CT SITE PLANNING

& INSTALLATION GUIDE

Everything You Need to Know Before the Scanner Arrives

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Why does CT site planning matter? Because skipping it costs far more — in time, in money, and in scope creep — than doing it right the first time. Before you lock in that great deal on a refurbished CT scanner, the equally important question is whether your facility is ready to house it. Room configuration, radiation shielding, gantry cooling, climate control, and power supply all need to be designed and approved well before delivery day.

A properly developed CT site plan — produced by a qualified radiation physicist and architect with imaging experience — specifies floor plans, equipment placement, shielding requirements, plumbing, electrical service, and safety measures for the scanner location. Skipping or shortcutting any of these elements is how a clean installation turns into a project that runs months late and tens of thousands of dollars over budget.

This guide walks through every major site planning consideration for a CT installation, from room dimensions and lead shielding through gantry cooling, electrical service, rigging, and the final readiness checklist. Local and state requirements, site conditions, and OEM-specific specifications may modify the recommendations here — always defer to your scanner's siting documentation and your jurisdiction's radiation control program.

WHERE CT SCANNERS LIVE

CT scanners are typically installed in radiology suites, emergency departments, and increasingly near catheterization and cardiology suites for cardiac imaging applications. Wherever the scanner sits, site planning must account not only for the scan room itself but also for occupied spaces above and below — radiation does not respect floor and ceiling boundaries without proper shielding.

1. Site Layout & Room Design

A CT installation involves three connected spaces: the scan room (where the gantry and patient table live), the control room (where the technologist operates the console), and an equipment alcove or technical area (for the system's power distribution unit and cooling components). The relationship between these three spaces drives nearly every other design decision.

Typical Room Dimensions

Most CT installations work within these dimensions, though exact requirements vary by manufacturer and model:

Space	Recommended
Scan Room — Minimum Interior	18' x 20' (approximately 360 sq ft)
Scan Room — Typical Interior	20' x 24' to 24' x 32'
Scan Room — Ceiling Height	Minimum 8'-0" clear; 9'-0" preferred for newer systems
Control Room — Minimum	10' x 12' (approximately 120 sq ft)
Equipment Alcove	6' x 8' minimum, adjacent to scan room
Total CT Suite — Retrofit	375 to 405 sq ft when adding to existing facility
Total CT Suite — New Build	600 to 650 sq ft including waiting and ancillary

Where in the Building to Place the CT

Ground-floor placement is the default recommendation for new CT installations, for several practical reasons. Floor structural capacity is easiest to verify at grade. Lead shielding weight (which can run thousands of pounds on a fully shielded CT room) is simpler to support on a slab-on-grade than on an elevated floor. Delivery is straightforward without needing rigging up stairs or through elevators.

When ground-floor placement is not possible, the structural engineer must verify floor load capacity for both the scanner itself (typically 4,000 to 6,500 pounds for a modern multi-slice CT) and the additional shielding mass. Floors above and below the scan room require evaluation for occupancy type and may need additional shielding to protect adjacent areas.

Adjacent Space Considerations

CT planning is a three-dimensional problem. Uncontrolled areas with high occupancy — public waiting rooms, offices, treatment rooms — should be located as far from the scan room as the building footprint allows. Where adjacent spaces cannot be moved, additional shielding is required.

Specifically, consider:

- Floors directly above the scan room: occupied offices, patient rooms, conference rooms.
- Floors directly below the scan room: parking garages, mechanical spaces, retail.
- Adjacent rooms on the same floor: nursing stations, exam rooms, public corridors.
- PET/CT facilities require extended consideration because radiopharmaceutical isotopes continue emitting in the uptake room well before and after the scan itself.

Operator-Patient Sight Lines

The technologist at the control console must maintain continuous visual contact with the patient throughout every scan. The control room is positioned so that the operator can directly see the patient on the gantry table through a shielded viewing window. A two-way intercom system, with clear microphone and speaker placement on both sides of the shielded wall, supports patient communication during positioning and breath-hold instructions.

The control room should be large enough to comfortably hold the operating console, a workstation for image review, and one or two staff members during a scan — without crowding.

ACCESS ROUTE REALITY CHECK

Walk the delivery route from the loading dock to the final scanner position before you sign the contract. Doorways, elevators, corners — measure every dimension. A modern CT gantry is roughly 6 feet wide, 6 feet tall, and 4 feet deep, but the rigging path needs more clearance than the equipment itself. Surprises here add weeks to the schedule.

2. Radiation Shielding

Radiation shielding is the single most consequential element of a CT site plan. The CT scanner produces high-energy X-rays during every study — typical operating voltages run between 120 and 150 kVp — and that radiation must be contained within the controlled scan room. Inadequate shielding exposes staff, adjacent patients, and the public to radiation doses that exceed regulatory limits and can endanger health.

Shielding design is not a job for a contractor working from generic guidelines. Every CT room shielding plan must be calculated and stamped by a qualified medical physicist who accounts for your specific scanner's workload, the kVp settings you will run, the occupancy of every adjacent space, and the distance to each point of concern. The guidance below describes typical practice — but the licensed physicist's signed report is what you build to.

Lead Equivalent Requirements

Typical CT room shielding falls within these ranges, but always defer to your physicist's calculations:

Element	Typical Lead Thickness
Walls	1/16" (1.6 mm) minimum; 0.5" to 1.0" (12–25 mm) for high-workload rooms
Doors	0.25" to 0.5" (6–12 mm) lead equivalent
Floor Perimeter	Minimum 2-foot-wide perimeter at 1/16" lead, lapped with wall shielding
Ceiling	1/16" lead minimum when occupied space above

Element	Typical Lead Thickness
Operator Barrier	0.25" to 0.5" lead equivalent with leaded viewing window
Concrete Equivalent	4 to 6 inches standard-density concrete (147 lb/ft^3) substitutes for 1/16" lead

Vertical Shielding Extent

Wall shielding must extend continuously from the floor up to at least 7 feet above the finished floor — or all the way to the ceiling if ceiling height is less than 7 feet. At seams, joints, and door frames, lead must be lapped continuously to prevent radiation leakage paths. Any pull-out shielding sections, removable access panels, or service openings must be designed to maintain continuous shielding when closed.

Floor and Ceiling Shielding for Adjacent Occupancy

Where the room directly above or below the CT scan room is occupied, ceiling and/or floor shielding is required in addition to wall shielding. The standard reference points for dose calculation are:

- Patient height assumed at 1 meter above the floor of the scan room.
- Dose rate calculated at 0.5 meters above the floor for rooms directly above.
- Dose rate calculated at 1.7 meters above the floor for rooms directly below.

The shielding mass involved in floor and ceiling work is significant. A fully shielded ceiling using 1/16" lead adds roughly 4 pounds per square foot to the dead load; thicker shielding scales proportionally. Your structural engineer must verify the existing floor system can support this additional weight, particularly in retrofit situations where the original construction was not designed for imaging use.

Viewing Window

A lead-equivalent viewing window between the control room and the scan room lets the technologist observe the patient without leaving the shielded operator area. Standard window sizes run from 48" wide by 36" tall up to 96" wide by 48" tall, with larger sizes giving the operator a better view of both the patient and the gantry. Lead glass and lead acrylic are both common options; lead acrylic is lighter and easier to install but typically more expensive per square foot.

Vertical Barriers and Operator Stations

Beyond the main shielded wall, additional vertical barriers may be required around the operator console, at the nursing station outside the scan room, and at any pass-through window between scan and control rooms. The physicist's report identifies each of these supplementary shielding locations and specifies the lead equivalence required.

Portable Shielding

For PET/CT installations and certain interventional CT applications, portable lead shields are often used in patient uptake rooms to protect staff during patient preparation. Mobile lead screens, typically 0.5" to 1.0" lead equivalent and 6 to 7 feet tall, can be positioned around injection chairs or imaging beds as the workflow demands.

ALARA & Dose Limits

All radiation protection planning operates under the ALARA principle — As Low As Reasonably Achievable. Even when shielding meets the regulatory minimum, the design goal is to drive occupational and public dose as low as practical given the cost, layout, and operational realities of your facility.

The maximum allowable occupational dose for radiation workers in controlled areas is 50 millisieverts (mSv) per year under U.S. regulations, with public dose limits in uncontrolled areas substantially lower at 1 mSv per year. Properly designed CT shielding keeps both well within these limits with significant safety margin.

THE PHYSICIST'S REPORT DRIVES EVERYTHING

Every state radiation control program requires a stamped shielding plan from a qualified medical physicist before a CT installation can be authorized for patient use. Build this into the project timeline early — the physicist needs scanner specifications, workload projections, and detailed room drawings to produce the report, and the report must be finalized before construction begins.

3. Gantry Cooling Systems

A CT scanner generates substantial heat — the X-ray tube alone can dissipate 7 to 10 kilowatts of thermal energy during active scanning, and the entire gantry runs warm even at idle. That heat has to go somewhere, and the cooling system you choose during site planning shapes the room layout, the ongoing operating cost, and the day-to-day reliability of the scanner.

Modern CT systems use one of two cooling approaches: water-cooled (closed-loop chilled water) or air-cooled (room air drawn through the gantry by integrated fans). Some platforms offer a hybrid water/air split-cooling design that combines elements of both.

Water-Cooled Systems

Water-cooled CT gantries route a closed-loop chilled water circuit through a heat exchanger built into the gantry housing. The chilled water absorbs heat from the X-ray tube and gantry electronics, carries it out of the room, and rejects it through a remote chiller or cooling unit. Two configurations are common:

- Building chilled water connection — the facility's existing chilled water plant supplies the gantry directly through a regulating heat exchanger; lowest installation cost when adequate building chilled water is already available
- Dedicated heat exchanger cabinet with outdoor cooling unit — a self-contained chiller unit mounted outside the building handles all heat rejection; required when the facility does not have suitable onsite chilled water

Water-cooled systems deliver tighter temperature control inside the scan room because most of the heat leaves the room through pipes rather than being dissipated into room air. They also tend to run quieter, an underrated patient-comfort feature. The tradeoff is more involved installation (chilled water piping, dedicated heat exchanger, sometimes a roof or grade-mounted outdoor unit) and more frequent maintenance — water chemistry, flow rate monitoring, and pump service all become facility responsibilities.

Air-Cooled Systems

Air-cooled CT gantries use integrated fans to draw room air through the gantry chassis and exhaust the warmed air back into the room or through a duct to outside. There is no chilled water loop and no outdoor heat exchanger to maintain. Installation is faster and lower cost.

The tradeoff with air-cooled systems is room HVAC sizing. All of the heat that water-cooled systems carry away through pipes is, in air-cooled designs, dumped directly into the scan room. The room HVAC must be sized to handle that thermal load while maintaining the required temperature and humidity range. Air-cooled gantries also tend to pull in more room air dust over time, which can accelerate filter and bearing maintenance compared to a sealed water loop.

Choosing Between Water and Air

The right choice depends on your facility infrastructure, climate, and workload:

Scenario	Typical Choice
High-volume facility	Water-cooled generally preferred — better thermal stability.
Existing building chilled water available	Water-cooled connection is most cost-efficient.
Outpatient center, lower workload	Air-cooled often adequate and simpler.
Hot or humid climate	Water-cooled offers better room temperature control.
Limited mechanical room access	Air-cooled avoids chiller and heat exchanger logistics.

4. Climate Control & HVAC

CT scanners are sensitive to temperature and humidity excursions. Out-of-range conditions cause image quality drift, accelerated component wear, and in extreme cases automatic protective shutdowns that take the scanner offline mid-shift. The HVAC system serving the CT suite must be specified for continuous operation, with separation between the scan room, control room, and equipment alcove.

Temperature & Humidity Specifications

Parameter	Recommended
Scan Room Temperature	64°F – 75°F (18°C – 24°C)
Control & Equipment Areas	59°F – 75°F (15°C – 24°C)
Relative Humidity	30% – 70%, non-condensing
Temperature Stability	±2°F over 24-hour period
Operating Schedule	24 hours a day, 365 days a year — including off-hours

Maintaining Conditions 24/7

CT scanners are designed to be powered on continuously, even when no scans are scheduled. The X-ray tube benefits from being held at operating temperature rather than cycling through cold starts, and the gantry's internal electronics maintain calibration only when ambient conditions stay stable. That means the HVAC serving the CT suite must run continuously through weekends, holidays, and overnight hours — not on the typical building schedule that powers down when offices close.

Heat output from other parts of the facility should not influence conditions in the CT suite. If your building's HVAC zoning ties the CT room to a larger area where temperature varies with sun load, occupancy, or kitchen activity, the scan room should be re-zoned with its own dedicated thermostat and supply registers.

Air Quality

Dust and particulates accelerate wear on gantry bearings, fans, and electronic components — particularly in air-cooled designs. Filtration at the air handler should be MERV 13 or better, and the scan room should be designed with slight positive pressure relative to the corridor to prevent dust infiltration through door openings.

5. Electrical Requirements

CT scanners draw substantial electrical power, with sharp short-duration current spikes during X-ray exposure. The electrical service feeding the scanner must be sized appropriately, isolated from sensitive equipment elsewhere in the building, and installed in full compliance with applicable codes.

Code Compliance

All electrical work for a CT installation must comply with the National Electrical Code (NEC) and any applicable state and local amendments. A qualified electrical contractor experienced with imaging equipment installations should perform the work. Improperly sized conductors, incorrect grounding, or non-compliant disconnects can damage the scanner, create life-safety risks, and void the system warranty.

Typical Electrical Specifications

Exact electrical specifications vary by manufacturer, model, and cooling configuration (water-cooled, air-cooled, or split systems each have different power profiles):

Item	Typical Requirement
Main Service	208V or 480V three-phase, dedicated branch from main switchgear
Typical Continuous Load	20 – 50 kVA depending on slice count and cooling type
Peak Scanning Load	Up to 100 kVA during high-power acquisitions
Branch Circuits	Sized per OEM specifications and NEC Article 517
Grounding	Dedicated equipment ground per OEM specification

Item	Typical Requirement
UPS	Recommended for the host computer and image archive
Emergency Power Off	Required button in scan room, accessible to operator

Emergency Power Off

Every CT scan room is required by code to include at least one Emergency Power Off (EPO) button, positioned where the operator can reach it quickly from the control area or scan room entrance. The EPO disconnects power to the scanner and disables radiation production immediately when activated. The button location, signage, and reset procedure are all reviewed during the medical physicist's commissioning inspection.

Power Quality

Voltage sags, harmonics, and transient surges from elsewhere in the building can degrade CT image quality and damage sensitive electronics. A dedicated step-down transformer or active power conditioner upstream of the scanner isolates the system from building-wide power quality issues.

A UPS for the host computer and image archive is strongly recommended, particularly in regions with frequent lightning storms, brownouts, or unstable utility service. Generator backup for full scanner operation is generally optional and depends on whether the facility needs continuous CT availability during extended outages.

6. Plumbing & Mechanical Utilities

Beyond electrical service, several mechanical utilities serve the CT suite. Most are routine, but each needs to be in place before commissioning.

Chilled Water Supply (Water-Cooled Systems)

Water-cooled CT gantries require continuous chilled water supply to the gantry heat exchanger. Typical specifications:

Parameter	Typical Requirement
Flow Rate	5 – 15 GPM depending on system
Supply Temperature	45°F – 50°F at the gantry inlet
Return Temperature	75°F – 85°F maximum
Pressure	30 – 60 PSI at the gantry inlet
Water Chemistry	pH 7.0 – 8.5; hardness below 100 ppm as $CaCO_3$
Glycol Concentration	25 – 40% propylene glycol where outdoor lines see freeze risk

Other Utilities

- Medical gases (oxygen, vacuum) — required at the patient table for contrast-enhanced and emergency studies
- Floor drain near the gantry — useful for spill cleanup and contrast media handling
- Patient sink and contrast preparation area in or adjacent to the control room
- Data network connectivity — fiber optic preferred for the connection to PACS and RIS
- Telecommunications for the operator console — voice and data ports

7. Rigging & Delivery

Compared to MRI, CT rigging is straightforward — the gantry is heavy but not magnetic, and there is no cryostat that needs to stay cold during transit. That said, proper rigging still matters. A modern multi-slice CT gantry weighs between 4,000 and 6,500 pounds, with the patient table adding another 400 to 600 pounds. Getting that mass safely from the truck to the scan room without damaging finishes, blocking traffic, or compromising the scanner takes coordination.

Access Route Requirements

- Minimum 8'-0" clear width along the entire delivery path
- Minimum 9'-0" clear ceiling height
- Doors along the path: 4'-0" minimum width preferred, 3'-6" absolute minimum
- Elevators must accommodate 6'-0" depth and the full gantry weight
- Loading dock or grade-level staging within reasonable distance of the scan room

Floor Loading

The gantry concentrates significant weight on a small footprint. The scan room floor and the entire delivery route must support both the static weight of the scanner and the dynamic loads from rigging dollies and lift equipment. For ground-floor installations on slab-on-grade, this is rarely a concern. For elevated floor installations, a structural engineer must verify floor capacity before the gantry is moved into the space.

Delivery Coordination

Unlike MRI, a CT install does not typically require a specialized rigging firm — experienced medical equipment movers can handle most CT scanner deliveries. The OEM or installation team typically provides the rigging plan as part of the installation contract. Confirm during site planning whether rigging is included in your purchase agreement or whether it falls to the customer to arrange separately.

8. Patient Safety & Workflow Design

CT site planning extends beyond the technical infrastructure to the practical patient workflow that the room must support every day. Patient flow, staff safety, signage, and communication all influence the final layout.

Radiation Signage

Permanent radiation warning symbols must be posted at every entry to the CT suite and on the scan room door itself. Additional signage at the entrance must include the universal radiation warning trefoil and a notice for patients who are or may be pregnant — these signs are required by state radiation control regulations and inspected during commissioning.

Operator Safety

Technologists working with CT patients are exposed to the highest occupational doses in the imaging environment — from contrast injections, patient positioning, and unavoidable proximity during certain procedures. Site design supports operator safety through:

- Shielded operator console with leaded viewing window
- Lead aprons, thyroid shields, and protective eyewear stored within easy reach
- Dosimetry badge stations at the entrance to the controlled area
- Sufficient distance between operator station and gantry during scanning

Patient Flow

A well-designed CT suite supports smooth patient flow without unnecessary backtracking. Typical patient flow runs from the waiting area through reception, to a changing area or dressing room, into the scan room for the study, and back out through a recovery or post-scan area. Wheelchair and gurney access need to be planned along the entire route — door widths, turning radii, and clear paths through the space.

9. Project Timeline — What to Expect

A refurbished CT installation, from signed contract to first patient scan, typically runs 4 to 8 weeks. This is significantly shorter than MRI because there is no superconducting magnet to cool, no RF shield to test, and no cryogen logistics to coordinate. The timeline below represents a typical outpatient imaging center installation.

1	Week 1–2: Final site survey, physicist's shielding report ordered, permits applied for. Architect and contractor selected.
2	Week 2–4: Demolition (if applicable), structural modifications, slab preparation. Long-lead items (shielding materials, doors, viewing window, chiller) ordered.
3	Week 3–5: Construction phase — lead shielding installation, electrical rough-in, HVAC modifications, plumbing for water-cooled systems.

4	Week 4–6: Construction finishes, equipment alcove built out. Site is ready for scanner delivery once shielding inspection passes.
5	Week 5–7: Scanner delivery, rigging into final position, system installation by the OEM or vendor service team. Calibration and image quality validation begin.
6	Week 6–8: Medical physicist commissioning inspection, state radiation control survey, ACR accreditation phantom scanning if required. Applications training for technologists.
7	Week 7–8+: First patient scan. Ongoing service plan kicks in. Post-install support window with the installation team for any tuning or workflow adjustments.

10. Site Readiness Checklist

Before scanner delivery, every project should pass through a final site readiness review. This punch list catches the last details before the truck arrives:

STRUCTURAL & ARCHITECTURAL

- Access route measured and verified end-to-end
- Scan room dimensions confirmed against final site drawing
- Floor load capacity verified, especially if installation is above grade
- Ceiling height verified clear of obstructions
- Adjacent room occupancy documented for the physicist's report

SHIELDING

- Medical physicist's shielding report received, stamped, and on site
- Lead shielding installed per the physicist's specification — walls, doors, ceiling, floor perimeter

- Lead-equivalent viewing window installed and inspected for continuity
- Shielding lapped at all joints with no leakage paths
- State radiation control program notified of pending installation

MECHANICAL & ELECTRICAL

- Dedicated electrical service installed, tested, and code-compliant
- Branch circuits, disconnects, and grounding completed per OEM specification
- Emergency Power Off button installed and labeled
- HVAC running and maintaining specified temperature and humidity
- Chilled water supply active (water-cooled systems) meeting all flow, temperature, pressure, and chemistry requirements
- UPS or backup power provisions in place for the host computer

OPERATIONAL

- Permanent radiation warning signage posted at all entry points
- Pregnancy notification signage posted at scan room entrance
- Dosimetry program active for radiation workers
- Lead aprons, thyroid shields, and eyewear delivered and staged
- Intercom system tested between control and scan rooms
- PACS and RIS integration tested with IT team

Putting Together Your CT Project

CT site planning sits at the intersection of architecture, radiation physics, electrical and mechanical engineering, and project management. The facilities that consistently hit their go-live dates do so by engaging the right experts early — a qualified medical physicist for the shielding plan, an electrical contractor with imaging experience for the power work, an HVAC engineer who understands continuous-load environments, and a project manager who keeps all of those threads coordinated.

Before you finalize a scanner purchase, the practical checklist is simple. Consult with your equipment provider about your facility's site requirements. Check your state's specific radiation regulations. Document the construction phase carefully as it progresses. Schedule the construction completion date with margin. And only then schedule the scanner delivery, with the certainty that the room will be ready.

Amber Diagnostics has installed hundreds of refurbished CT scanners across North America, in modalities ranging from 16-slice through 128-slice and beyond. Our project management team works alongside your facilities, IT, and clinical staff from the first site survey through first patient scan. If you have questions or need help with any aspect of your CT project planning, do not hesitate to reach out.

READY TO PLAN YOUR CT PROJECT?

Our project management team will walk through your site with you, identify the considerations specific to your space, and build a realistic timeline and budget around your facility. Contact us today at AmberUSA.com or call our Orlando headquarters at 407-509-6739 to schedule a site planning conversation. Refurbished CT scanners from Amber typically save 40 to 60 percent versus new pricing — without compromising quality, performance, or familiar platforms.

All technical specifications in this guide are general reference figures and should be verified against the specific OEM siting documentation for your selected CT scanner. Local building codes, state radiation control program requirements, and facility-specific conditions may impose additional requirements not covered here. Final shielding specifications must be calculated and stamped by a qualified medical physicist.