Buyer

Telephone Number

E-mail Address

Fax Number

STATE OF CONNECTICUT

UNIVERSITY OF CONNECTICUT HEALTH CENTER
Procurement Operations & Contracts
263 Farmington Avenue, MC4036
Farmington, CT 06032-4036

RFP NUMBER:	PROPOSAL DUE DATE:	PROPOSAL DUE TIME: EST	RFP SURETY:
RFP TITLE:			

RFP ADDENDUM NUMBER: _____

DATE ADDENDUM ISSUED: _____

FOR: The University of Connecticut Health Center

NOTE TO PROPOSER: _____

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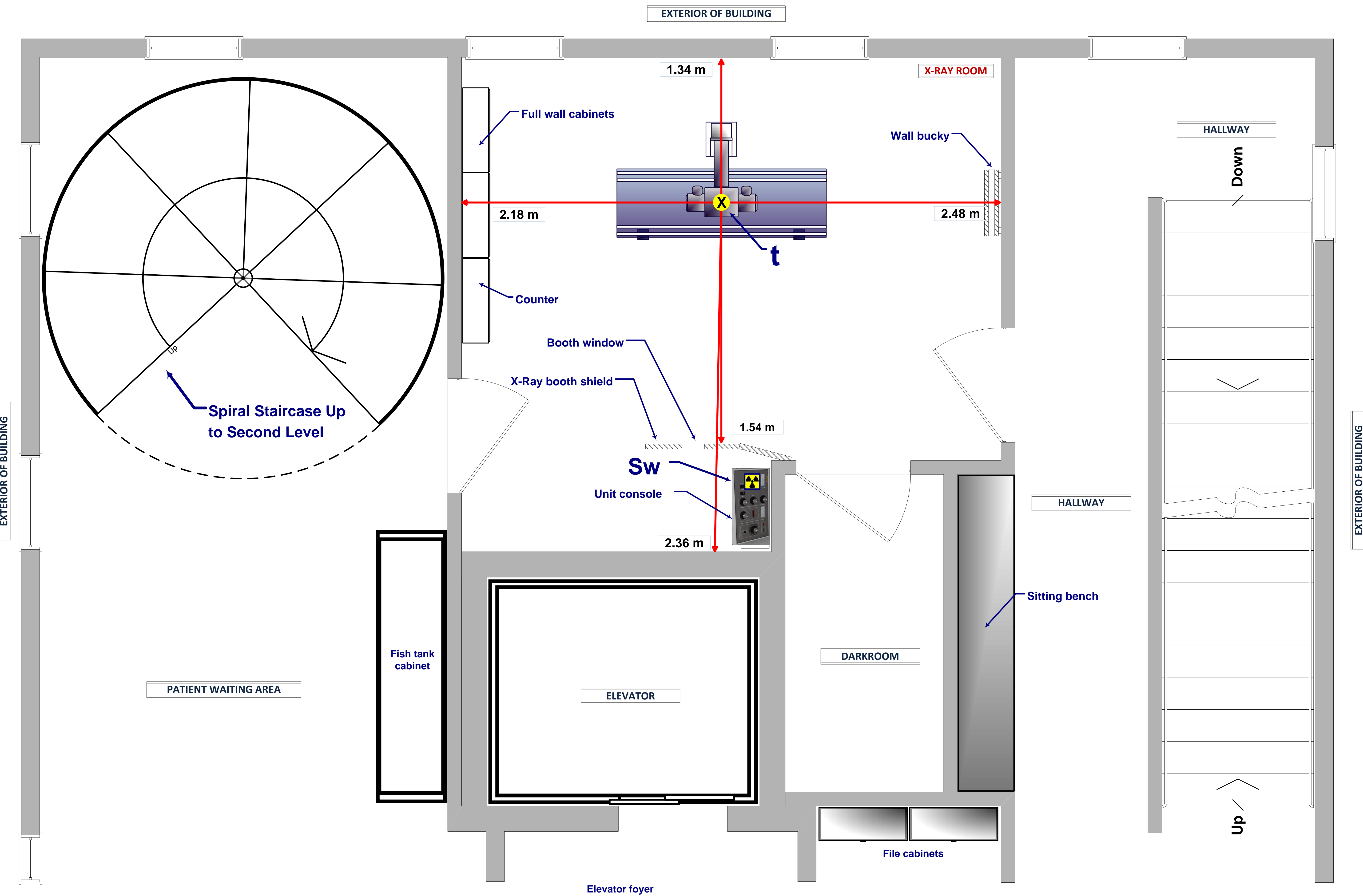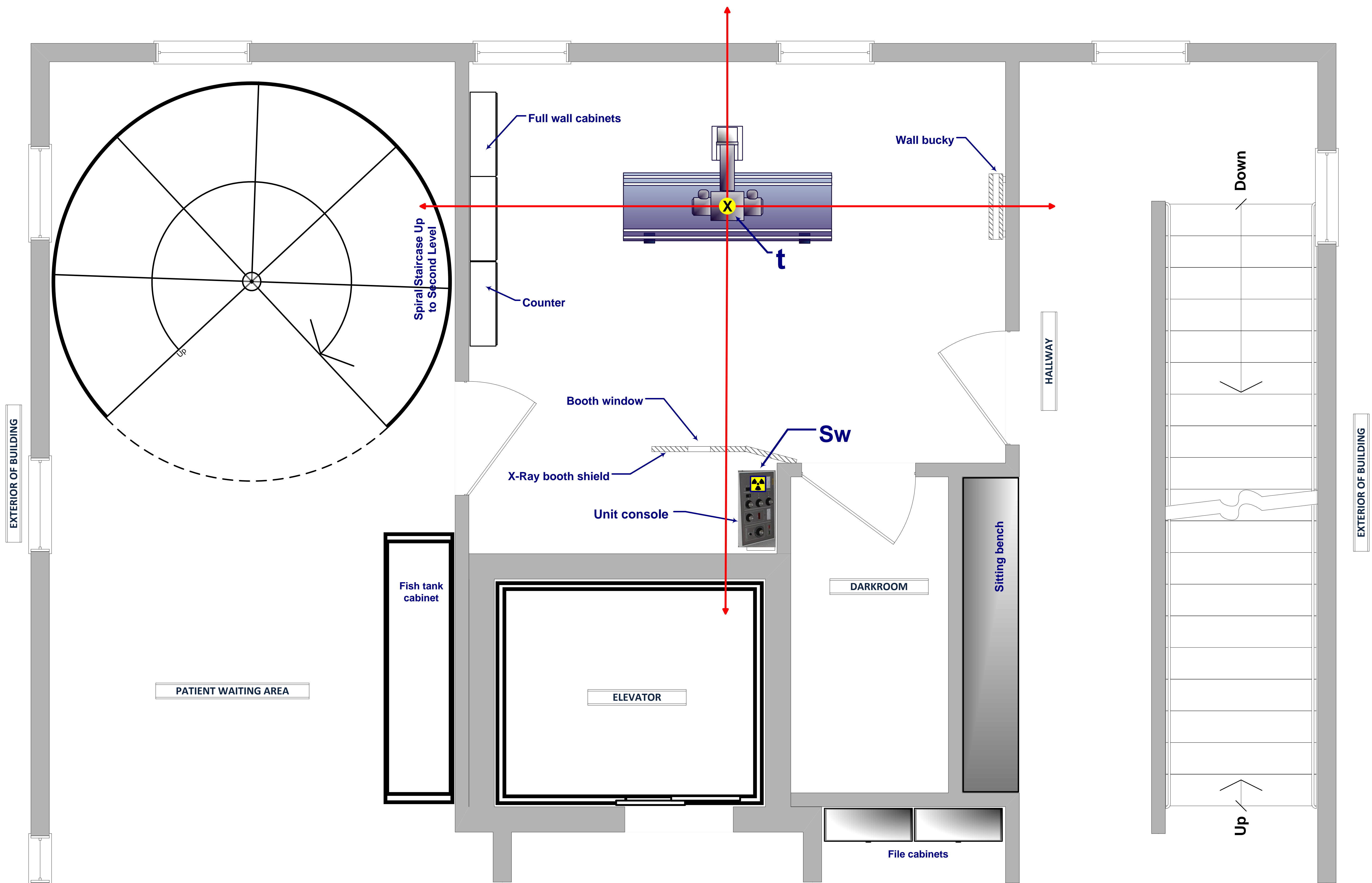**This Addendum must be *Signed & Returned* with your proposal.**

_____   _____
Authorized Signature of Proposer   *Company Name*
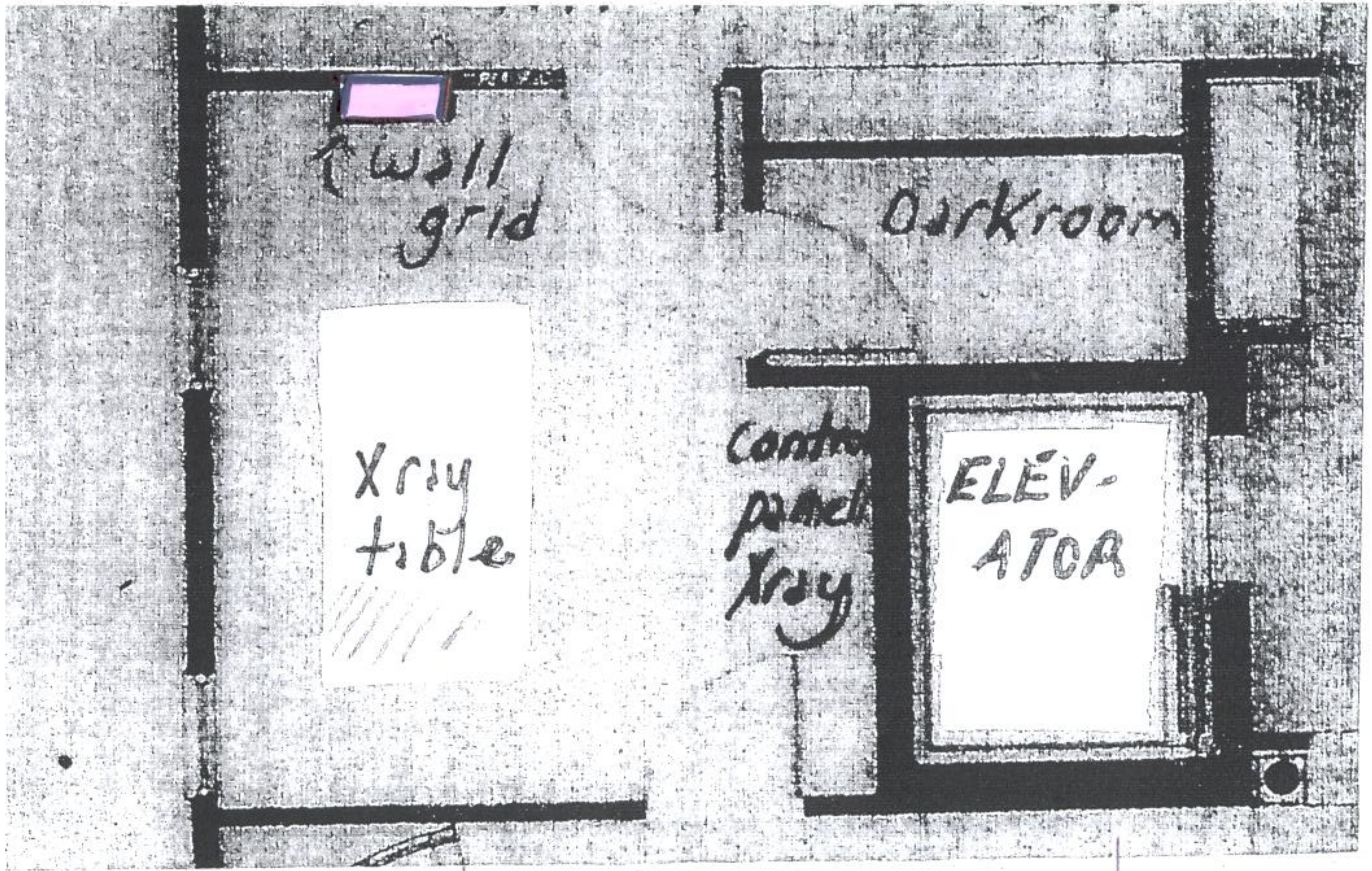
Approved By: _____

[   ]
Fiscal Administrative Officer
(Original Signature on Document in Procurement Files)

END OF ADDENDUM

EXTERIOR OF BUILDING

X-RAY ROOM

HALLWAY

Down

1.34 m

Full wall cabinets

Wall bucky

2.18 m

2.48 m

t

X

Counter

EXTERIOR OF BUILDING

Spiral Staircase Up
to Second Level

UP

Booth window

X-Ray booth shield

1.54 m

Sw

Unit console

HALLWAY

EXTERIOR OF BUILDING

2.36 m

Sitting bench

Fish tank
cabinet

ELEVATOR

DARKROOM

PATIENT WAITING AREA

Up

File cabinets

Elevator foyer

Medical Diagnostic X-Ray Equipment Compliance Survey and Shielding Evaluation Floor Plan	Facility: **University of Connecticut Health Center New England Musculoskeletal Institute 2 Simsbury Road, Avon, CT 06051**	Surveyed by: Jim Fomenko, C.H.P.	Page 1 of 1
		Date of survey: *Tuesday, May 8, 2012*	DRAWING NOT TO SCALE

Full wall cabinets

Wall bucky

Down

Spiral Staircase Up
to Second Level

X

t

Counter

HALLWAY

Booth window

Sw

X-Ray booth shield

Unit console

EXTERIOR OF BUILDING

EXTERIOR OF BUILDING

Fish tank
cabinet

DARKROOM
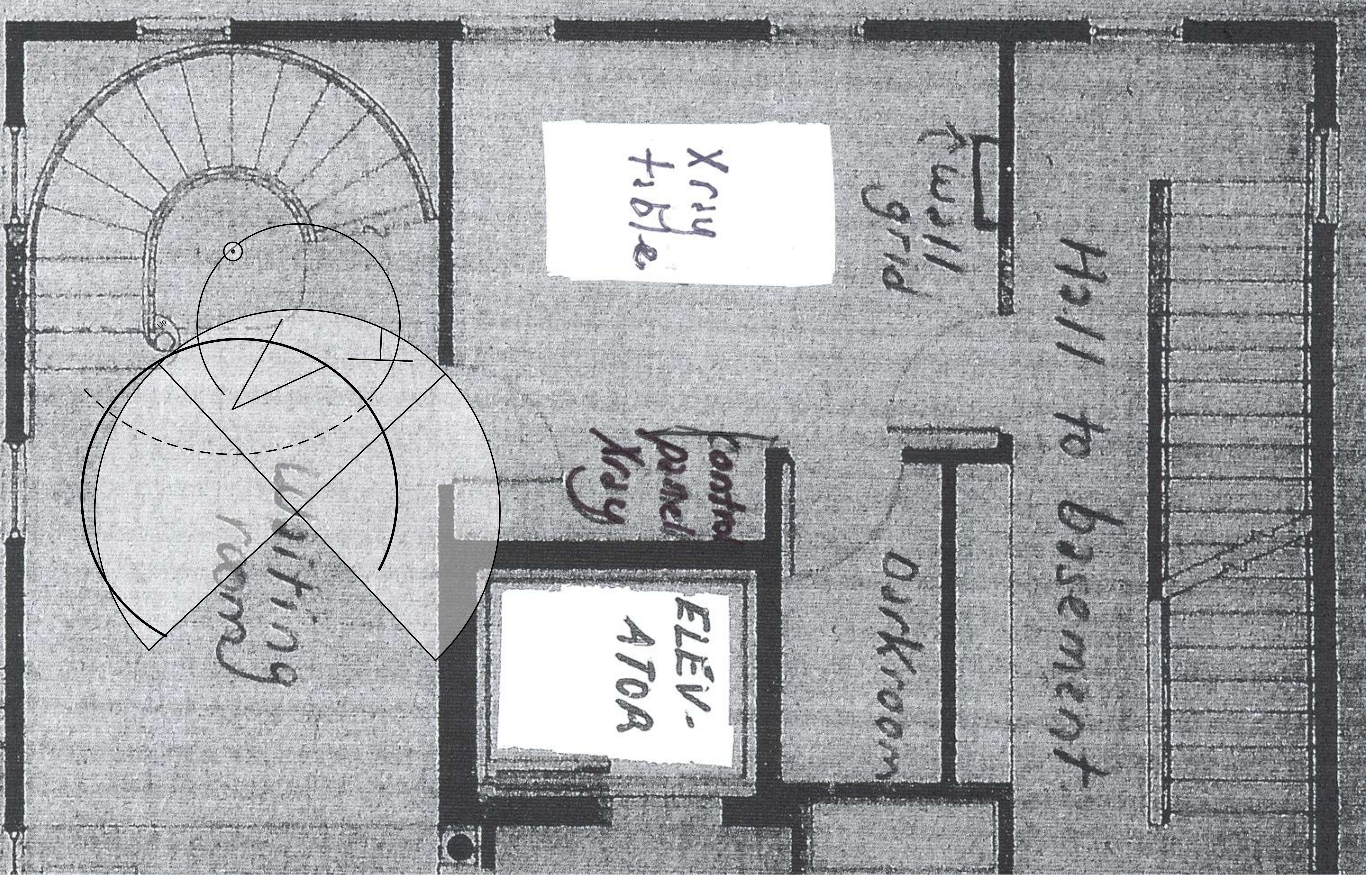
Sitting bench

PATIENT WAITING AREA

ELEVATOR

Up

File cabinets

wall grid
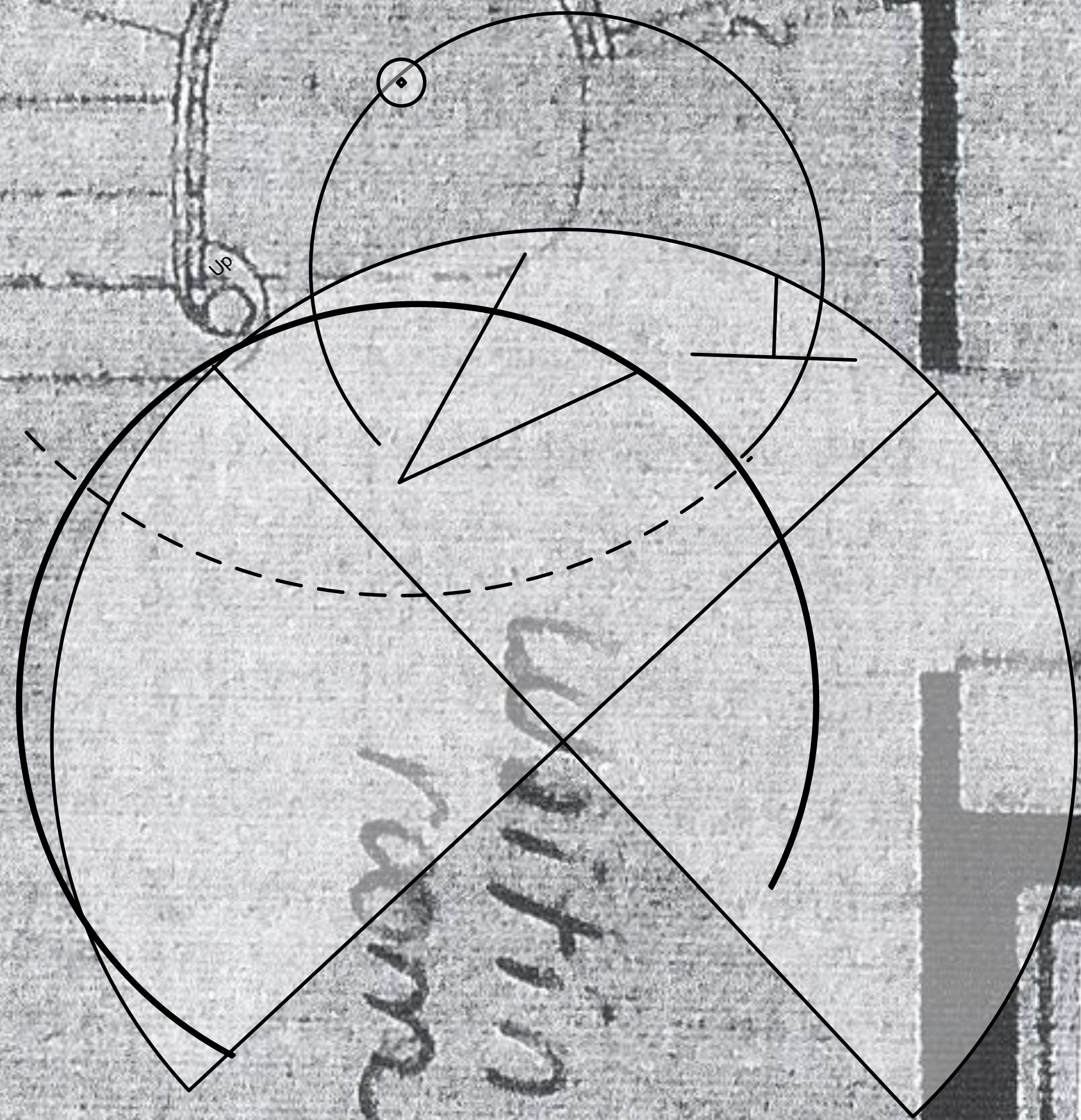
Darkroom

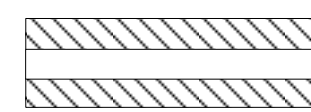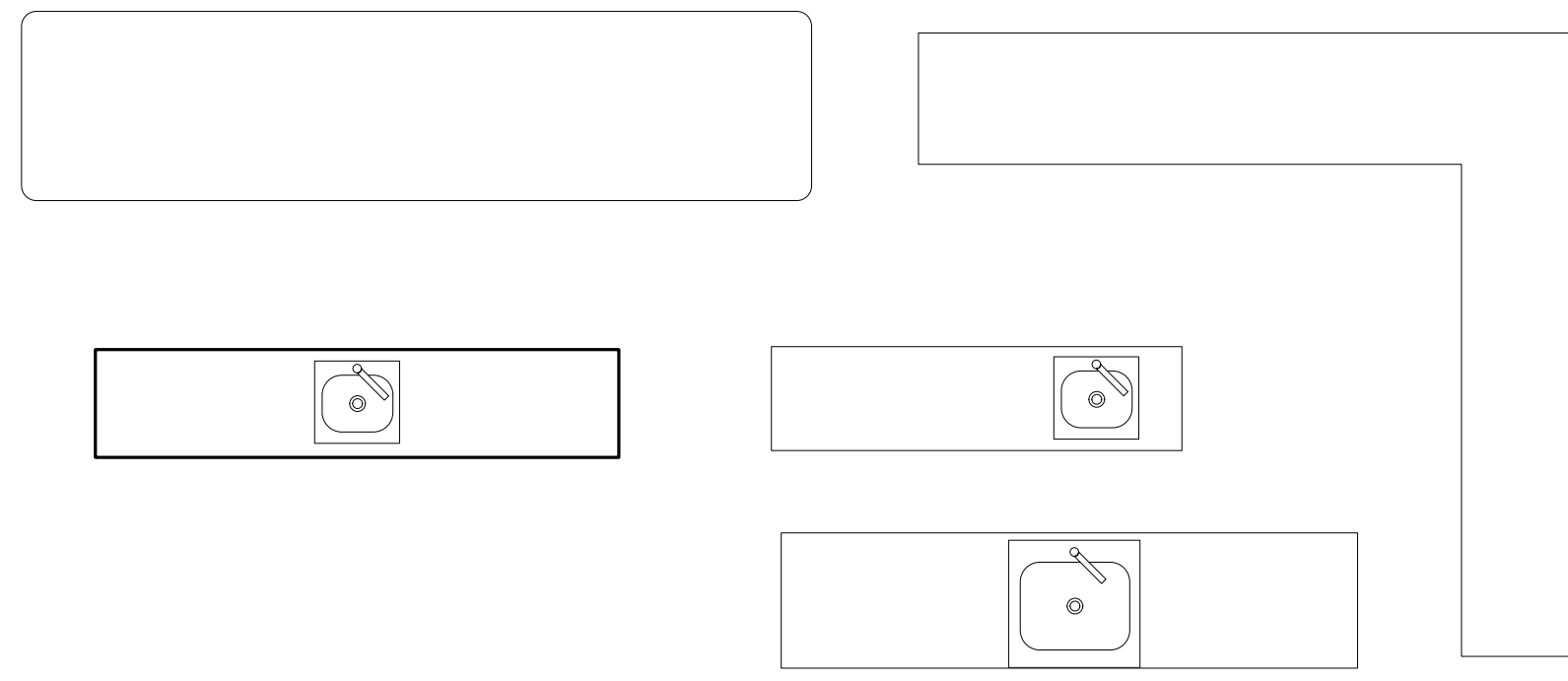Xray table

Control panel Xray

ELEV- ATOR

Heather Ort   December 26, 2012
UConn Health Center
New England Musculoskeletal Institute
2 Simsbury Road
Avon, CT 06051

Dear Heather,

Below is my radiation shielding evaluation report for the Americomp Model 325E
radiographic unit at the above location.

The following assumptions and information were used to make the radiation shielding
estimates.

The National Council on Radiation Protection and Measurements (NCRP) Report 147 on
Structural Shielding Design for Medical X-Ray Imaging Facilities was utilized to
evaluate shielding requirements.

Attached is a diagram that shows the location of the x-ray unit in the X-Ray room and the
areas surrounding this room.

The following workload information was used:

Primary beam output data for the Americomp Model 325E radiographic unit from a
Physicist report dated 3/23/12 was used.
Primary beam = 3.4 mR/mAs @ 30" @ 70 kVp.
            = 4.4 mR/mAs @ 30" @ 80 kVp.
            = 6.2 mR/mAs @ 30" @ 90 kVp.
Leakage = 0.1% of primary.
Beam Area = 1535 cm^2 for bucky and 1000 cm^2 for the table.
Scatter a1 factor @ 140 degrees (max. scatter).
The workload information below was used:
   Table (left): w= 5.6 mAs/patient = 1,120 mAs/month. N= 200 patients/month.
Assumed all x-rays directed at the floor. Max. kVp= 70.
   Table (middle): w= 70 mAs/patient = 15,400 mAs/month. N= 220 patients/month.
Assumed all x-rays directed at the floor. Max. kVp= 90.
   Table (right): w= 7.4 mAs/patient = 828.8 mAs/month. N= 112 patients/month.
Assumed all x-rays directed at the floor. Max. kVp= 80.
   Bucky (wall B): w= 30 mAs/patient = 12,000 mAs/month. N= 400 patients/month.
Assumed all x-rays directed at wall B. Max. kVp= 90.
.

The barrier transmission factors for lead and glass at 70, 80 and 90 kVp from Simpkin, H.P.S. Journal, Vol. 54, #3, March 1988, pp 345-347 were used.

The radiation limit design goal = 100 mrem/year

U- Use factor- the fraction of the workload during which the useful beam is directed at the barrier under consideration. U=1 for the primary barrier (floor below or wall B) when the x-ray beam is directed at that barrier.

T- Occupancy factor- the average fraction of time that a maximally exposed individual is present while the x-ray beam is on. For example, an occupancy factor T=1 for an area would imply that a given member of the public would spend an average of 40 hours/ week in that area (while the x-ray beam is activated) every week for a year.

d_{sec}= secondary radiation distance for leakage and scattered radiation defined here as the distance from the center of the patient's body or body part to the occupied area evaluation point.

d_p= primary radiation distance for primary radiation defined here as the distance from the x-ray tube to the occupied area evaluation point.

The occupied area evaluation point is 1 foot beyond each wall. The estimated distances d_{sec} or d_p are shown in **Table 1**.

Table 1: Estimated distances d_{sec} or d_p (feet) from the midline of the patient's body or body part to a maximally exposed individual at 1 foot beyond each wall or the approximate midline of a maximally exposed individual on the floor above or below. (Distances are for d_{sec} unless otherwise indicated).

Barrier	$X_{barrier}$ (cm) barrier thickness / barrier type	Table-left (feet)	Table-middle (feet)	Table-right (feet)	Bucky (feet)
Wall A (Operator)	0.159 / lead	7.17	6.05	7.17	10.08
Wall A (Elevator)	0.159 / lead	9.74	9.74	9.74	12.81
Wall B (Hallway)	0.159 / lead	12.61	9.56	5.52	d_p= 5.34
Wall C (Outside)	1 / glass	5.82	5.82	5.82	5.82
Wall D (Waiting room)	0.159 / lead	5.52	8.57	12.61	14.7
Floor Above (Kitchen)	0.159 / lead	10	10	10	10
Floor Below (Storage)	0.159 / lead	d_p= 8	d_p= 8	d_p= 8	d_p= 8

The floor below and wall B will include an additional 0.085 cm lead equivalent shielding attenuation for the cassette and image receptor supporting structures, as indicated in NCRP 147, when the primary beam is directed at that barrier. (1/16"= 0.159 cm).

The annual dose equivalent results (mrem/yr) that a maximally exposed individual could receive beyond each barrier from the radiographic x-ray unit are shown in **Table 2**.

Table 2: Estimated annual dose equivalent (mrem/yr) from primary, secondary and leakage x-ray transmission through each barrier for a maximally exposed individual beyond each barrier from the radiographic x-ray unit.

Barrier	T	Table-left mrem/yr.	Table-middle mrem/yr.	Table-right mrem/yr.	Bucky mrem/yr.	Total mrem/yr.
Wall A (Operator)	1	0	2.3	0	0.8	3.1
Wall A (Elevator)	0.05	0	0	0	0	0
Wall B (Hallway)	0.2	0	0.2	0	0.7	0.9
Wall C (Outside)	0.025	0.4	14.8	0.5	16.3	32
Wall D (Waiting room)	1	0	1.1	0	0.4	1.5
Floor Above (Kitchen)	1	0	0.8	0	0.4	1.5
Floor Below (Storage)	0.05	0	0.1	0	0.1	0.2

Table 2 shows that a maximally exposed individual who occupies an area adjacent to the X-Ray room where the x-ray unit is used could potentially receive a radiation dose up to 32 mrem/year. Additional shielding and radiation dosimetry badges are generally not required since the dose equivalents shown in Table 2 are below the recommended 100 mrem/year limit (design goal) for non occupationally exposed individuals. However, pregnant workers who operate an x-ray unit should be badged.

If the x-ray unit workload increases, a new x-ray unit is used and/or a layout change affects use or occupancy factors, then an x-ray shielding re-evaluation should be performed.

Please do not hesitate to contact me if you have any questions or require additional information.

Respectfully,

Jim Fomenko, CHP
Asst. RSO
UConn Health Center
Radiation Safety Office
263 Farmington Ave.
Farmington, CT 06030
860-679-2250

#1:	**Avon Facility -** The building, which is reported to be less than 30 years old has a 400 amp main panel in the basement. It is 208/120 VAC three phase power. It is a five wire configuration. The x-ray room is fed with three phase 208/120 VAC power. It is a five wire configuration with a 70 amp circuit breaker. The wire size appears to be #3 AWG. In addition Heath Ort measured the ceiling heights 101" in the Xray room 97 " in the Darkroom
#2	See the two attached documents on the layout and the Radiation Report for the Avon Radiology Suite would be useful information to send out to the Radiology Vendors to help them with their proposals. Avon Layout and Avon XRay Report.

March 20, 2013
END OF ADDENDUM