



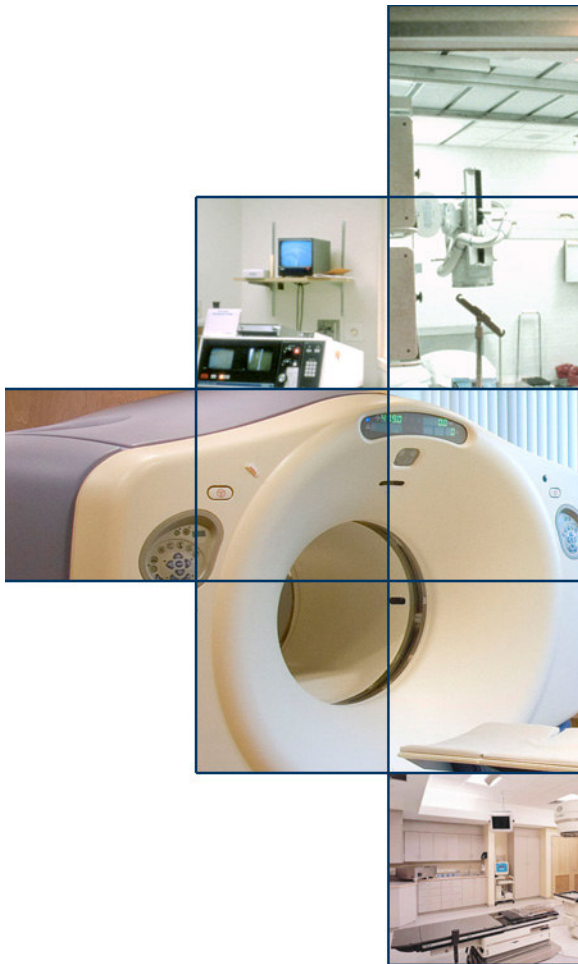
**Table of Contents**

**Section 1 Foreword & Acknowledgements**  
 Introduction  
 Definitions  
 Abbreviations  
 Legends and Symbols

**Section 2 Narrative**  
 General Considerations  
 Functional Considerations  
 Technical Considerations

**Section 3 Functional Diagram**

**Section 4 Guide Plates (typical order)**  
 Floor Plan  
 Reflected Ceiling Plan  
 Design Standards  
 Equipment Guide List



**Section 1: Foreword and Acknowledgements**

	Page
Foreword .....	<a href="#">1-2</a>
Acknowledgements .....	<a href="#">1-3</a>
Introduction .....	<a href="#">1-5</a>
Definitions .....	<a href="#">1-6</a>
Abbreviations .....	<a href="#">1-8</a>
Logistical Categories .....	<a href="#">1-9</a>
Legends of Symbols .....	<a href="#">1-10</a>

## Foreword

The material contained in the Radiology Service Design Guide is the culmination of a partnering effort by the Department of Veterans Affairs Veterans Health Administration and the Facilities Quality Office. The goal of the Design Guide is to ensure the quality of VA facilities while controlling construction and operating costs.

This document is intended to be used as a guide and as a supplement to current technical manuals and other VA criteria in the planning of the Radiology Service. **The Design Guide is not to be used as a standard design, and the use of this Design Guide does not limit the project Architect's and Engineer's responsibilities to develop a complete and accurate project design that best meets the user's needs and the applicable code requirements.**

Lloyd H. Siegel, FAIA  
Director, Strategic Management Office  
Office of Construction & Facilities Management  
*Washington, DC*

## Acknowledgements

The following individuals are those whose guidance, insight, advice and expertise made the update and revision of the Radiology Service Design Guide possible:

### Office of Construction & Facilities Management

Lloyd H. Siegel, FAIA  
*ACFMO for Strategic Management*  
*Washington, DC*

Kurt Knight  
*Director Facilities Quality Service*  
*VHACO (181A)*  
*Washington, DC*

Donald L. Myers, AIA, NCARB  
*Senior Architect Facilities Quality Service*  
*VHACO (181A)*  
*Washington, DC*

### Radiology Service Advisory Group

Dr. Charles M. Anderson  
*Director, VHA Radiology Program*  
*VAMC, San Francisco*

Dana M. Sullivan  
*Assistant Director, VHA Radiology Program*  
*VACO, Washington, DC*

Joseph DeRosier  
*Engineering Program Manager*  
*National Center for Patient Safety*

Thomas Hensch  
*Radiation Safety Officer*  
*VAMC, Minneapolis*

### Prime Consultant

#### Cannon Design

Jose M. Silva, AIA, Project Principal

Ronald Villasante, Assoc. AIA, CAP

Scott Speser, NCARB, LEED

Millard Berry III, PE, LEED

Ronald Curtis, PE

Michael Dlugosz, PE

J. Joe Scott, CPD

Blake Bowen

**Radiology / Imaging Specialty Sub-consultants**

**Junk Architects / MRI-Planning**

Tobias Gilk, M Arch

Robert Junk, AIA, AHRA



## Introduction

The Radiology Service Design Guide was developed as a tool to assist Contracting Officers, Medical Center Staff, and Architects and Planners with the design and construction of Radiology Service facilities. It is not intended to be project specific; but rather provide an overview with respect to the design and construction of Radiology Service facilities.

Guide plates for various rooms within the Radiology Service are included in this chapter to illustrate typical VA furniture, equipment, and personnel space needs. They are not project specific as it is not possible to foresee future requirements. The project specific space program is the basis of design for an individual project. It is important to note that the guide plates are intended as a generic graphic representation only.

Equipment manufacturers should be consulted for actual dimensions, utilities, shielding, and other requirements as they relate to specified equipment. Use of this design guide does not supersede the project architects' and engineers' responsibilities to develop a complete and accurate design that meets the user's needs and complies with appropriate code requirements.

## Definitions

Angiographic Room: A radiographic/fluoroscopic system with rapid filming techniques and with special capabilities for performing angiographic procedures. The system may be single-plane or bi-plane.

Chest Room - Dedicated: A specific or specialized radiographic room used for routine chest X-rays and those radiographic procedures which can or should be performed in an upright position.

Computed Radiology (CR): CR uses special plate technology, scanning and computer processing to produce a digital image of a patient's organ or body part.

Computed Tomography: The technique employing ionizing radiation to produce axial (cross section) body section images. Data obtained by X-ray transmission through the patient are computer analyzed to produce these images. The series of sectional, planar images may be manipulated to produce different planar or volumetric view of the areas of interest and eliminate overlying structures such as bone. Manipulations of data allows for the selective view of either dense tissues such as bones or diffuse tissues such as the heart, brain, or lung. CT is used for both head and body imaging and is applicable to diagnosis, biopsy, and therapy planning.

Diagnostic Radiology: The medical specialty that utilizes imaging examinations with or without ionizing radiation to affect diagnosis. Techniques include radiography, tomography, fluoroscopy, ultrasonography, mammography, interventional radiography (IR) and computed tomography (CT).

Diagnostic Room: Designated room containing diagnostic equipment performing patient procedures such as Radiographic, Radiographic/Fluoroscopic (R/F), Mammography, Ultrasound, Interventional Radiology (IR), and Computed Tomography (CT).

Digital Radiography: The capture or conversion of radiographic images in a digital format.

Fluoroscopy: The technique used to produce real time motion in either an instantaneous or stored fashion. A non-ionic contrast material is injected or consumed by the patient to enhance visualization of various organs. A constant stream of radiation passes through the patient and strikes a fluorescent screen creating shadows of the opaque internal organs. Induced motion provides a continuous or nearly continuous evaluation of the visual effects of that motion. Images produced by this modality include upper and lower gastrointestinal series, cystography, pyelography and esophageal mobility studies.

General Purpose Radiology Room: A room in which direct radiography is performed.

General Radiology: Images of the skull, chest, abdomen, spine, and extremities produced by the basic radiographic process.

Interventional Radiology (IR): The clinical subspecialty that uses fluoroscopy, CT and ultrasound to guide percutaneous (through the skin) procedures such as performing biopsies, draining fluids, inserting catheters, or dilating or stenting narrowed ducts or vessels. IR Procedures are complex, requiring a team of doctors and technicians. As such, they are often performed in the Surgical Suite, and scheduled in advance as they require special preparation. An IR / Special Procedure Room can be categorized as: Angiographic Room - an R/F system with rapid filming techniques including capabilities for performing angiographic procedures; Vascular / Neuro-radiology Room - a diographic/fluoroscopic system with rapid film



changer and capabilities for performing a range of neuro, visceral, and peripheral procedures, single-plane or bi-plane.

Mammography: A modality utilizing ionic X-ray imaging for breast examinations.

Picture Archiving and Communication System (PACS): The digital capture, transfer and storage of diagnostic images. A PACS system consists of workstations for interpretation, image / data producing modalities, a web server for distribution, printers for file records, image servers for information transfer and holding, and an archive of off-line information. A computer network is needed to support each of these devices.

Radiography: A still patient image record utilizing ionizing radiation. The image is recorded in digital format.

Radiographic / Fluoroscopic Room: A room containing a radiographic / fluoroscopic system that produces either still photographic records or real-time images of internal body structures. Most fluoroscopy procedures are performed early in the day because of fasting requirements. After most fluoroscopy procedures have been completed, this room can be used as a general purpose room.

Stereotactic Mammography: Imaging of the breast from two slightly angled directions in order to identify a path to help guide a needle for breast biopsy. The procedure may be performed upright or with the patient lying face down. Several stereotactic pairs of X-ray images are made. Small samples of tissue are then removed from the breast using a hollow core needle or vacuum-assisted biopsy device that is precisely guided to the correct location using X-ray imaging and computer coordinates.

Ultrasound: High frequency sound waves are utilized to determine the size and shape of internal organs based on the differential rates of reflection. In addition, images can be observed in real time to reveal motion, and can include coloration of arterial and venous blood flow. Cyst aspiration and fluid removal are also procedures done with the ultrasound modality.



## Abbreviations

A	Amps
AC	Air Conditioning
ABA	Architectural Barriers Act
AC/HR	Air Changes per Hour
ADA	Americans with Disability Act
ADAAG	ADA Accessibility Guidelines
A/E	Architectural / Engineering Firm
AHJ	Authority Having Jurisdiction
AIA	American Institute of Architects
ANSI	American National Standards Institute
AR	As Required
ASRAE	American Society of Heating Refrigerating & Air-Conditioning Engineers
BGSF	Building Gross Square Feet
BTU	British Thermal Unit
CARES	Capital Asset Realignment for Enhanced Services
CFM	Cubic Feet per Minute
DOE	Department of Energy
DGSF	Departmental Gross Square Feet
DVA	Department of Veterans Affairs
FAR	Floor Area Ratio
FC	Foot Candle
OCFM	Office of Construction & Facilities Management
GSF	Gross Square Feet
GSM	Gross Square Meters
HIPAA	Healthcare Insurance Portability and Accountability Act
HP	Horsepower
HVAC	Heating, Ventilating and Air Conditioning
IAQ	Indoor Air Quality
IBC	International Building Code
JCAHO	Joint Commission (on Accreditation of Healthcare Organizations)
LB	Pound, Pounds
LUX	Lumen Per Square Meter
NEC	National Electrical Code
NFPA	National Fire Protection Association
NHCU	Nursing Home Care Unit
NSF	Net Square Feet
NSM	Net Square Meters
NTS	Not to Scale



NUSIG	National Uniform Seismic Installation Guidelines
OSHA	Occupational Safety and Health Administration
RCP	Reflected Ceiling Plan
RH	Relative Humidity
SF	Square Feet, Square Foot
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association
SqM	Square Meters
TIL	Technical Information Library
TV	Television
UBC	Uniform Building Code
UFAS	Uniform Federal Accessibility Standards
V	Volts
VA	Department of Veterans Affairs
VACO	Veterans Affairs Central Office
VAFM	Veterans Affairs Facilities Management
VAMC	Veterans Affairs Medical Center
VHA	Veterans Health Administration
VISN	Veterans Integrated Service Network































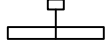




#### **LOGISITICAL CATEGORIES (LOG CATS)**




















VV: Department of Veterans Affairs furnished and installed - Medical Care Appropriations

VC: Department of Veterans Affairs furnished and Contractor installed - Medical Care Appropriations for Equipment and Construction Appropriations for Installation

CC: Contractor Furnished and Installed - Construction Appropriations

CF: Construction Appropriations - Department of Veterans Affairs furnished - Installed by the Department of Veterans Affairs or Contractor

	DUPLEX RECEPTACLE, NEMA 5-20R - 20AMP - MOUNTED 450MM (18")AFF UNLESS OTHERWISE NOTED.		WALL MOUNTED TELEPHONE OUTLET-MOUNTED 1200MM (48") AFF UNLESS OTHERWISE NOTED
	DUPLEX RECEPTACLE, NEMA 5-20R - 20AMP - MOUNTED ABOVE COUNTER TOP		COMPUTER TERMINAL OUTLET - VERIFY EXACT NEEDS-PROVIDE SIGNAL AND POWER OUTLET AS REQUIRED
	DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER, NEMA 5-20R - 20 AMP - MOUNTED 450MM (18")AFF UNLESS OTHERWISE NOTED		SPEAKER-CEILING MOUNTED
	DUPLEX RECEPTACLE WITH GROUND FAULT INTERRUPTER, NEMA 5-20R - 20 AMP - MOUNTED ABOVE COUNTER TOP		INTERCOM OUTLET
	WEATHERPROOF DUPLEX RECEPTACLE WITH GFI, NEMA 5-20R - 20 AMP - MOUNTED ABOVE 450MM (18") AFF UNLESS OTHERWISE NOTED		NURSE CALL DOME LIGHT-CEILING MOUNTED
	QUADRAPLEX OUTLET, NEMA 5-20R - 20 AMP - MOUNTED ABOVE 450MM (18") AFF OR QUADRAPLEX OUTLET, NEMA 5-20R - 20 AMP - PEDESTAL-MOUNTED.		NURSE CALL DOME LIGHT-WALL MOUNTED
	QUADRAPLEX OUTLET, NEMA 5-20R - 20 AMP - MOUNTED ABOVE COUNTER TOP		NURSE CALL DUTY STATION
	QUADRAPLEX OUTLET WITH GROUND FAULT INTERRUPTER, NEMA 5-20R - 20AMP - MOUNTED 450MM (18") AFF UNLESS OTHERWISE NOTED		EMERGENCY NURSE CALL
	QUADRAPLEX OUTLET WITH GROUND FAULT INTERRUPTER, NEMA 5-20R - 20AMP - MOUNTED ABOVE COUNTER TOP		NURSE CALL STAFF STATION
	DUPLEX RECEPTACLE, NEMA 5-20R - 20AMP - EMERGENCY POWER-MOUNTED 450MM (18")AFF UNLESS OTHERWISE NOTED		VOLUME CONTROL-WALL MOUNTED
	QUADRAPLEX RECEPTACLE, NEMA 5-20R - 20AMP - EMERGENCY POWER		JUNCTION BOX-PURPOSE AND LOCATION AS NOTED
	SPECIAL RECEPTACLE		SUPPLY AIR DIFFUSER
	TELEVISION OUTLET		EXHAUST OR RETURN AIR REGISTER OR GRILLE
	TELEPHONE OUTLET-MOUNTED 450MM (18") AFF UNLESS OTHERWISE NOTED		EMERGENCY EXHAUST GRILLE
			THERMOSTAT
			HUMIDISTAT
			COMBINATION FAUCET HOSE BIBB
			VACUUM
			MEDICAL AIR
			OXYGEN
			ELECTRICAL STRIP MOLD - NEMA 5-20R RECEPTACLES AT 600MM (2"-0") INTERVALS

	SINGLE POLE SWITCH		WALL-MOUNTED FLUORESCENT FIXTURE
	SINGLE POLE SWITCH – SUFFIX OF a,b OR c INDICATES SEPARATE CONTROL OR FIXTURES WITH SAME DESIGNATION		2'x2' FLUORESCENT FIXTURE-EMERGENCY POWER
	DIMMER SWITCH		2'x4' FLUORESCENT FIXTURE-EMERGENCY POWER
	THREE WAY SWITCH		WALL MOUNTED FLUORESCENT FIXTURE-EMERGENCY POWER
	DOOR SWITCH		WALL MOUNTED LIGHT FIXTURE-TYPE AS NOTED
	FUSED OR UNFUSED DISCONNECT SWITCH		LIGHT FIXTURE-TYPE AS NOTED
	EMERGENCY POWER OFF (EPO) PUSH BUTTON		LIGHT FIXTURE-TYPE AS NOTED EMERGENCY POWER
	2'x2' FLUORESCENT FIXTURE		CIRCUIT BREAKER
	1'x4' FLUORESCENT FIXTURE		BATTERY POWERED CLOCK
	2'x4' FLUORESCENT FIXTURE		