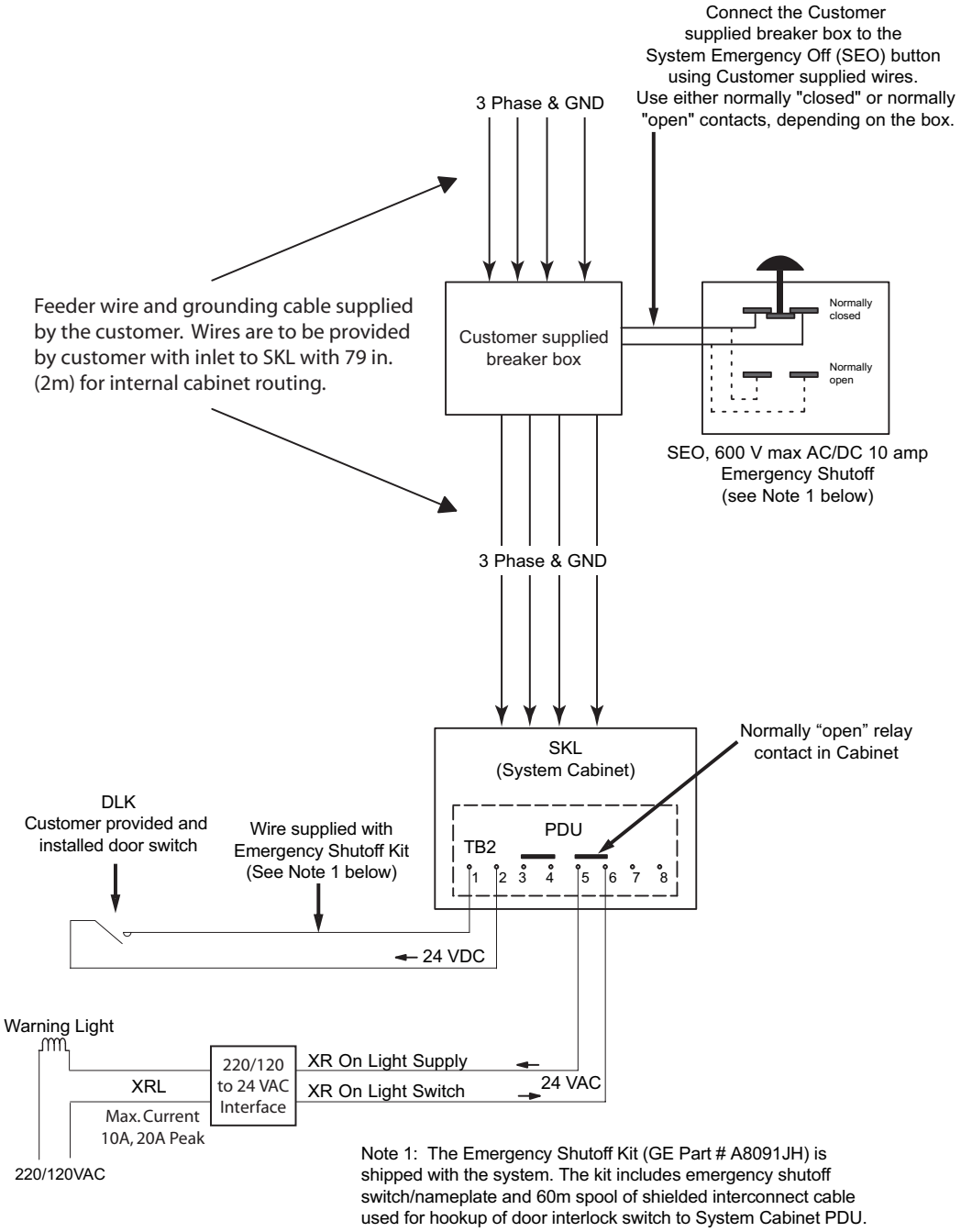


Figure 4-1 Room Power Supply (see Table 4-7 for Legend)

.

United States Key	Description
1	Feeder wire and grounding cable supplied by the customer. Wires are to be provided by customer with inlet to SKL with 2 meters or 79 inches for internal cabinet routing).
E/O *(see note below)*	Emergency Off button located near room access door, 1.5 meters (59 inches) above floor. Wires to connect to cabinet supplied by GE and found in Catalog item A8091JH.
XRL	Yellow X-ray emission indicator lamp above the room access door. 220 V in Europe/120 V in USA with 25 W max. bulb (per local regulations). Wires and light fixtures supplied by customer.
DLK *(see note below)*	Open-door detector (per local regulations). SKL provides 24 VDC.
RML	Room Light control, wires, and light fixtures supplied by customer.
CB	Circuit breaker with remote trip (under voltage) capabilities supplied by customer.
Note: Use only a multi conductor, shielded, PVC/PVC, UL TYPE CM cable. Alpha Wire. This wire is found in GE Catalog Item A8091JH as a “bulk” roll of wire (60 Meters). Material consists of two 16 AWG (19/0.0117 strand) conductors. Shields must be grounded at both ends.	

Table 4-7 Legend for Figure 4-1

1.2.3.2 Multiple Emergency “OFF” Switches

Figure 4-2 shows how multiple Emergency Power Off switches could be wired.

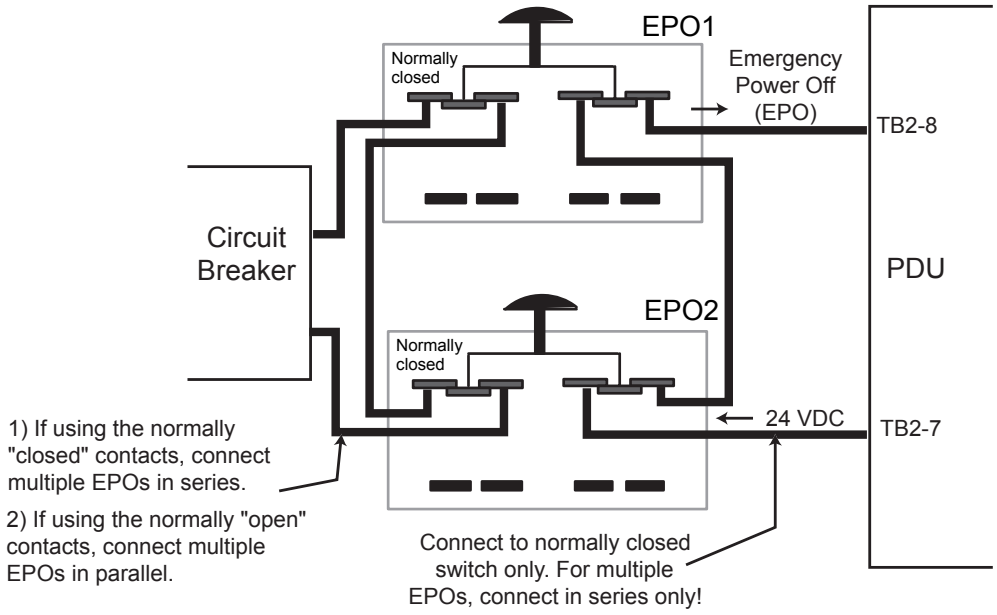


Figure 4-2 Wiring Multiple “Emergency OFF” (E/O) Switches

1.2.3.3 Customer-supplied Electrical Outlet

Customer must provide an electrical outlet of appropriate voltage rating within 3 feet (0.91meters) of the System Cabinet.

Section 2.0 - Electrical Grounds

2.1 System and Facility Grounds

The ground for this system must originate at the system's power source and be continuous (i.e., transformer or first access point of power into a facility, and be continuous to the system power disconnect in the room). Ground connection at the power source must be at the grounding point of the "Neutral/Ground" if a "Wye" transformer is used, or typical grounding points of a separately derived system. In the case of an external facility, it must be bonded to the facility ground point at the electrical service entrance.

The "system" ground can be spliced using "High Compression Fittings" but must be properly terminated at each distribution panel it passes through. When it is terminated, it must be connected into an approved grounding block. Incoming and outgoing grounds must terminate at this same grounding block. Grounds must only be terminated to approved grounding blocks. Grounds must never connect directly to the panels, frames or other materials in a cabinet or distribution panel (refer to Figure 4-3).

2.2 Recommended Ground Wire Sizes

The ground wire must be copper and never smaller than 1/0 AWG.

The ground wire impedance from the system disconnect (including the ground rod) measured to earth, must not exceed 2 ohms (as measured by one of the applicable techniques described in Section 4 of ANSI/IEEE Standard 142 - 1982). Refer to Figure 4-4 and Figure 4-5 for typical equipment and methods to measure the different portions of the 2 ohm impedance.

Note: Additional Reference Material Exists

For general system grounding requirements and information on establishing an equi-potential grounding system, refer to:

- Direction 46-014505, *Electrical Safety - Equipment Grounding*
- Direction 46-014546, *Electrical Safety - Leakage Currents*

For specific system grounding requirements and information on establishing an equi-potential grounding system, refer to: Chapter 4 - - System Facility Power & Grounds. For specific Revolution XR/d system grounding maps and connection details, refer to Direction 5115589-100, *Revolution XR/d System Drawings (Schematics, MIS Map, MIS Charts).* This information is also present in this manual; see Chapter 8 - - System Cable Information.

2.3 Final Checks, Before System Installation Can Begin

The customer must provide GE Medical Systems or its representative (installation specialist) evidence that grounds and electrical power meet GE Medical Systems' specifications.

Prior to product installation, a local service or installation specialist, to be determined by GEMS, will do a physical walk through of the exam suite to ensure the following:

1.) Ground wires are of the same size as the power feeder or AWG 1/0, whichever is larger.

2.) Grounds at junction points are connected properly and securely to an approved ground bus.

3.) Grounds within an enclosure are tied together by copper wire or to an appropriate buss bar (i.e., separate buss bars within an enclosure must be tied together with copper wire of appropriate size).

4.) Grounds originate at the power source (i.e., transformer or entrance panel into facility).

5.) Ground wires measure less than 2 ohms to earth.

You may use the following form to record the results of that inspection.

GROUND IMPEDANCE MEASURED TO BE _____ OHMS

Inspector's Name and Date: _____

Customer's Name and Date: _____

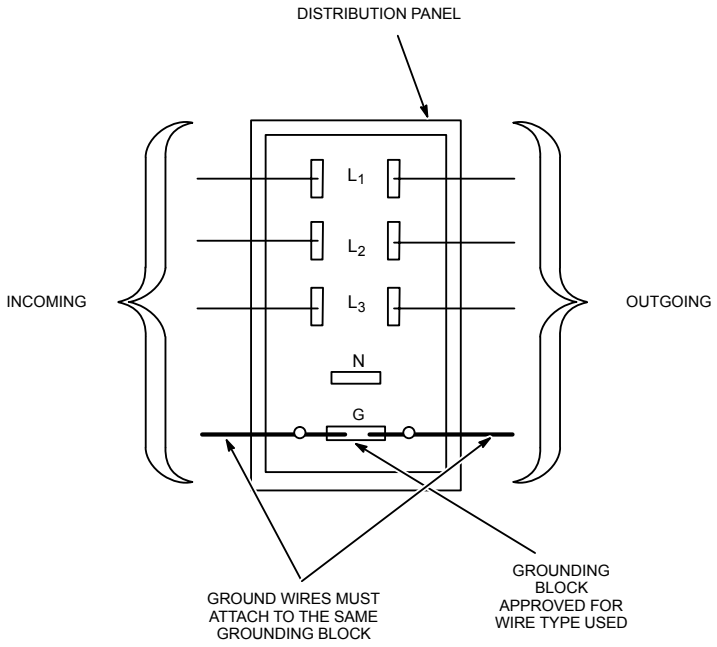


Figure 4-3 Ground Connection at Distribution Panel

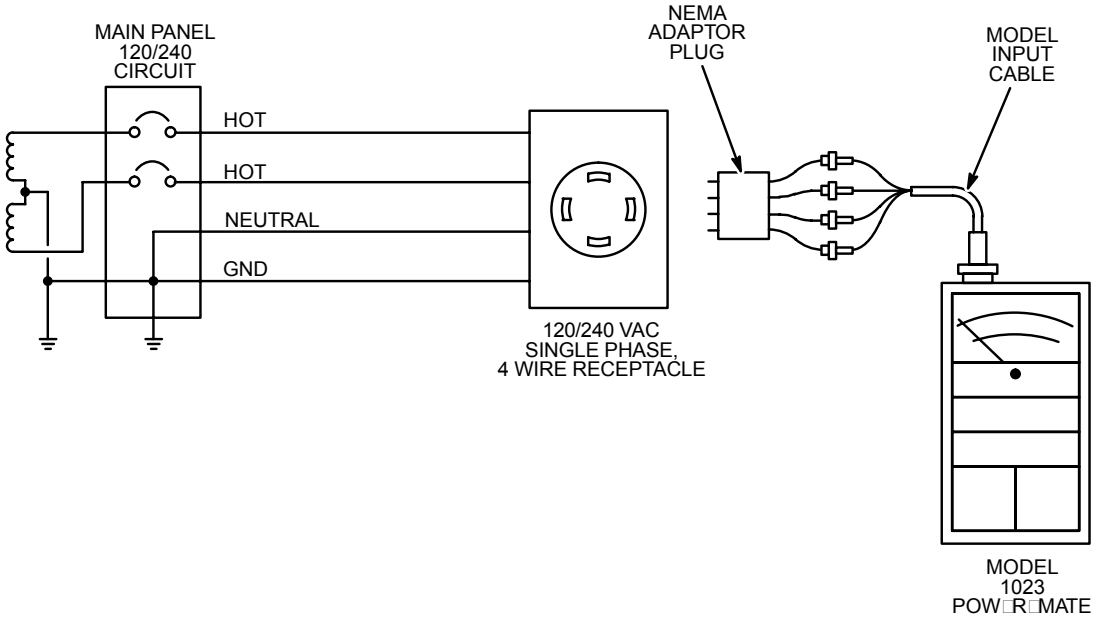


Figure 4-4 Wire Impedance Test

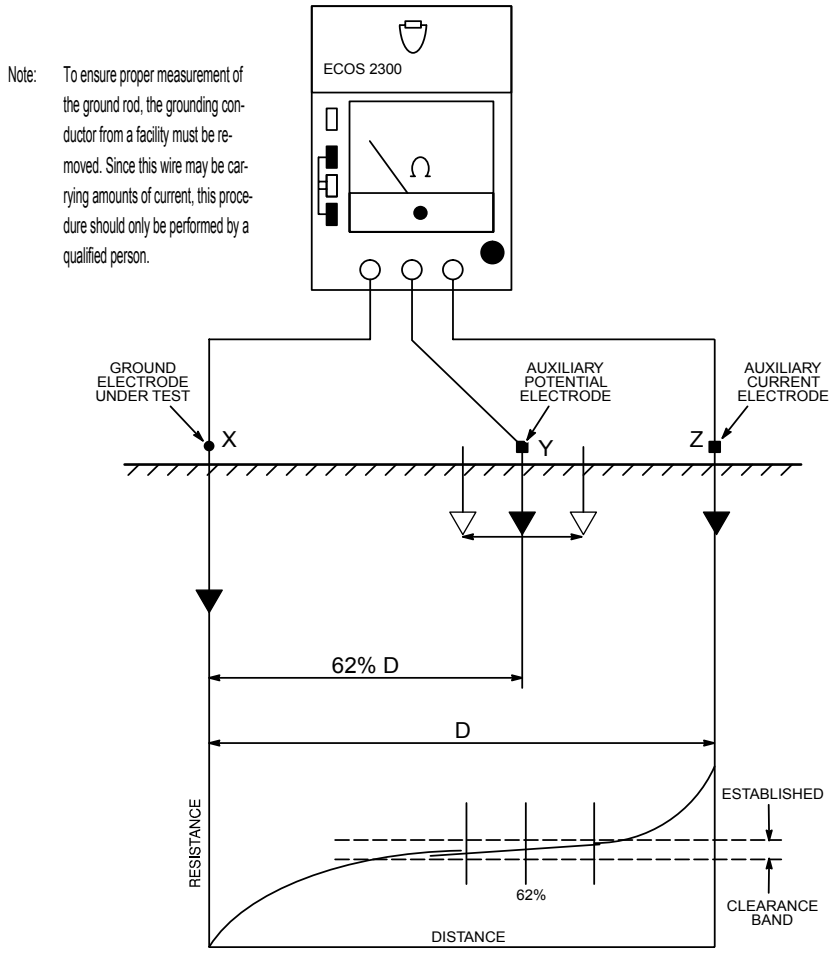


Figure 4-5 Ground Rod Impedance Test

Chapter 5 - Product Characteristics

Section 1.0 - Overview

Refer to this section for dimensional drawings for the components of the Revolution XR/d system. These components include:

- Operator Console - Figure 5-2 through Figure 5-4 and Figure 5-1 (wall plate).
- Table (TBL) - Figure 5-5 and Figure 5-6.
- System Cabinet (SKL) - Figure 5-7 through Figure 5-9.
- Overhead Tube Suspension (OTS) - Figure 5-11 through Figure 5-18.
- Wall Stands (WLS), DSA and Stretcher - Figure 5-19 through Figure 5-26.

Note: Drawings are not to scale. Dimensions are called out on each drawing.

Section 2.0 - System Components Dimensions and Weights

2.1 Dimensions

PRODUCT OR COMPONENT	DIMENSIONS			References
	Width	Depth	Height	
Operator Console:				
PC Tower	210 mm (8.3 in)	525 mm (20.7 in)	455 mm (17.9 in)	See Figure 5-2 through Figure 5-4
LCD Monitor	387 mm (15.2 in)	180 mm (7.1 in)	504 mm (19.9 in)	
RCIM	451 mm (17.8 in)	135 mm (5.3 in)	70 mm (2.8 in)	
Keyboard	460 mm (18.1 in)	165 mm (6.5 in)	50 mm (2 in)	
Mouse	65 mm (2.6 in)	116 mm (4.6 in)	40 mm (1.6 in)	
Table Assembly	2295 mm (90.4 in)	938 mm (36.9 in)	575-820 mm (22.6-32.3 in)	See Figure 5-5, Figure 5-6
Extended Wall Stand Stretcher (optional)	2150 mm (84.7 in)	870 mm (34.25 in)	705 mm (27.75 in)	See Figure 5-26
Stationary Rail (5.79 m) each	5.79 m (19 ft)	62.3 mm (2.45 in)	84.3 mm (3.32 in)	See Figure 5-11, Figure 5-12
3 Meter Bridge	3073 mm (121 in)	655.3 mm (25.8 in)	158.7 mm (6.25 in)	See Figure 5-11
2 Meter Bridge	2133 mm (84 in)	655.3 mm (25.8 in)	158.7 mm (6.25 in)	
Overhead Tube Support Includes: carriage, collimator, tube, and UIF	940 mm (37 in)	508 mm (20 in)	927 mm (36.5 in)	See Figure 5-11, Figure 5-13
System Cabinet	915 mm (36 in)	762 mm (30 in)	1905 mm (75.0 in)	See Figure 5-7, Figure 5-8
Detector Support Assembly	622 mm (24.5 in)	416 mm (18.5 in)	526 mm (21.0 in)	See Figure 5-25
Grid Holder	544 mm (21.4 in)	237 mm (9.35 in)	599 mm (23.6 in)	See Figure 5-10
Wall Stand	860 mm (33.9 in)	650 mm (25.6 in)	2286 mm (90.0 in)	See Figure 5-19, Figure 5-20, Figure 5-21
Extended Wall Stand	860 mm (33.9 in)	1387 mm (54.61 in)	2286 mm (90.0 in)	See Figure 5-22, Figure 5-23, Figure 5-24
*Showing: Mounting Holes, Cable Entrance, Air Vents, Service Access, Center of Gravity				

Table 5-1 Product Physical Characteristics (Width / Depth / Height)

2.2 Dimensioned Figures and Drawings

2.2.1 Wall Plate

Note: The use of a wall plate and wall box is required with this system. The cables used with this system are terminated with connectors that can only be used with this specific wall plate.

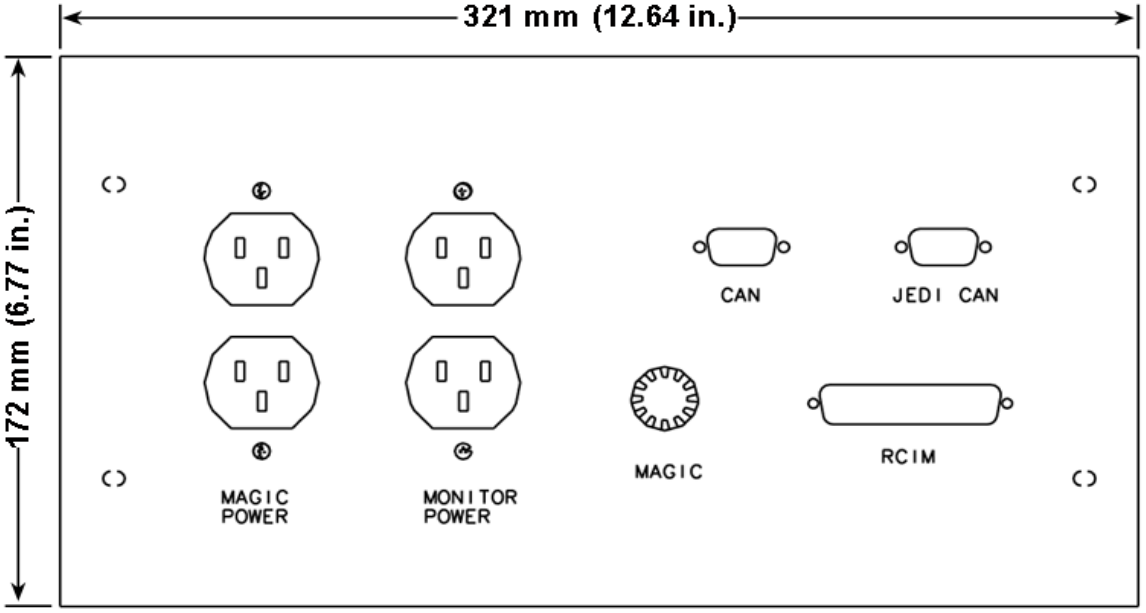


Figure 5-1 Wall Plate Dimensions

2.2.2 Operator Console

Figure 5-2 Operator Console - Keyboard / Mouse / RCIM / Exposure Handswitch

Figure 5-3 Operator Console - Monitors

Figure 5-4 Operator Console - Computer

2.2.3 Table

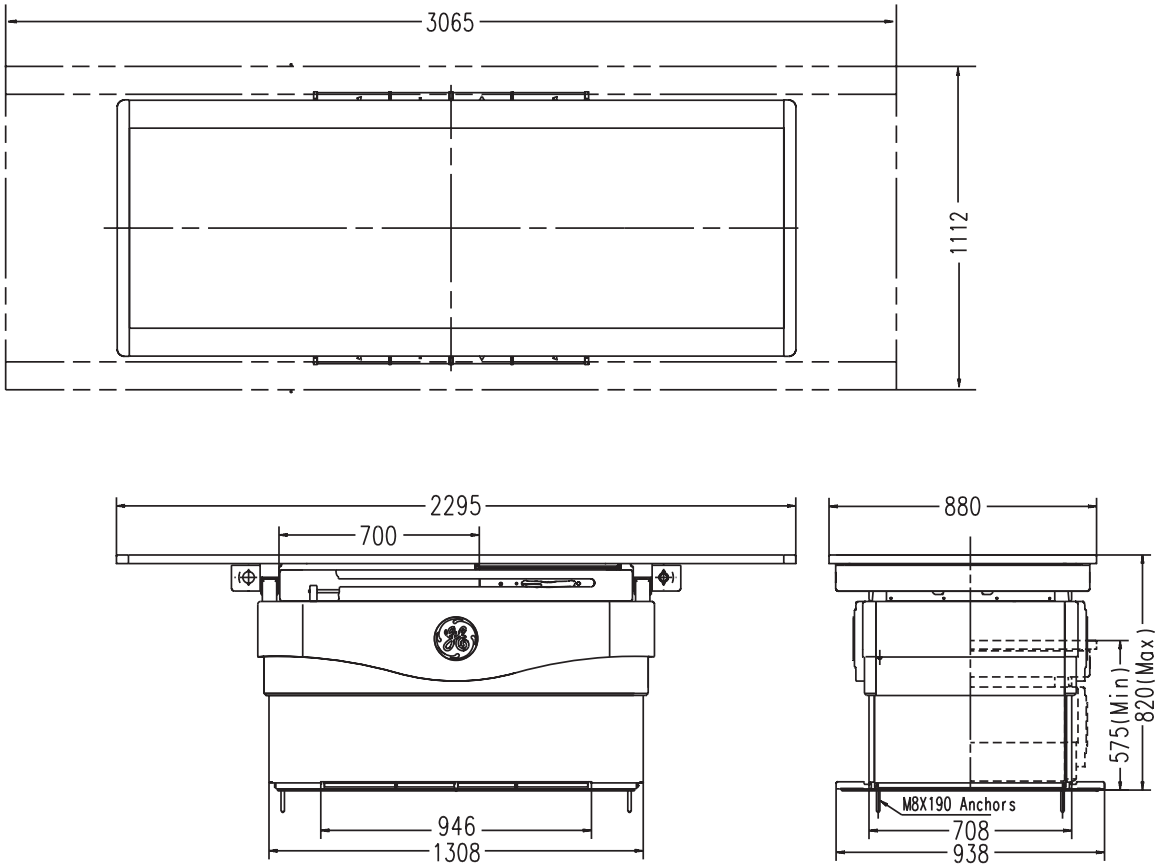


Figure 5-5 Revolution XR/d Table Views

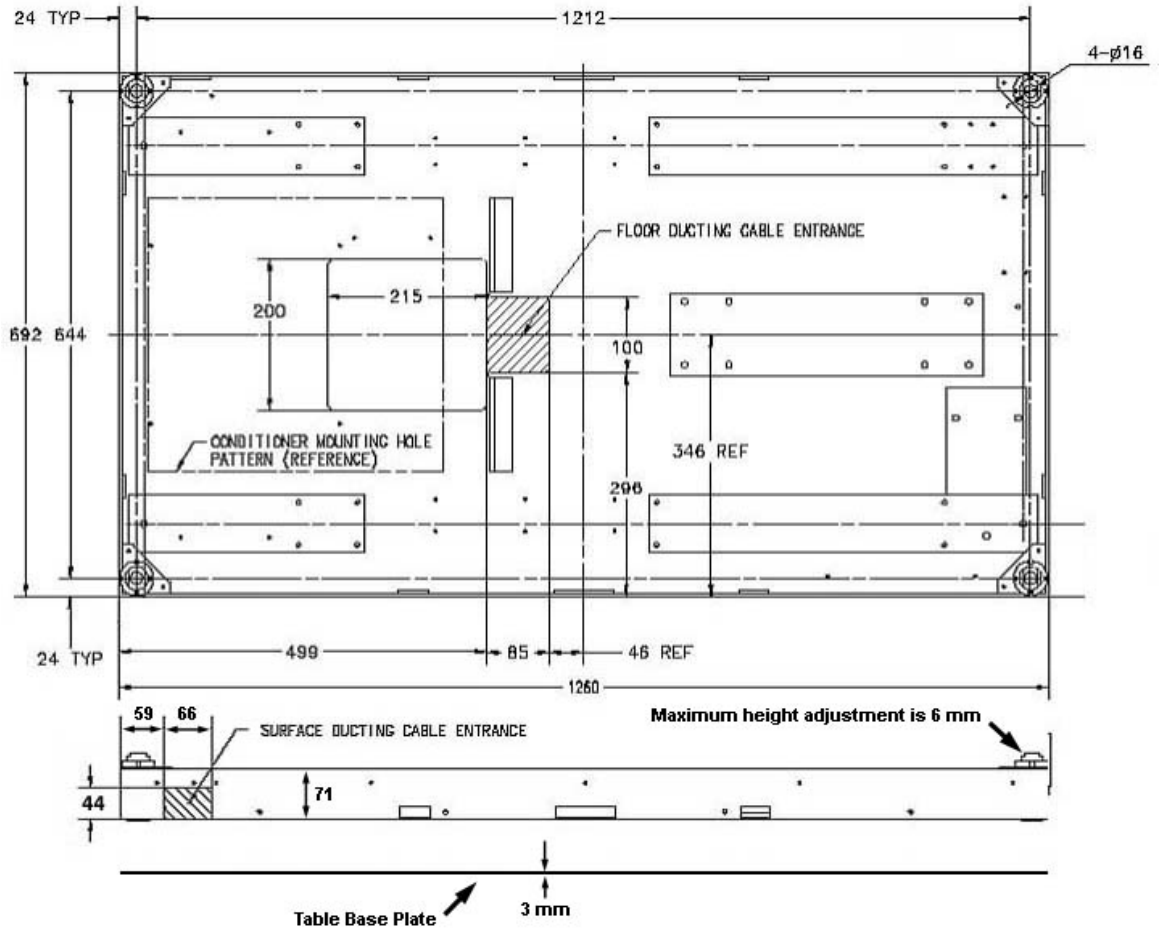


Figure 5-6 Revolution XR/d Table Bottom Plate

2.2.4 System Cabinet, 5115763 (Single IDC) or 2406453 (Dual IDC)

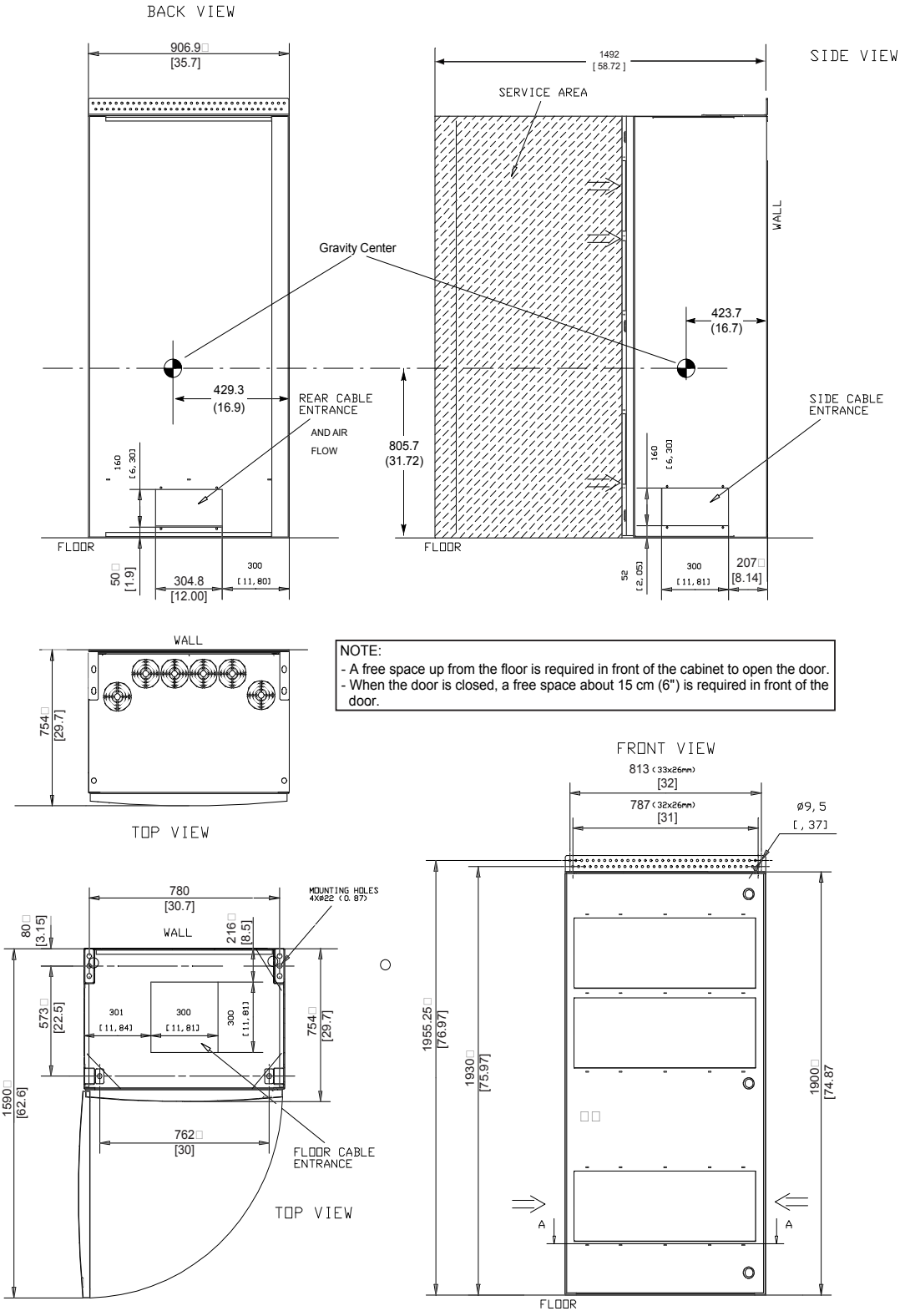


Figure 5-7 System Cabinet Dimensions

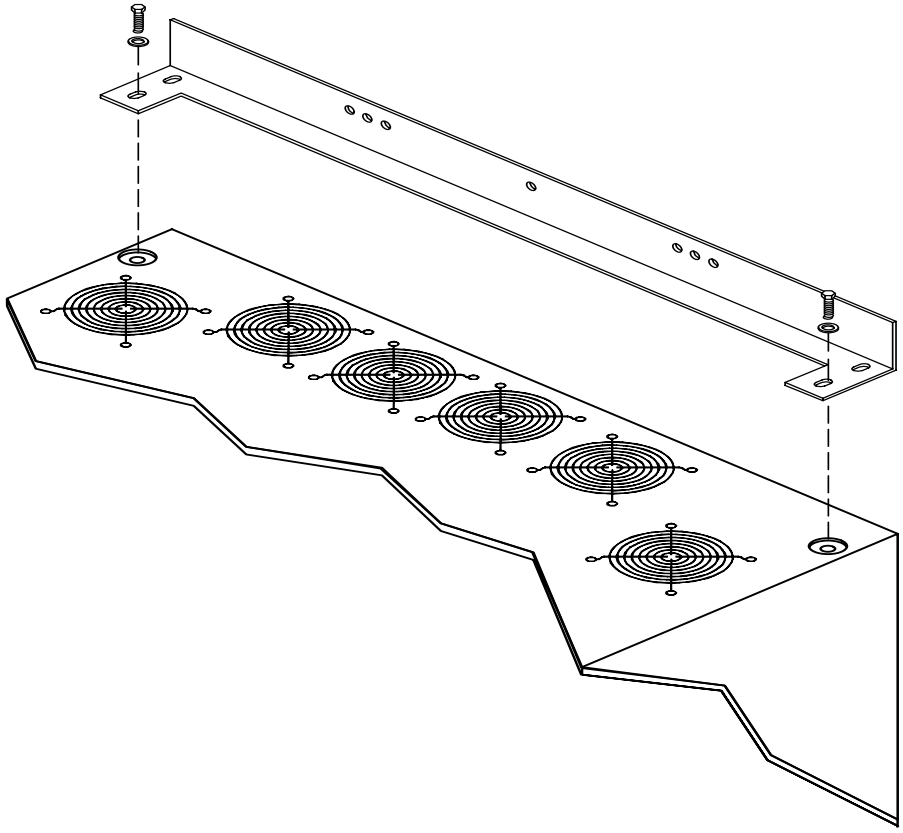


Figure 5-8 System Cabinet Wall-Mount Bracket

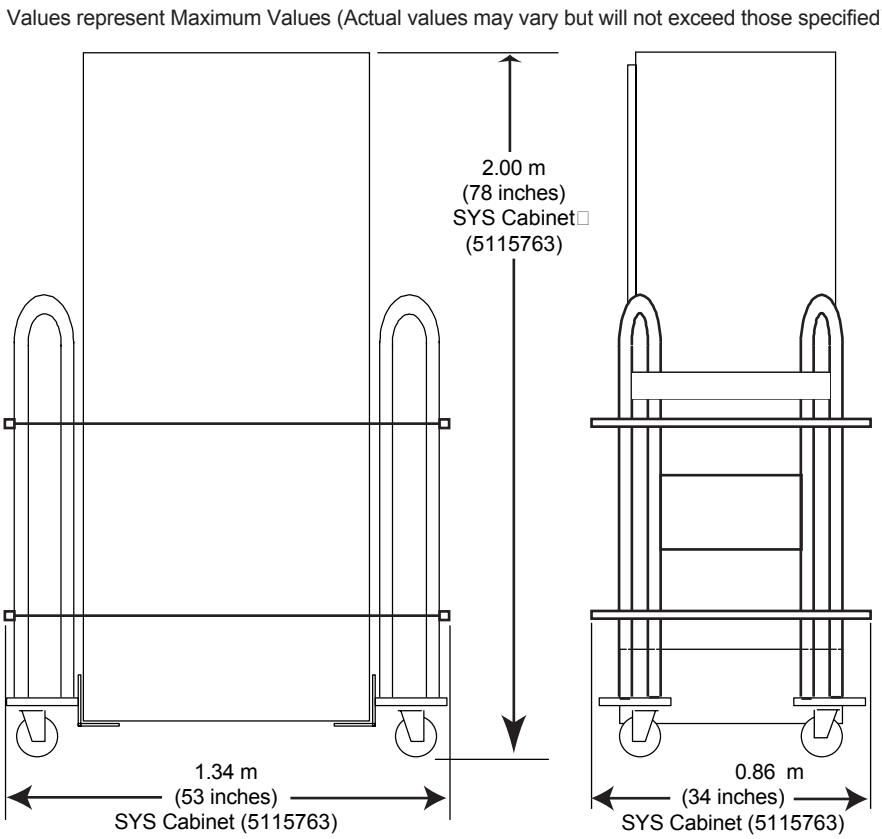


Figure 5-9 Typical Illustration Showing Shipping Dolly Dimensions

2.2.5 Grid Holder

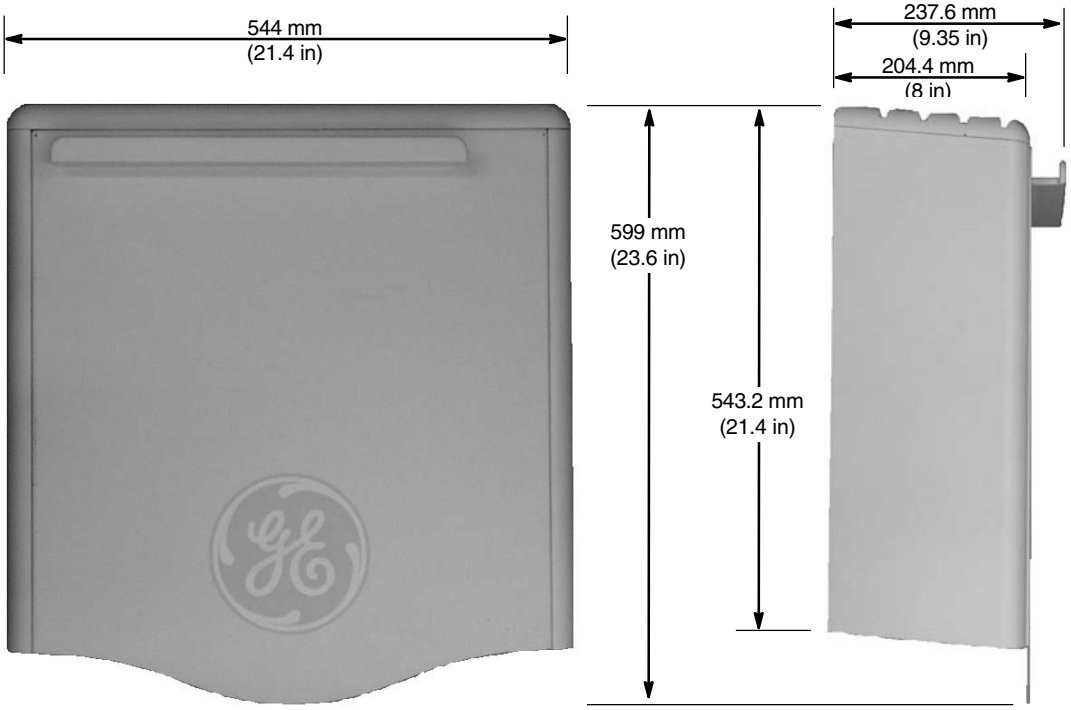


Figure 5-10 Grid Holder Dimensions

2.2.6 Over-Head Tube Support (OTS)

The OTS comprises a system for suspending and supporting an X-ray tube unit and collimator. It employs a spring counterpoise mechanism to balance these loads. The OTS's main components are the stationary rails, the bridge and the support column.

The stationary rails utilize extruded aluminum channels which are ceiling mounted. Depending on room length, these stationary rails can be ordered in any 4" (10.2 cm) incremental length between 11'-2" (3.4 m) and 19' (5.8 m). The spacing between these stationary rails accommodates an overhead mounted bridge structure.

The bridge length is 10'-1/2" (3.06 m) or 83.5" (2.12 m) and the bridge width is 25" (63.5 cm). The bridge end caps are 25-5/16" (64.3 cm) wide excluding two 1/4" (6.4 mm) high fastener heads.

Cables to and from the OTS Suspension are attached to the OTS bridge and stationary rails by a cable drape system.

2.2.6.1 Weights

COMPONENT	WEIGHT (LBS.)	WEIGHT (KGS.)
2 STATIONARY RAILS [19' LONG (5.79 m)]	138	62.6
BRIDGE AND CARRIAGE DOLLY	148	67.1
CARRIAGE AND COLUMN ASSEMBLY	243	110.2
TUBE SUPPORT	27	12.2
X-RAY TUBE UNIT	65	29.5
AUTO COLLIMATOR	31	14.1
CABLES AND MISCELLANEOUS PARTS	45	20.4
TOTAL	**697**	**316.1**

Table 5-2 OTS RAD Suspension Weights

2.2.6.2 Dimensions and Layout

Figure 5-11 shows basic overall dimensions for an OTS Suspension. Figure 5-12 through Figure 5-17 give layout dimensions for a typical OTS Suspension System. The equipment arrangements shown are generally preferred since they result in good utilization of equipment for the most commonly used procedures.

Figure 5-4 lists major layout factors and concerns which need to be considered. Carefully check room layouts for adequate radiographic coverage, necessary clearances and provision for related equipment. Good judgement is required to avoid compromising important features. There must be ample maneuvering space allowed for the hospital cart and for personnel around the table.

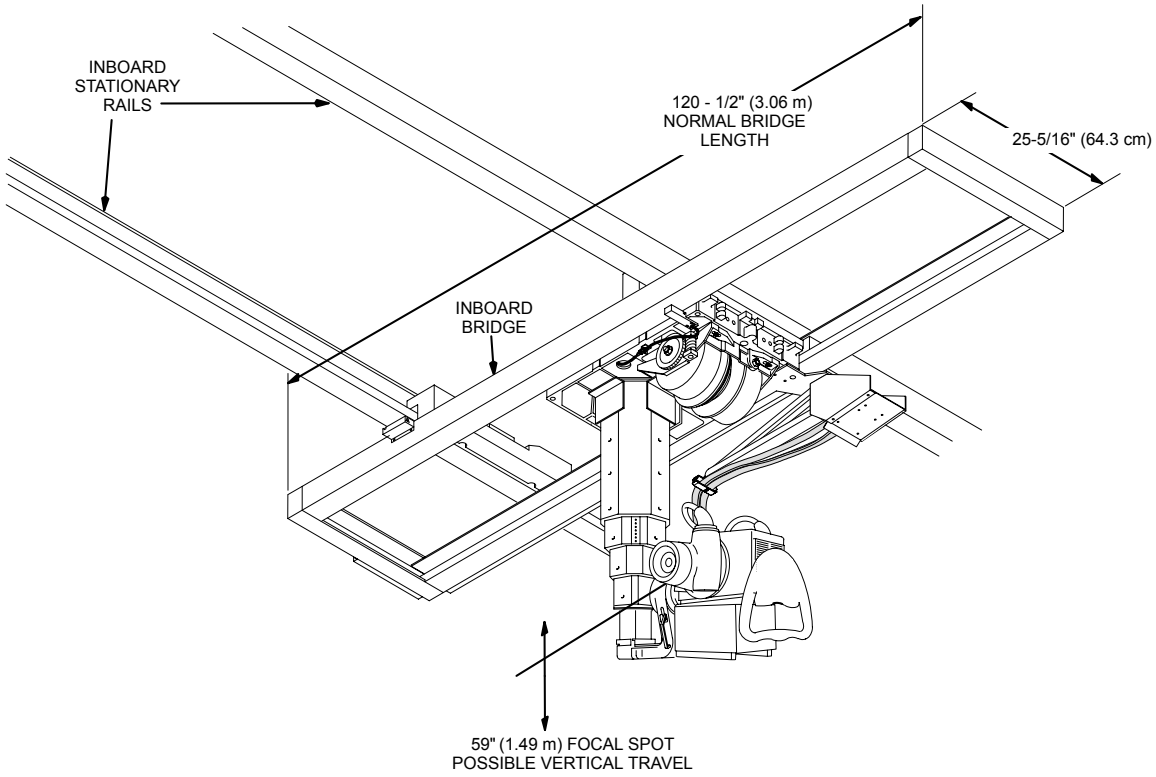
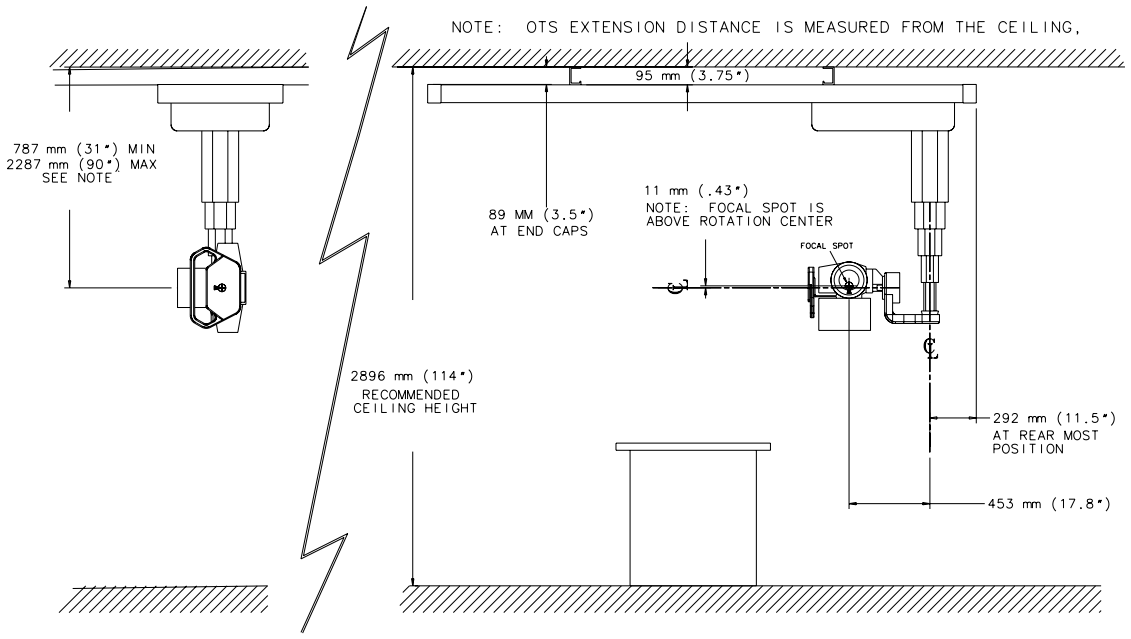
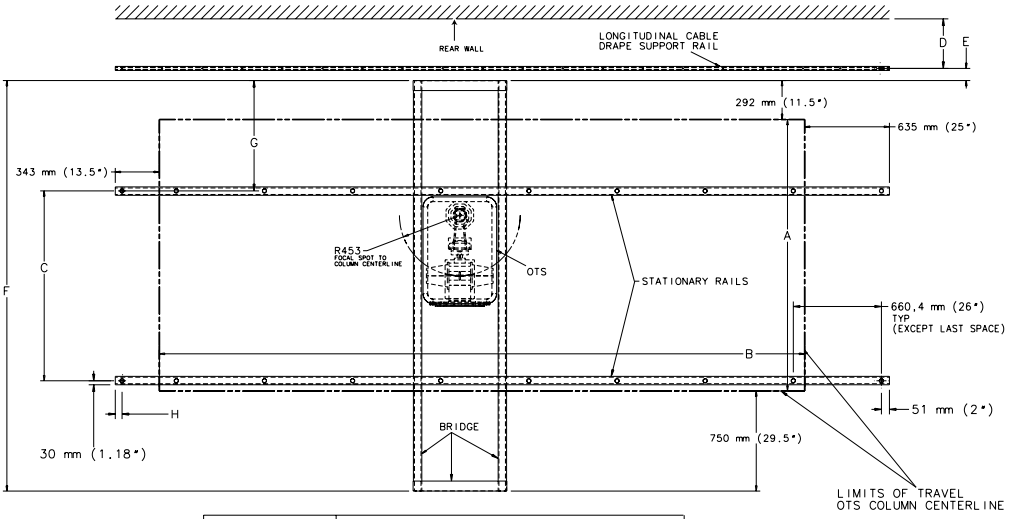


Figure 5-11 OTS Suspension

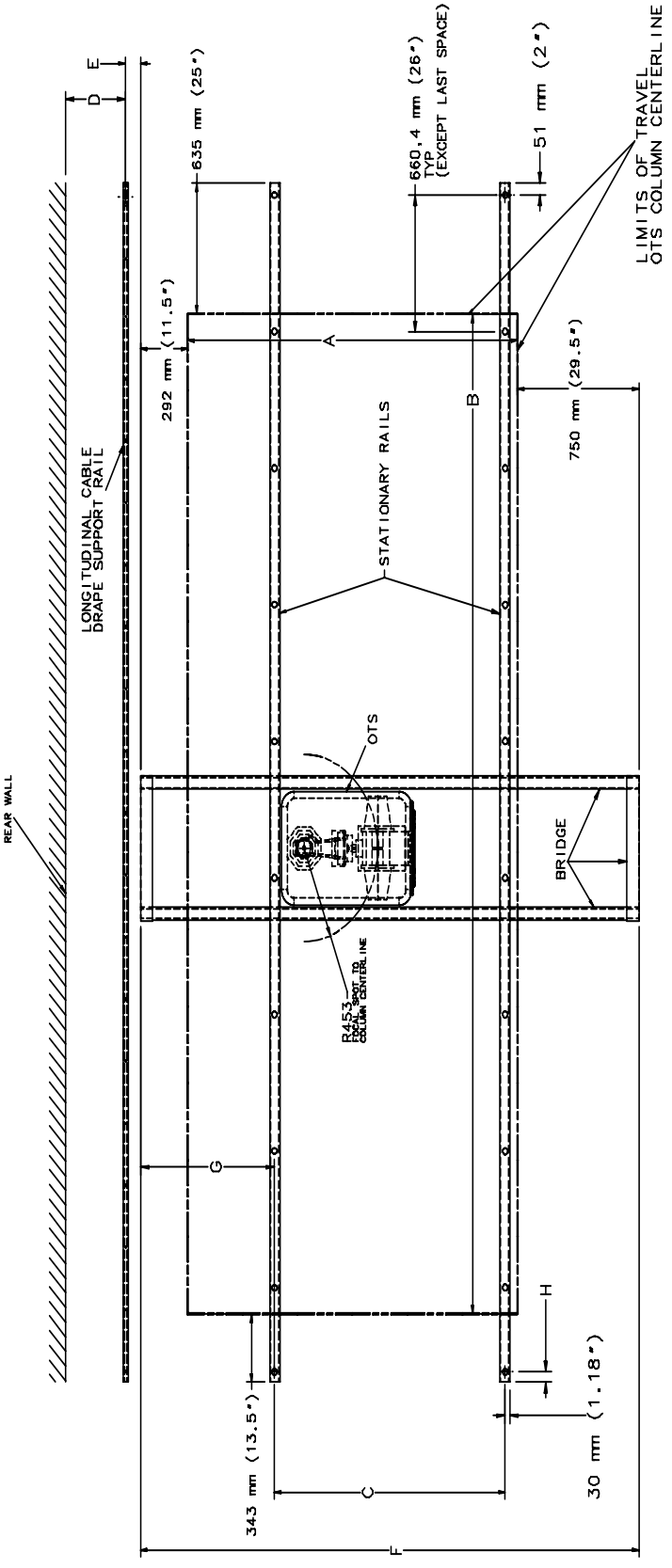




DIMENSION	3 METER (120") BRIDGE
A	2024 mm (79.7")
B	STATIONARY RAIL LENGTH MINUS 978 mm (38.5") (4812 mm (189.4") FOR 5790 mm (19') RAILS)
C	1422 mm (56") RECOMMENDED. 1270 mm (50") OR 1219 mm (48") TO MATCH EXISTING STRUCTURE.
D	100 mm (4") MINIMUM.
E	62 mm (2.4") TO MATCH EXISTING SPACING. NOTE: FOR NEW INSTALLS, A LARGER DISTANCE OF UP TO 280 MM (11") IS SUGGESTED
F	3061 mm (120.5")
G	820 mm (32.3") (SEE NOTE 1)
H	51 mm (2") EXCEPT FOR 162" AND 214" RAILS 102 mm (4") 162" AND 214" RAILS

NOTES: 1 THE OVERHANG OF THE BRIDGE (DIM. G) IS AFFECTED BY THE RAIL SPACING. IF THE RAIL SPACING IS LESS THAN 1422 mm (56") THE OVERHANG WILL BE GREATER THAN THE VALUE LISTED IN THE TABLE.

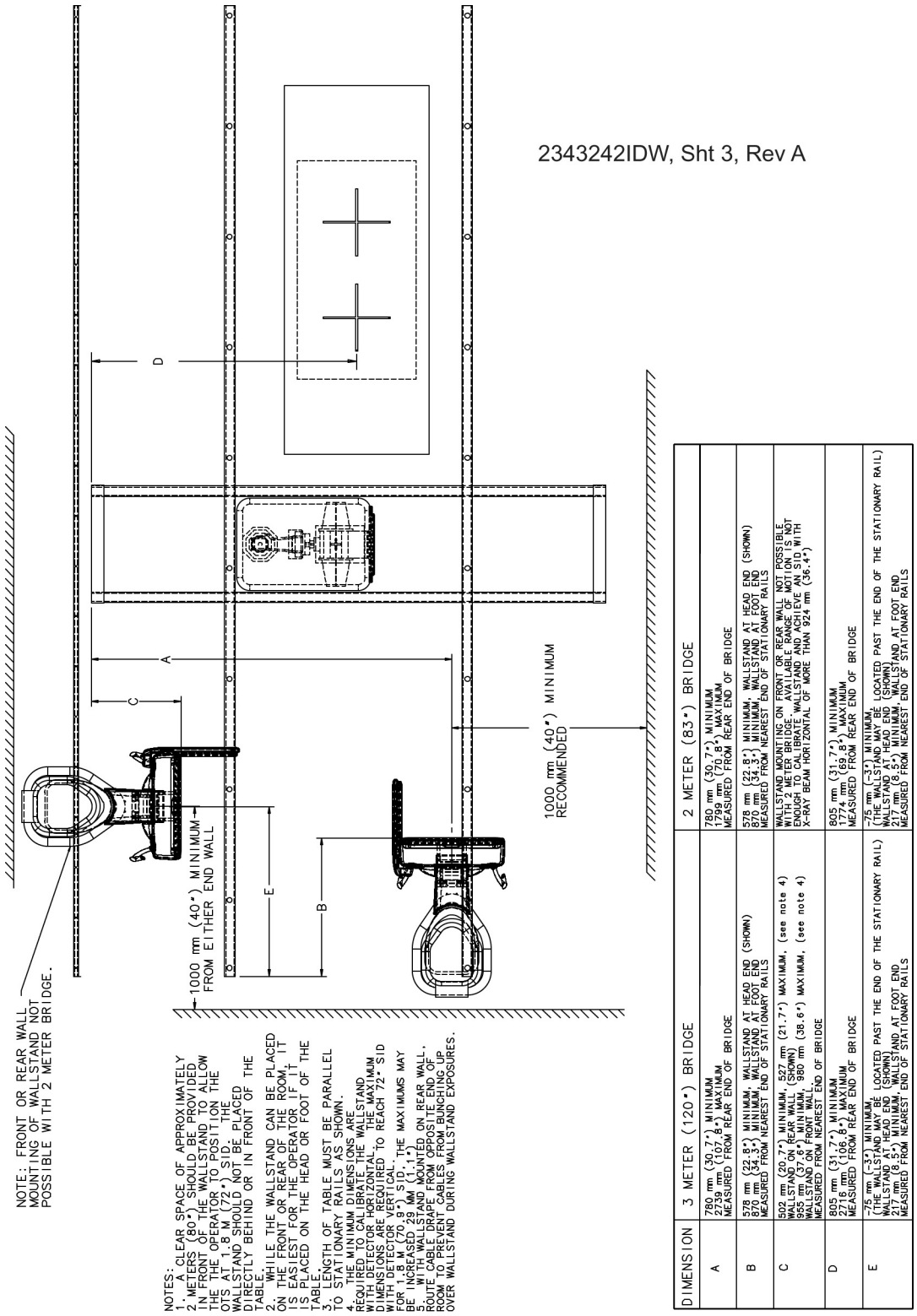
Figure 5-12 OTS Dimensions



DIMENSION	3 METER (120") BRIDGE	2 METER (83") BRIDGE
A	2024 mm (79.7")	1084 mm (42.7")
B	STATIONARY RAIL LENGTH MINUS 978 mm (38.5") (4812 mm (189.4") FOR 5790 mm (19') RAILS)	STATIONARY RAIL LENGTH MINUS 978 mm (38.5") (4812 mm (189.4") FOR 5790 mm (19') RAILS)
C	1422 mm (56") RECOMMENDED. 1270 mm (50") OR 1219 mm (48") TO MATCH EXISTING STRUCTURE.	1422 mm (56") RECOMMENDED. 1270 mm (50") OR 1219 mm (48") TO MATCH EXISTING STRUCTURE.
D	100 mm (4") MINIMUM.	100 mm (4") MINIMUM.
E	62 mm (2.4") TO MATCH EXISTING SPACING. NOTE: FOR NEW INSTALLS A LARGER DISTANCE OF UP TO 280 MM (11") is SUGGESTED	62 mm (2.4") TO MATCH EXISTING SPACING. NOTE: FOR NEW INSTALLS A LARGER DISTANCE OF UP TO 280 MM (11") is SUGGESTED
F	3061 mm (120.5")	2121 mm (83.5")
G	820 mm (32.3") (SEE NOTE 1)	350 mm (13.5") (SEE NOTE 1)
H	51 mm (2") EXCEPT FOR 162" AND 214" RAILS 102 mm (4") 162" AND 214" RAILS	51 mm (2") EXCEPT FOR 162" AND 214" RAILS 102 mm (4") 162" AND 214" RAILS

NOTES: 1 THE OVERHANG OF THE BRIDGE (DIM. G) IS AFFECTED BY THE RAIL SPACING. IF THE RAIL SPACING IS LESS THAN 1422 mm (56") THE OVERHANG WILL BE GREATER THAN THE VALUE LISTED IN THE TABLE.

Figure 5-13 OTS Suspension Plan View, All Dimensions Minimum Values



DIMENSION	3 METER (120") BRIDGE	2 METER (83") BRIDGE
A	780 mm (30.7") MINIMUM 2334 mm (107.8") MAXIMUM MEASURED FROM REAR END OF BRIDGE	780 mm (30.7") MINIMUM 1590 mm (70.8") MAXIMUM MEASURED FROM REAR END OF BRIDGE
B	578 mm (22.8") MINIMUM, WALLSTAND AT HEAD END (SHOWN) 870 mm (34.2") MINIMUM, WALLSTAND AT FOOT END MEASURED FROM NEAREST END OF STATIONARY RAILS	578 mm (22.8") MINIMUM, WALLSTAND AT HEAD END (SHOWN) 870 mm (34.2") MINIMUM, WALLSTAND AT FOOT END MEASURED FROM NEAREST END OF STATIONARY RAILS
C	502 mm (20.7") MINIMUM, 527 mm (21.7") MAXIMUM, (see note 4) WALLSTAND ON REAR WALL (SHOWN) 698 mm (27.5") MINIMUM, 980 mm (38.6") MAXIMUM, (see note 4) WALLSTAND ON FRONT WALL. MEASURED FROM NEAREST END OF BRIDGE	WALLSTAND MOUNTING ON FRONT OR REAR WALL NOT POSSIBLE WITH 2 METER BRIDGE. AVAILABLE RANGE OF MOTION IS NOT ENOUGH TO CALIBRATE WALLSTAND AND ACHIEVE AN SID WITH X-RAY BEAM HORIZONTAL OF MORE THAN 924 mm (36.4")
D	805 mm (31.7") MINIMUM 2716 mm (106.8") MAXIMUM MEASURED FROM REAR END OF BRIDGE	805 mm (31.7") MINIMUM 1774 mm (69.8") MAXIMUM MEASURED FROM REAR END OF BRIDGE
E	-75 mm (-3") MINIMUM, (THE WALLSTAND MAY BE LOCATED PAST THE END OF THE STATIONARY RAIL) WALLSTAND AT HEAD END (SHOWN) 227 mm (8.9") MAXIMUM, WALLSTAND AT FOOT END MEASURED FROM NEAREST END OF STATIONARY RAILS	-75 mm (-3") MINIMUM, (THE WALLSTAND MAY BE LOCATED PAST THE END OF THE STATIONARY RAIL) WALLSTAND AT HEAD END (SHOWN) 227 mm (8.9") MAXIMUM, WALLSTAND AT FOOT END MEASURED FROM NEAREST END OF STATIONARY RAILS

Figure 5-14 OTS Bridge View for Wall Stand, All Dimensions Minimum Values

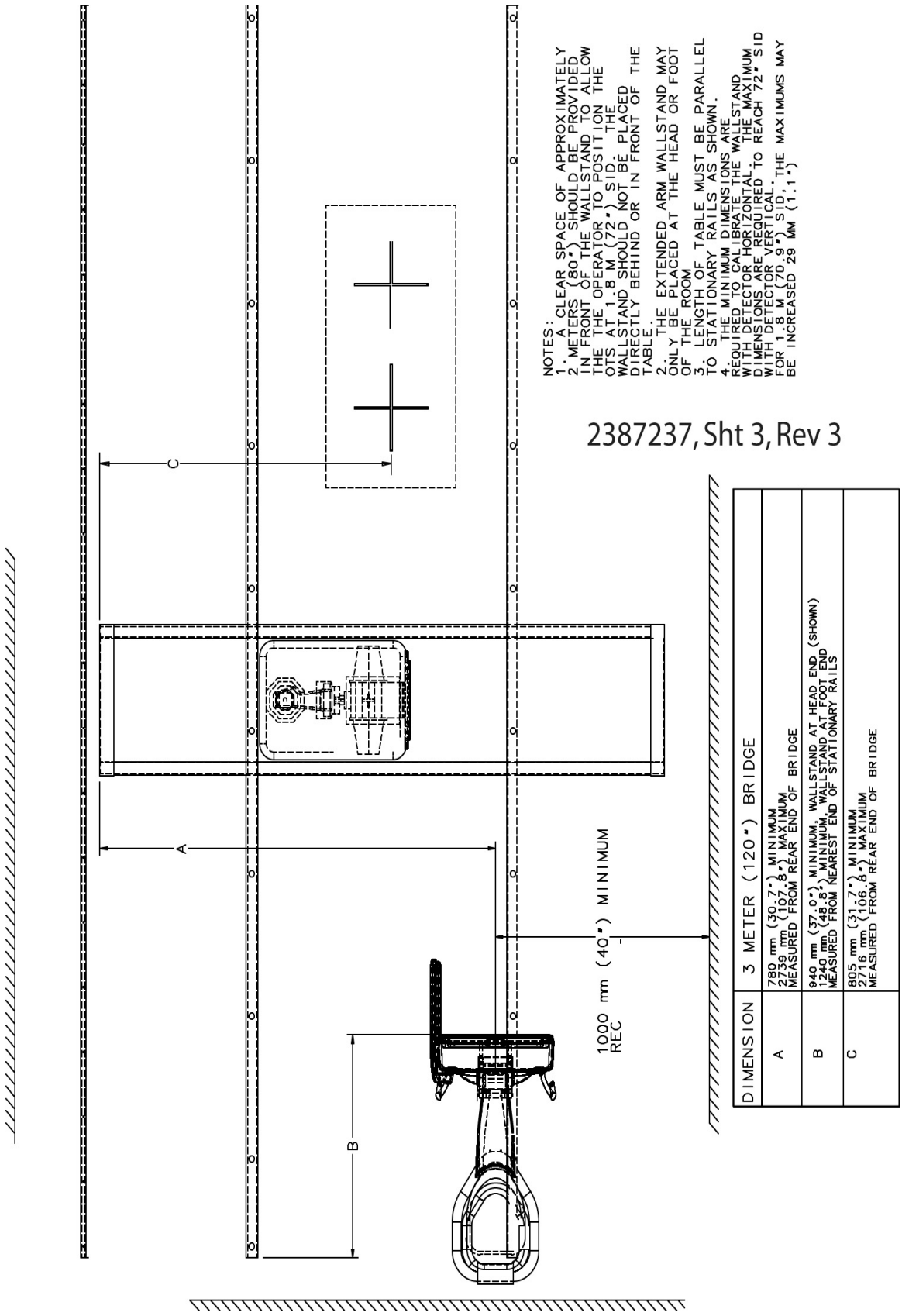


Figure 5-15 OTS Bridge View for Wall Stand, All Dimensions Minimum Values

Note: Height measurements are the same for both the regular and extended Wall Stands.

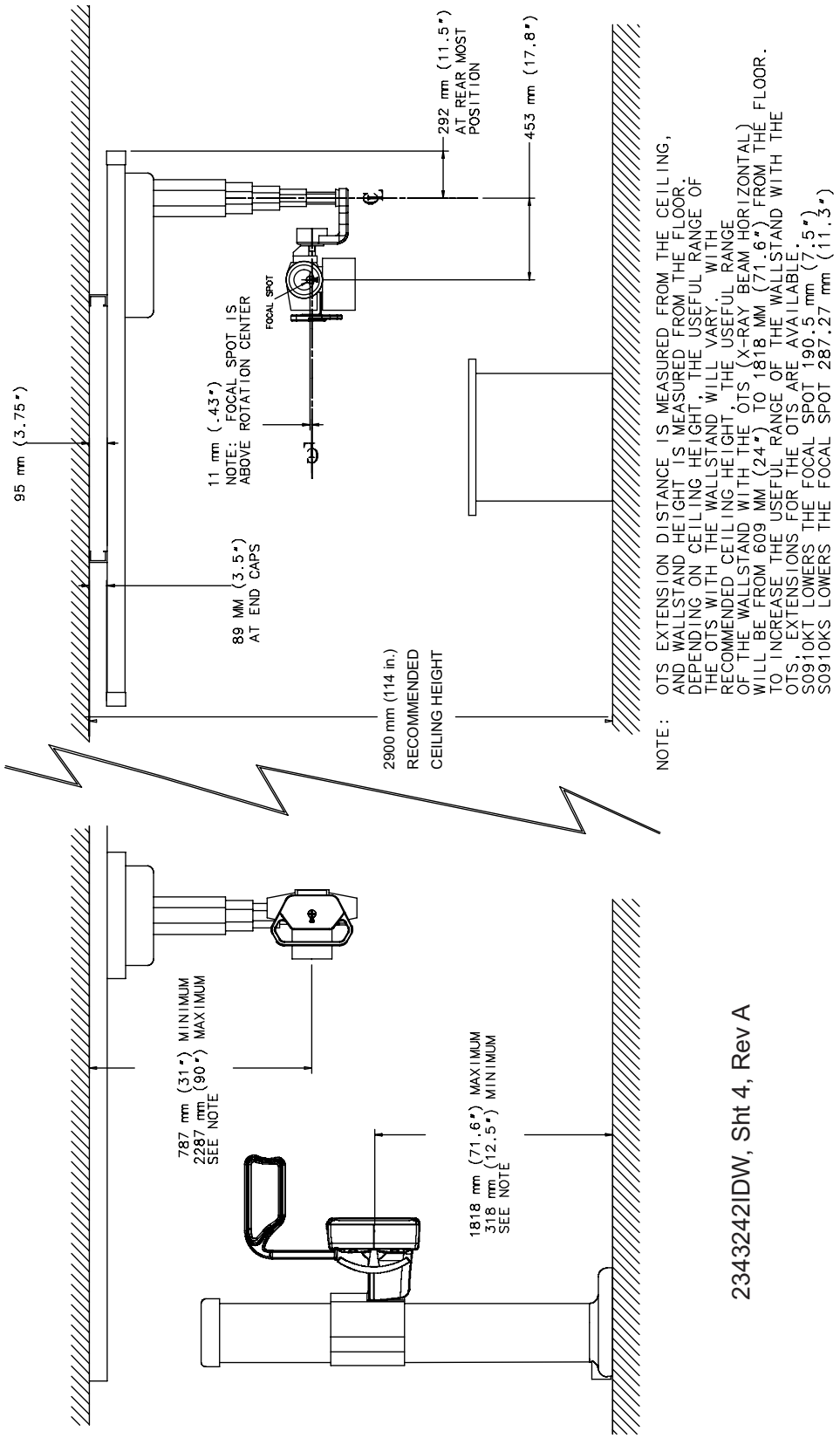


Figure 5-16 OTS Suspension Foot-End View and Wall Stand/OTS Side View

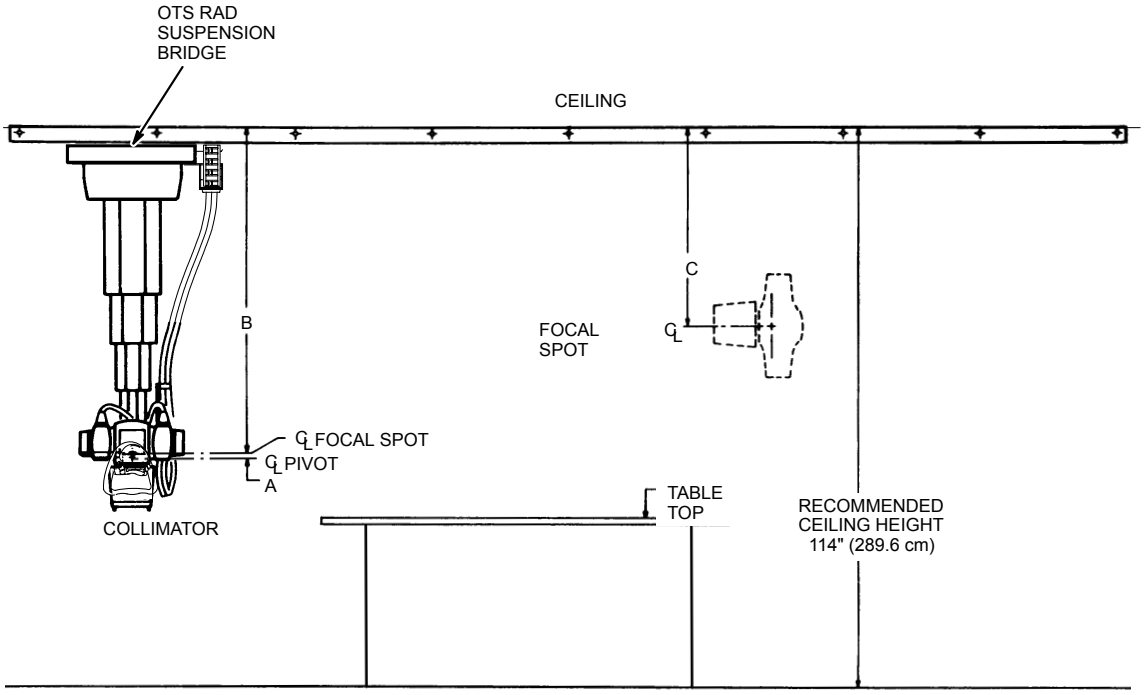


Figure 5-17 OTS Suspension Side View

TRAVEL LOCATION	DIMENSIONS WITH THE MAXIRAY 100 TUBE UNIT	MIN.	MAX.
A	FOCAL SPOT ABOVE TUBE PIVOT POINT	13/16” (2.1 cm)	
B	COLLIMATOR POINTED DOWN (VERTICAL)	28-1/16” (71.3 cm)	87-1/16” (221.1 cm)
C	COLLIMATOR POINTED SIDEWAYS (HORIZONTAL)	28-7/8” 73.3 cm)	87-7/8” (223.2 cm)

Table 5-3 OTS Suspension Vertical Travel Limits (See Figure 5-17)

FACTORS TO BE CONSIDERED	PERTINENT INFORMATION
1.) Vertical operating range of OTS Suspension.	Generally, a 9'-6" (2.9 m) stationary rail height is recommended. At 9'-6" (2.9 m), the OTS Suspension has these vertical limits (with Maxiray 100 Tube Unit): Max. Source-to-Image Distance = 85-15/16" (2.18 m). Min. Source-to-Image Distance = 26-15/16" (68.4 cm).
2.) Distance between center lines of ceiling mounting bolt holes in stationary rails. 56" (1.43m) spacing is recommended and should be used with all new structures. Holes have been drilled in the rails to accommodate 48" (1.22m) and 50" (1.27m) spacing distances resulting from an existing structure.	56" (1.4 3 m), or 50" (1.27 m), or 48" (1.22 m) Adjustment is provided to permit a +/-1/4 inch (+/- 6 mm) variation of this span; however, this tolerance does not have anything to do with degree of parallelism of the stationary rails, which must be held to +/- 1/8" (+/- 3 mm)
3.) Minimum overall room dimension, front-to-back, without modifying basic structure.	124-1/4" (3.2 m)
4.) 36" (91.4 cm) focal spot to table center-line distance for cross table radiography, rear to front.	50" (1.27 m) minimum required from longitudinal center line of table to center line of support rail for cable drape or concealment.
5.) When using 3-1/2" X 3-1/2" (8.9 cm X 8.9 cm) posts (Cat. #B2054FH) and structural steel channel to support stationary rail.	Allow for width of channel between wall and stationary rail. Overall length must include stationary rail length plus columns at each end. Minimum recommended channel size 2"x 8" x 11.5 Lb./Ft. (5.1 cm x 20.3 cm x 17.1 kg/m).
6.) Clearance for longitudinal shift top excursion. Allow clearance for cart work at head end of the table.	Preferably, there should be walking space between the end of the extended table top and any obstruction.
7.) Clearance at end of stationary rail for RAD tube unit 90 degrees from front.	14" (35.6 cm) clearance required between end of stationary rail and side wall. (Requirements decrease if cable covers are used).
8.) Heat from overhead spotlights.	Caution should be taken to avoid excessive heat from overhead spotlights. Damage can occur to ceiling-mounted components and wiring if high wattage bulbs are used. Recommend low wattage bulbs no higher than 75 watts and use dimmer controls. Do not mount lights directly above areas where ceiling mounted accessories will be parked.

Table 5-4 OTS Suspension Layout Factors

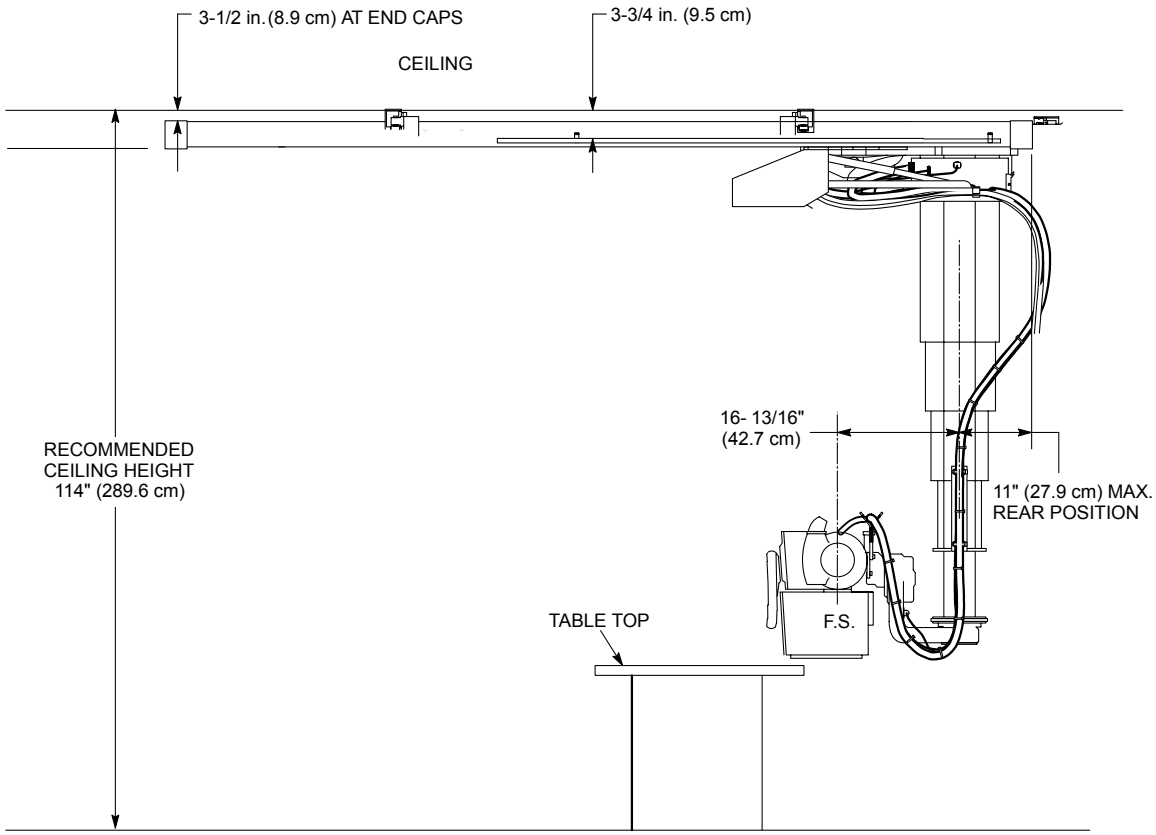


Figure 5-18 OTS Suspension - Foot End View

2.2.7 Wall Stands and Stretcher (optional)

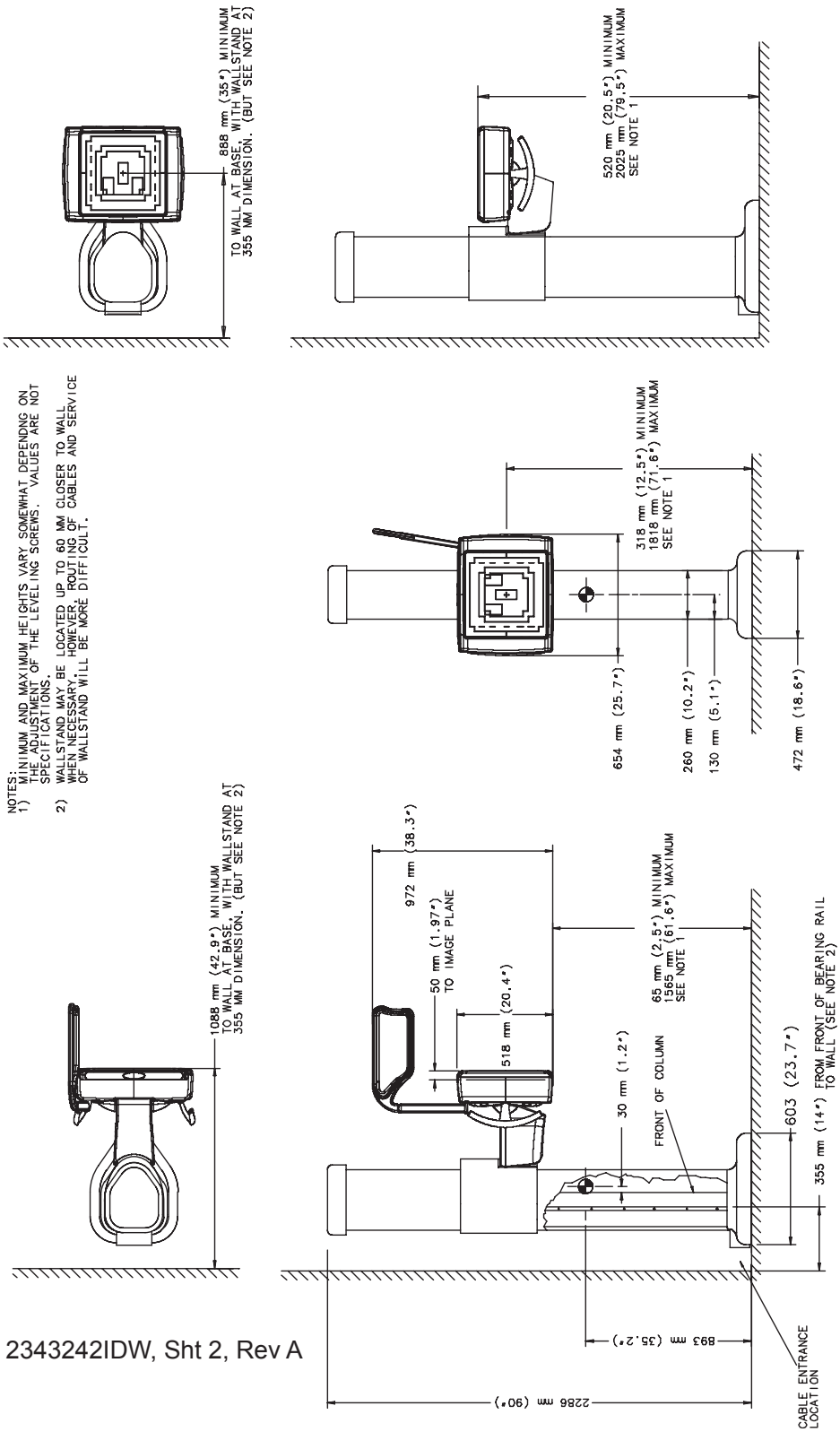


Figure 5-19 Wall Stand (Regular Arm Length) Dimensions (A)

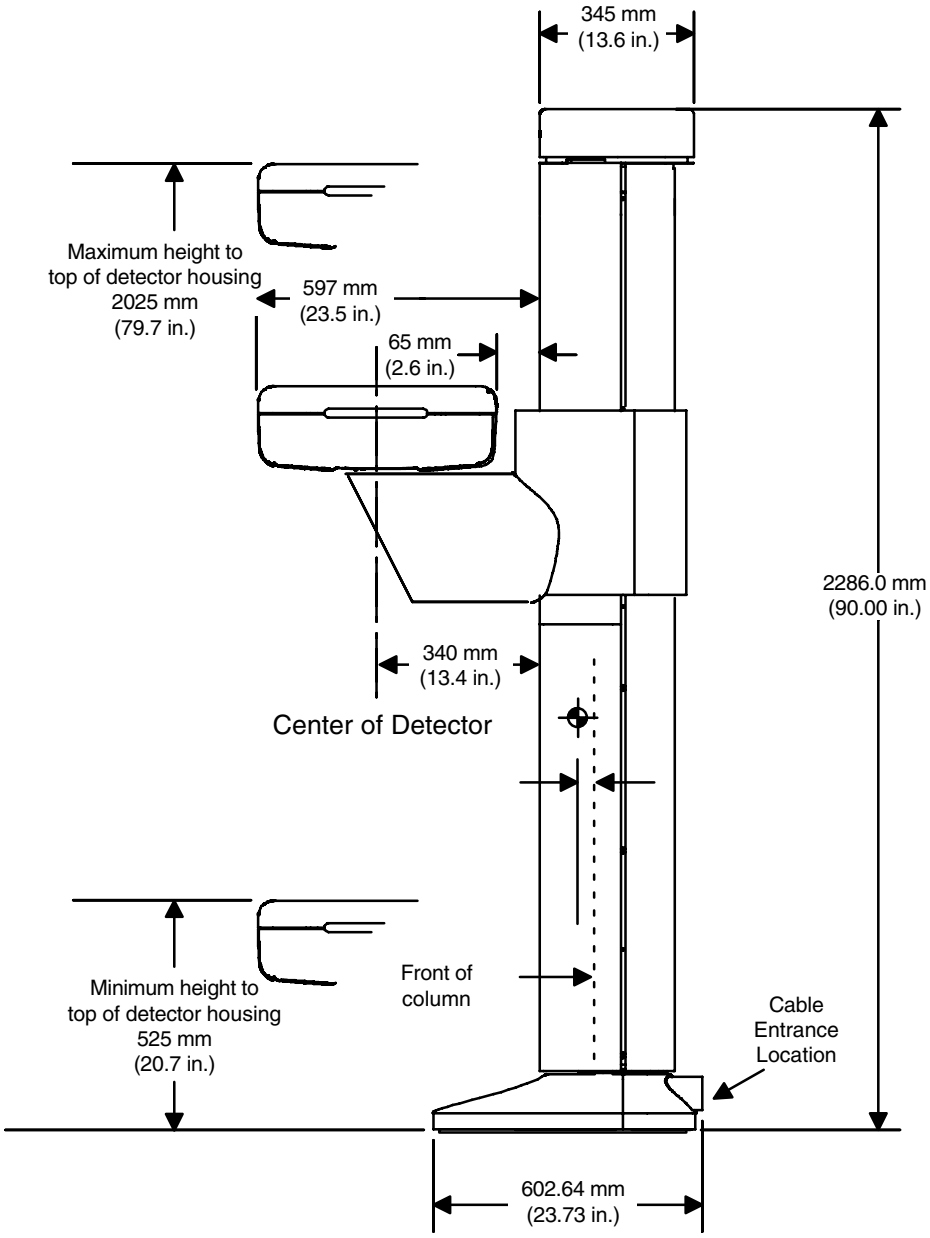


Figure 5-20 Wall Stand (Regular Arm Length) Dimensions (B)

The “In-transit” position, shown below, should be used only to move the Tube Stand and Extended Wall Stand through low clearance areas. If the clearance height of an area is 2286.0 mm (90.0 in) or greater, then the Tube Stand and Extended Wall Stand may be moved in the “upright” position.

Note: This drawing is not precise and is used only to show the approximate In-transit positioning for both stands.

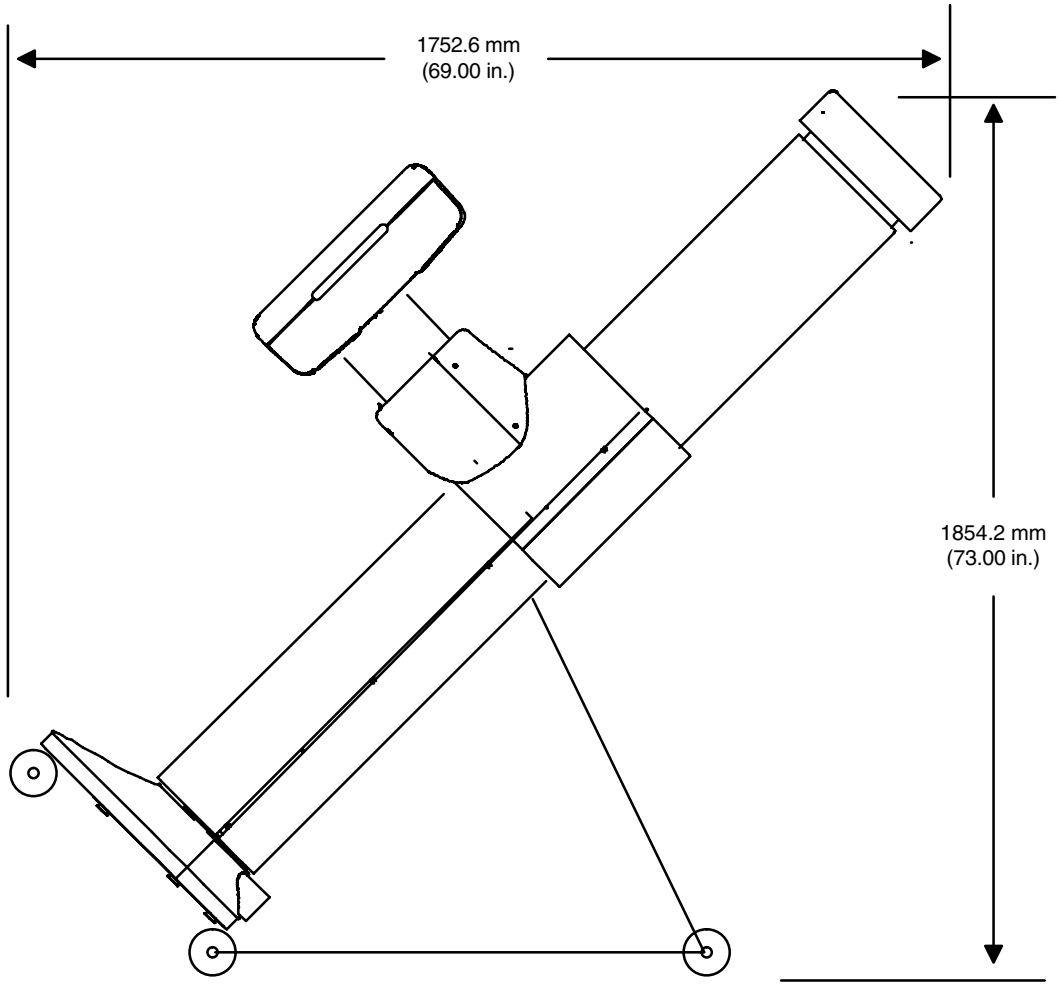


Figure 5-21 Wall Stand (Regular Arm Length) Site In-Transit Dimensions

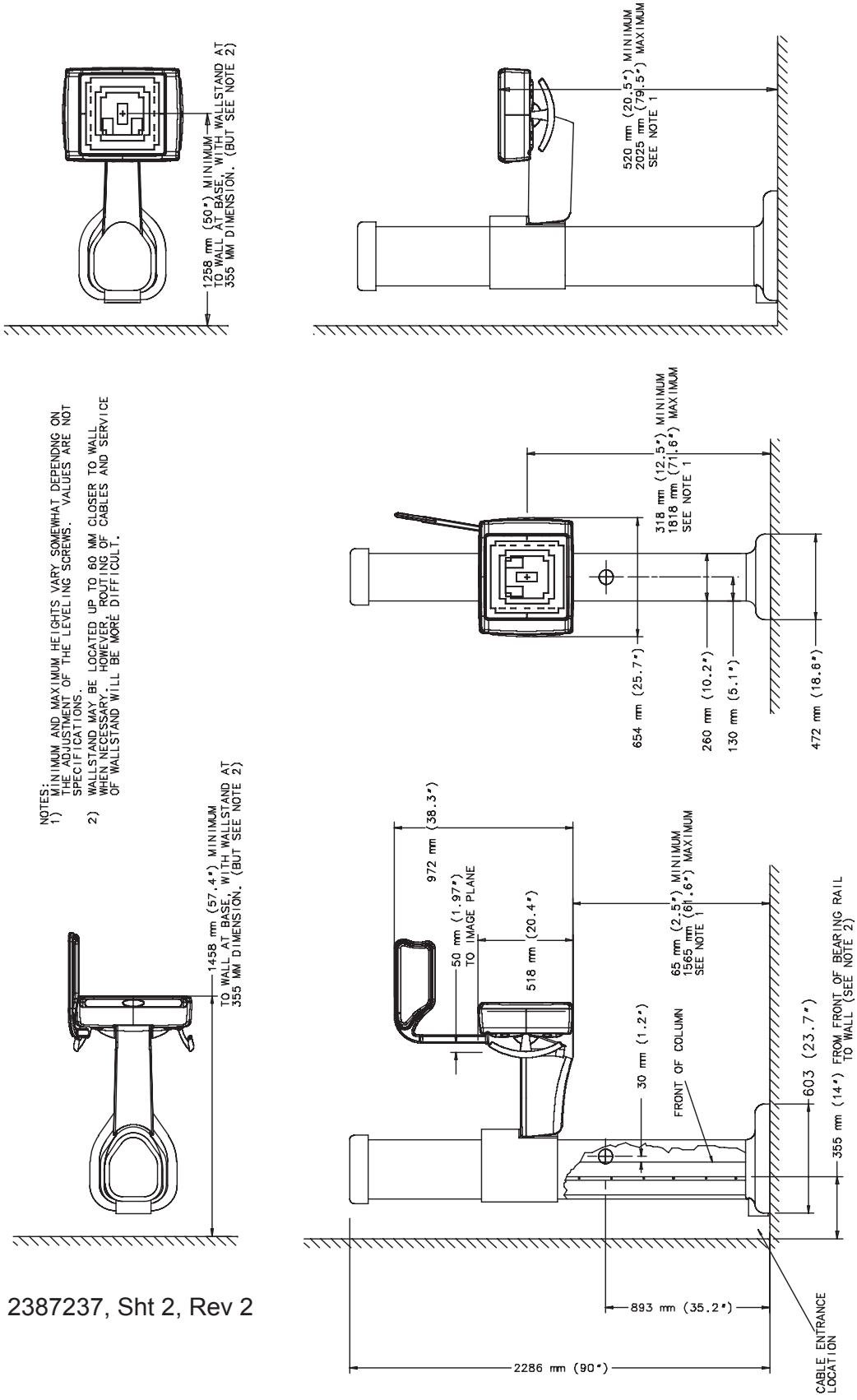


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Figure 5-22 Extended Wall Stand Dimensions (A)

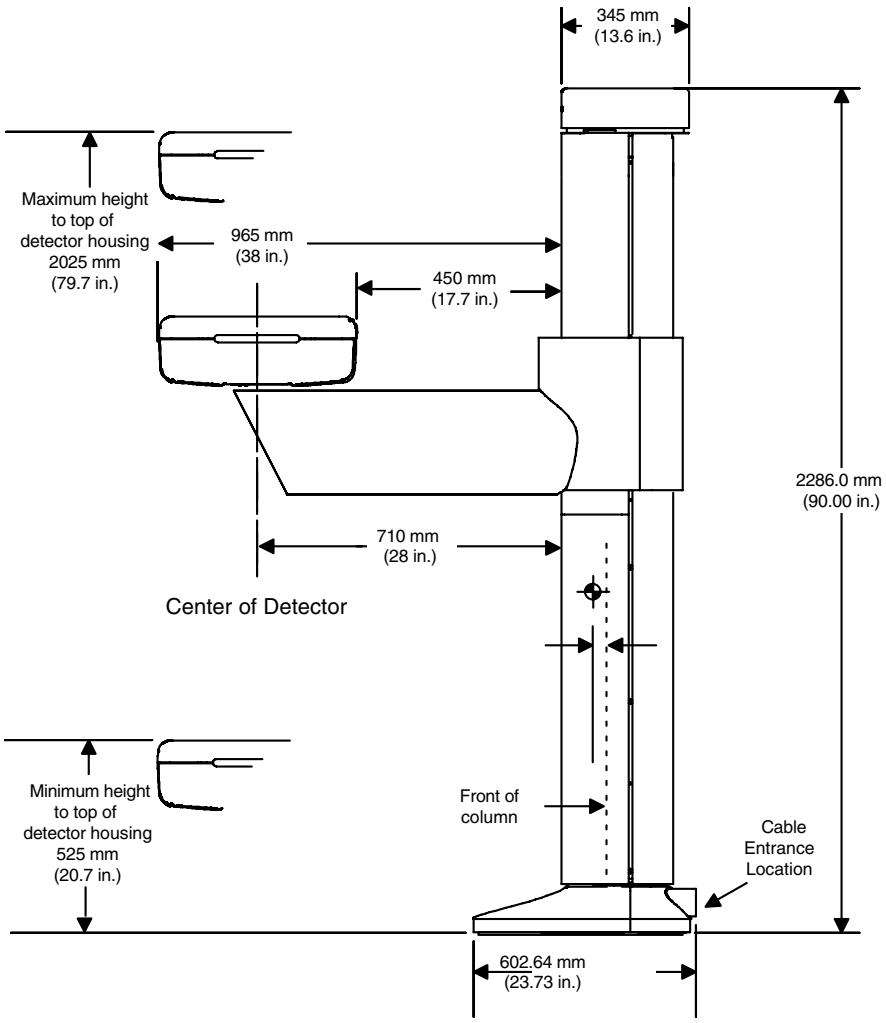


Figure 5-23 Extended Wall Stand Dimensions (B)

The “In-transit” position that is shown below should be used only to move the Tube Stand and Extended Wall Stand through low clearance areas. If the clearance height of an area is 2286.0 mm (90.0 in) or greater, then the Tube Stand and Extended Wall Stand may be moved in their “upright” positions.

Note: This drawing is not precise and is used only to show the approximate In-transit positioning for both stands.

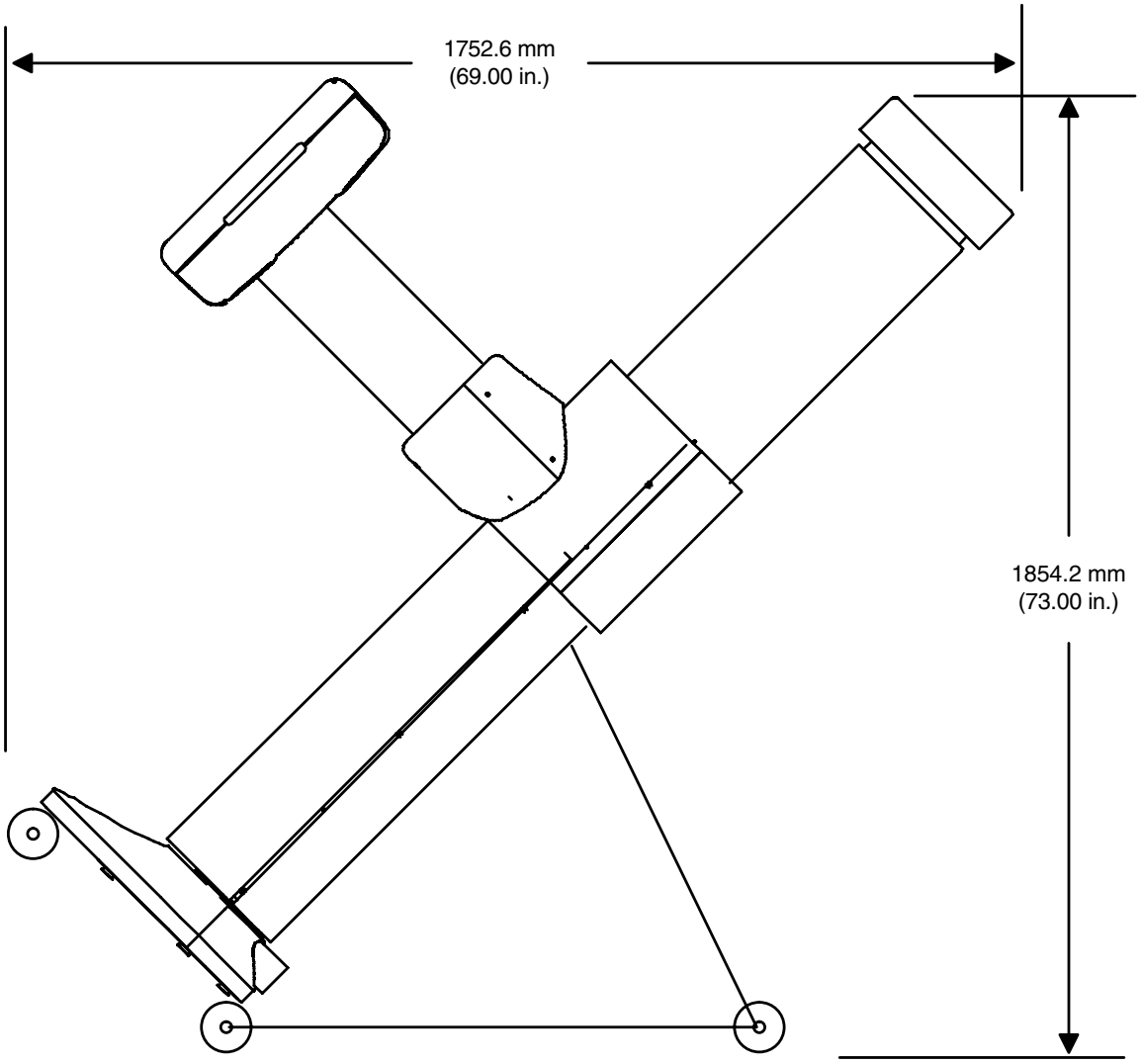


Figure 5-24 Extended Wall Stand Site In-Transit Dimensions

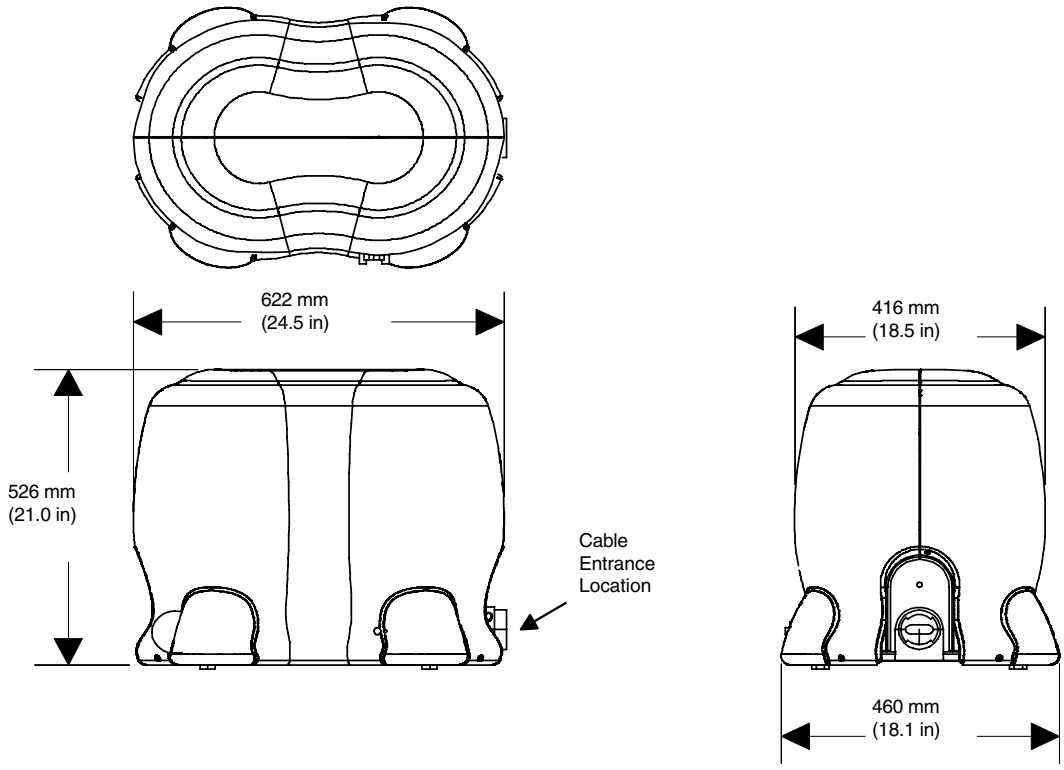


Figure 5-25 Detector Support Assembly (DSA) Dimensions

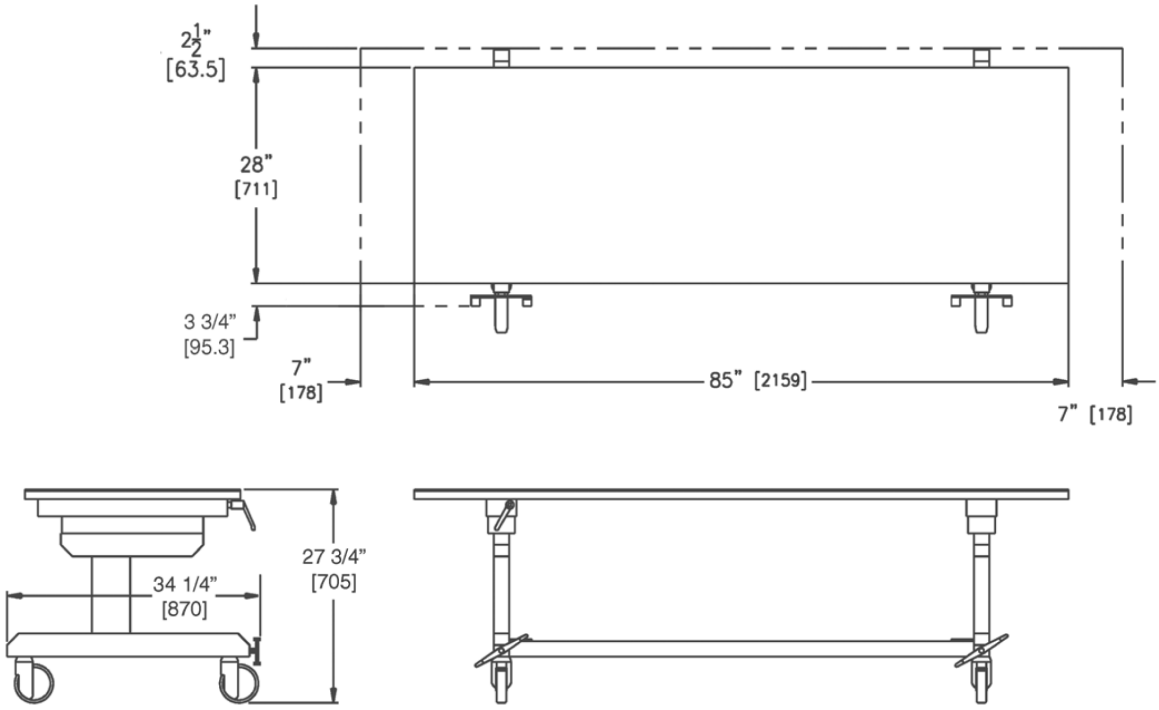


Figure 5-26 Revolution XR/d Stretcher Dimensions (optional)

Section 3.0 - Positioning and Mounting Equipment

3.1 Floor / Ceiling Loading and Recommended Mounting Methods

PRODUCT OR COMPONENT	WEIGHT	LOAD BEARING AREA ft^2 (m^2)	WEIGHT/OCCUPIED AREA kg/m^2 (lb./ft^2)	RECOMMENDED MOUNTING INFORMATION
Operator Console: PC Tower Monitor	 19-24 kg (42-54 lbs) 8.2 kg (18.1 lbs)		 NA NA	Shelf/Table mount (not anchored)
Table Assembly	344 kg (758 lbs) Max. Patient Load = 220 kg (485 lbs.)	0.85 m^2 (9.15 $ft.^2$)	405 kg/m^2 (82.8 lbs/$ft.^2$)	Floor mount Recommended: (4) M8 X 190 mm anchors (2400546, supplied)
Extended Wall Stand Stretcher (optional)	102 kg (225 lbs)		25.5 (56.25) point contact	Not anchored
Wall Stand	260 kg (572 lbs)			1/2 inch x 5 3/4 inch Rawl anchors to floor (supplied)
Extended Wall Stand	265 kg (584 lbs)			1/2 inch x 5 3/4 inch Rawl anchors to floor (supplied)
Detector Support Asm	30 kg (66.1 lbs)			Floor mount (not anchored) (located near Wall Stand base)
Stationary Rail (5.79 m)			NA	
2 Meter Bridge			NA	
3 Meter Bridge	64 kg (140 lbs)		NA	
2 Meter Cable Assembly	42 kg (93 lbs)		NA	
3 Meter Cable Assembly	49 kg (108 lbs)		NA	
Overhead Tube Support Includes: carriage, collimator, tube, and UIF	172 kg (377 lbs)		NA	
System Cabinet	529 kg (1166 lbs)	0.66 m^2 (7.1 $ft.^2$)	802 kg/m^2) (165 lbs/$ft.^2$ft)	Recommended: •3/8 in. or 10 mm (4) anchors to floor •5/16 in. or 8 mm (2) anchors to wall ***(Mounting hardware not provided by GEMS)***
Grid Holder Assembly	15.5 kg (34 lbs)		NA	Mount on wall

Table 5-5 Product Physical Characteristics (weight)

Chapter 6 - Room Layout

Section 1.0 - Radiation Production

Because X-ray equipment produces radiation, you may need to take special precautions or make special site modifications. The General Electric Company does not make recommendations regarding radiation protection. It is the purchasers responsibility to consult a radiation physicist for advisement on radiation protection in X-ray rooms.

Section 2.0 - Service Access

Allow appropriate space for service access of equipment. Consult component pre-installation directions for clearance information.

Section 3.0 - Clinical Access

Make sure that you plan the room with the following clinical access requirements:

- Provide easy access to the patient table. Stretchers and other mobile hospital equipment must reach the table quickly.
- Table cannot be installed at 90 degrees to the ceiling rails.
- Clinicians at the patient table must be able to communicate with assistants in the control area.
- Operators in the control area must have easy access to the Operator Console. However, position the controls (including handswitches) so the operator cannot take exposures while looking around or standing outside the control booth's lead glass window.
- Consult customer on the number and location of nonelectrical lines (air, oxygen, vacuum, water, etc.) in the radiographic room.
- Provide easy access to the Wall Stand.
- Ensure there is enough space between the table and the Wall Stand to perform standing ankles, knees, etc.
- For both the extended and the regular Wall Stands, ensure that the room layout is such that the tube can be centered on top of the horizontal detector.
- 3m bridge must be used with the installation of the extended Wall Stand.
- When installing an extended Wall Stand, the Wall Stand should be positioned directly in the center of the 3m bridge if full tube angling capabilities are to be achieved.
- When installing an extended Wall Stand, it may only be located in the head- or foot-position of the room.
- For the extended Wall Stand, the gooseneck may only be used in the 0 degree and 90 degree positions.

Note: The generally accepted practice is to load the patient laterally. In case of room layout designed for longitudinal patient loading, some modifications must be brought to the table.

Section 4.0 - Peripheral Equipment

Consult hospital personnel regarding additional space requirements for the following types of hospital equipment:

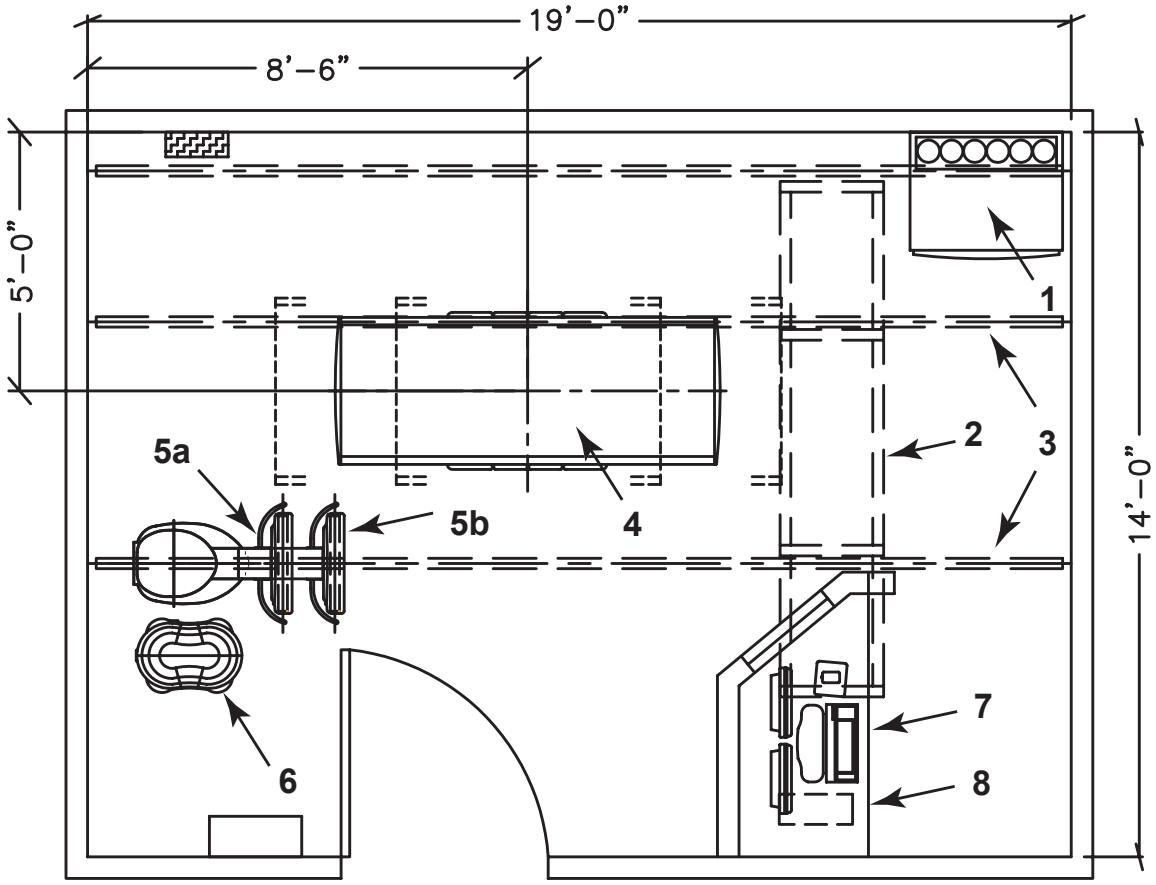
- Storage Cabinets
- Sinks
- Oxygen Stations
- Monitoring Equipment
- Crash Cart

Section 5.0 - Room Layout Drawings

See Figure 6-1 through Figure 6-5 for typical Revolution XR/d system room layouts.

Note: You will notice that a minimum of 2200 mm of clearance is shown, from the table frame to either end of the table, to allow the table top to be installed.

5.1 Table and Wall Stand Offset from Table Center Line



1. System Cabinet
2. OTS
3. Longitudinal Stationary Rails
4. Table

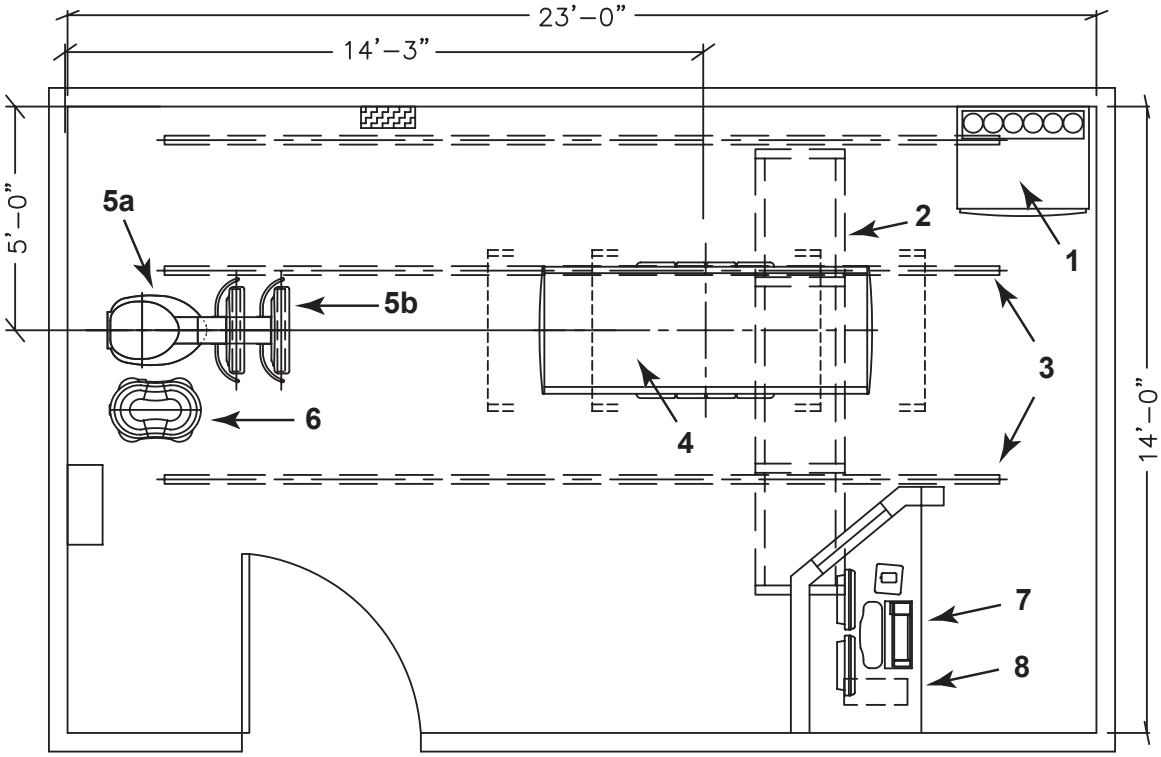
5a. Wall Stand

5b. Extended Wall Stand

6. DSA
7. Operator Console (keyboard, mouse, RCIM, monitors)
8. Operator Console Magic PC

Figure 6-1 Typical Room Layout 1

5.2 Table and Wall Stand Inline with Table Center Line



1. System Cabinet
2. OTS
3. Longitudinal Stationary Rails
4. Table

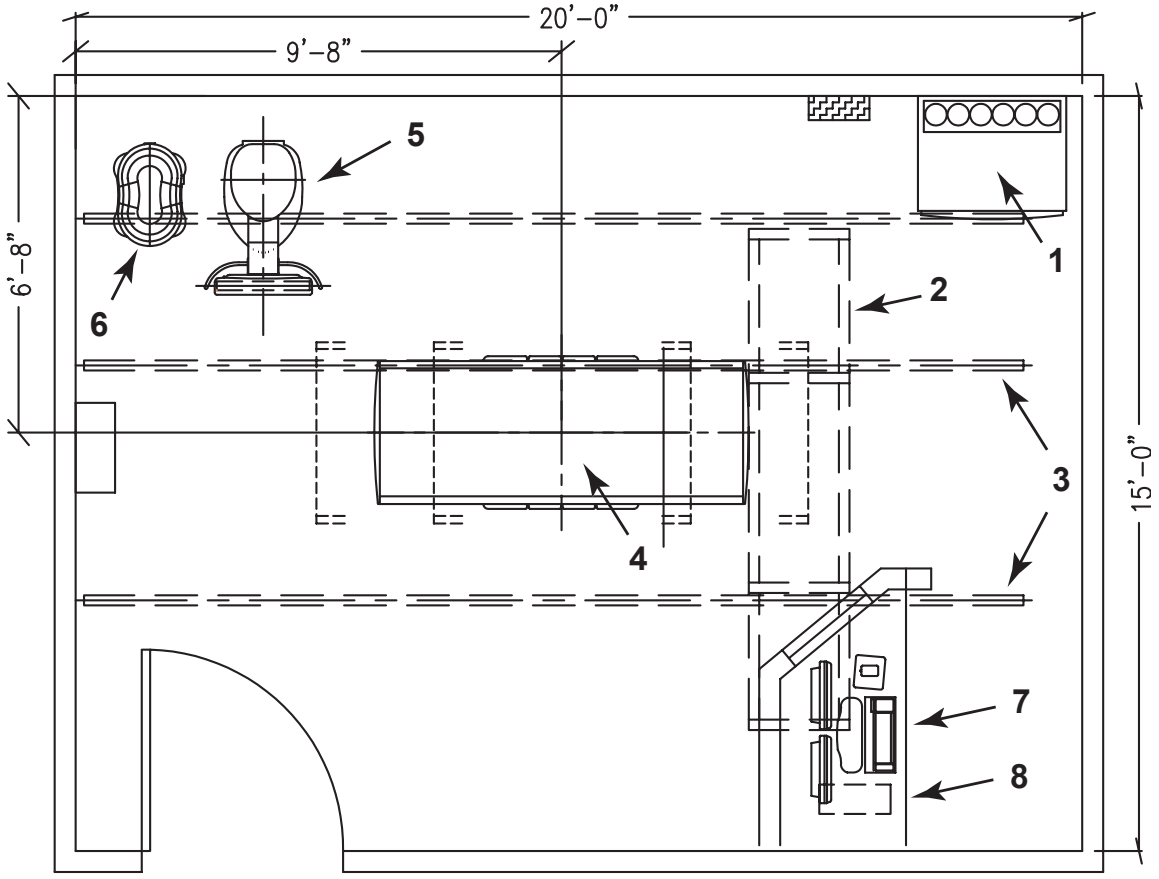
5a. Wall Stand
5b. Extended Wall Stand

6. DSA
7. Operator Console (keyboard, mouse, RCIM, monitors)
8. Operator Console Magic PC

Figure 6-2 Typical Room Layout 2

5.3 Table and Wall Stand Perpendicular to Table Center Line

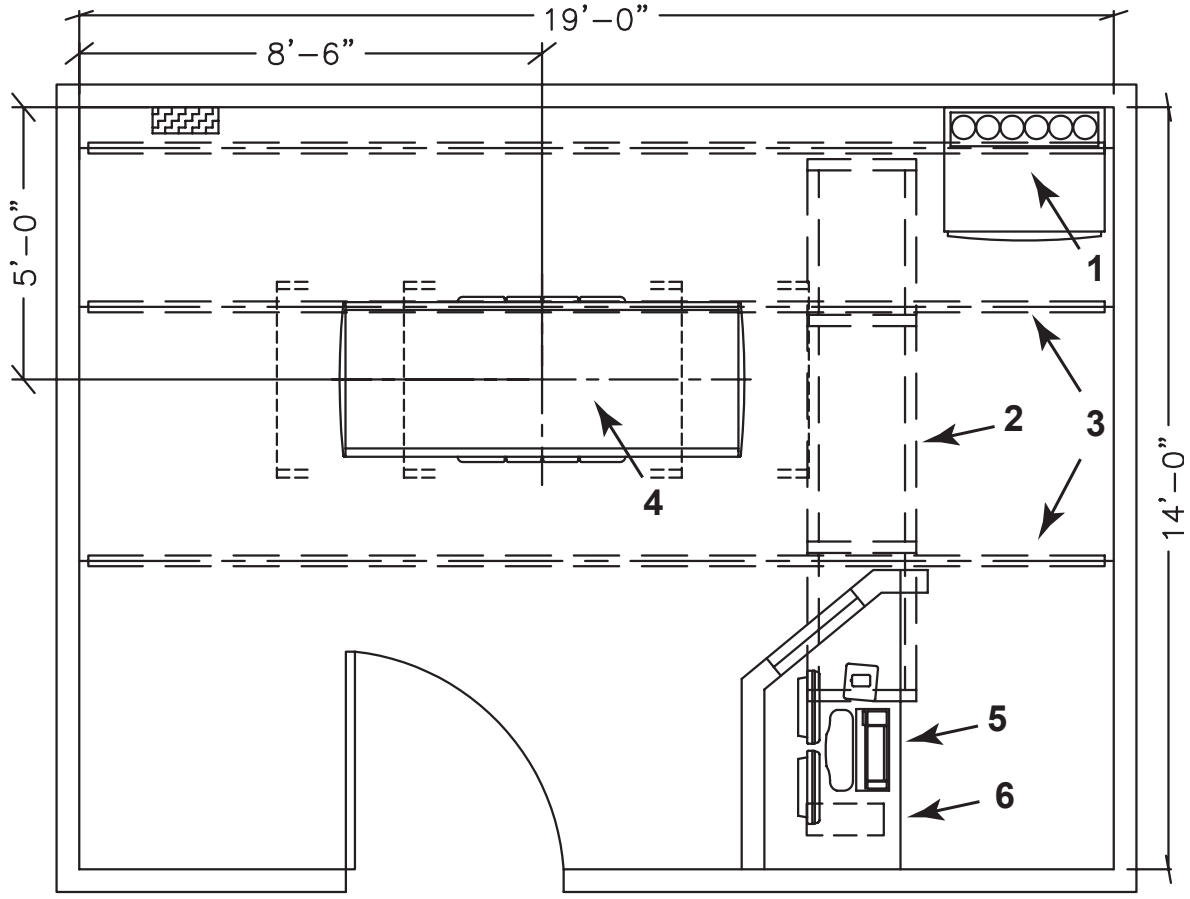
This layout cannot be used with Extended Wall Stand.



1. System Cabinet
2. OTS
3. Longitudinal Stationary Rails
4. Table
5. Wall Stand
6. DSA
7. Operator Console (keyboard, mouse, RCIM, monitors)
8. Operator Console Magic PC

Figure 6-3 Typical Room Layout 3

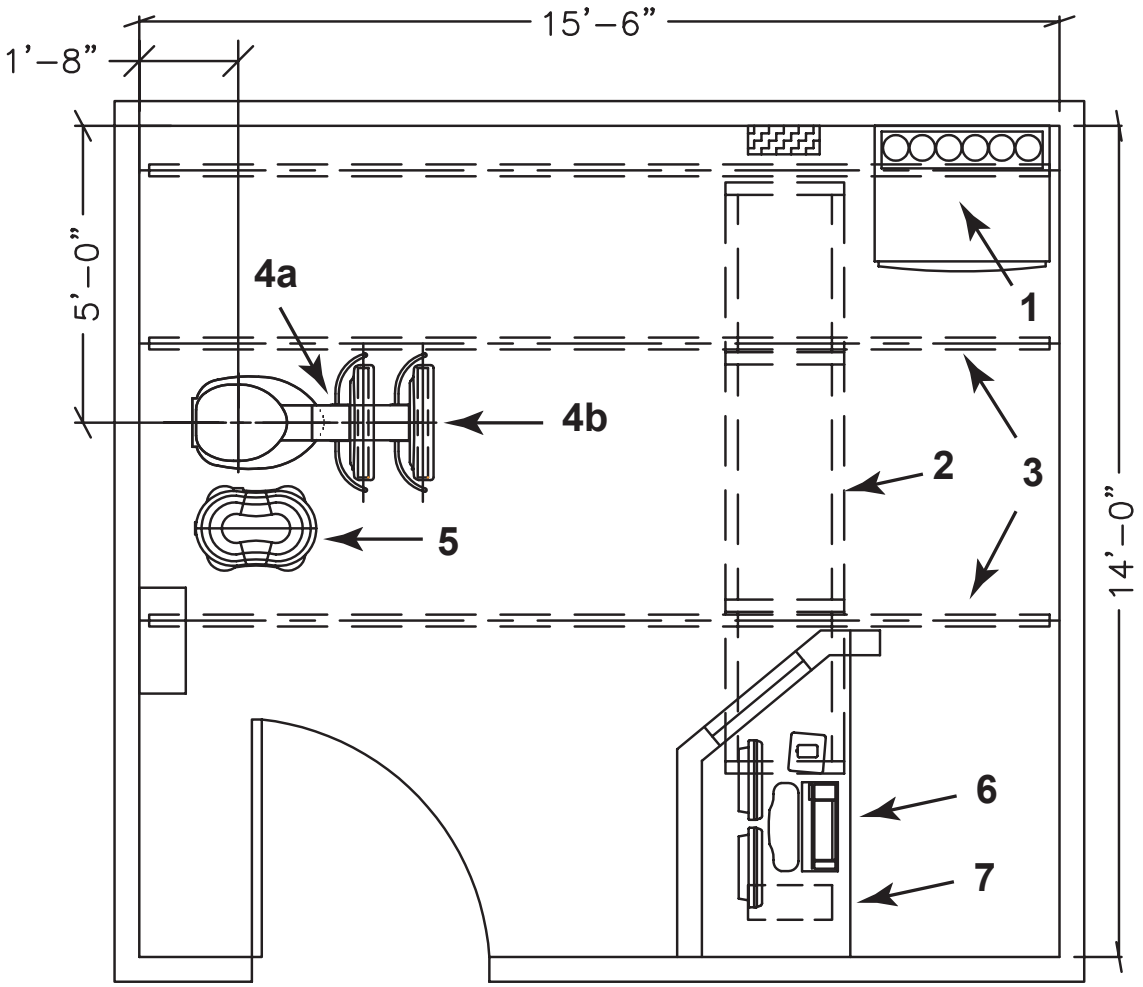
5.4 Typical Room Layout with Table Only



1. System Cabinet
2. OTS
3. Longitudinal Stationary Rails
4. Table
5. Operator Console (keyboard, mouse, RCIM, monitors)
6. Operator Console Magic PC

Figure 6-4 Typical Room Layout 4

5.5 Typical Room Layout with Wall Stand Only



1. System Cabinet
2. OTS
3. Longitudinal Stationary Rails

4a. Wall Stand

4b. Extended Wall Stand

5. DSA
6. Operator Console (keyboard, mouse, RCIM, monitors)
7. Operator Console Magic PC

Figure 6-5 Typical Room Layout 5

CEILING	
Recommended	2900 mm (114 in.)
Minimum	2745 mm (108 in.)

Table 6-1 Recommended and Minimum Room Height

FACTORS TO BE CONSIDERED	PERTINENT INFORMATION
Vertical operating range of OTS Suspension.	Generally, a 9'-6" (2.9 m) stationary rail height Is recommended. At 9'-6" (2.9 m). The OTS Suspension has these vertical limits (with Maxiray 100 tube unit): Max. Source-to-Image Distance - 85-15/16" (2.18 m) Min. Source-to-Image Distance - 26-15/16" (68.4 cm)
Distance between center lines of ceiling mounting bolt holes in stationary rails. The recommended spacing is 56 inches (1.43 meters) and should be used with all new structures. Holes have been drilled in the bridge rails to accommodate 48 inch (1.22 meter) and 50 inch (1.27 meter) spacing distances resulting from an existing structure.	56" (1.43m), or 50" (1.27m), or 48" (1.22m) Adjustment is provided to permit a +/- 1/4" (+/- 6 mm) variation of this span; however, this tolerance does not have any thing to do with degree of parallelism of the stationary rails, which must be held to +/-1/8" (+/- 3 mm)
Minimum overall room dimension, front-to-back, without modifying basic structure.	124-1/4" (3.2 m)
The recommended focal spot to table centerline distance for cross table radiography, rear to front, is 36 inches (91.4 cm)	50" (1.27 m) minimum required from longitudinal center line of table to center line of support rail for cable drape or concealment.
When using 3-1/2" x 3-1/2" (8.9 cm x 8.9 cm) posts (Cat. #B2054FH) and structural steel channel to sup port stationary rail.	Allow for width of channel between wall and stationary rail. Over all length must included stationary rail length plus columns at each end. Minimum recommended channel size is 2" x 8" x 11.5 Lb./Ft. (5.1 cm x 20.3 cm x 17.1 Kg/m).
Clearance for longitudinal shift top excursion. Allow clearance for cart work at head end of the table.	Preferably, there should be walking space between the end of the extended table top and any obstruction.
Clearance at end of stationary rail for RAD tube unit 90 degrees from front.	14" (35.6 cm) Clearance required between end of stationary rail and side wall. (Requirements decrease if cable covers are used).
Number of bridges on the same set of stationary rails.	Each bridge adds 25-1/2" (64.8 cm) to the overall length requirement. Also, each bumper used between these bridges will add 1" (25 mm).
Heat from overhead spotlights.	Caution should be taken to avoid excessive heat form over head spotlights. Damage can occur to ceiling-mounted components and wiring if high wattage bulbs are used. Recommend low wattage bulbs no higher than 75 watts and use dimmer controls. Do not mount lights directly above areas where ceiling mounted accessories will be parked.

Table 6-2 OTS Suspension Layout Factors

Chapter 7 - Planning Aids

Section 1.0 - Shipping Dimensions and Weights

1.1 Domestic Shipments

PRODUCT OR COMPONENT	SHIPPING DATA				
	SHIPPING DIMENSIONS (APPROX.)			SHIPPING WEIGHT (approx.)	SHIPPING METHOD
	LENGTH	WIDTH	HEIGHT		
Operator Console:					
PC	432 mm (17 in)	661 mm (26 in)	610 mm (24 in)	25.4 kg (56 lbs)	box
LCD Monitor (each)	610 mm (24.0 in)	610 mm (24.0 in)	533 mm (21.0 in)	25 kg (55 lbs)	box
Detector Asm	815 mm (32.0 in)	1020 mm (40.0 in)	560 mm (22.0 in)	68 kg (150 lbs)	padded box
Table Assembly	2400 mm (95 in)	1100 mm (44 in)	1300 mm (51 in)	575 kg (1268 lbs)	box / skid
Extended Wall Stand Stretcher (optional)	2312 mm (91 in)	1042 mm (41 in)	940 mm (37 in)	164 kg (360 lbs)	box / skid
Stationary Rail (5.79m) each rail	5.92 m (233 in)	178 mm (7 in)	76 mm (3 in)	68 kg (150 lbs)	box
2 Meter Bridge	2210 mm (87 in)	737 mm (29 in)	178 mm (7 in)	63 kg (138 lbs)	box
3 Meter Bridge	3099 mm (122 in)	737 mm (29 in)	178 mm (7 in)	84 kg (185 lbs)	box
2 Meter Cable Assembly	1422 mm (56 in)	813 mm (32 in)	432 mm (17 in)	95 kg (210 lbs)	box/skid
3 Meter Cable Assembly	1829 mm (72 in)	813 mm (32 in)	432 mm (17 in)	109 kg (240 lbs)	box/skid
Overhead Tube Support incl.: carriage, collimator, tube, and UIF	1092 mm (43 in)	940 mm (37 in)	1207 mm (47.5 in)	223kg (490 lbs)	crate/skid
System Cabinet	1321 mm (53 in)	864 mm (34 in)	1981 mm (78 in)	529 kg (1166 lbs)	dolly - See Figure 5-9
Wall Stand	2440 mm (96.0 in)	940 mm (37.0 in)	1270 mm (50.0 in)	380 kg (836 lbs)	box / skid
Extended Wall Stand	2440 mm (96.0 in)	940 mm (37.0 in)	1935 mm (76.2 in)	409 kg (901.7 lbs)	box / skid
Grid Holder	635 mm (25.0 in)	305 mm (12.0 in)	686 mm (27.0 in)	16.4 kg (36 lbs)	box

Table 7-1 DOMESTIC SHIPPING DATA

1.2 International Shipments

PRODUCT OR COMPONENT	SHIPPING DATA				
	SHIPPING DIMENSIONS (APPROX.)			SHIPPING WEIGHT (approx.)	SHIPPING METHOD
	LENGTH	WIDTH	HEIGHT		
Grid Holder Assembly DSA Covers QAP Phantom & Rack Tube Cover Kit Detector Coolant Loopback Kit RCIM Wall Stand Cables System MIS Cables Wall Stand Covers XT Suspension Hardware	1370 mm (54 in)	1370 mm (54 in)	1600 mm (63 in)	213 kg (470 lbs)	box/skid
3m Bridge and Associated Hardware	3180 mm (125 in)	840 mm (33 in)	510 mm (20 in)	165 kg (364 lbs)	box
Stationary Rail (5.79m) (set of 2 rails)	6120 mm (241 in)	380 mm (15 in)	230 mm (9 in)	118 kg (260lbs)	box
System Cabinet	1240 mm (49 in)	1090 mm (43 in)	2180 mm (86 in)	464 kg (1024 lbs)	dolly - See Figure 5-9
System Cabinet Hardware	1300 mm (51 in)	860 mm (34 in)	610 mm (24 in)	151 kg (332 lbs)	box
3 Meter Cable Assembly	1450 mm (57 in)	860 mm (34 in)	460 mm (18 in)	96 kg (212lbs)	box/skid
Wall Stand	2440 mm (96 in)	990 mm (39 in)	1300 mm (51 in)	404 kg (890 lbs)	box /skid
Extended Wall Stand	2439 mm (96 in)	965 mm (38 in)	1677 mm (66 in)	452 kg (996 lbs)	skid
Chiller	1020 mm (40 in)	910 mm (36 in)	860 mm (34 in)	86 kg (190 lbs)	box
Detector	1220 mm (48 in)	1070 mm (40 in)	790 mm (31 in)	89 kg (196 lbs)	box
LCD Monitor (pair)	1170 (46 in)	910 mm (36 in)	970 mm (38 in)	99 kg (218 lbs)	box
Ion Chamber PC Workstation OTS UIF Collimator	1170 mm (46 in)	910 mm (36 in)	970 mm (38 in)	99kg (218 lbs)	box
OTS Assembly Grid Assembly Software BarCode Reader Long/Lat Feedback Kit OTS Cover Kit Safety Trip Switch Wall Stand Vert. Motor. Kit XT Extension Kit Service Manuals	1090 mm (43 in)	1020 mm (40 in)	1570 mm (62 in)	229kg (504 lbs)	box/crate/ skid
Table Assembly	2413 mm (95 in)	1118 mm (44 in)	1372 mm (54 in)	625 kg (1378 lbs)	box/crate/ skid
Extended Wall Stand Stretcher (optional)					
2 Meter Bridge	3175 mm (125 in)	838 mm (33 in)	915 mm (36 in)	261 kg (574 lbs)	box
2 Meter Cable Assembly	1448 mm (57 in)	838 mm (33 in)	457 mm (18 in)	91 kg (200 lbs)	box

Table 7-2 INTERNATIONAL SHIPPING DATA

Section 2.0 - Installation Tools and Materials Required

2.1 Tools and Materials Checklist

The following tools and materials are needed for installation, but are not shipped with the product:	**Completed**
Assorted sizes of drywall “toggle” bolts (1/4”, 3/8”, and 1/2”)	☐
Floor anchors (Hilti™ HSL or equivalent, 3/8” x 2"; 1/4” x 2"; 3/4” x 5"; and 3/4” x4”)	☐
Plastic wall anchors	☐
Assorted hardware for termination of electrical connections (solder-less ring lug terminals and butt splices, AWG 2-18)	☐
Tie wraps, electrical tape and wire markers	☐
Tags for labelling incomplete work in accordance to OSHA and regulatory requirements	☐
Tag and lock-out equipment	☐
Assorted 12-point sockets (SAE and metric), drives, wrenches and torque wrench (Nm and ft.-lbs)	☐
Electric and hammer drill. Assorted masonry and high-speed bits in both metric and SAE sizes	☐
Assorted sizes of tongue and grove pliers, hammers, hex wrenches (metric and SAE), screw drivers and metal files	☐
Assorted sizes of wire cutters and strippers, ratchet and standard crimpers (AWG 0 and upwards), and a 75 watt soldering iron	☐
Heat and electrical tape	☐
Chalk line, plumb bob and assorted alignment tools (including squares, torpedo and 6-foot levels)	☐
Movers dollies, ladders, shop vacuum and push-broom	☐
Hacksaw and Sawzall™	☐
(2) #46-156940G1, XT Hoist assemblies (one set to be distributed to each district by headquarters)	☐
(2) 6 foot (1.8 m) Step ladders	☐
(2) Steel measuring tapes, 12 foot (3.5 m) and 50 foot (15 m)	☐
(1) #46-316872G1, Water Level kit [(ELECTRA/LEVEL by Zircon International) or equivalent capable of +/- 1/8 inches (3.2 mm) over 30 ft. (9.14 m)] with 30 foot (9.14 m) of 3/8 inches (9.5 mm) I.D. Plastic tubing (#46-136324P10).	☐
(1) Carpenter's level, 4 foot (61 cm) long	☐
Movers dollies, ladders, shop vacuum and push-broom	☐

Section 3.0 - Preparing the Delivery Route

1.) Step One – Sketch out the Route

Begin preparing Route Survey by sketching the area of the hospital or clinic which will receive the equipment. Include all areas on the delivery route from outside of building to destination. See sample sketch below.

Reference Numbers Numbers in circles refer to the Route Survey data. The Route Survey is a form on which site data is listed (step 2).

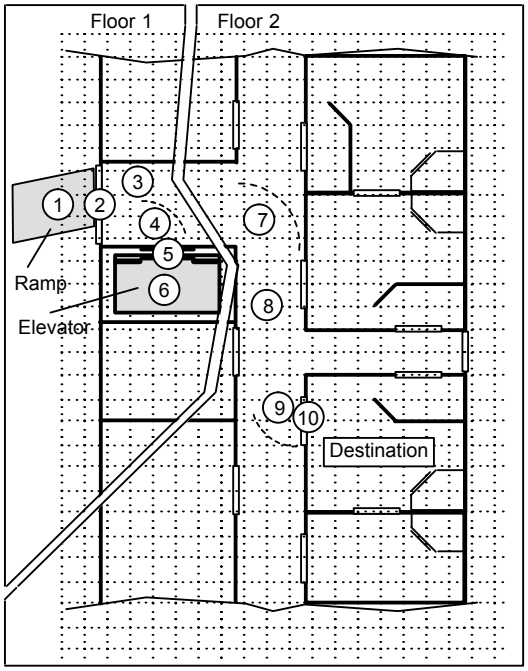


Figure 7-1 Sample Route

2.) Step Two – Survey the Route

Record all loading capacities, corridor widths, door openings, turning radii, flooring materials, elevator sizes, obstructions and so on for reference.

3.) Step Three – Check the Route

Verify equipment can actually be transported via the route determined in step 1.

Section 4.0 - Pre-Installation Checklist

Delivery Date: _____ Sales Person: _____

Customer: _____ FDO No.: _____ Room # _____

Equipment: _____

Physical Requirements of Site	Completed
1.) Room size adequate for intended equipment configuration?	☐
2.) Floor and ceiling is strong enough for intended equipment and mounting methods approved – seismic regulatory codes considered?	☐
3.) Delivery route accommodates all intended equipment?	☐
4.) Radiation physicist consulted?	☐
5.) Necessary alterations made to circumvent obstructions?	☐
6.) Modifications to room finished?	☐
7.) Supports, platforms, suspensions, ceiling materials been provided?	☐
8.) Support structures installed for floor, ceiling, and wall mounted equipment?	☐
9.) Ceiling supports leveled?	☐
10.) Has floor been modified for cable ducts?	☐
11.) If drop-in ceiling is not used, is access panel provided (3 x 2 ft. minimum)?	☐
12.) Electrical service in place – at the ratings specified in pre-installation documentation?	☐
13.) Power available to operate power tools?	☐
14.) All non-electrical lines (air, water, oxygen, vacuum) installed?	☐

Interconnections	Completed
1.) Signal cable, power and grounding plans produced?	☐
2.) Necessary interconnection hardware, such as junction boxes, conduit or raceways, and fittings provided?	☐
3.) Interconnection hardware installed?	☐
4.) Flexible, stranded wire provided for System input power connection?	☐
5.) System “feeder” power cables pulled and sufficient length available at disconnect box for connections?	☐
6.) Interconnecting cables continuity checked, and labeled?	☐
7.) All high voltage cable lengths verified?	☐

Interconnections	Completed
8.) Interface information available for equipment?	☐

General	Completed
1.) Ceiling, walls, and floor clear of all obstructions?	☐
2.) Walls finished?	☐
3.) Finished floor installed?	☐
4.) Room lights installed?	☐
5.) Dust-creating work completed?	☐
6.) Old equipment within room removed?	☐
7.) Component positions clearly marked on floor?	☐
8.) Space available to store equipment?	☐
9.) Lock on door, or locked room available?	☐
10.) Room IP Addresses for DICOM and Broadband identified?	☐
11.) Broadband connection provided for InSite connection? OR If Broadband connection will not be used, is dedicated inbound “dialup” phone line provided for InSite connection?	☐
12.) Voice phone line connection provided?	☐

Comments: _____

_____

_____

_____

_____

Inspection Date(s): _____

Chapter 8 - System Cable Information

Section 1.0 Introduction

The following information is provided as an aid to make the physical installation of system cables easy and efficient. In the tables that follow, the physical characteristics of each cable and its associated connectors is provided. Thus making it easier to plan cable paths and clearances in advance. Physical characteristics are given for each available cable length. Review cable lengths carefully and choose lengths appropriate for your installation prior to the equipment arriving, to avoid unnecessary installation delays.

Remember, it's up to you to make sure that all cables are routed and connected in accordance to all regulatory laws that may apply.

Section 2.0
Cable Information

2.1 Cable Lengths and Characteristics

Run Number	MIS Number	Description	Short Cables (Standard)			Long Cables (Optional)			Voltage Rating
			Part Number	Total Length	Usable Length	Part Number	Total Length	Usable Length	
1 - System Cabinet to Table	11632A	Table CANopen	2407432-35	15	12.5	2407432-36	20	17.5	300
	11750A	Table Ion Chamber	2407432	15	12.5	2407432-9	20	17.5	300
	11620A	Table Detector Fiber (Non Electrical)	2272863-9	15	12.5	2272863-26	21	18.5	N/A
	11753A	Table Detector PS 120VAC	2407432-4	15	12.5	2407432-12	20	17.5	300
	11618A	Table Detector PS Control	2272863-8	15	12.5	2272863-25	21	18.5	150
	11617A	Table Conditioner Control RS232	2272863-12	15	12.5	2272863-29	21	18.5	300
	11754A	Table Emergency Stop RT Line	2407432-5	15	12.5	2407432-13	21	18.5	300
	11751A	Table Power 220VAC	2407432-2	15	12.5	2407432-10	20	17.5	600
	11752A	Table Ground	2407432-3	15	12.5	2407432-11	20	17.5	600
2- System Cabinet to Wallstand	11644A	WallStand CANopen	2407432-37	15	12	2407432-38	20	17	300
	11759A	WallStand Ion Chamber	2407432-32	15	12	2407432-31	20	17	300
	11756A	WallStand Power 120VAC	2407432-7	15	12	2407432-15	20	17	600
	11637A	WallStand Detector Fiber (Non Electrical)	2272863-36	15	12	2272863-43	24	21	N/A
	11757A	WallStand Ground	2407432-8	15	12	2407432-16	20	17	600
2A - System Cabinet to Conditioner	11755A	WallStand Conditioner 120VAC	2407432-6	15	13	2407432-14	20	18	600
	11638A	WallStand Conditioner Control RS232	2272863-37	15	13	2272863-44	21	19	300
	11639A	WallStand Detector PS Communication	227286-38	15	13	2272863-45	21	19	150
3 - System Cabinet to OTS	11629A	OTS CAN and CANopen	2268602-7	15	10	2268602-8	20	15	300
	11708A	OTS Power	2322137-2	15	10	2322137	20	15	600
	11710A	OTS Tube 1 Stator, Fan & Pressure Switch (2 cables in bundled)	2322137-4	21.4	16.4	2322137-3	24.4	19.4	
	11690A	OTS Tube 1 Cathode	2308046-3	20	15	2308046-7	24	19	
	11691A	OTS Tube 1 Anode	2308046-4	20	15	2308046-8	24	19	
	11711A	OTS Ground	2322137-6	15	10	2322137-5	20	15	600

Table 8-1 Cable Lengths and Characteristics

Run Number	MIS Number	Description	Short Cables (Standard)			Long Cables (Optional)			Voltage Rating
			Part Number	Total Length	Usable Length	Part Number	Total Length	Usable Length	
4 - System Cabinet to Console Wallbox	11760A	Generator (Jedi) CAN	2407432-17	20	18	na	na	na	300
	11761A	System CAN Open	2407432-18	20	18	na	na	na	300
	11763A	Control Room Power	2407432-20	20	18	na	na	na	600
	11764A	Ground	2407432-21	20	18	na	na	na	600
	11762A	User I/O	2407432-19	20	18	na	na	na	300
4A - System Cabinet to System Computer (via Wallbox)	11765A	Table Ethernet from IDC	2407432-22	25	22.5	na	na	na	300
	11766A	WallStand Ethernet from IDC	2407432-23	25	22.5	na	na	na	300
	11776A	Ground	2407432-41	18		2407432-42	23	na	
5 - Wallbox to System Computer or Control Components	11590A	External Ethernet							
	11767A	Generator (Jedi) CAN	2407432-24	3	3	na	na	na	300
	11768A	System CAN Open	2407432-25	3	3	na	na	na	300
	11770A	120VAC from PDU	2407432-27	3	3	na	na	na	300
	11769A	RCIM	2407432-26	3	3	na	na	na	300

Table 8-1 Cable Lengths and Characteristics (Continued)

2.2 Cable Terminations (End A)

Run Number	MIS Number	Cable End A Subsystem (Color)	Cable Connector End A Type	Cable End A Termination	Cable Connector Dimensions						
					Width (mm)	Width (in)	Height (mm)	Height (in)	Dia. (mm)	Dia. (in)	Area (sq. in)
1 - System Cabinet to Table	11632A	System Cabinet (orange)	9 Pin Sub-D (M)	A25 J106	34.04	1.34	16.06	0.63	9.75	0.38	0.113
	11750A		9 Pin Sub-D (M)	A25 J81	33.71	1.32	16.08	0.63	7.76	0.3	0.971
	11620A		SC Duplex	A25 J102	23.2	0.91	10.31	0.41	2@2.22	0.17	0.023
	11753A		3 Pin Mate 'n Lok	A25 J4	28.42	1.11	14.79	0.58	8.14	0.32	0.08
	11618A		26 Pin HD Sub-D (M)	A25 J104	42.26	1.66	16.42	0.65	9.01	0.35	0.096
	11617A		9 Pin Sub-D (M)	A25 J103	33.53	1.32	16.3	0.64	7.55	0.3	0.071
	11754A		9 Pin Sub-D (F)	A25 J110	33.6	1.32	16.04	0.63	7.54	0.31	0.075
	11751A		3 Pin Mate 'n Lok	A25 J3	28.61	1.12	14.79	0.58	8.06	0.31	0.075
	11752A		1/4” Ring Terminal		11.62		0.46		6.39	0.25	0.053
2 - System Cabinet to Wallstand	11644A	System Cabinet (orange)	9 Pin Sub-D (M)	A25 J206	34.04	1.34	16.06	0.63	9.75	0.38	0.113
	11759A		9 Pin Sub-D (M)	A25 J14 (TBL/WS) or A25 J81 (WS-only)	33.65	1.32	16.4	0.64	7.92	0.31	0.075
	11756A		3 Pin Mate 'n Lok	A25 J1	28.61	1.12	14.79	0.58	8.06	0.31	0.075
	11637A		SC Duplex	A25 J202 (TBL/WS) or A25 J102 (WS-only)	23.2	0.91	10.31	0.41	2@2.22	0.18	0.025
	11757A		1/4" Ring Terminal		11.62		0.46		6.39	0.25	0.049
2A - System Cabinet to Conditioner	11755A	System Cabinet (orange)	3 Pin Mate 'n Lok	A25 J2	28.61	1.12	14.79	0.58	8.06	0.32	0.08
	11638A		9 Pin Sub-D (M)	A25 J203 (TBL/WS) or A25 J103 (WS-only)	33.53	1.32	16.3	0.64	7.55	0.29	0.066
	11639A		26 Pin HD Sub-D (M)	A25 J204 (TBL/WS) or A25 J104 (WS-only)	42.26	1.66	16.42	0.64	9.01	0.35	0.096
3 - System Cabinet to OTS	11629A	System Cabinet (orange)	9 Pin Sub-D (M)	A25 J41	34.04	1.34	16.06	0.58	9.75	0.38	0.113
	11708A		3 Pin Mate 'n Lok	A25 J5	28.61	1.12	14.79	0.64	8.06	0.32	0.08
	11710A		12 Pin (Matrix) Mate 'n Lok	A25 J42	34.79	1.37	27.31	0.64	14.13/ 6.56	0.81	0.515
	11690A		HV “Candle Stick”		----	----	----	----	62	2.44	4.7
	11691A		HV “Candle Stick”		----	----	----	----	62	2.44	4.7
	11711A		1/4” Ring Terminal		11.62		0.46		6.39	0.25	0.049

Table 8-2 Cable Terminations (End A)

Run Number	MIS Number	Cable End A Subsystem (Color)	Cable Connector End A Type	Cable End A Termination	Cable Connector Dimensions						
					Width (mm)	Width (in)	Height (mm)	Height (in)	Dia. (mm)	Dia. (in)	Area (sq. in)
4 - System Cabinet to Console Wallbox	11760A	System Cabinet (orange))	9 Pin Sub-D (M)	A25 J108	----		----		----		
	11761A		9 Pin Sub-D (M)	A25 J107	----		----		----		
	11763A		Mate 'n Lok	A25 J6	----		----		----		
	11764A		1/4” Ring Terminal		----		----		----		
	11762A		50 Pin Sub-D (M)	A25 J109	----		----		----		
4A - System Cabinet to System Computer (via Wallbox)	11765A	System Cabinet (orange)	RJ 45	IDC1	----		----		----		
	11766A		RJ 45	IDC2(TBL/WS) or IDC1(WS only)	----		----		----		
	11776A		1/4” Ring Terminal		----		----		----		
5 - Wallbox to System Computer or Control Components	11590A	Hospital Network	RJ 45		11.68	0.46	8.04	0.32	5.63	0.22	
	11767A	Wallbox (no color))	9 Pin Sub-D (M)	Generator (Jedi) CAN	33.46	1.32	16.87	0.66	10.26	0.4	
	11768A		9 Pin Sub-D (M)	CAN	33.84	1.33	17.02	0.67	10.2	0.4	
	11770A		NEMA 5-15 P	Power	25.23	1	19.02	0.75	9.3	0.36	
	11769A		50 Pin Sub-D (M)	RCIM	50.75	1.99	12.25	0.48	8.98	0.35	

Table 8-2 Cable Terminations (End A) (Continued)

2.3 Cable Terminations (End B)

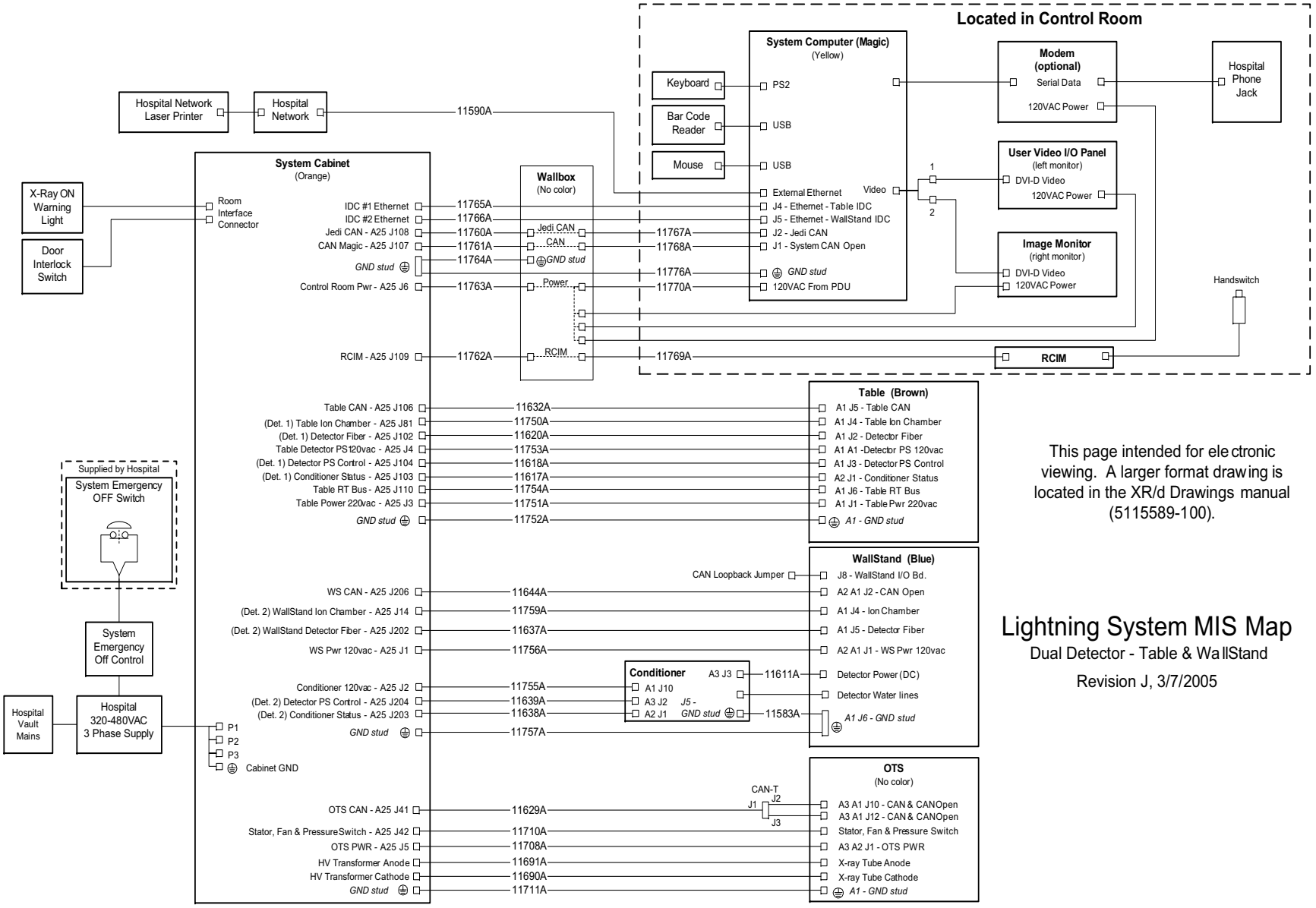
Run Number	MIS Number	Cable End B Subsystem (Color)	Cable Connector End B Type	Cable End B Termination	Cable Connector Dimensions						
					Width (mm)	Width (in)	Height (mm)	Height (in)	Dia. (mm)	Dia. (in)	Area (sq. in)
1 - System Cabinet to Table	11632A	Table (brown)	9 Pin Sub-D (F)	A1 J5	33.97	1.34	16.18	0.64	9.66	0.38	0.113
	11750A		9 Pin Sub-D (F)	A1 J4	33.35	1.31	16.28	0.64	7.77	0.31	0.075
	11620A		SC Duplex	A1 J2	22.51	0.89	9.52	0.37	2@2.42	0.17	0.023
	11753A		IEC 32D	A1 A1	28.88	1.31	20.84	0.82	8.8	0.35	0.096
	11618A		26 Pin HD Sub-D (F)	A1 J3	42.05	1.66	16.44	0.64	9.27	0.36	0.102
	11617A		9 Pin Sub-D (M)	A2 J1	33.29	1.31	16.27	0.64	7.77	0.31	0.075
	11754A		9 Pin Sub-D (F)	A1 J6	33.16	1.3	16.19	0.68	8.09	0.32	0.08
	11751A		6 Pin (Matrix) Mate 'n Lok	A1 J1	3@10.08	3@0.4	3@4.94	3@0.2	8.92	0.35	0.096
	11752A		1/4” Ring Terminal	A1	12.29		0.48		6.51	0.26	0.053
2 - System Cabinet to Wallstand	11644A	Wallstand (blue)	9 Pin Sub-D (F)	A2 A1 J2	33.28	1.31	16.6	0.65	9.15	0.36	0.102
	11759A		9 Pin Sub-D (F)	A1 J4	33.68	1.32	16.69	0.65	7.58	0.29	0.066
	11756A		IEC 32D	A2 A1 J1	29.05	1.14	20.98	0.83	8	0.31	0.075
	11637A		SC Duplex	A1 J5	23.15	0.91	10.33	0.41	2@2.10	0.17	0.023
	11757A		1/4” Ring Terminal	A1 J6	12.29		0.48		6.51	0.26	0.053
2A - System Cabinet to Conditioner	11755A	Wallstand Conditioner (blue)	IEC 320	A1 J10	29.05	1.14	21.07	0.83	8.32	0.37	0.108
	11638A		9 Pin Sub-D (M)	A2 J1	33.02	1.3	16.34	0.64	8.14	0.32	0.08
	11639A		26 Pin HD Sub-D (F)	A3 J2	41.84	1.65	16.5	0.65	9.16	0.36	0.102
3 - System Cabinet to OTS	11629A	OTS (no color)	9 Pin Sub-D (F)	OTS CAN-T J1	33.49	1.31	16.65	0.65	8.99	0.35	0.096
	11708A		3 Pin Mate 'n Lok	A3 A2 J1	----		----		----		0.08
	11710A		Spade & Ring Connectors *(2 cables bundled together)*						14.05/6.37	0.81	0.515
	11690A		HV Candle Stick		62.79			2.47	16.82	0.67	0.353
	11691A		HV Candle Stick		62.79			2.47	16.82	0.67	0.353
	11711A		#10 Ring Terminal	A1	12.29		0.48		6.51	0.25	0.049

Table 8-3 Cable Terminations (End B)

Run Number	MIS Number	Cable End B Subsystem (Color)	Cable Connector End B Type	Cable End B Termination	Cable Connector Dimensions						
					Width (mm)	Width (in)	Height (mm)	Height (in)	Dia. (mm)	Dia. (in)	Area (sq. in)
4 - System Cabinet to Console Wallbox	11760A	Wallbox (no color)	9 Pin Sub-D (F)	Generator (Jedi) CAN	33.49	1.31	16.65	0.65	8.99	0.35	0.096
	11761A		9 Pin Sub-D (F)	CAN	33.97	1.33	16.18	0.64	9.66	0.38	0.113
	11763A		Receptacle	Power	3@10.08	3@0.4	3@4.94	3@0.2	8.92	0.35	0.096
	11764A		#10 Ring Terminal	GND	12.29		0.48		6.51	0.26	0.053
	11762A		50 Pin Sub-D (F)	RCIM	69.79	2.74	19.54	0.79	8.49	0.33	0.086
4A - System Cabinet to System Computer (via Wallbox)	11765A	System Computer (yellow)	RJ 45	System Computer J4	11.68	0.46	8.04	0.32	5.63	0.22	0.038
	11766A		RJ 45	System Computer J5	11.68	0.46	8.04	0.32	5.63	0.22	0.038
	11776A		#10 Ring Terminal	System Computer Ground Stud	Area 12.29		Area 0.48		6.51	0.26	0.053
5 - Wallbox to System Computer or Control Component	11590A	System Computer (yellow)	RJ 45		----		----		----		
	11767A		9 Pin Sub-D (F)	System Computer J2	----		----		----		
	11768A		9 Pin Sub-D (F)	System Computer J1	----		----		----		
	11770A		IEC 320	System Computer Power	----		----		----		
	11769A	RCIM (yellow)	SCSI Connector		----		----		----		

Table 8-3 Cable Terminations (End B) (Continued)

Section 3.0 - System Master Interconnect Schematic (MIS)



This page intended for electronic viewing. A larger format drawing is located in the XR/d Drawings manual (5115589-100).

Lightning System MIS Map

Dual Detector - Table & WallStand

Revision J, 3/7/2005

Figure 8-1 System MIS Map - Table and Wall Stand, Rev J, Sheet 1

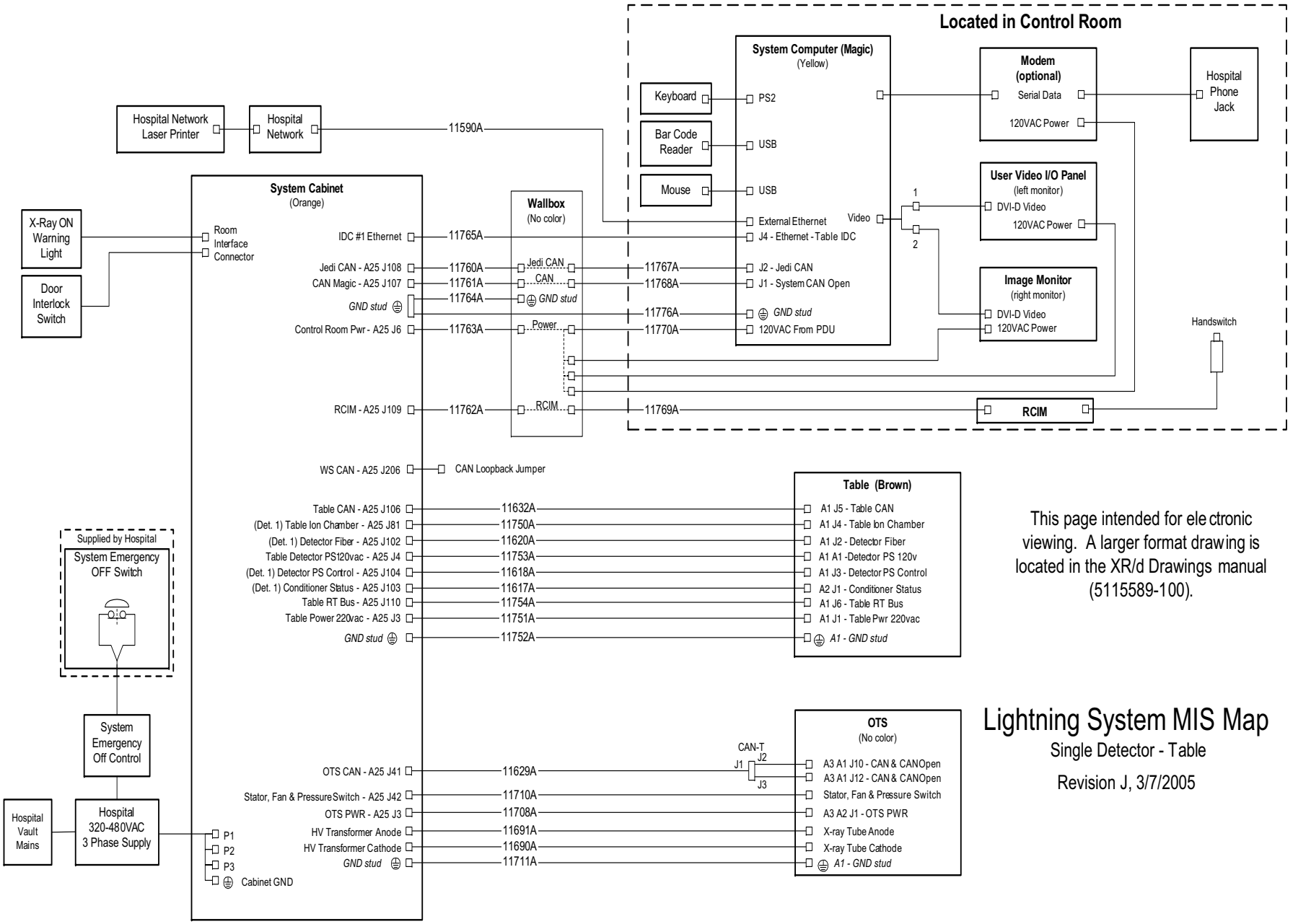
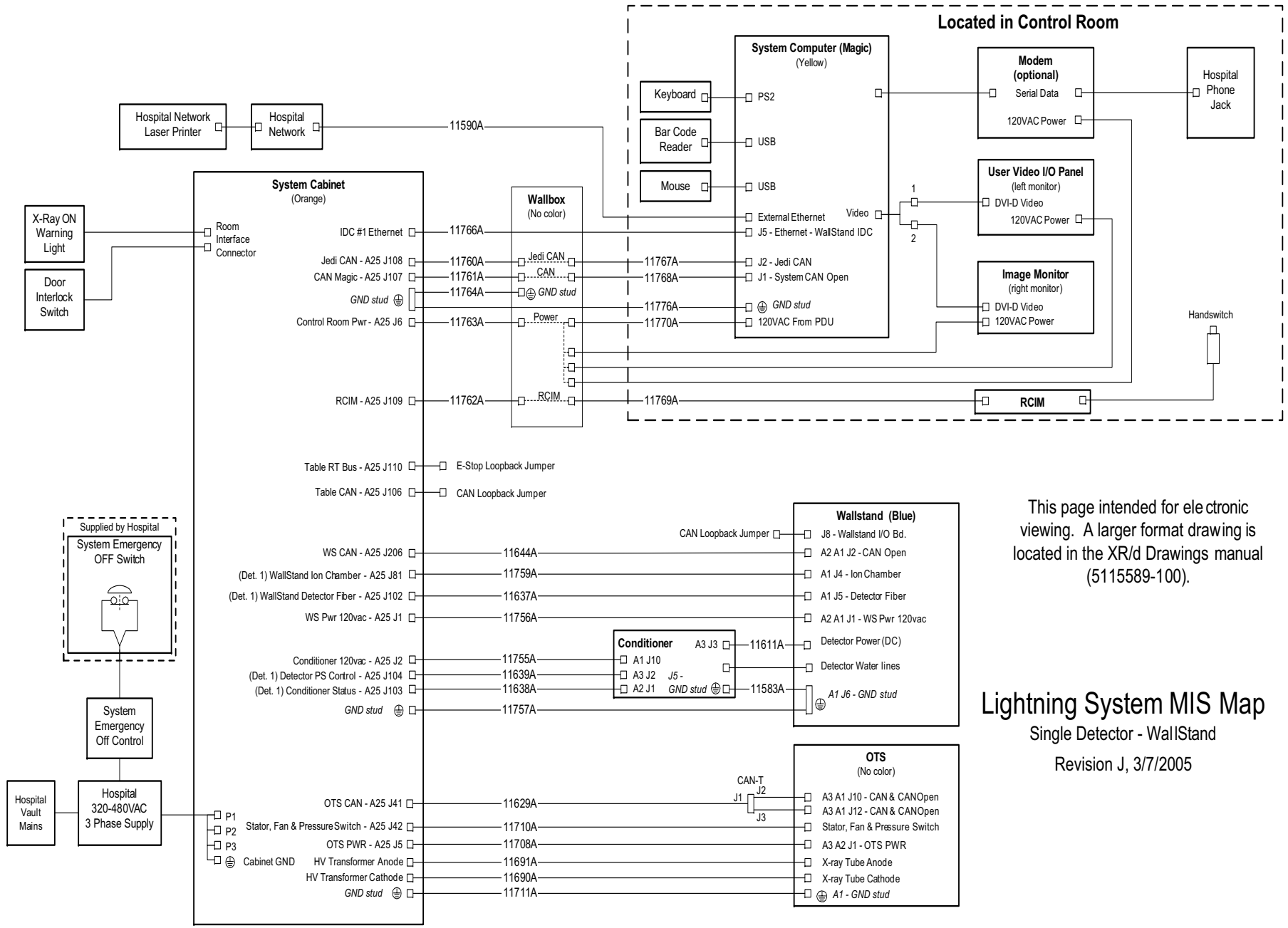


Figure 8-2 System MIS Map - Table Only, Rev J, Sheet 2



This page intended for electronic viewing. A larger format drawing is located in the XR/d Drawings manual (5115589-100).

Lightning System MIS Map

Single Detector - WallStand

Revision J, 3/7/2005

Figure 8-3 System MIS Map - Wall Stand Only, Rev J, Sheet 3

Chapter 9 - Seismic Calculations

Section 1.0 Overview

Seismic requirements are determined and specified by the hospital architect of record and may require approval by the specific state or country agency.

Seismic attachment hardware shown on seismic calculations may differ from hardware supplied with system. Any additional hardware that is required will be the responsibility of the institution and/or their contractor. Contact your Installation Specialist with any related questions.

Seismic calculations included in this chapter are per California Building Code.

Section 2.0 Calculations

Seismic calculations are included for the following:

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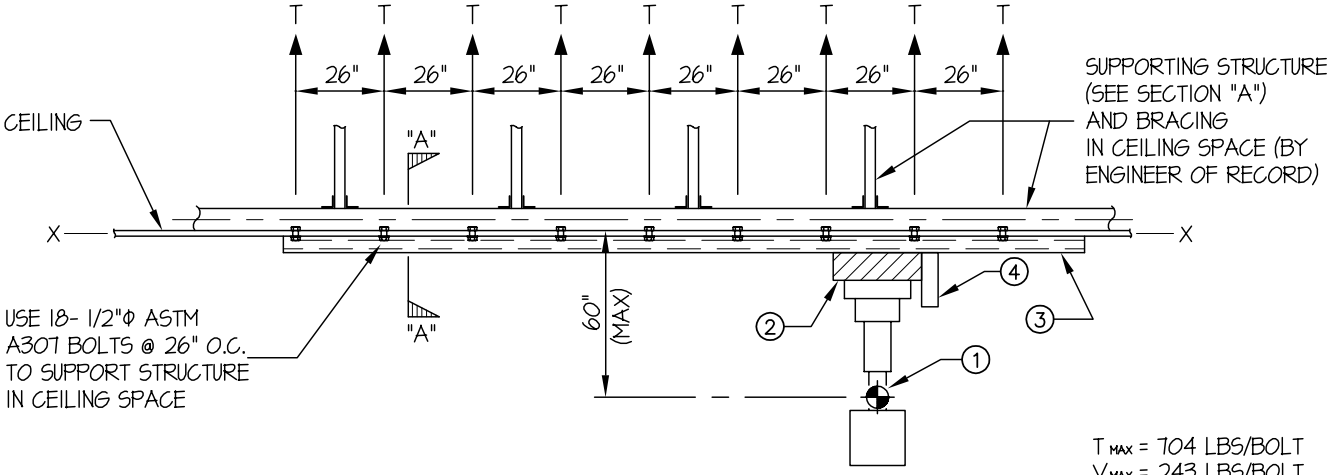
2.1 Overhead Tube Suspension (OTS) - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

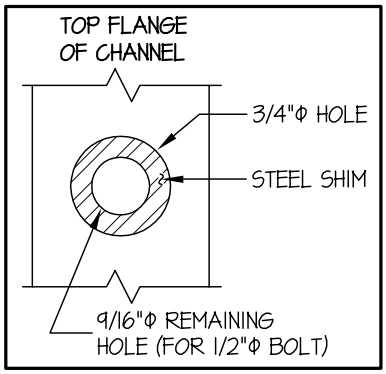
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Overhead Tube Suspension (OTS)	DATE 2/22/05	OF 2 SHEETS

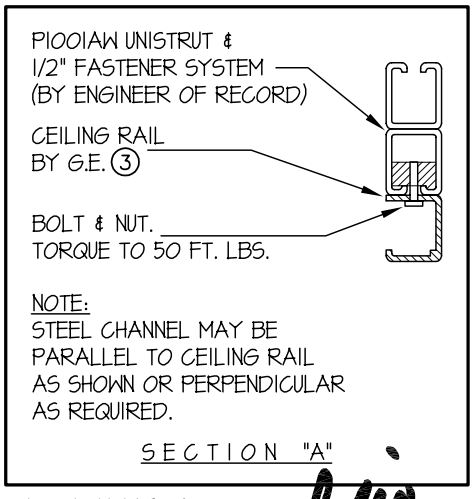
SEISMIC ANCHORAGE CALCULATION



ELEVATION

DESCRIPTION	WEIGHT (LBS)
① COLUMN & TUBE SUPPORT	377
② BRIDGE CARRIAGE DOLLY	140
③ LONGITUDINAL RAILS	3.6 LBS./FT.
④ LATERAL CABLE CONCEALMENT	108

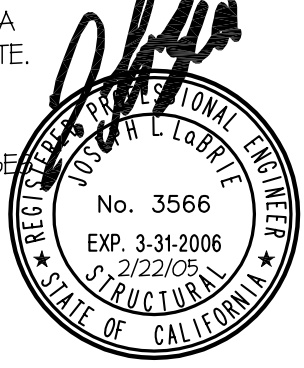




SECTION "A"

NOTES:

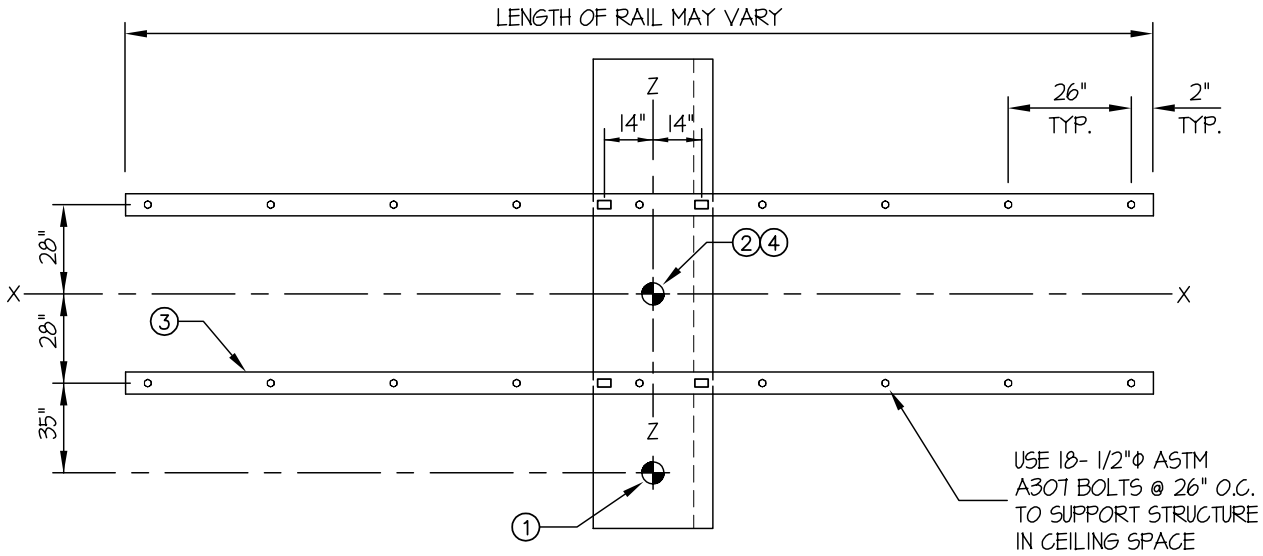
1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.94W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.



Overhead Tube Suspension (OTS) - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0505	
Overhead Tube Suspension (OTS)	DATE 2/22/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION



PLAN AT CEILING RAILS

LOADS:

(1) COLUMN & TUBE SUPPORT
WEIGHT = 377 LBS
HORIZ. FORCE = 354 LBS
VERT. FORCE = 118 LBS

(3) LONGITUDINAL RAILS
WEIGHT = 3.6 LBS/FT
HORIZ. FORCE = 3.4 LBS/FT
VERT. FORCE = 1.1 LBS/FT

(2) & (4) BRIDGE CARRIAGE DOLLY & LATERAL CABLE CONCEALMENT
WEIGHT = 248 LBS
HORIZ. FORCE = 233 LBS
VERT. FORCE = 78 LBS

BOLT FORCES:

TENSION (T)

$$T_1 = \frac{(377\# + 118\#)91"}{2\ \text{WHEELS}(56")} + \frac{354\#(60")}{2\ \text{WHEELS}(56")} = 592\ \text{LBS}$$

$$T_2\ \&\ T_4 = \frac{248\# + 78\#}{4\ \text{WHEELS}} + \frac{233\#(10")}{2\ \text{WHEELS}(56")} = 102\ \text{LBS}$$

$$T_3 = \frac{(3.6\#/FT + 1.1\#/FT)(26")}{12"/\ FT.} = 10\ \text{LBS}$$

$$T = T_1 + (T_2\ \&\ T_4) + T_3 = 704\ \text{LBS/BOLT (MAX)}$$

SHEAR (V)

$$V = \frac{354\#}{2\ \text{BOLTS}} + \frac{233\#}{4\ \text{BOLTS}} + \frac{3.4\#(26")}{12} = 243\ \text{LBS/BOLT (MAX)}$$

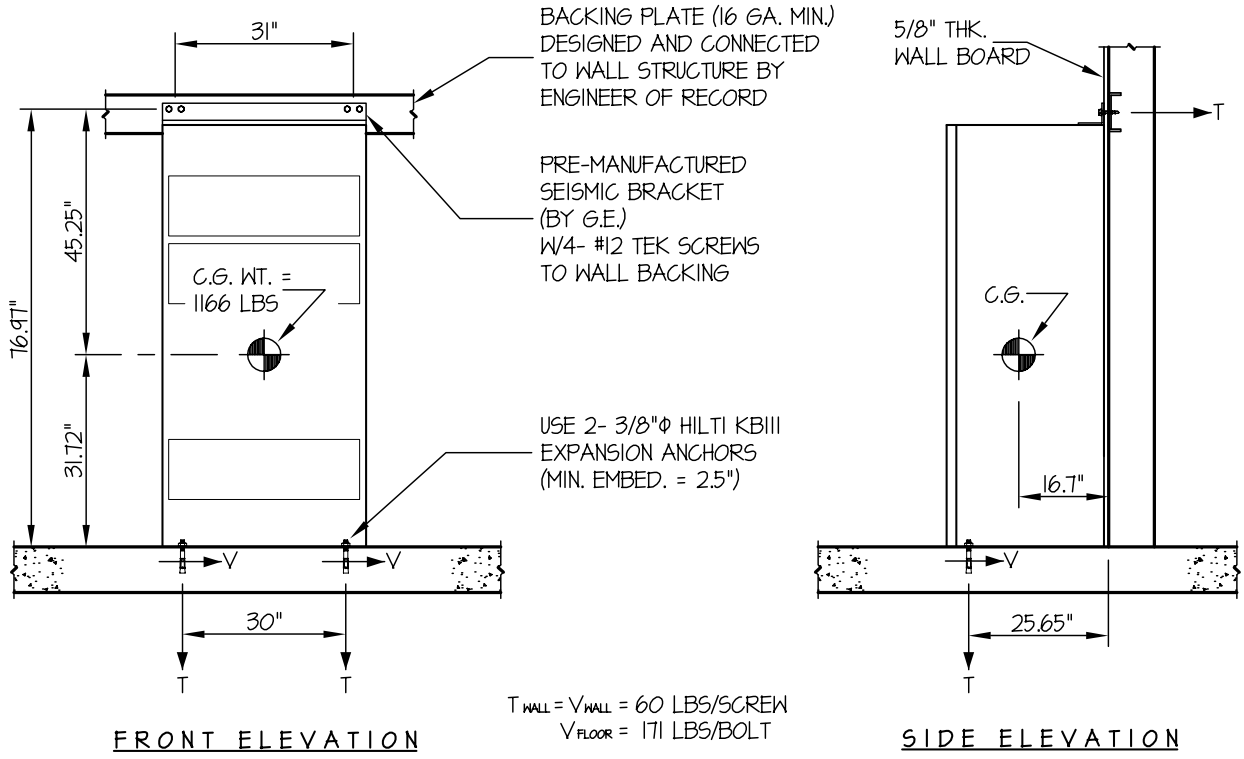
COMBINED STRESSES ARE O.K. BY INSPECTION

2.2 System Cabinet (SKL) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
System Cabinet (SKL)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



$T_{WALL} = V_{WALL}$ = 60 LBS/SCREW
V_{FLOOR} = 171 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 1166 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 583 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 194 LBS

#12 SM SCREWS TO 16 GAGE, 50 KSI
$T_{ALLOW.}$ = 225 LBS
$V_{ALLOW.}$ = 570 LBS

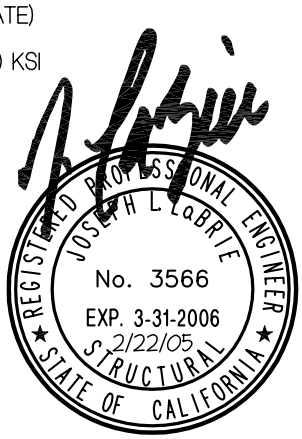
BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{583\#(31.72'')}{4 \text{ SCREWS } (76.97'')} = 60 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{583\#(45.25'')}{2 \text{ BOLTS } (76.97'')} = 171 \text{ LBS/BOLT (MAX)}$$

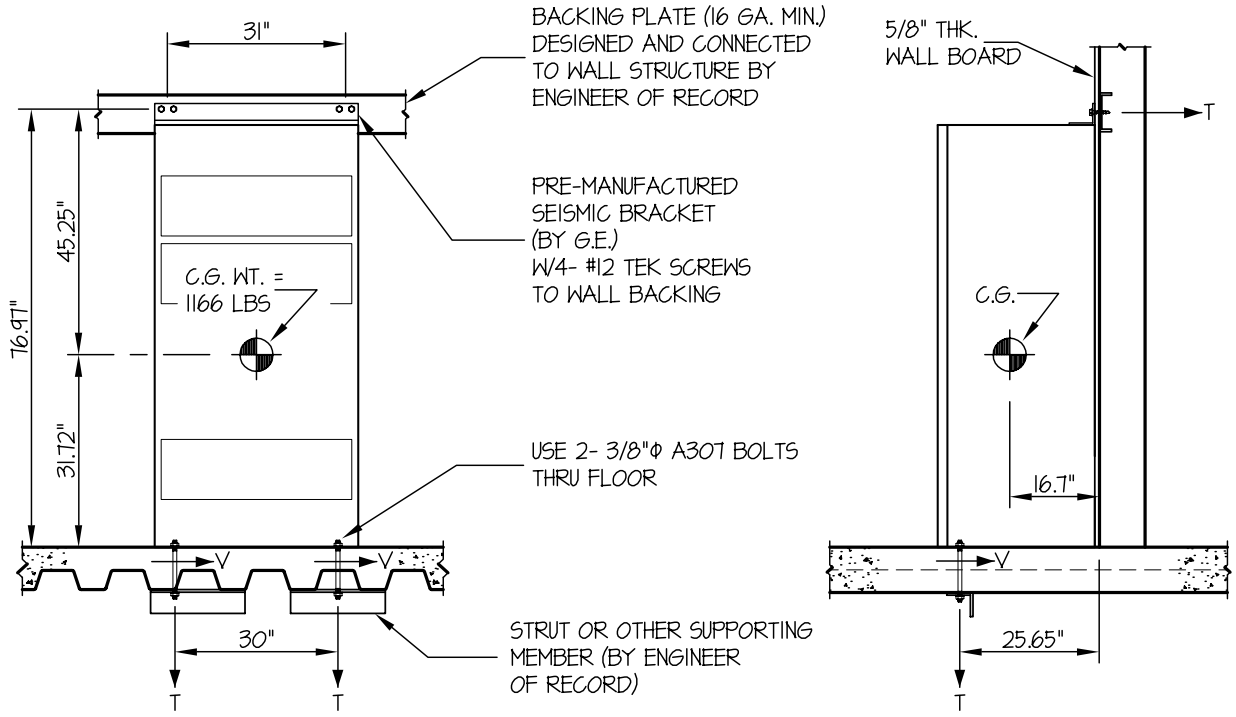


NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN. (BY ENGINEER OF RECORD FOR THE BUILDING)

2.3 System Cabinet (SKL) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
System Cabinet (SKL)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION — UPPER FLOOR



FRONT ELEVATION

$T_{WALL} = V_{WALL}$ = 113 LBS/SCREW
V_{FLOOR} = 322 LBS/BOLT

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 1166 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 1096 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 365 LBS

#12 SM SCREWS TO 16 GAGE, 50 KSI
$T_{ALLOW.}$ = 225 LBS
$V_{ALLOW.}$ = 570 LBS

BOLT FORCES:

TENSION (T)

$$T_{WALL} = V_{WALL} = \frac{1096\#(31.72'')}{4 \text{ SCREWS } (76.97'')} = 113 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{FLOOR} = \frac{1096\#(45.25'')}{2 \text{ BOLTS } (76.97'')} = 322 \text{ LBS/BOLT (MAX)}$$

REGISTERED PROFESSIONAL ENGINEER
JOSEPH L. LaBRIE
No. 3566
EXP. 3-31-2006
2/22/05
STRUCTURAL
STATE OF CALIFORNIA

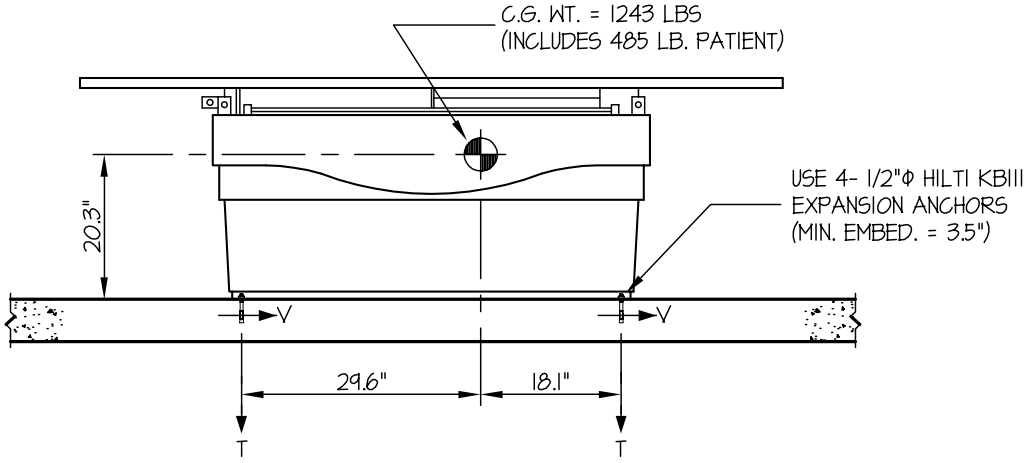
NOTE:
PROVIDE FLOOR AND WALL STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN.
(BY ENGINEER OF RECORD FOR THE BUILDING)

2.4 Table (TBL) - Slab on Grade - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Table (TBL)	DATE 2/22/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



T_{MAX} = 92 LBS/BOLT
V_{MAX} = 189 LBS/BOLT

ELEVATION

NOTES:

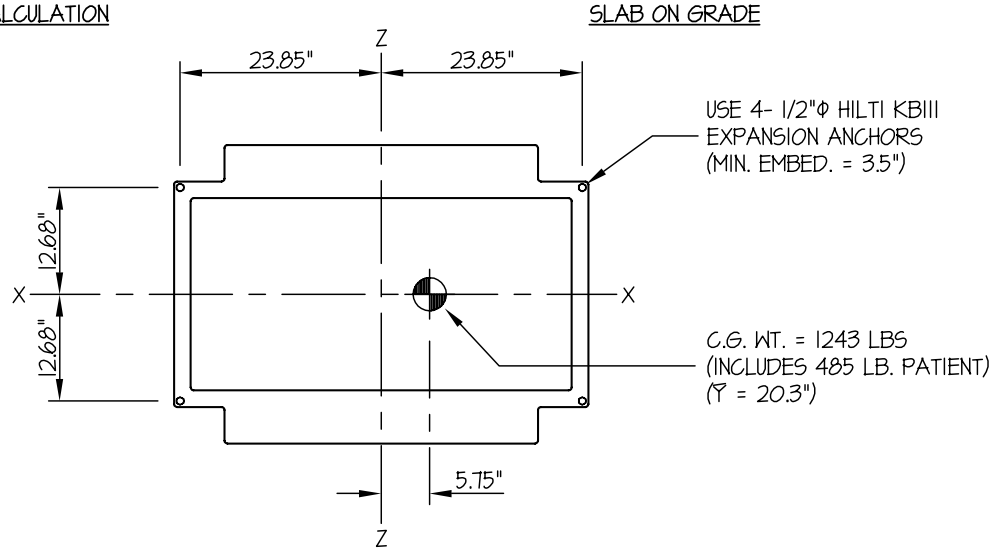
1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.50W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 1.5)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

Table (TBL) - Slab on Grade - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0505	
Table (TBL)	DATE 2/22/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION

SLAB ON GRADE



PLAN AT BASE

LOADS:

WEIGHT = 1243 LBS (INCLUDES 485 LB. PATIENT)
HORIZONTAL FORCE (V_H) = 622 LBS
VERTICAL FORCE (V_V) = 207 LBS

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (1243# - 207#)5.75" = 5,957"#

BOLT GROUP PROPERTIES:

I_{X-X} = 643 in.^{4}
I_{Z-Z} = 2275 in.^{4}
I_{Y-Y} = 2918 in.^{4}

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 622#(20.3") = 12,627"#
M_{ZZ} = 622#(20.3") = 12,627"#
M_{YY} = 622#(5.75") = 3,577"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{12627"\#(12.68")}{643}\right] + \left[\frac{12627"\#(23.85")}{2275} \times (0.3)\right] + \left[\frac{5957"\#(23.85")}{2275}\right] - \left[\frac{1243\# - 207\#}{4 \text{ BOLTS}}\right] = 92 \text{ LBS/BOLT (MAX)}$$

$\frac{M_{XX\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}VERT}(C)}{I}$ $\frac{P}{A}$

SHEAR (V)

$$V = \frac{622\#}{4 \text{ BOLTS}} + \frac{3577"\#\sqrt{12.68^2 + 23.85^2}}{2918} = 189 \text{ LBS/BOLT (MAX)}$$

$\frac{P}{A}$ $\frac{M_{YY}(C)}{I}$

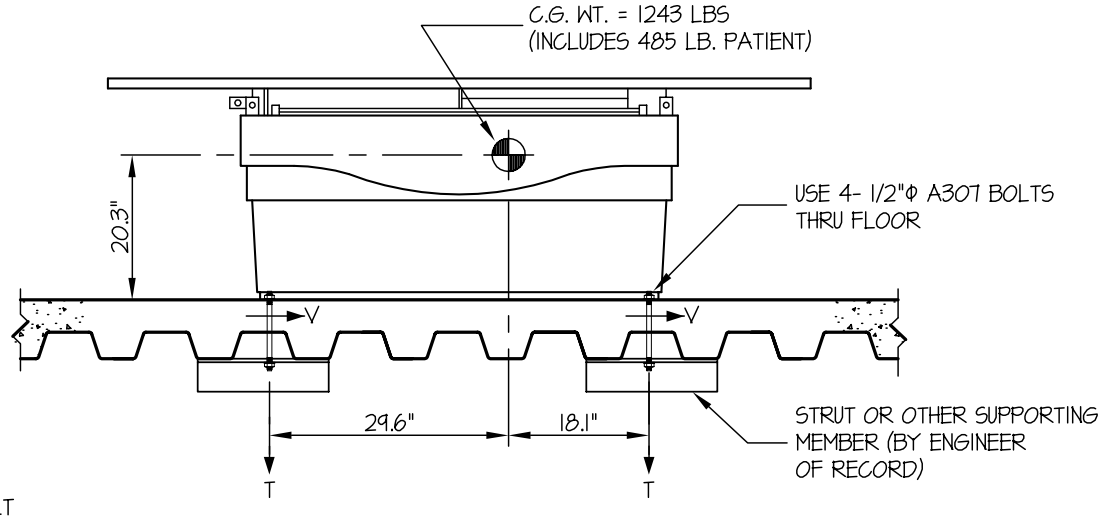
UNITY CHECK:

$$\frac{T_{ACTUAL}}{T_{ALLOW.}} + \frac{V_{ACTUAL}}{V_{ALLOW.}} = \frac{92}{2000} + \frac{189}{1840} = .149 < 1.0 \therefore \text{O.K.}$$

2.5 Table (TBL) - Upper Floor - Sheet 1 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Table (TBL)	DATE 2/22/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION UPPER FLOOR



T_{MAX} = 380 LBS/BOLT
V_{MAX} = 354 LBS/BOLT

ELEVATION

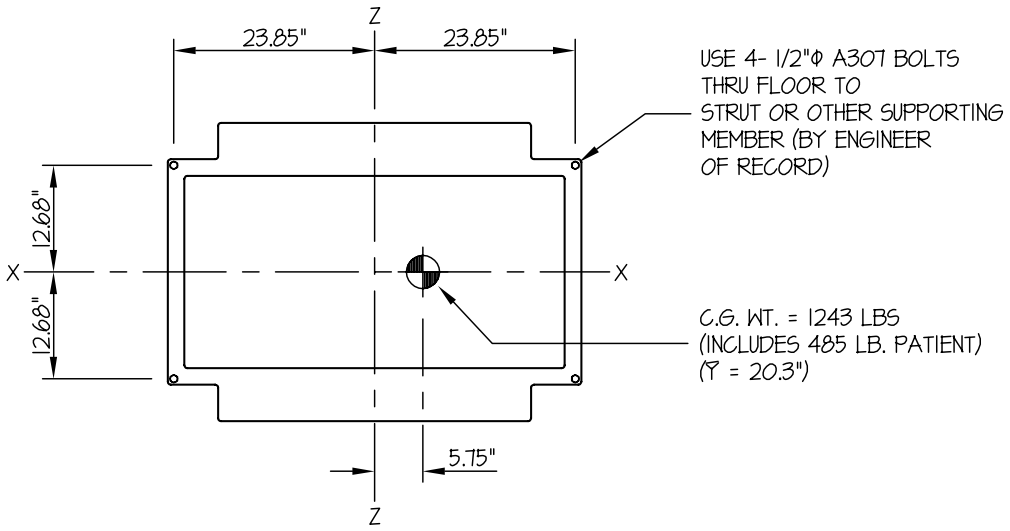
NOTES:

1. FORCES ARE DETERMINED PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A AND HAVE BEEN FACTORED TO REPRESENT WORKING DESIGN LOADS, NOT ULTIMATE.
   HORIZONTAL FORCE (V_H) = 0.94W (C_a = .66, a_p = 1.0, I_p = 1.5, R_p = 3.0)
   VERTICAL FORCE (V_V) = 0.33(V_H)
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS CALCULATION ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

Table (TBL) - Upper Floor - Sheet 2 of 2

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 2
	JOB NO. 12-0505	
Table (TBL)	DATE 2/22/05	OF 2 SHEETS

SEISMIC ANCHORAGE CALCULATION — UPPER FLOOR



PLAN AT BASE

LOADS:

WEIGHT = 1243 LBS (INCLUDES 485 LB. PATIENT)
HORIZONTAL FORCE (V_H) = 1168 LBS
VERTICAL FORCE (V_V) = 389 LBS

BOLT GROUP PROPERTIES:

$I_{X\text{-}X}$ = 643 in.^{4}
$I_{Z\text{-}Z}$ = 2275 in.^{4}
$I_{Y\text{-}Y}$ = 2918 in.^{4}

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (1243# - 389#)5.75" = 4,911"#

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 1168#(20.3") = 23,710"#
M_{ZZ} = 1168#(20.3") = 23,710"#
M_{YY} = 1168#(5.75") = 6,716"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{23710"\#(12.68")}{643}\right] + \left[\frac{23710"\#(23.85")}{2275} \times (0.3)\right] + \left[\frac{4911"\#(23.85")}{2275}\right] - \left[\frac{1243\# - 389\#}{4 \text{ BOLTS}}\right] = 380 \text{ LBS/BOLT (MAX)}$$

$\frac{M_{XX\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}VERT}(C)}{I}$ $\frac{P}{A}$

SHEAR (V)

$$V = \frac{1168\#}{4 \text{ BOLTS}} + \frac{6716"\#\sqrt{12.68^2 + 23.85^2}}{2918} = 354 \text{ LBS/BOLT (MAX)}$$

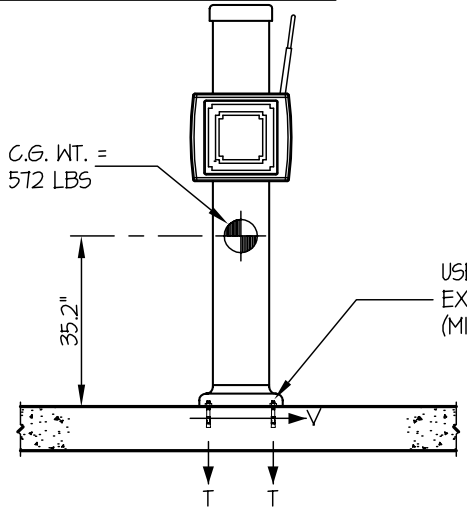
$\frac{P}{A}$ $\frac{M_{YY}(C)}{I}$

2.6 Wall Stand (WLS) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

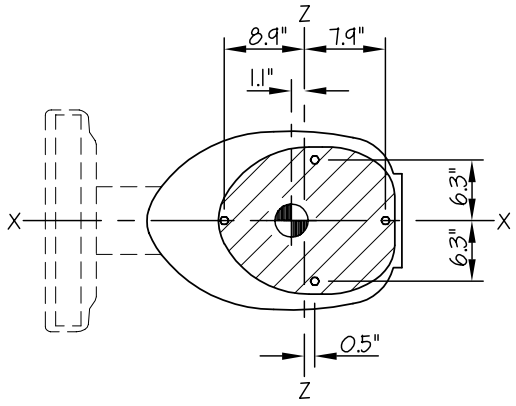
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Wall Stand (WLS)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

SLAB ON GRADE



PLAN AT BASE

T_{MAX} = 906 LBS/BOLT
V_{MAX} = 81 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 572 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 286 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 95 LBS

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (572# - 95#)1.1" = 525"#

BOLT GROUP PROPERTIES:

I_{X-X} = 79 in.^{4}
I_{Z-Z} = 142 in.^{4}
I_{Y-Y} = 221 in.^{4}

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 286#(35.2") = 10,067"#
M_{ZZ} = 286#(35.2") = 10,067"#
M_{YY} = 286#(1.1") = 315"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{10067"\#(6.3")}{79}\right] + \left[\frac{10067"\#(8.9")}{142} \times (0.3)\right] + \left[\frac{525"\#(8.9")}{142}\right] - \left[\frac{572\# - 95\#}{4 \text{ BOLTS}}\right] = 906 \text{ LBS/BOLT (MAX)}$$

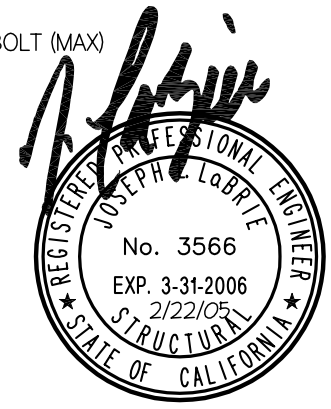
$\frac{M_{XX\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}VERT}(C)}{I}$ $\frac{P}{A}$

SHEAR (V)

$$V = \frac{286\#}{4 \text{ BOLTS}} + \frac{315"\#\sqrt{0.5^2 + 6.3^2}}{221} = 81 \text{ LBS/BOLT (MAX)}$$

$\frac{P}{A}$ $\frac{M_{YY}(C)}{I}$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

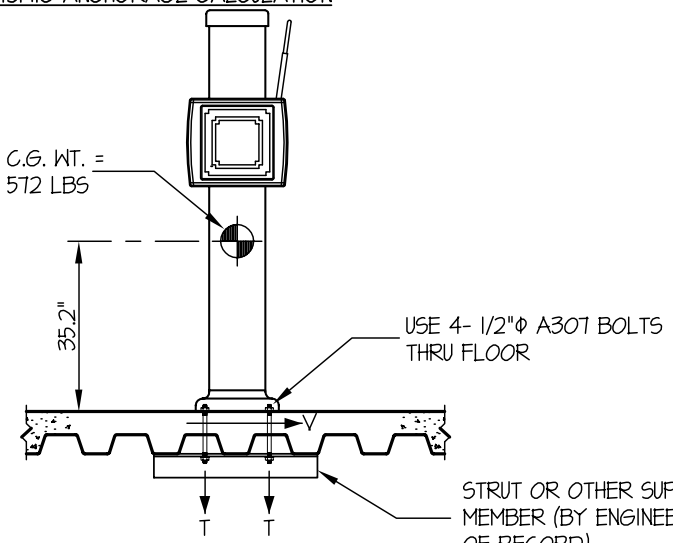


2.7 Wallstand (WLS) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

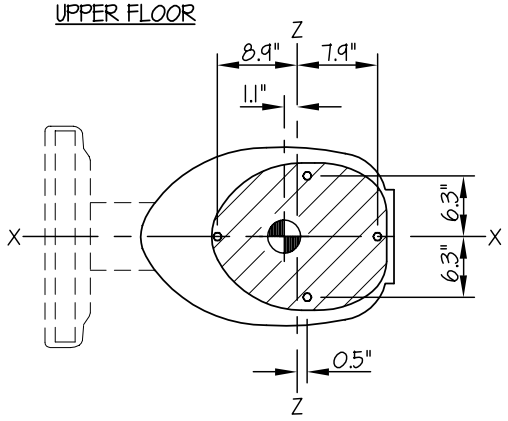
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Wall Stand (WLS)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

UPPER FLOOR



PLAN AT BASE

T_{MAX} = 1795 LBS/BOLT
V_{MAX} = 151 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 572 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 538 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 179 LBS

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (572# - 179#)1.1" = 432"#

BOLT GROUP PROPERTIES:

I_{X-X} = 79 in.^{4}
I_{Z-Z} = 142 in.^{4}
I_{Y-Y} = 221 in.^{4}

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 538#(35.2") = 18,938"#
M_{ZZ} = 538#(35.2") = 18,938"#
M_{YY} = 538#(1.1") = 592"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{18938"\#(6.3")}{79}\right] + \left[\frac{18938"\#(8.9")}{142} \times (0.3)\right] + \left[\frac{432"\#(8.9")}{142}\right] - \left[\frac{572\# - 179\#}{4 \text{ BOLTS}}\right] = 1795 \text{ LBS/BOLT (MAX)}$$

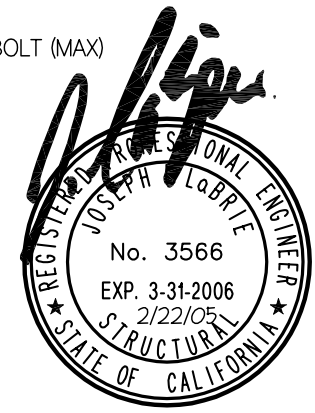
$\frac{M_{XX\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}VERT}(C)}{I}$ $\frac{P}{A}$

SHEAR (V)

$$V = \frac{538\#}{4 \text{ BOLTS}} + \frac{592"\#\sqrt{0.5^2 + 6.3^2}}{221} = 151 \text{ LBS/BOLT (MAX)}$$

$\frac{P}{A}$ $\frac{M_{YY}(C)}{I}$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

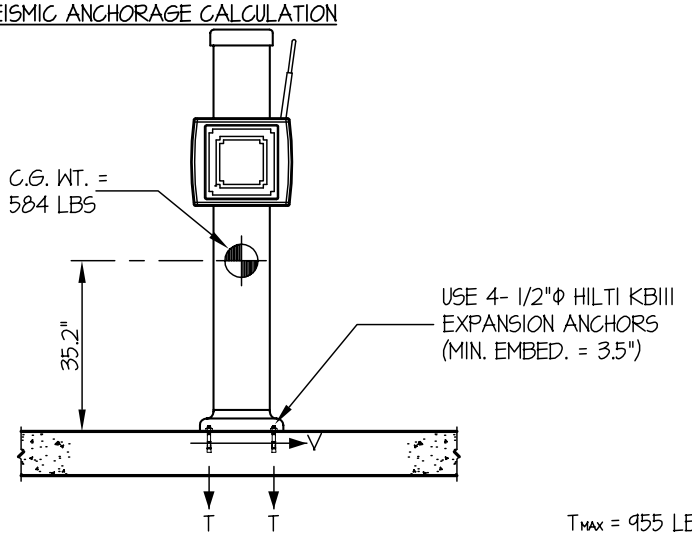


2.8 Extended Wall Stand (WLS) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

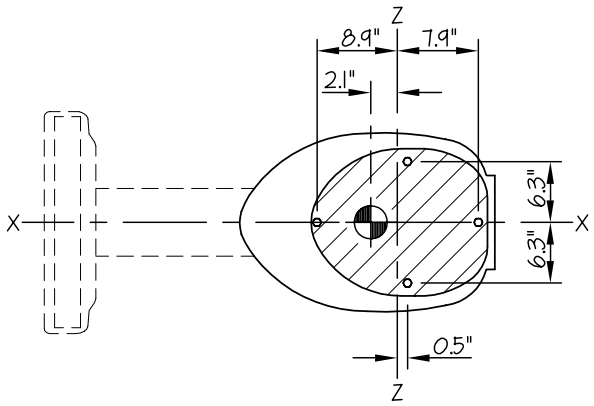
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Extended Wall Stand (WLS)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

SLAB ON GRADE



PLAN AT BASE

T_{MAX} = 955 LBS/BOLT
V_{MAX} = 91 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 584 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 292 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 97 LBS

BOLT GROUP PROPERTIES:

I_{X-X} = 79 in.^{4}
I_{Z-Z} = 142 in.^{4}
I_{Y-Y} = 221 in.^{4}

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (584# - 97#)2.1" = 1,023"#

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 292#(35.2") = 10,278"#
M_{ZZ} = 292#(35.2") = 10,278"#
M_{YY} = 292#(2.1") = 613"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{10278"\#(6.3")}{79}\right] + \left[\frac{10278"\#(8.9")}{142} \times (0.3)\right] + \left[\frac{1023"\#(8.9")}{142}\right] - \left[\frac{584\# - 97\#}{4 \text{ BOLTS}}\right] = 955 \text{ LBS/BOLT (MAX)}$$

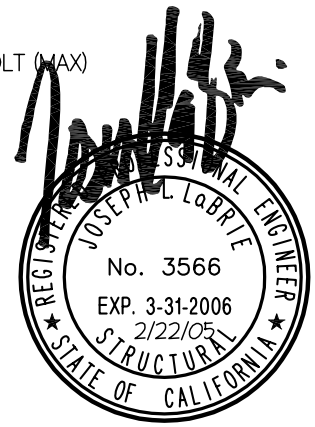
$\frac{M_{XX\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}LAT}(C)}{I}$ $\frac{M_{ZZ\text{-}VERT}(C)}{I}$ $\frac{P}{A}$

SHEAR (V)

$$V = \frac{292\#}{4 \text{ BOLTS}} + \frac{613"\#\sqrt{0.5^2 + 6.3^2}}{221} = 91 \text{ LBS/BOLT (MAX)}$$

$\frac{P}{A}$ $\frac{M_{YY}(C)}{I}$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

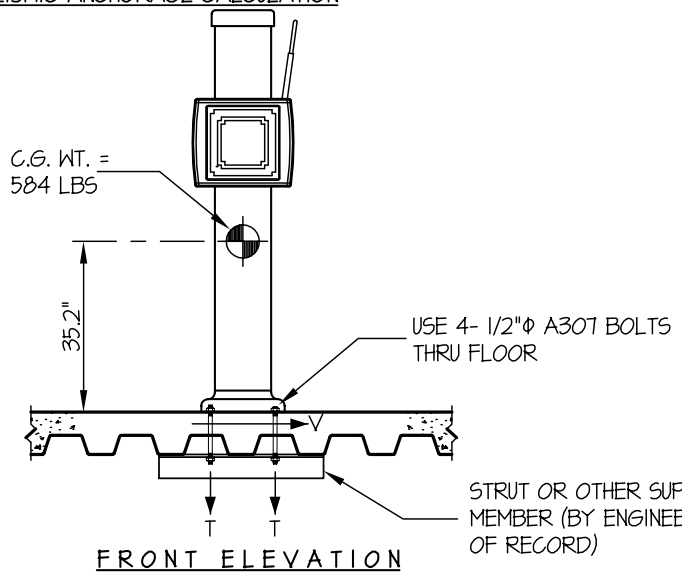


2.9 Extended Wall Stand (WLS) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING

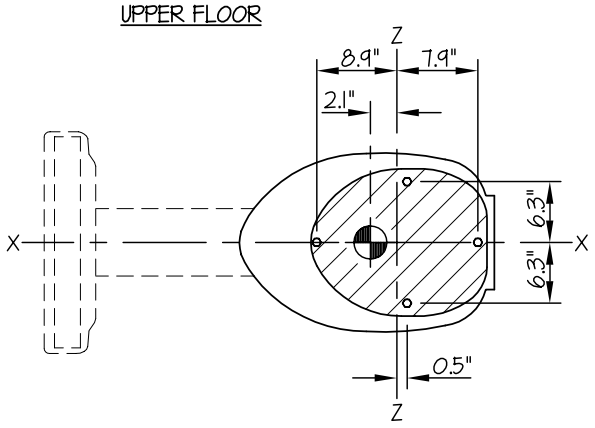
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Extended Wall Stand (WLS)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION



FRONT ELEVATION

UPPER FLOOR



PLAN AT BASE

T_{MAX} = 1857 LBS/BOLT
V_{MAX} = 170 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 584 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 549 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 183 LBS

MOMENTS: (FROM VERTICAL LOADS)

M_{ZZ} = (584# - 183#)2.1" = 842"#

BOLT GROUP PROPERTIES:

I_{X-X} = 79 in.^{4}
I_{Z-Z} = 142 in.^{4}
I_{Y-Y} = 221 in.^{4}

MOMENTS: (FROM LATERAL LOADS)

M_{XX} = 549#(35.2") = 19,325"#
M_{ZZ} = 549#(35.2") = 19,325"#
M_{YY} = 549#(2.1") = 1,153"#

BOLT FORCES:

TENSION (T)

$$T = \left[\frac{19325"\#(6.3")}{79}\right] + \left[\frac{19325"\#(8.9")}{142} \times (0.3)\right] + \left[\frac{842"\#(8.9")}{142}\right] - \left[\frac{584\# - 183\#}{4 \text{ BOLTS}}\right] = 1857 \text{ LBS/BOLT (MAX)}$$

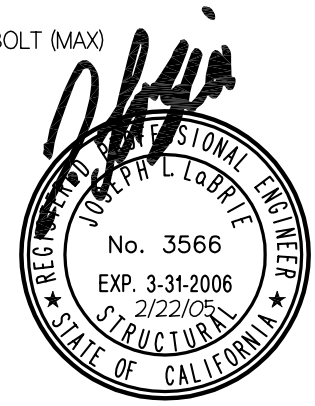
$$\frac{M_{XX\text{-LAT}}(C)}{I} \qquad \frac{M_{ZZ\text{-LAT}}(C)}{I} \qquad \frac{M_{ZZ\text{-VERT}}(C)}{I} \qquad \frac{P}{A}$$

SHEAR (V)

$$V = \frac{549\#}{4 \text{ BOLTS}} + \frac{1153"\#\sqrt{0.5^2 + 6.3^2}}{221} = 170 \text{ LBS/BOLT (MAX)}$$

$$\frac{P}{A} \qquad \frac{M_{YY}(C)}{I}$$

NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

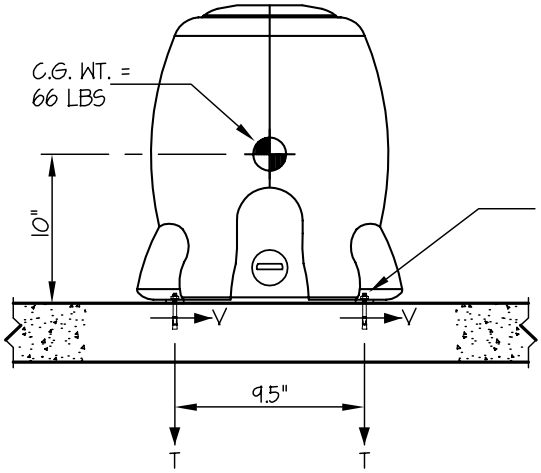


2.10 Detector Support Assembly (DSA) - Slab on Grade

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Detector Support Assembly (DSA)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

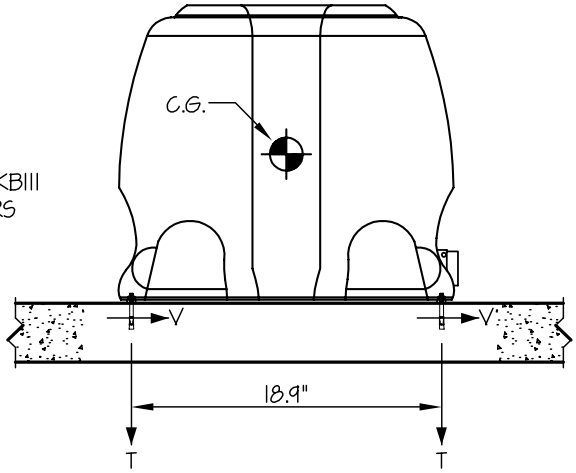
SLAB ON GRADE



FRONT ELEVATION

USE 4- 3/8"Φ HILTI KBIII
EXPANSION ANCHORS
(MIN. EMBED. = 2.5")

T_{MAX} = 6 LBS/BOLT
V_{MAX} = 8 LBS/BOLT



SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 66 LBS
HORIZONTAL FORCE (V_H) = 0.50W = 33 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 11 LBS

BOLT FORCES:

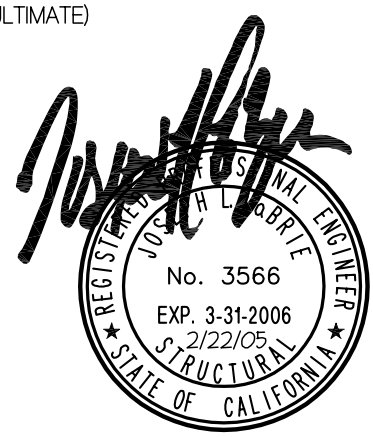
TENSION (T)

$$T_{MAXIMUM} = \frac{33\#(10'')}{2\ \text{BOLTS}\ (9.5'')} + \left[\frac{33\#(10'')}{2\ \text{BOLTS}\ (18.9'')} \times (0.3)\right] - \frac{66\# - 11\#}{4\ \text{BOLTS}} = 6\ \text{LBS/BOLT (MAX)}$$

(HORIZ. - SIDE TO SIDE) (HORIZ. - FRONT TO BACK) (WEIGHT - V_V)

SHEAR (V)

$$V = \frac{33\#}{4\ \text{BOLTS}} = 8\ \text{LBS/BOLT (MAX)}$$



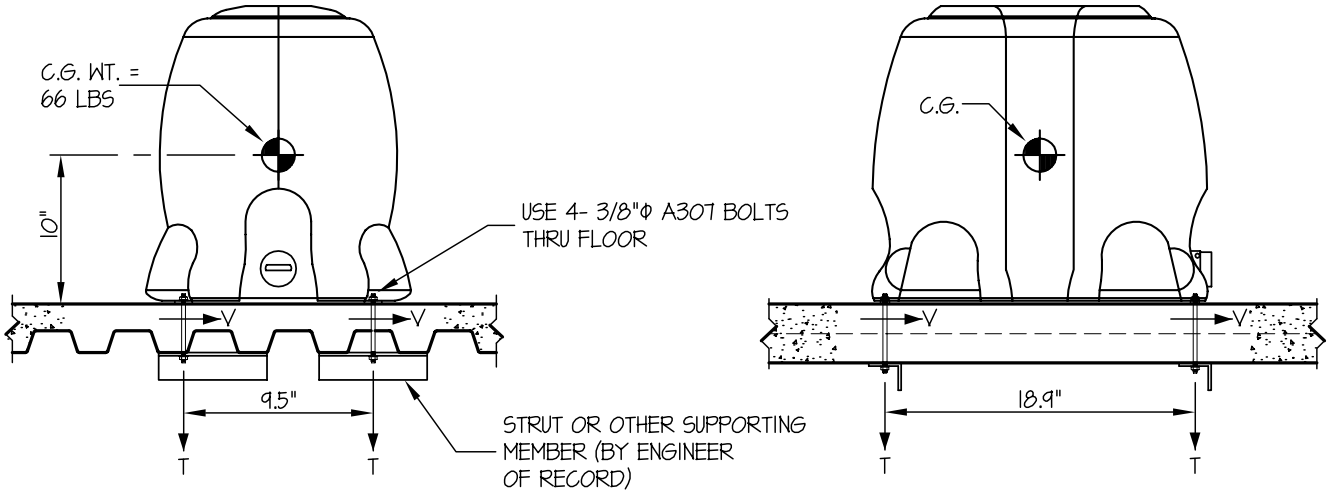
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.11 Detector Support Assembly (DSA) - Upper Floor

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Detector Support Assembly (DSA)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

UPPER FLOOR



FRONT ELEVATION

SIDE ELEVATION

T_{MAX} = 26 LBS/BOLT
V_{MAX} = 16 LBS/BOLT

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)
WEIGHT = 66 LBS
HORIZONTAL FORCE (V_H) = 0.94W = 62 LBS
VERTICAL FORCE (V_V) = 0.33(V_H) = 21 LBS

BOLT FORCES:

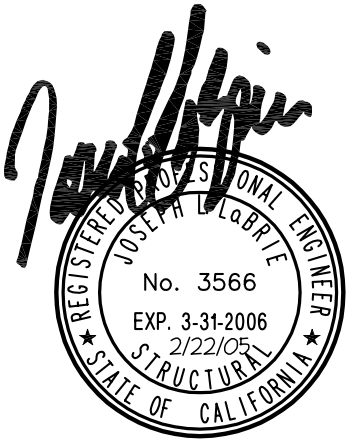
TENSION (T)

$$T_{MAXIMUM} = \frac{62\#(10'')}{2\ \text{BOLTS}\ (9.5'')} + \left[\frac{62\#(10'')}{2\ \text{BOLTS}\ (18.9'')} \times (0.3)\right] - \frac{66\# - 21\#}{4\ \text{BOLTS}} = 26\ \text{LBS/BOLT (MAX)}$$

(HORIZ - SIDE TO SIDE) (HORIZ - FRONT TO BACK) (WEIGHT - V_V)

SHEAR (V)

$$V = \frac{62\#}{4\ \text{BOLTS}} = 16\ \text{LBS/BOLT (MAX)}$$



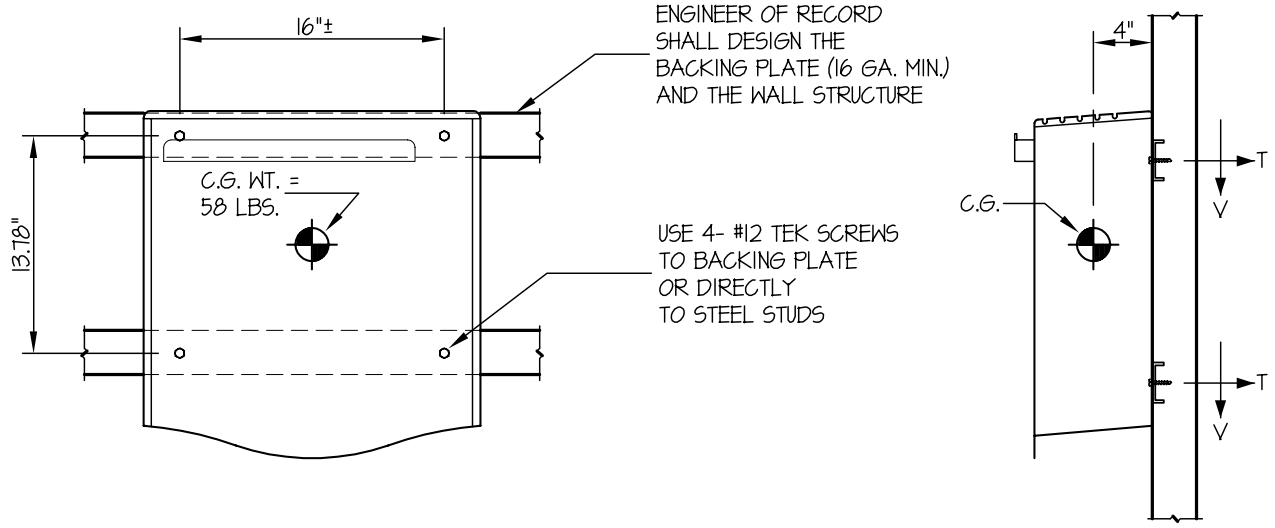
NOTE:
ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

2.12 Grid Holder (GH)

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING		
GEHC PIM 5115585-100	DES. R. LA BRIE	SHEET 1
	JOB NO. 12-0505	
Grid Holder (GH)	DATE 2/22/05	OF 1 SHEET

SEISMIC ANCHORAGE CALCULATION

WALL MOUNTED



FRONT ELEVATION

T_{MAX} = 27 LBS/SCREW
V_{MAX} = 33 LBS/SCREW

SIDE ELEVATION

LOADS: PER 2001 CALIFORNIA BUILDING CODE - SECTION 1632A (WORKING LOADS, NOT ULTIMATE)

WEIGHT = 58 LBS (INCLUDES 24 LBS FOR ACCESSORIES)

HORIZONTAL FORCE (V_H) = 0.94W = 55 LBS

VERTICAL FORCE (V_V) = 0.33(V_H) = 18 LBS

TENSION (T)

$$T_{VERTICAL} = \frac{(58\# + 18\#)4''}{2 \text{ SCREWS } (13.78'')} = 11 \text{ LBS}$$

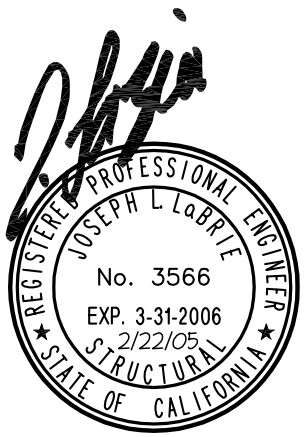
$$T_{PARALLEL} = \frac{55\#(4'')}{2 \text{ SCREWS } (16'')} = 7 \text{ LBS}$$

$$T_{PERP.} = \frac{55\#}{4 \text{ SCREWS}} = 14 \text{ LBS}$$

$$T_{MAX} = 11\# + \sqrt{7^2 + 14^2} = 27 \text{ LBS/SCREW (MAX)}$$

SHEAR (V)

$$V_{MAX} = \frac{58\# + 18\# + 55\#}{4 \text{ SCREWS}} = 33 \text{ LBS/SCREW (MAX)}$$



NOTE:

ARCHITECT OR STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE SUPPORT STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN.

GE HEALTHCARE

GE HEALTHCARE-AMERICAS: FAX 262.544.3384
P.O. BOX 414; MILWAUKEE, WISCONSIN 53201-0414, U.S.A.

GE HEALTHCARE-EUROPE: FAX 33.1.40.93.33.33
PARIS, FRANCE

GE HEALTHCARE-ASIA: FAX 65.291.7006