Within any new practice or remodel, good site planning is essential. Considering the range of design decisions, special note should be given to the radiographic suite. Proper equipment installation and operation is only available when the electrical, mechanical and plumbing requirements are met. Additionally, room dimension and location play important roles in maximizing the efficiency of the radiographic suite.

If room or equipment requirements are not established in the planning stages, costly construction rework may be necessary prior to the installation of the equipment. However, giving attention to the following requirements, and making note of them, will allow equipment installation to be efficient and accurate.

Too often small items are easily overlooked. And though these items don't interfere with the performance of the equipment, some efficiency may be lost or problems can arise. This Guide identifies some of those small things to help design the most efficient and effective radiographic suite possible. These items are identified by the $\mathbb{E}$ symbol.

The ImageFirst™ Site Planning section includes information on:

- X-ray room
- Darkroom
- Example of a radiographic suite layout
- Summit equipment specifications including:
  - Dimensions and weights
  - Electrical requirements
  - Mechanical requirements
Site Planning

For proper installation and performance, all requirements should be met. Room and equipment requirements are identified by the symbol. Take special notice of all these items. Equally important, the X-ray room and darkroom must meet or exceed all State and Local Building Codes. To learn more about building codes, contact your architect or building contractor.

Beyond the equipment requirements, proper radiation shielding must be provided. Every state differs in shielding requirements and procedures. To learn more about shielding and licensing requirements for your area, visit www.crspd.org (Conference of Radiation Control Program Directors, Inc.) and select the “State Radiation Control Programs” from the home page.

Your ImageFirst Certified Dealer is an invaluable resource during the planning and pre-installation stages of your new radiographic suite. Your commitment to your ImageFirst Certified Dealer will be met with a reciprocal commitment to you — a relationship dedicated to efficiency, safety and diagnostic capability.

The X-Ray Room

Understanding that radiography is primarily used for new patients, allocation of space for the room is usually kept to a minimum. However, it is important to plan for both current and future imaging needs. Will a standard 60 Hz X-ray generator be upgraded to high frequency someday? Proper planning today can eliminate the cost of remodeling.

The function of the X-ray room does not vary, but designs do. Some chiropractors design the room specifically for X-ray. Others will increase the room size and create a multi-purpose room to accommodate patient exam and X-ray. Consider the patient—will they enter the room and see a cluttered control booth? Can the operator easily position them in front of the wallstand? How quickly can the operator move behind the control booth wall once the patient is positioned? Like every other room in the office, a good design and layout can maximize efficiency without wasting space.
What constitutes a good x-ray room design?

**Location**

- To minimize shielding expenses, select a location with one or more outside walls and avoid common walls with heavily occupied areas, such as the waiting room or reception area.
- Locating the x-ray room close to the incoming power can reduce the cost for wiring.
- The x-ray room and darkroom should be adjoined or proximal to one another for maximum efficiency.

**Size & Materials**

- Consider a room dimension of 8 ft. x 11-1/2 ft., which will allow the x-ray system and the operator control booth to be run in-line. If the room is more square in shape, additional costs may be incurred for radiation shielding and/or extended wire and cable lengths for equipment interconnection.
- When determining final room dimensions, refer to the equipment specifications in this section for equipment dimensions.
- To accommodate the tube stand height and movement, the ceiling should be a minimum of 90 in. If minimum ceiling height cannot be met, contact your ImageFirst Certified Dealer.
- Vinyl flooring is recommended. Vinyl material is easy to clean, it minimizes the build-up of static electricity and it allows for easier movement of the tube stand.
- If carpet is the preferred floor covering, it is recommended that carpet padding be eliminated. If padding is a must, select a minimal pad thickness and/or remove it from the area where the x-ray tube stand will be mounted. Carpet padding can cause uneven settling of the tube stand which can impede tube stand movement.
- Consider sheet lead in rolls, drywall with embedded lead or additional drywall layers to meet radiation shielding requirements for minimum lead equivalencies.

**Structural**

- Consider mounting a shelf in the control booth for managing the patient exposure log.
- True walls and a level floor will ensure proper equipment alignment and installation.
The tubestand requires either a wall or ceiling support for mounting.

- The tubestand requires either a wall or ceiling support for mounting. Refer to the equipment specifications for additional information.
- If the tubestand is ceiling mounted, locate the ceiling support beam directly above the ceiling material (e.g. suspended ceiling tiles).
- The wallstand requires a support in the wall for mounting. Refer to the equipment specifications for additional information.
- If the x-ray room is above ground level and load bearing is a concern, refer to the equipment specifications for weight measurements.

**Electrical**

- Overhead fluorescent lighting can make the x-ray field light difficult to see. In addition to fluorescent lights, consider adding 2 or 3 incandescent lights to achieve proper lighting during x-ray exams.
- If the x-ray room includes a viewbox, consider placing the 110V outlet adjacent to the viewbox’s power cord attachment.
- Including a 100A disconnect today can eliminate re-wiring expenses when x-ray system upgrades to high frequency are considered in the future.
- The disconnect switch for the x-ray generator can be flush or surface mounted. If the disconnect switch is flush mounted, a junction box with a 12 in. pigtail should be located near the location of the 60 Hz transformer or HF power cabinet.
- The disconnect switch should be mounted 5 ft. above the finished floor to afford operator access.
- The ChiroSelect™, as well as some x-ray components, require 110V power for electric lock operation. Refer to the equipment specifications for additional information.
- For required wire size and disconnect rating refer to the equipment specifications.

*The X-Ray Room must meet or exceed all State and Local Building Codes.*
The Darkroom

Darkrooms are small spaces that handle a lot of work. From reloading cassettes to processing films to monthly processor cleanings, the darkroom needs to be functional. When a film processor is on, the chemistry is heated and the odors build. Good ventilation is a must and is usually met by a standard bathroom fan.

In a small space clutter can be a problem. Storage and a planned workspace can offer efficiency without chaos. Consider the routine in processing films. You enter the darkroom and place the cassettes on a countertop, open them one at a time, stamp the exposed film in the ID printer and feed it into the processor. You then retrieve a new piece of film from the film box, place it into the opened cassette, close the cassette and start the routine all over with the next cassette. That is a lot of steps, so consider the flow pattern. How do you like to work? Left to right or front to back? Will you need to twist your back to reach from the countertop to the processor's feedtray? Will managing several cassettes at one time be a problem? Is there enough countertop space? Design for the function and you'll have an efficient darkroom design.

Many darkrooms suffer from poor planning. Either it is too small or it is large enough that it becomes a stock room. A good darkroom design is one that is designed specifically for the purpose — a dark room to process x-ray film. What constitutes a good darkroom design?

Location

- To minimize plumbing expenses, locate the darkroom adjacent to other rooms requiring plumbing, such as a bathroom.
- Locating the darkroom close to the x-ray room will enable efficient cassette reloading.
- Avoid choosing a room that includes a window or skylight.

Size & Materials

- Consider a room dimension of 5 ft. x 6 ft. minimum. This should accommodate an automatic film processor and workspace countertop and utility sink.

When a film processor is on, the chemistry is heated and the odors build. Good ventilation is a must.

Storage and a planned workspace can offer efficiency without chaos.

Consider the flow pattern. How do you like to work?

A good darkroom design is one that is designed specifically for the purpose — a dark room to process x-ray film.

The darkroom should be 5 ft. x 6 ft. minimum.

Locating the darkroom close to the x-ray room will enable efficient cassette reloading.
**Site Planning**

- A drywall ceiling can eliminate light leaks from above. If a drop ceiling is unavoidable, use duct tape or filler to seal all the joints where white light leaks are present. If ceiling tiles raise or shift as air pressure changes, place small weights on top of the tiles to prevent dust and light leaks.

- Vinyl floors are recommended for easy cleaning. Select a dark color to conceal the effects of staining.

- To prevent light leaks around the door, use weather stripping material around the door-jamb and install a door sweep on the bottom of the door. Select items with good sealing properties.

- Use white paint on the walls and ceiling for improved light reflection during safelight conditions.

- When the darkroom is adjacent to the x-ray room, lead shielding may be required to protect the film storage area. Consult with your ImageFirst Certified Dealer or refer to your state regulatory agency for specific requirements.

**Structural**

- The darkroom must be light tight. To identify light leaks, spend several minutes in the darkroom with the door closed. The overhead white light and the safelight should be off. After a few minutes, your vision will be adjusted to the dark. Look for light leaks around the door, ceiling and walls. Use a filler, duct tape, etc. to seal or cover the leaks.

- Include a countertop to accommodate film handling and cassette reloading. Recommended countertop height is 34 in. If a floor mounted film bin is being installed, verify the height of the film bin before establishing the countertop installation height.

**Electrical**

- Include an overhead light fixture for proper room illumination during monthly processor maintenance, service and darkroom cleaning.

- If the overhead light fixture and the safelight are operated by wall switches, separate the height or location of the two switches to avoid inadvertent exposure of the film.
Site Planning

- Include a 110V outlet at countertop height to meet the power requirements of the ID printer and safelight. Position the outlet at the area where the ID printer and safelight will be located.
- The safelight should be mounted in a location that provides good illumination over the workspace and processor feedtray. The safelight must be a minimum of 4 ft. from workspace or feedtray to prevent film fog.
- The maximum bulb wattage for the safelight is 15W.
- A 110V outlet is required to power most automatic film processors. Refer to the processor specifications to determine if a 15A or 20A configuration is required. Position the outlet in an area around the processor and at a height to afford easy access.

Plumbing

- A utility sink, with hot and cold water, should be included in the darkroom to enable monthly processor cleaning.
- To optimize space allocation, consider placing the utility sink under the countertop. Design the countertop (or the portion over the sink) to lift open to accommodate access to the sink. Include a locking mechanism to keep the countertop up during sink use.
- For added efficiency, select a faucet with threads for attaching a short water hose. This will afford easy cleaning of the processor and replenishment tanks.
- Most processors require a cold water connection. Refer to your processor product specifications for exact plumbing requirements.
- A standard 1-1/2 in. floor or wall drain is usually required. PVC material is recommended. If a wall drain is being installed, the drain height should not exceed 12 in. above the finished floor. To accommodate processor drain hoses, the drain mouth should be 2 - 3 in. in diameter. Refer to your processor product specifications for drain inlet diameter and maximum height for wall drains.

The Darkroom must meet or exceed all State and Local Building Codes.
Site Planning

Radiographic Suite

For details, see the following pages.
X-Ray Room

Refer to the product specification for exact wiring requirements.

Add a low table and chair to accommodate extremity positioning.

If adding a viewbox in the x-ray room, position the 110V outlet near the location of viewbox power cord.
Carefully position the control booth window to accommodate a range of operator heights.

The disconnect switch should be placed 5 ft. above the finished floor for easy operator access.
Darkroom

110V 15A duplex at counter height

Utility sink with hot and cold water located under a hinged countertop

Automatic Film Processor
Processor feedtray

Inside Dimension 6 ft.
Inside Dimension 5 ft.

110V 15/20A outlet
Check product specs to verify power requirements

Check processor specifications to identify the connection requirements for the water supply.

Locate the water supply and ball valve at a comfortable height for easy access after the processor is installed.

Check the processor specs to verify maximum height of the drain.
Synergy 200™ High Frequency Generator

SPACER REQUIREMENTS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Module</td>
<td>37&quot; height, 16&quot; depth, 18&quot; width</td>
</tr>
<tr>
<td>Generator Console</td>
<td>Approx. 3&quot; x 8-1/2&quot; x 17&quot;</td>
</tr>
<tr>
<td>Communication Cable</td>
<td>Two cables (25' or 50'), 2&quot; conduit required</td>
</tr>
<tr>
<td>Cable Access</td>
<td>At power module rear, 21&quot; above floor</td>
</tr>
</tbody>
</table>

ELECTRICAL REQUIREMENTS

**30 kW Version:** 230 VAC +/- 10%, single phase, 195 Amp draw, 100 Amp disconnect. 45 kVA distribution transformer, maximum allowable voltage drop under full load to be 5%. Recommended copper wire sizes are #1 for 50' run, #00 for 100' run, #0000 for 200' run. (Run is distance between distribution transformer and service disconnect.)

The generator provides 24 VAC and 24 VDC supply voltages for locks and collimation. (If a 110 VAC supply for structures is required it must come from a breaker or outlet.)

SHIPPING INFORMATION

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>DIMENSIONS</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Console &amp; Power Module</td>
<td>32&quot; x 28&quot; x 42&quot;</td>
<td>245 lbs.</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.
Floor/Wall or Floor/Ceiling Tubestand

TABLE B: Tubearm Lengths

10" for Chiro applications some non-angulating tubemounts.
14" for small tables
17" for stationary integrated tables
19" for other fixed radiographic tables
23" for radiographic float-top tables
Site Planning

Wallstand

TRAVEL AND ALIGNMENT CONSIDERATIONS

<table>
<thead>
<tr>
<th>Wall to rear of column</th>
<th>1/8&quot; (flush) or 1-1/2&quot; (offset)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall to film plane</td>
<td>10&quot; (flush) or 11-3/8&quot; (offset)</td>
</tr>
<tr>
<td>Center of film plane vertical travel</td>
<td>72-3/4&quot; maximum to 9-3/4&quot; minimum</td>
</tr>
</tbody>
</table>

MOUNTING SPECIFICATIONS

<table>
<thead>
<tr>
<th>Minimum ceiling height</th>
<th>86&quot; from finished floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall bracket mounting hole centers</td>
<td>Four total, 85&quot; from finished floor</td>
</tr>
<tr>
<td>Four wall anchors, each with a minimum pull-out force of 250 lbs. Two floor anchors, with a minimum pullout force of 500 lbs.</td>
<td>See reference sheet for typical holding forces of various devices in common construction materials.</td>
</tr>
</tbody>
</table>

ELECTRICAL REQUIREMENT FOR ELECTRIC LOCK VERSION

24 VDC, 2 Amp, from D164 power supply (included) or 325 Generator.

SHIPPING INFORMATION

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>DIMENSIONS</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Column</td>
<td>8&quot; x 9&quot; x 86&quot;</td>
<td>118 lbs.</td>
</tr>
<tr>
<td>Accessory Carton</td>
<td>13&quot; x 32&quot; x 27&quot;</td>
<td>65 lbs.</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.
# Site Planning

## Wallstand

<table>
<thead>
<tr>
<th>TYPE OF WALL BRACKET</th>
<th>DIMENSION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&quot;A&quot;</td>
</tr>
<tr>
<td>FLUSH</td>
<td>10&quot;</td>
</tr>
<tr>
<td>OFFSET</td>
<td>11(\frac{3}{8})&quot;</td>
</tr>
</tbody>
</table>

![Diagram of Wallstand]

- **Floor Plate Detail:**
  - "D": 4\(\frac{1}{2}\)"

- **8.6" Minimum Ceiling Height:**
  - 85"

- **14 x 17 Grid Cab:**
  - 72 - 3\(\frac{1}{4}\)" Maximum

- **9 - 3/4" Minimum:**
  - (23" Grid Cabinet: 24\(\frac{1}{8}\)" Bucky)
Site Planning

Nova 325/360 Generator

**SPACE REQUIREMENTS**

<table>
<thead>
<tr>
<th></th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>22-1/4&quot; wide x 12&quot; deep x 46&quot; high</td>
</tr>
<tr>
<td>Transformer</td>
<td>15&quot; diameter, 23&quot; high</td>
</tr>
<tr>
<td>Primary/Filament Cables</td>
<td>24', rear access</td>
</tr>
</tbody>
</table>

**ELECTRICAL REQUIREMENTS**

- 325 - 140 Amp maximum momentary draw at 240 VAC.
- 360 - 160 Amp maximum momentary draw at 240 VAC.
- Minimum fusing for 240 VAC is 70 Amps; 100 Amp service is recommended for 240 VAC and is required for 208 VAC operation.
- Distribution transformer supplying power to the unit to be 37.5 kVA.
- Recommended copper wire sizes are #2 for 50' run, #00 for 100' run, 250 mcm for 200' run. (Run is distance between distribution transformer and service disconnect.)
- Maximum acceptable line voltage drop under full load conditions is 5%.
- 24 VAC collimator power and 24 VDC lock power is available from the generator.

**SHIPPING INFORMATION**

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>DIMENSIONS (Palleted)</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control &amp; Transformer</td>
<td>60&quot; x 23&quot; x 26&quot;</td>
<td>489 lbs.</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.
Site Planning

Floor/Wall or Floor/Ceiling Tubestand

TRAVEL AND ALIGNMENT

<table>
<thead>
<tr>
<th>Longitudinal travel of Focal Spot</th>
<th>Rail length less 7&quot; at each end.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical travel of Focal Spot</td>
<td>77&quot; maximum, 10&quot; minimum</td>
</tr>
<tr>
<td>Distance of Focal Spot from wall</td>
<td>Depending on application, distance is:</td>
</tr>
<tr>
<td>(assuming tubestand is wall mounted)</td>
<td>18-7/8&quot; (chiro), 22-7/8&quot; (mobile table),</td>
</tr>
<tr>
<td></td>
<td>27-7/8&quot; (stationary radiographic table),</td>
</tr>
<tr>
<td></td>
<td>31-7/8&quot; (float-top radiographic table)</td>
</tr>
</tbody>
</table>

MOUNTING SPECIFICATIONS

<table>
<thead>
<tr>
<th>Minimum ceiling height</th>
<th>89&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceiling mounting bolt locations</td>
<td>Minimum 1&quot; from rear wall</td>
</tr>
<tr>
<td>Wall bracket mounting bolt locations.</td>
<td>1&quot; and 4&quot; below top of ceiling rail (minimum ceiling height), each with a minimum pull-out force of 500 lbs.</td>
</tr>
<tr>
<td>Floor mounting bolt locations</td>
<td>At ends of 5' rail, approximately every 24&quot; on other rails, each with a minimum pull-out force of 500 lbs.</td>
</tr>
</tbody>
</table>

ELECTRICAL (OPTION)

24 VDC, 2 Amp, from additional D164 power supply or 325 Generator.

SHIPPING INFORMATION

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>DIMENSIONS</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accessory Carton</td>
<td>13&quot; x 32&quot; x 27&quot;</td>
<td>55 lbs.</td>
</tr>
<tr>
<td>8' Rails</td>
<td>8&quot; x 9&quot; x 112&quot;</td>
<td>68 lbs.</td>
</tr>
<tr>
<td>Column</td>
<td>8&quot; x 9&quot; x 86&quot;</td>
<td>136 lbs.</td>
</tr>
</tbody>
</table>

Specifications subject to change without notice.