

STREAMING INNOVATION

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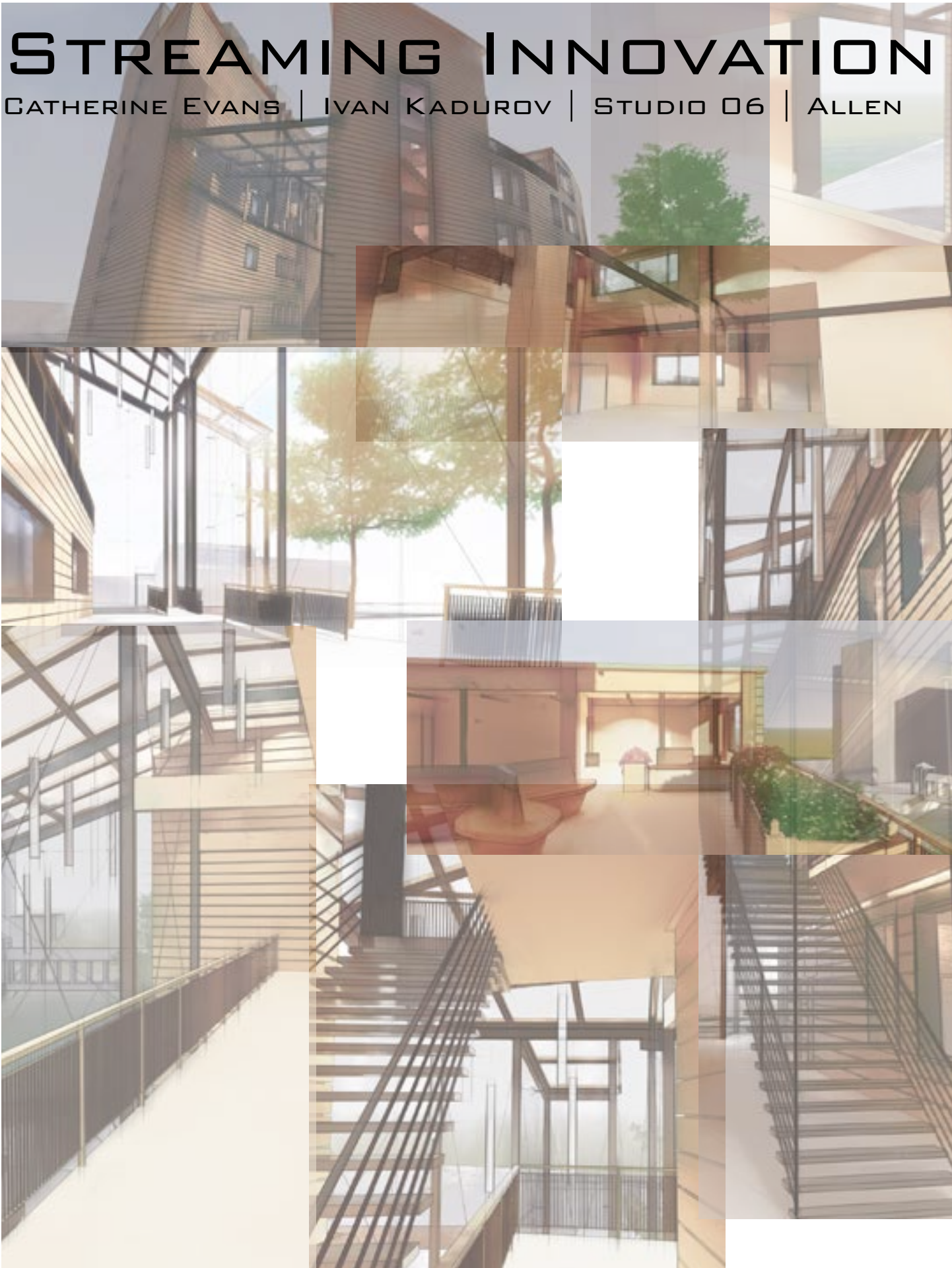


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Summary of Program

Streamline Innovations program includes a series of workshops including a woodshop, metal shop, recording studio, ceramics studio, textiles studio, graphic design lab, and a tech lab. The building also includes some classrooms, locker rooms, an exhibition hall, as well as plenty of informal meeting spaces where classes can be held as well as group meetings. Having these types of shops within the same building opens up many opportunities for the users to be imaginative and design whatever they wish while remaining confident that they will be able to see their project through from start to finish.

The maker spaces' significance to the community is the idea that anyone can make. With this facility being open 24/7, the resources are constantly available for the community of Lowell to come to create whenever they can fit it into their schedule. This maker space also serves as a beacon of education and learning for the current and future generations of Lowell. This idea gives the opportunity for all people of the community to learn something new and useful in everyday life and even possibly start a career within this workspace.

The general mission of creating a maker space is to have a space that is well maintained and available to many with limited restrictions. It is also to have a community within a community that supports each other in their craft aiding where they can. The exterior of the maker space is also meant to draw in more visitors with ample green space as that was something that was lacking within the community as well.

Understanding the Program

Value and Goals statement:

The objective of the program is to allow for the instruction of modern basic technical skills.

Relevance of the program:

Some architectural questions raised by the program are:

How do you place the program so it is efficient?

How do you develop a workflow that can be easily navigated by new members?

Conclusions derived from data analysis:

Considering the program, this often changed certain rooms around as to be most efficient when working on a project as well as considering a smooth circulation path.

Program List:

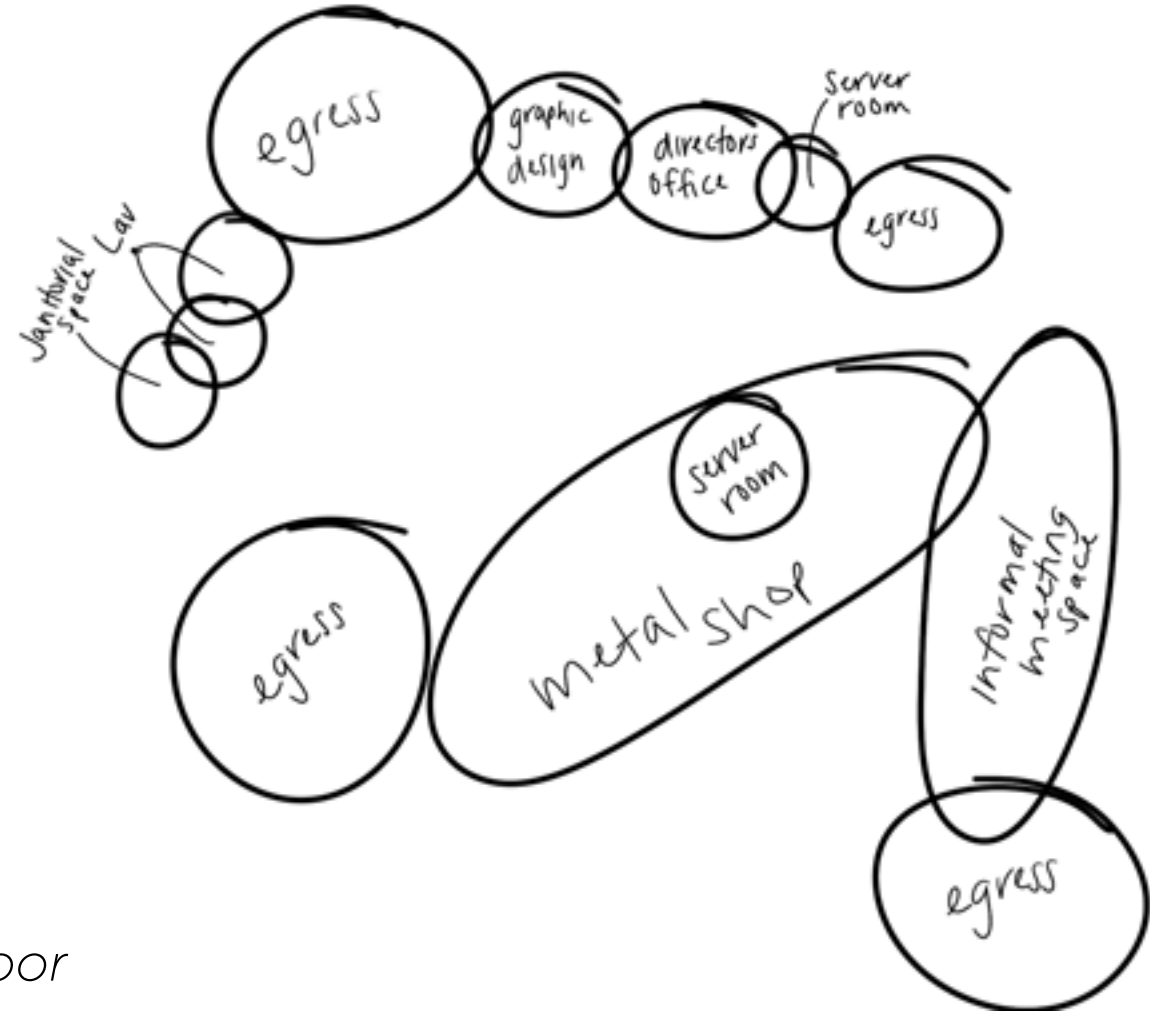
Function	Size (sq.ft.)
Wood Shop	4,383
Metal Shop	1,609
Ceramics	523
Recording Studio	435
Textiles	344
Tech Lab	412
Graphic Design Studio	224
Exhibition Space	2,400
Classroom 1	409
Classroom 2	377
Kitchen	285
Dining	1,371
Admin Building Bathroom (per floor)	162
Maker Building Bathroom (per floor)	261
1 Locker Room (per floor)	833
Directors Office	189
Staff Support Area and Conference Room	833
Informal Meeting Spaces	4,015
Mechanical Space	475
Total	19,975

Program Relationship Diagrams

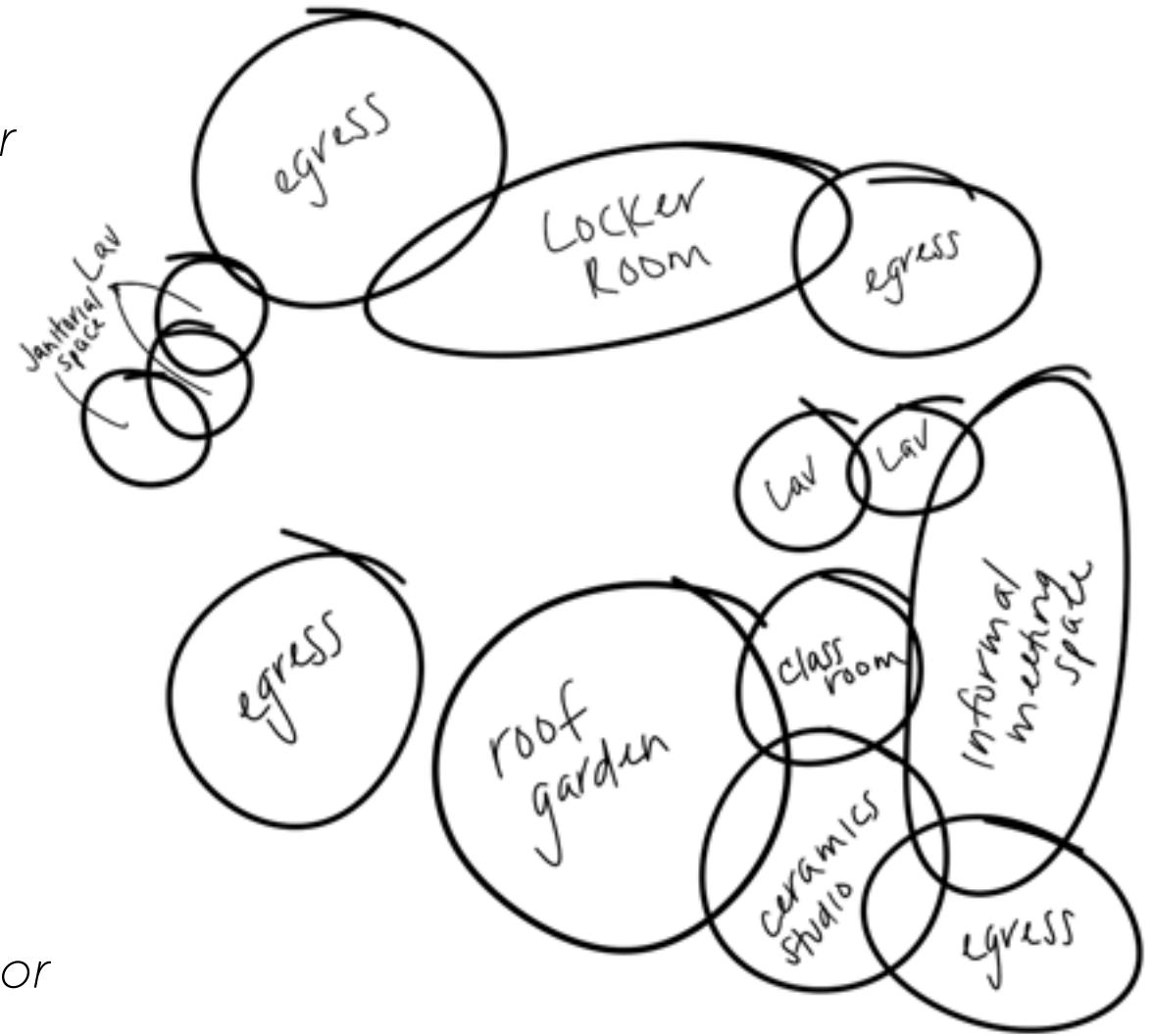
Ground Floor



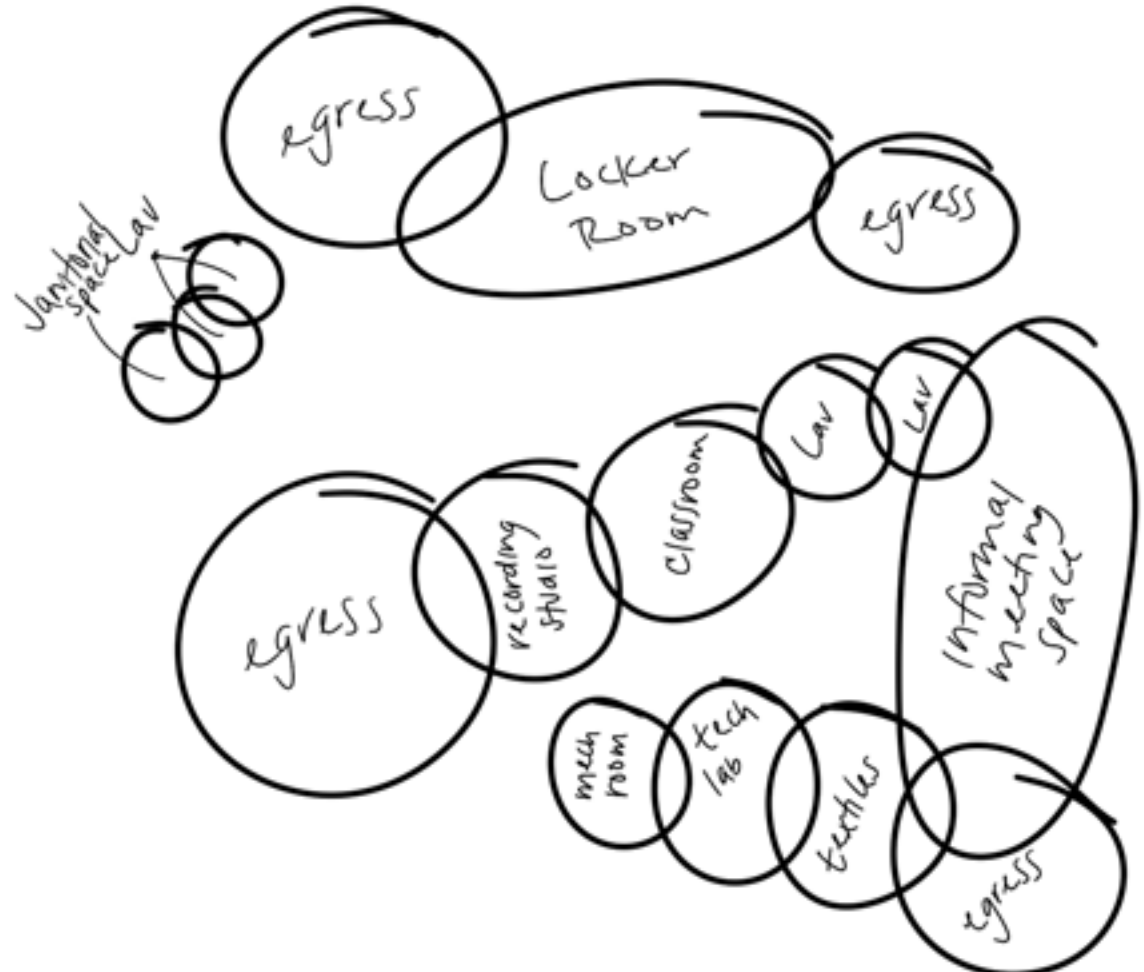
First Floor



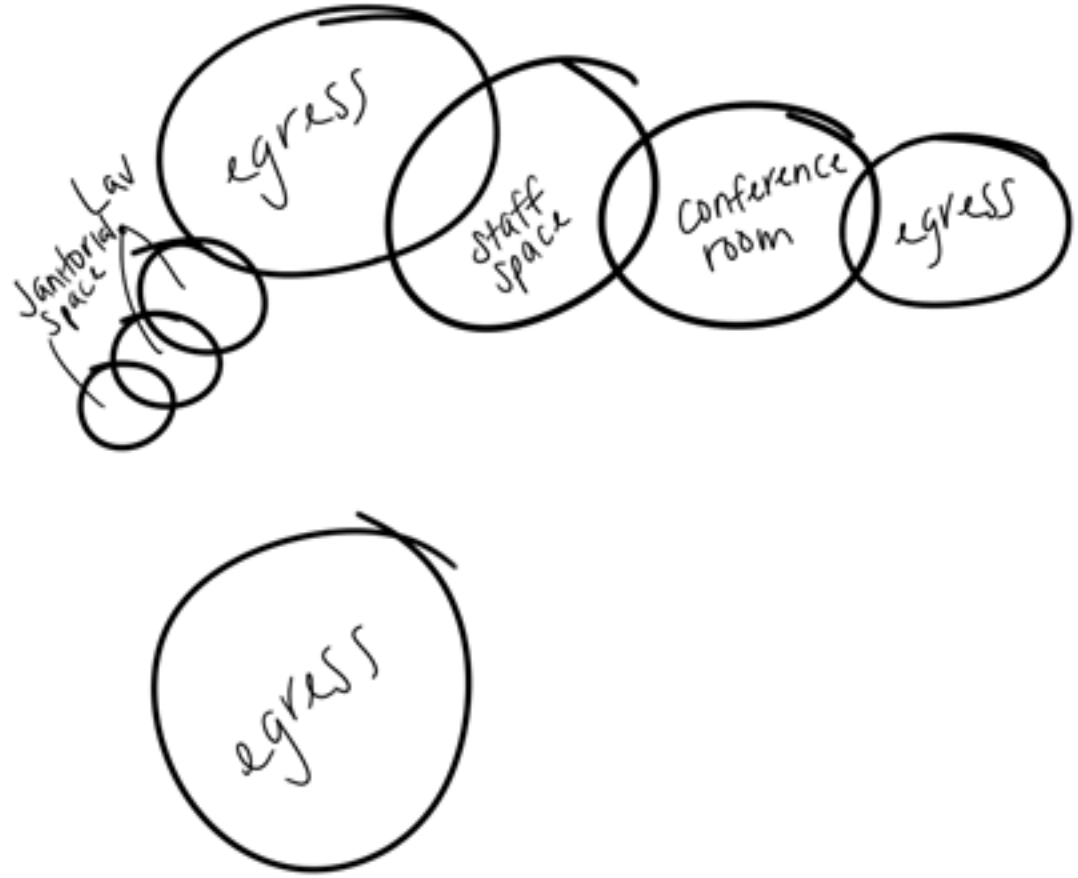
Third Floor



Second Floor



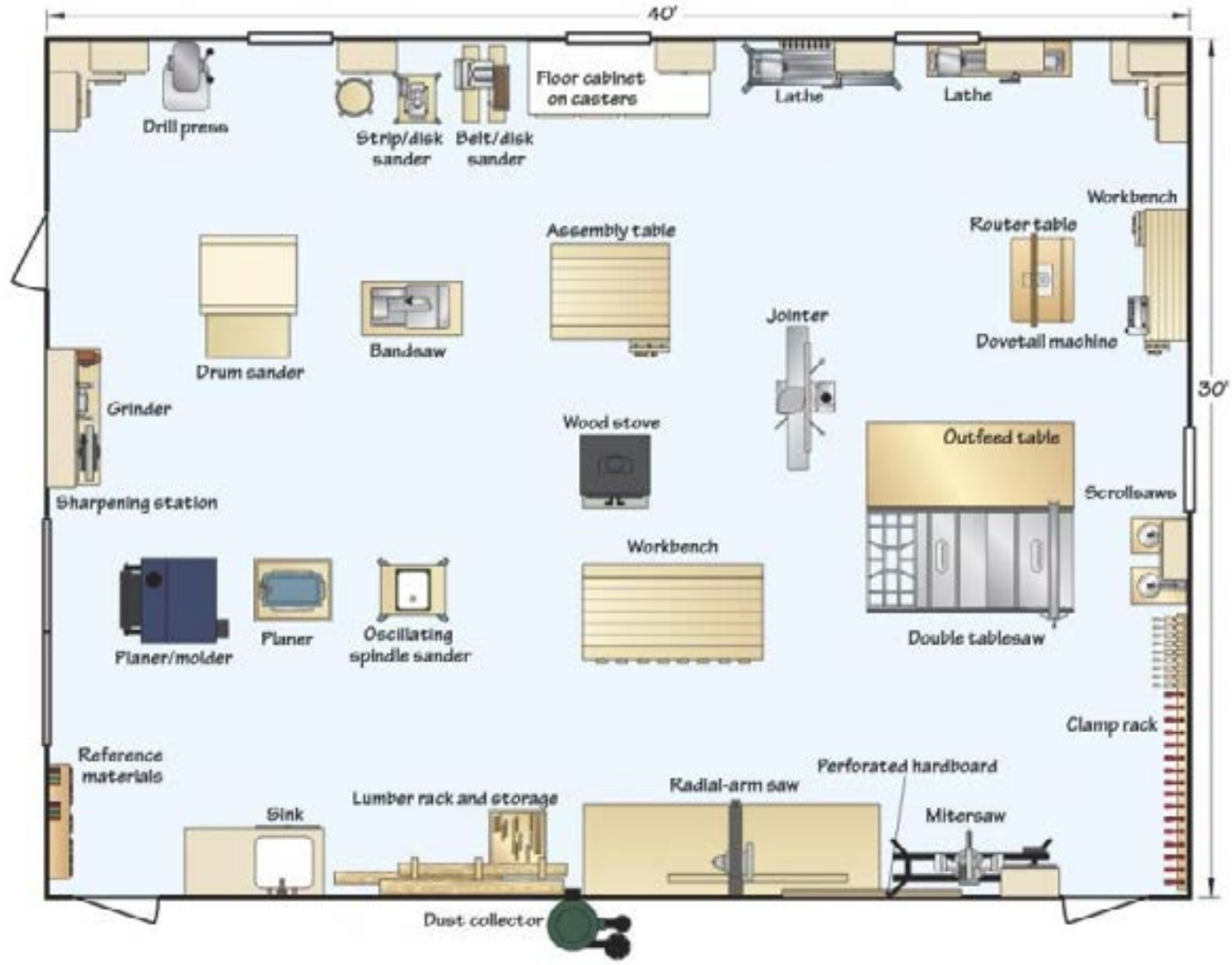
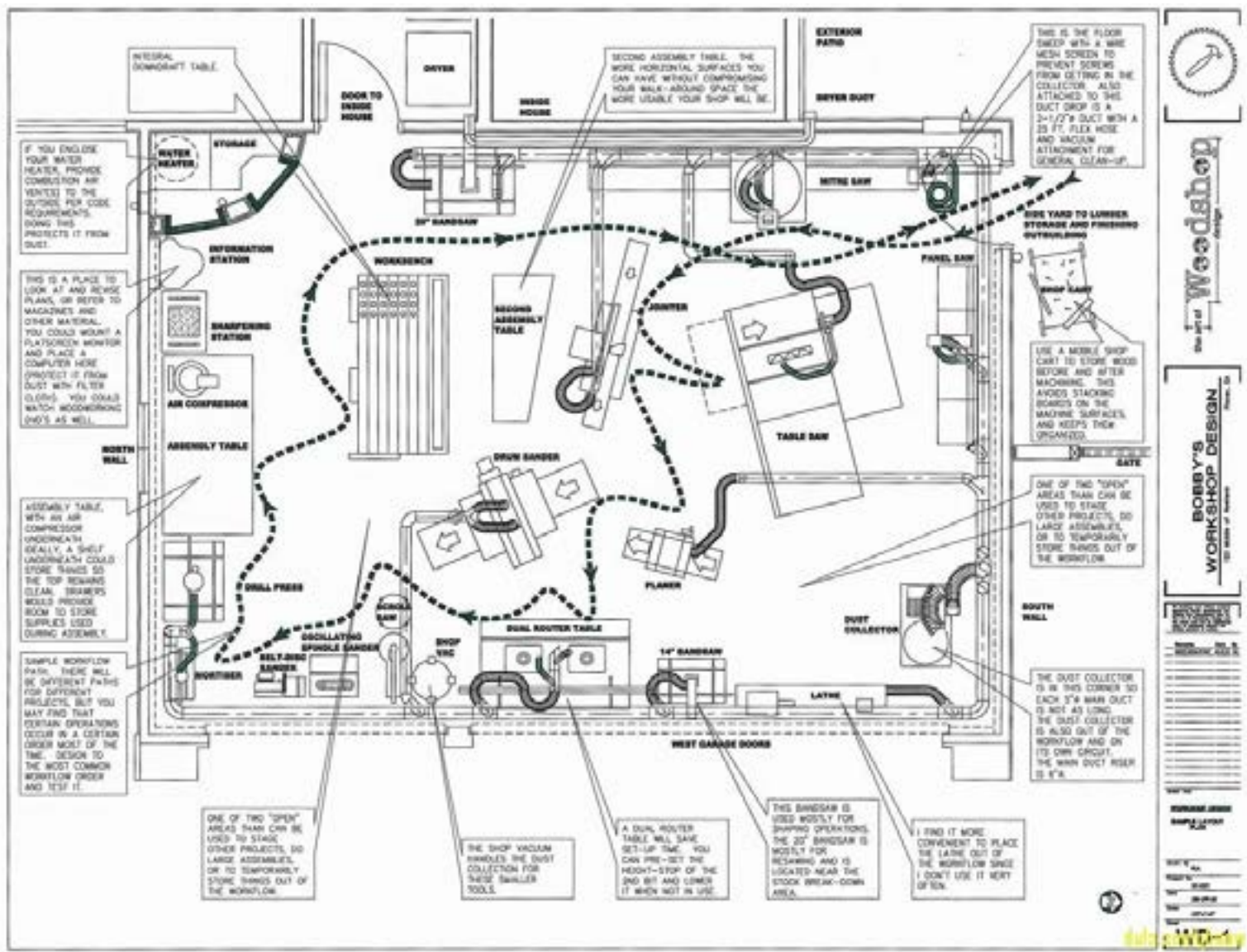
Fourth Floor



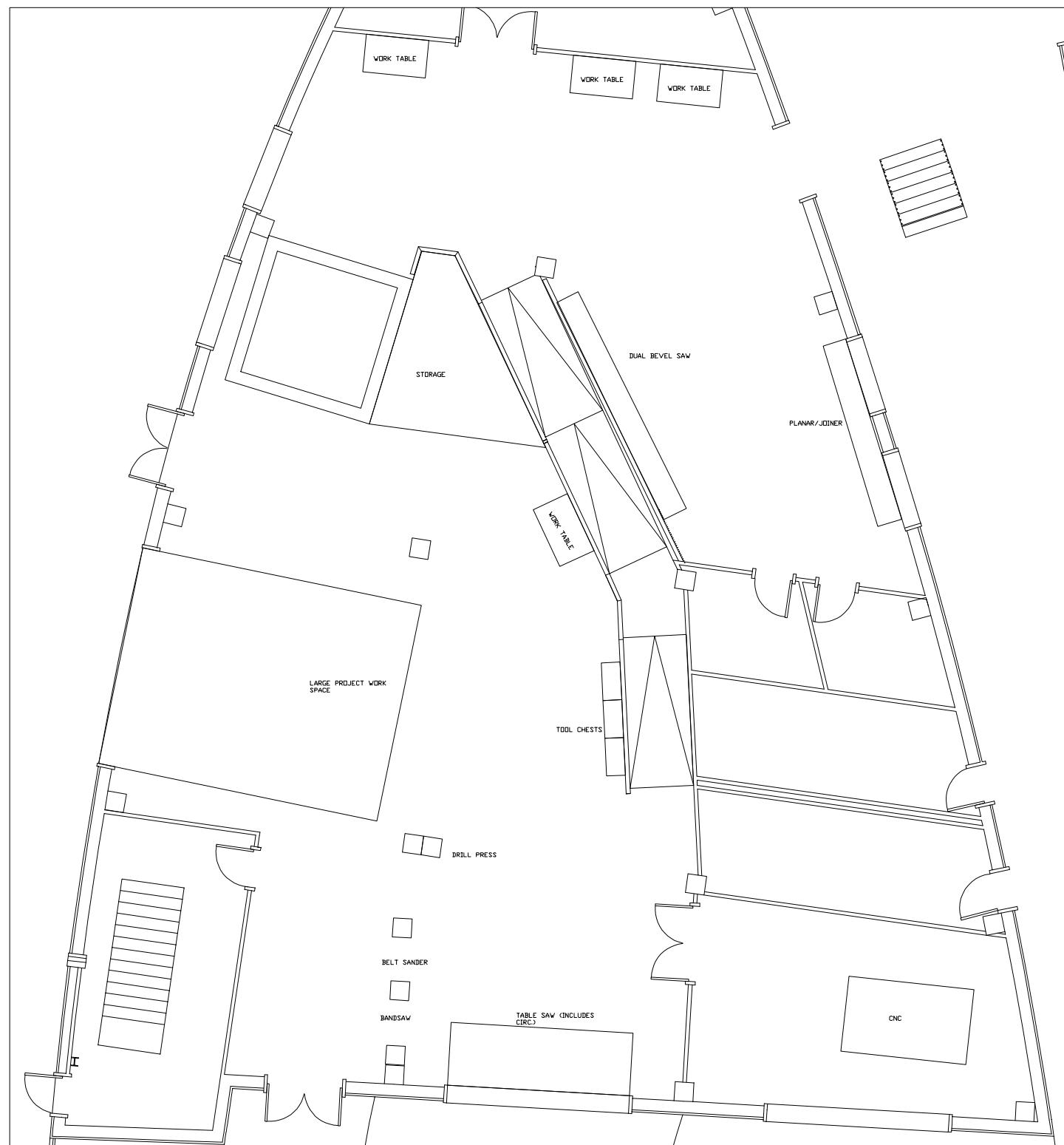
Spacial Layout Research

Woodshop

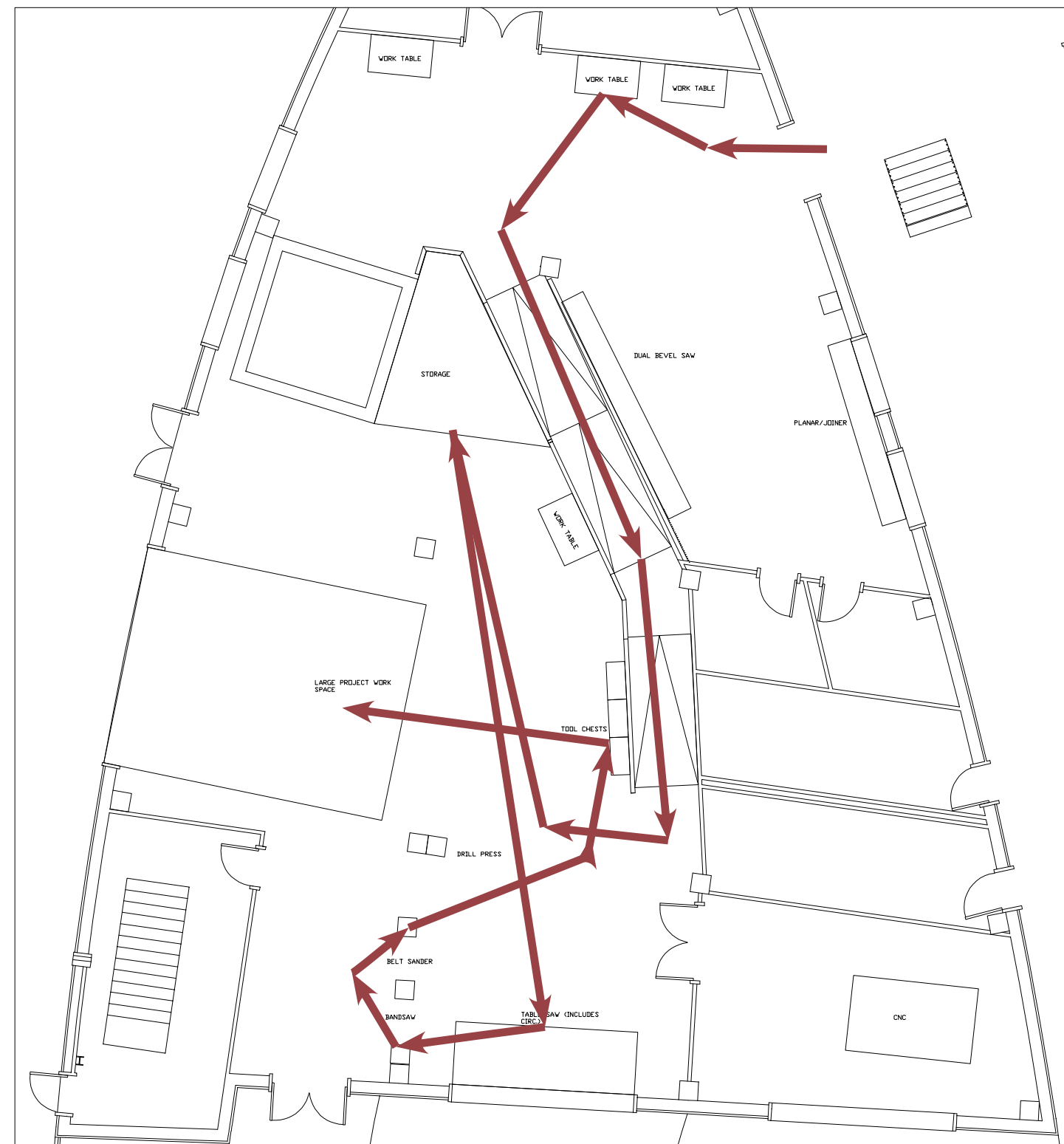
Layout Examples:



Actual Configuration:
Square Footage:

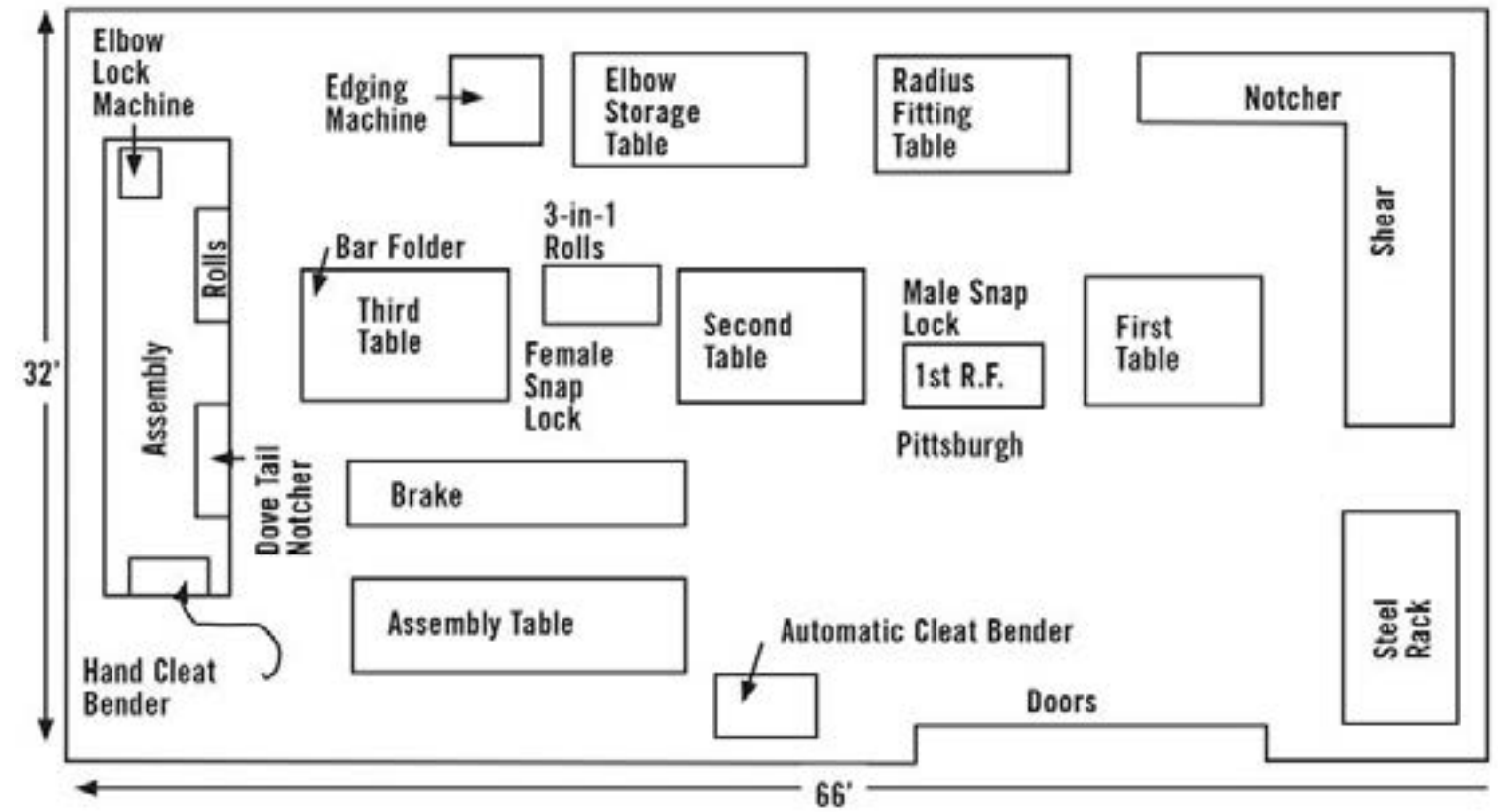
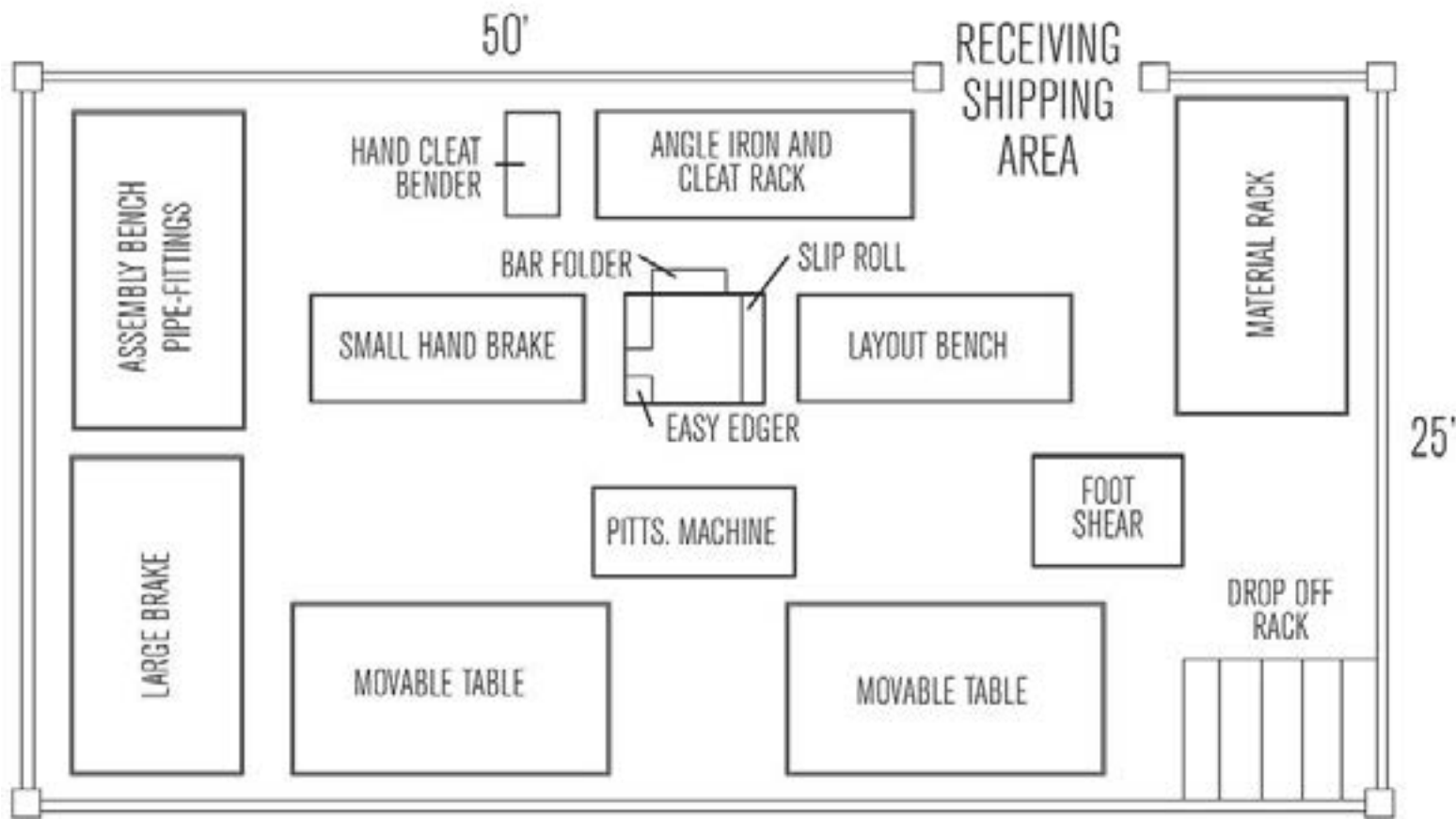


Work Flow Diagram:

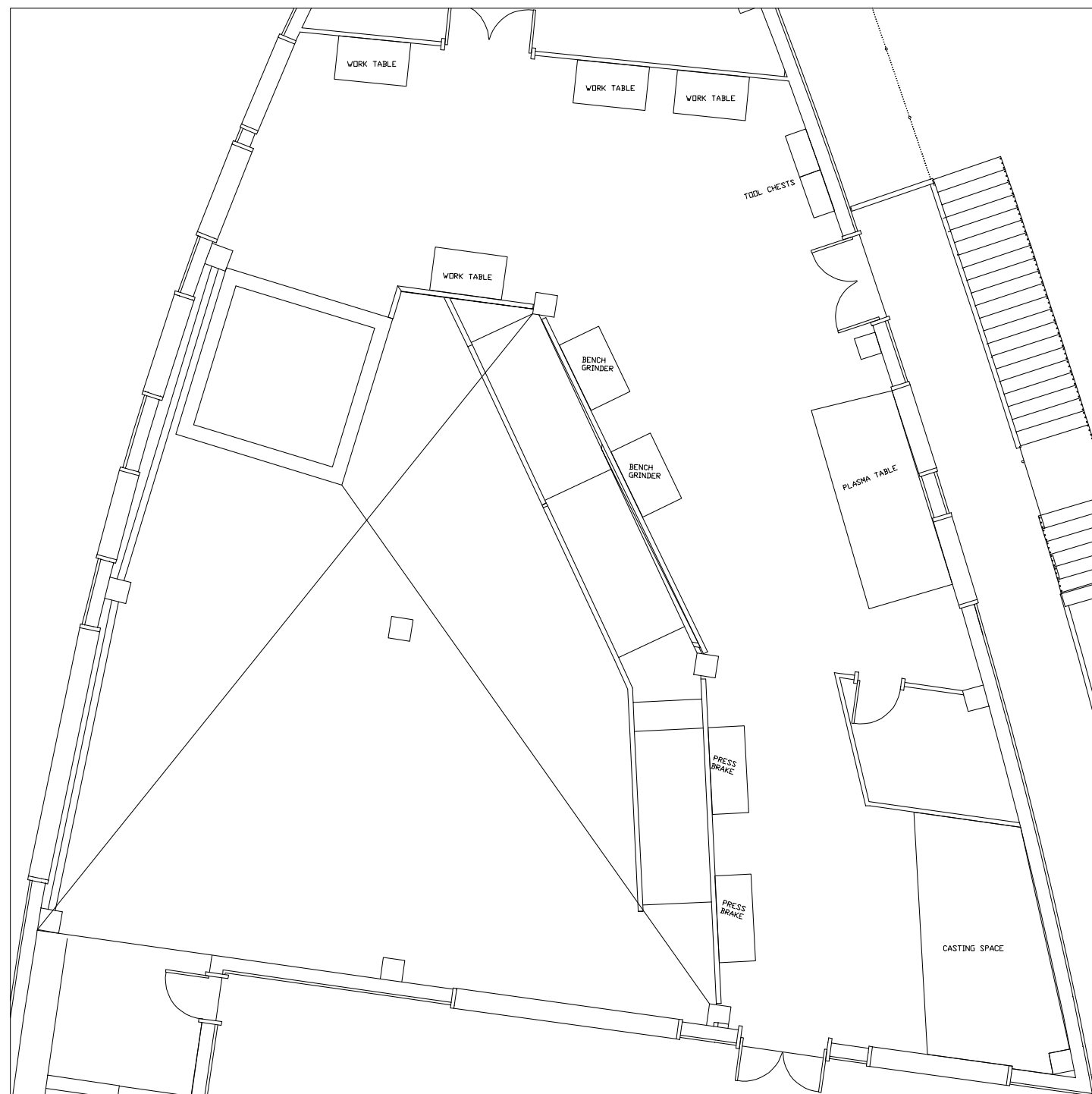


Metal shop

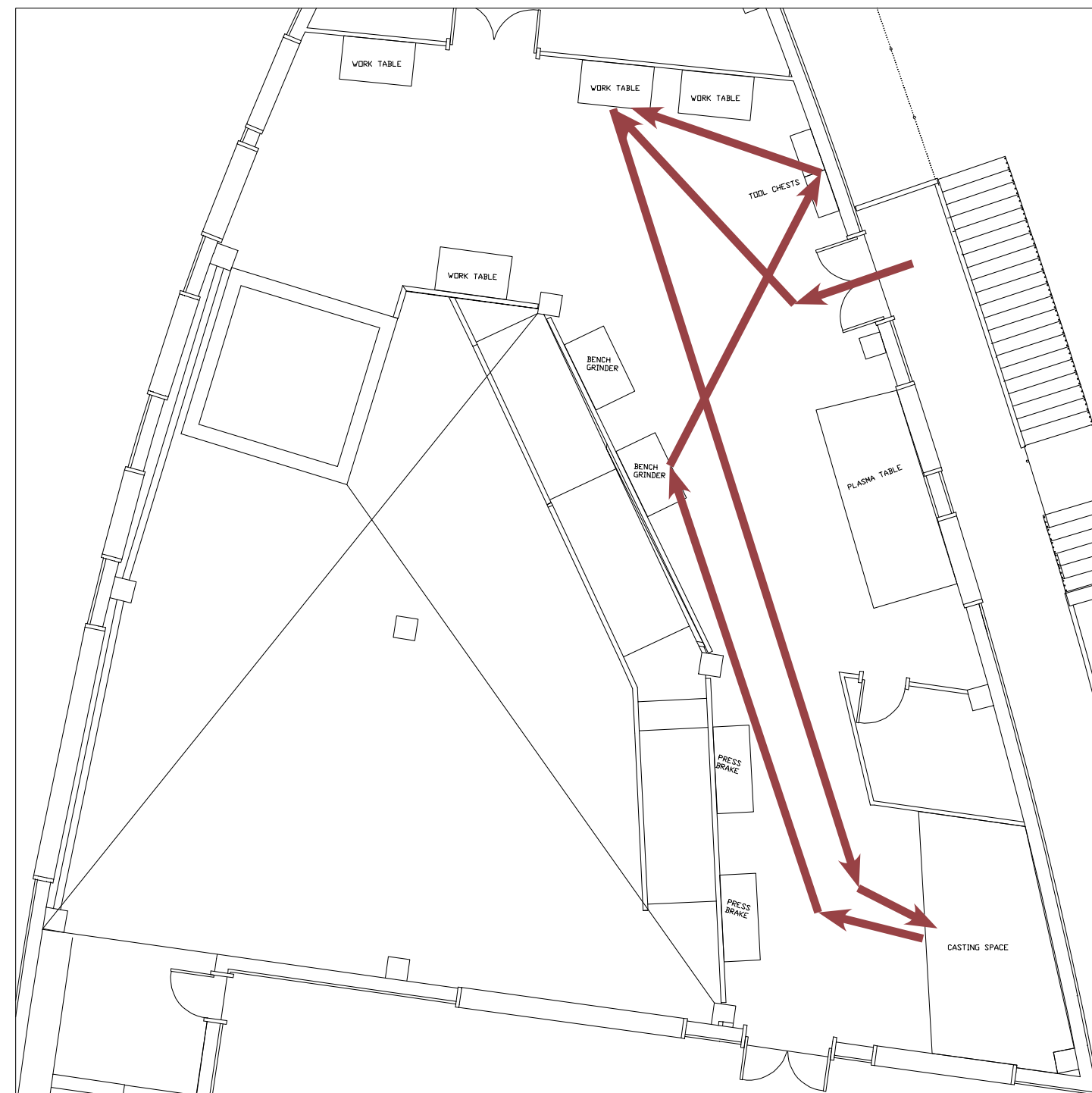
Layout Examples:



Actual Configuration:
Square Footage:

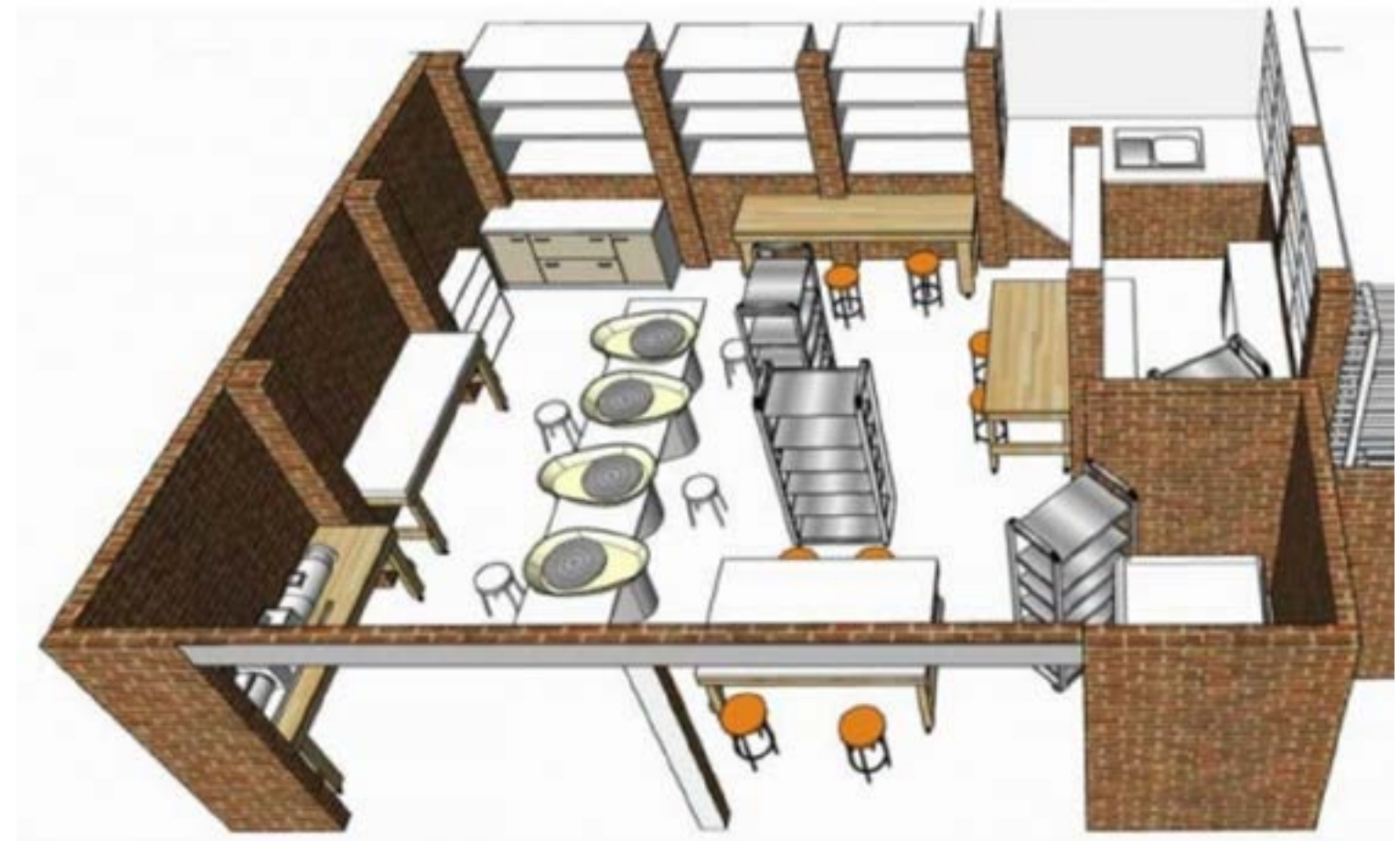
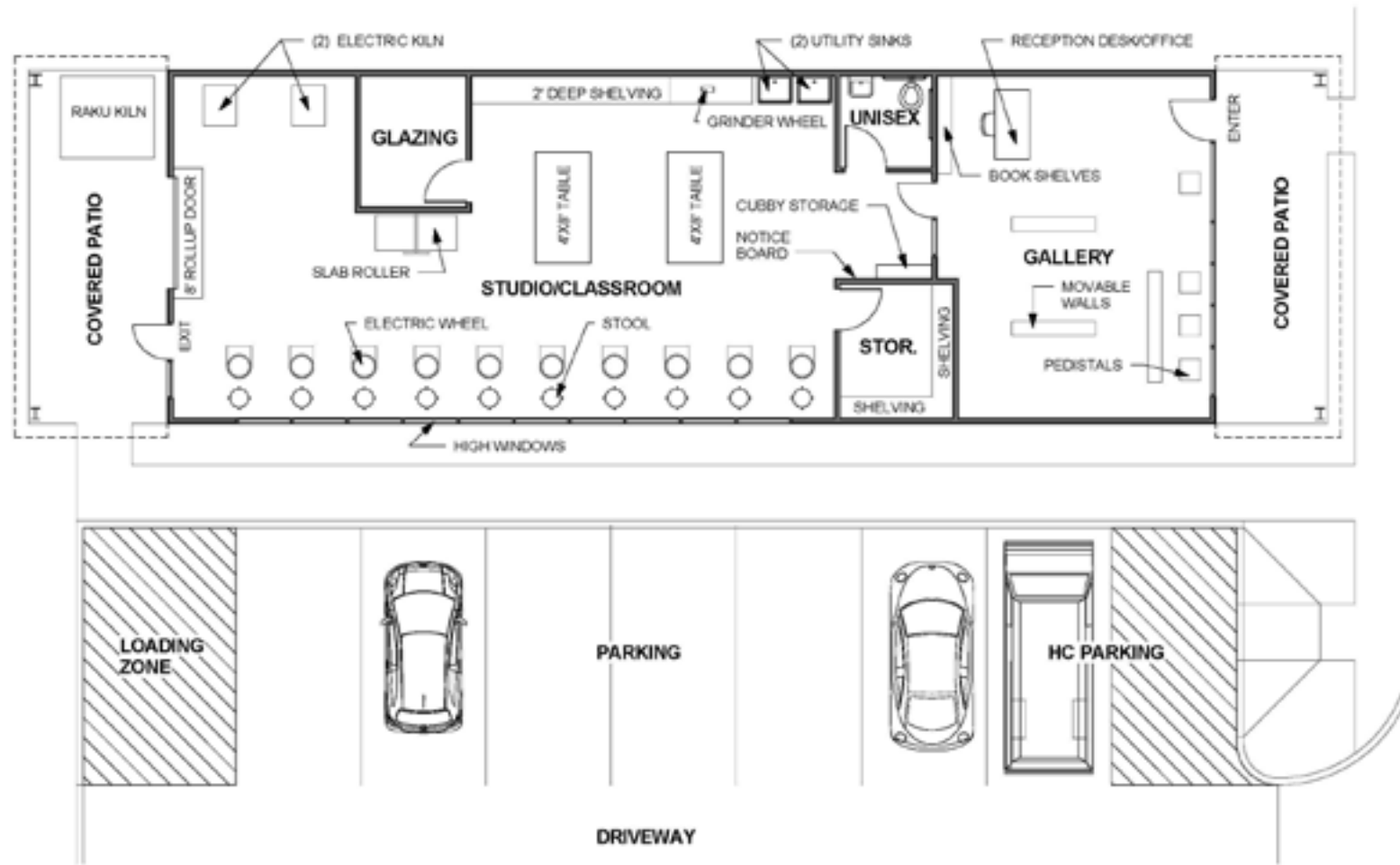


Work Flow Diagram:



Ceramics Studio

Layout Examples:



Actual Configuration:
Square Footage: 523 sqft

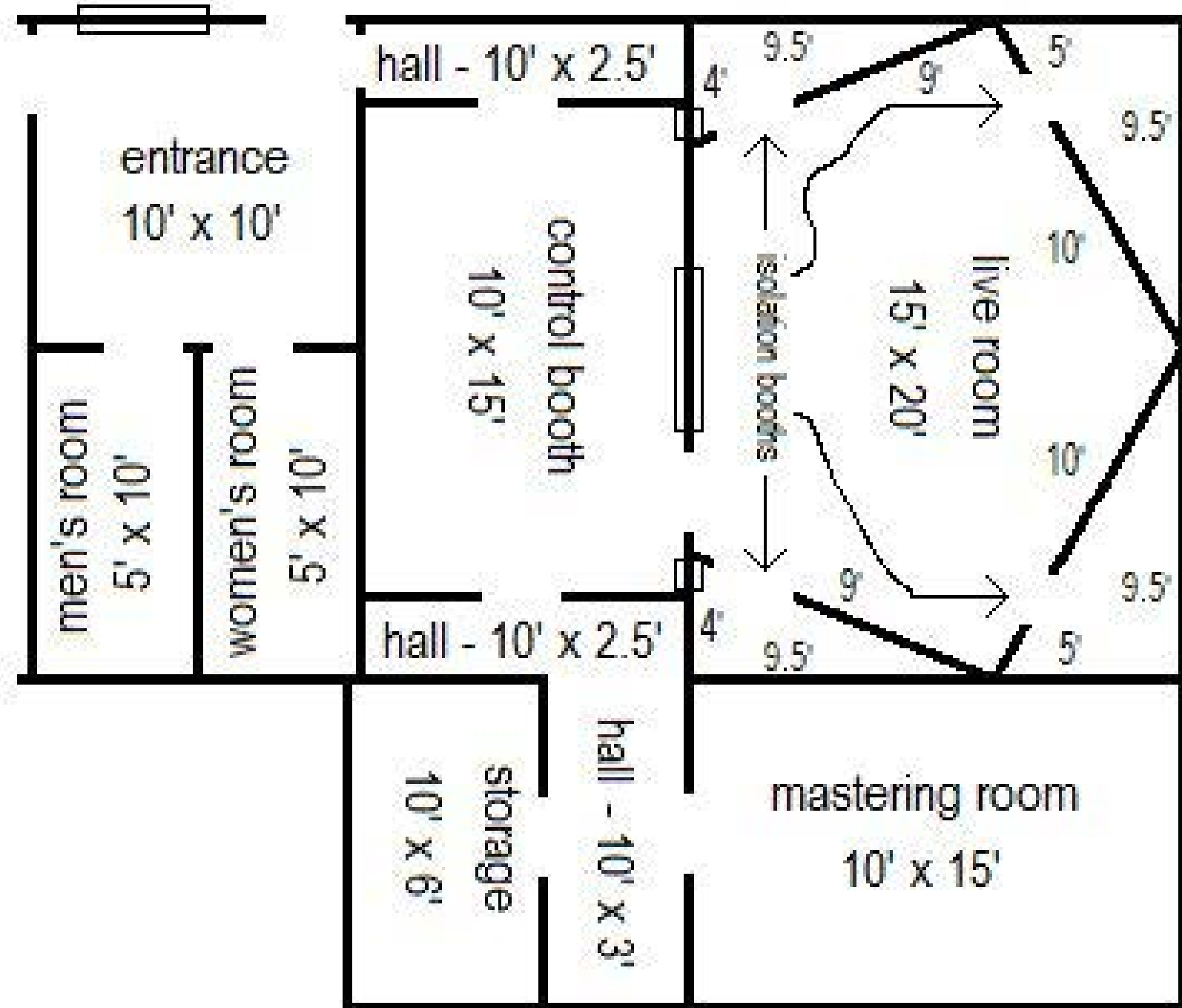
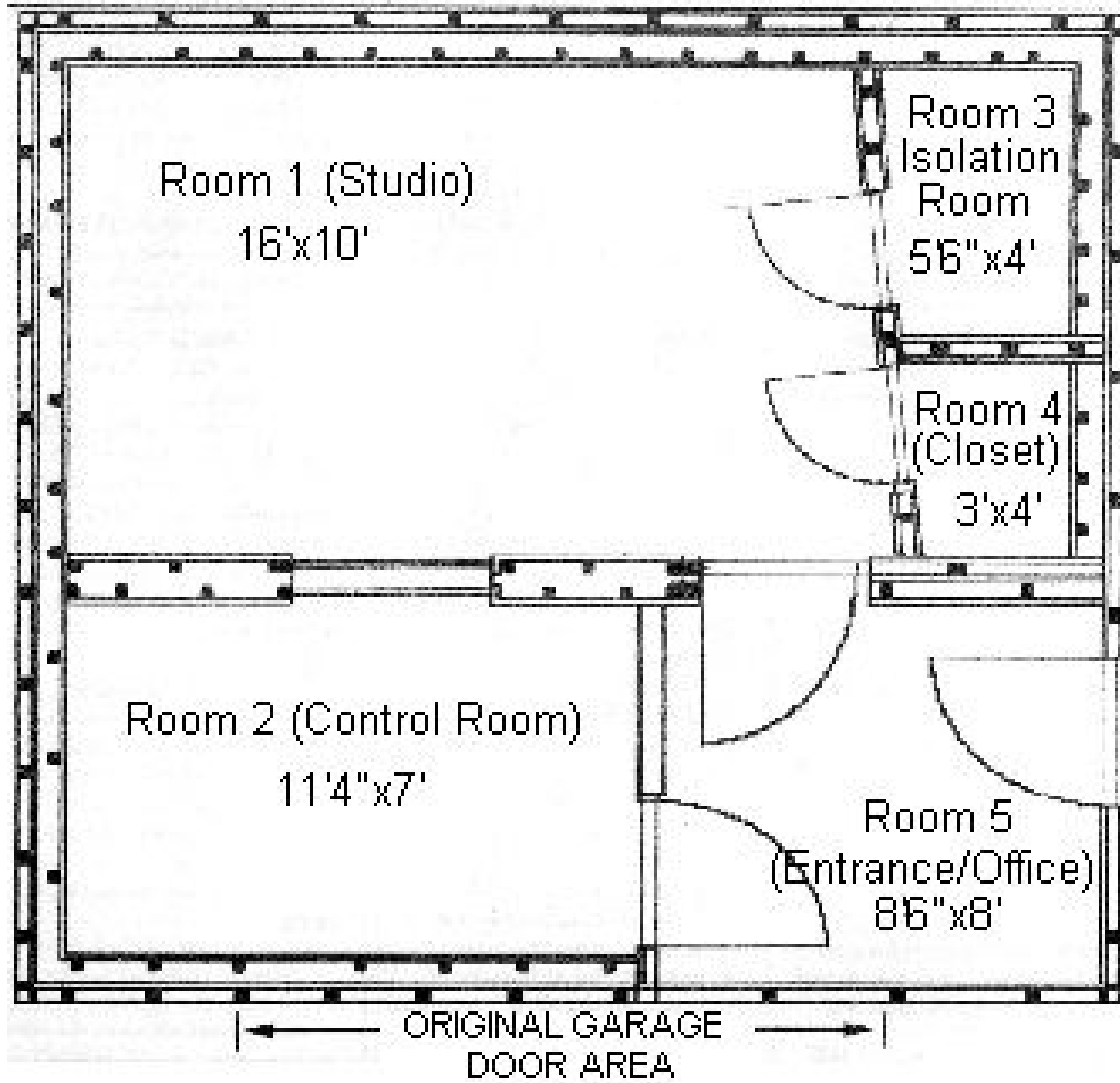


Work Flow Diagram:



Recording Studio

Layout Examples:



Actual Configuration:
Square Footage: 435 sqft.

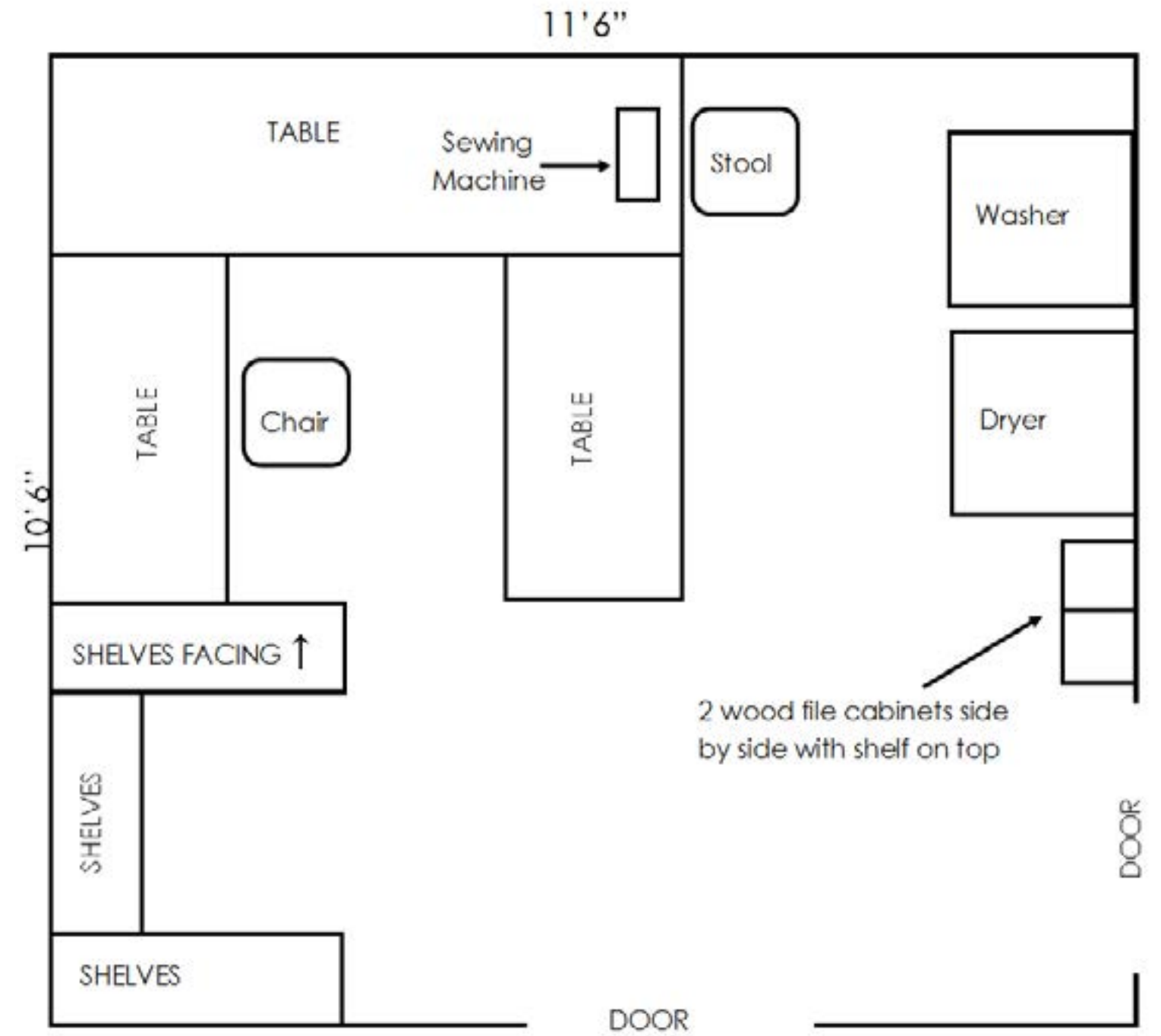
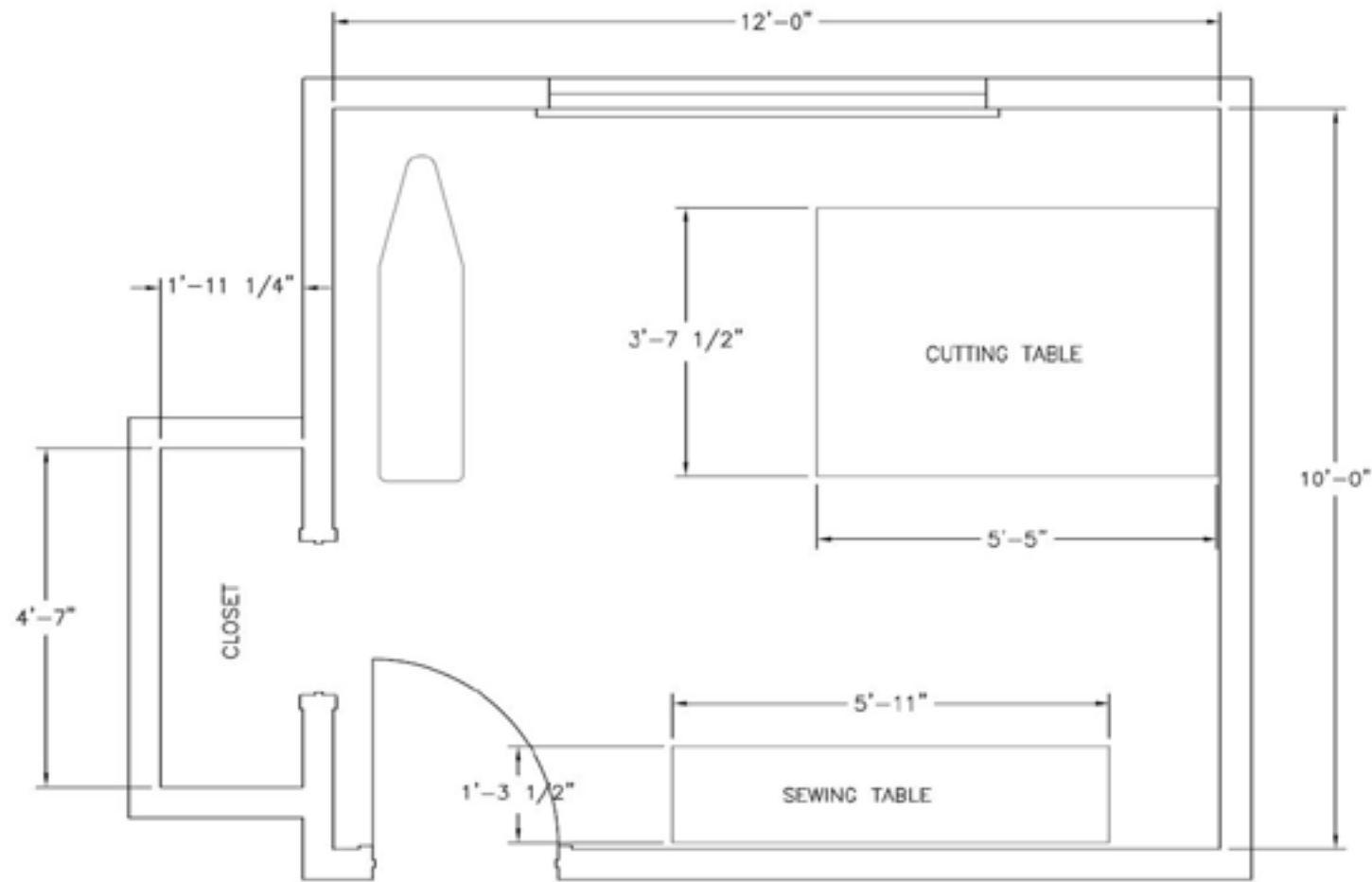


Work Flow Diagram:

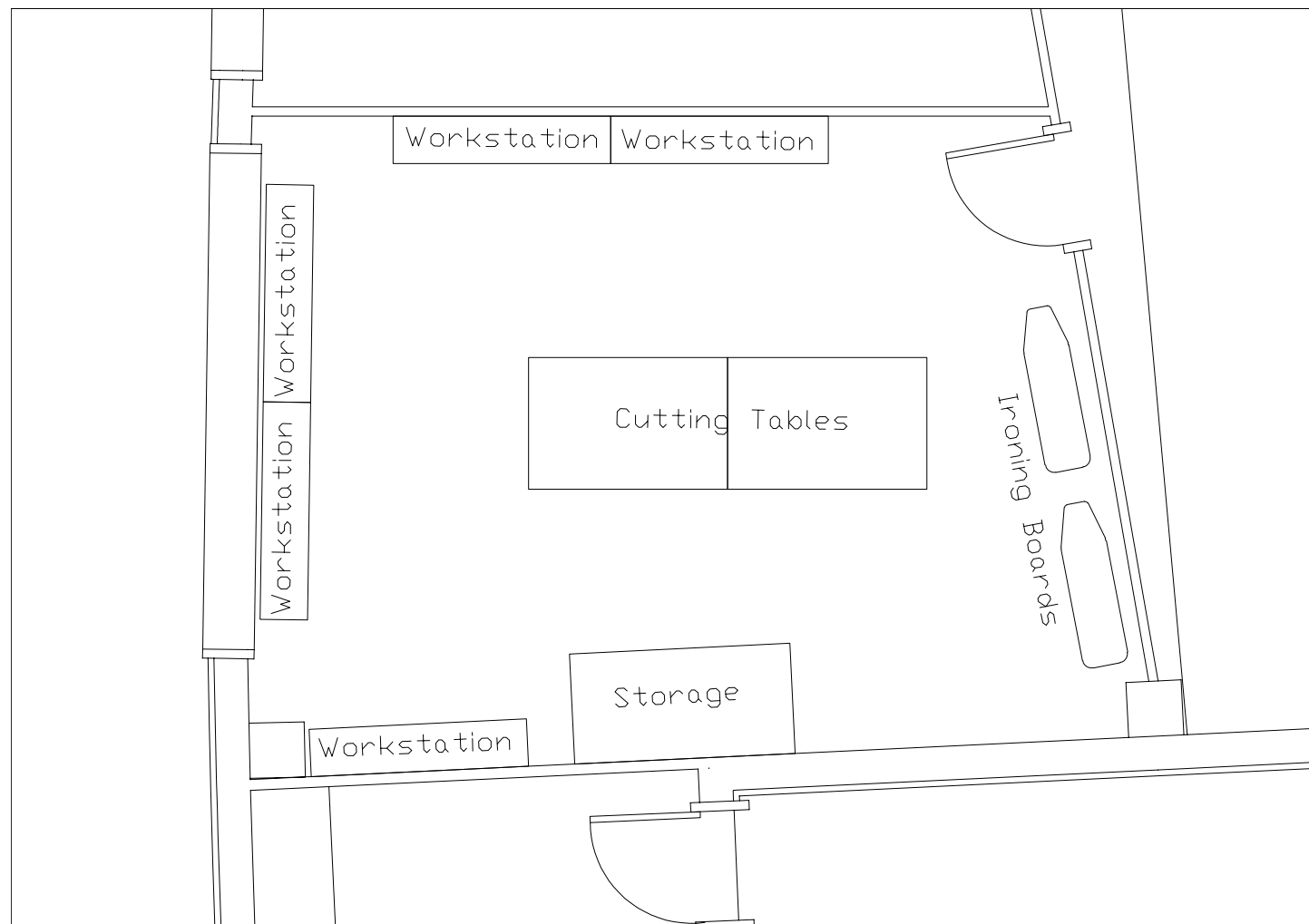


Textiles

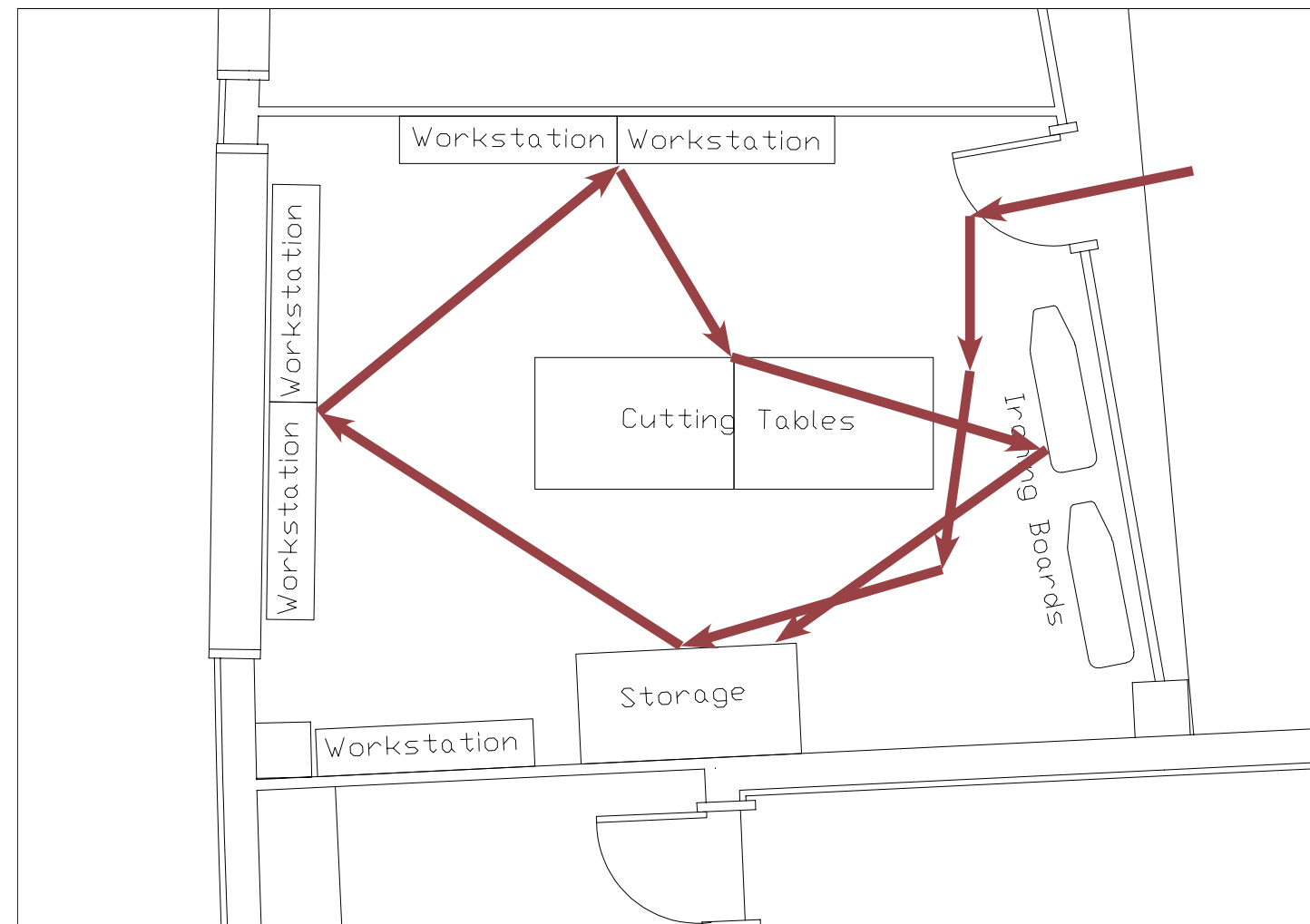
Layout Examples:



Actual Configuration:
Square Footage: 344 sqft.

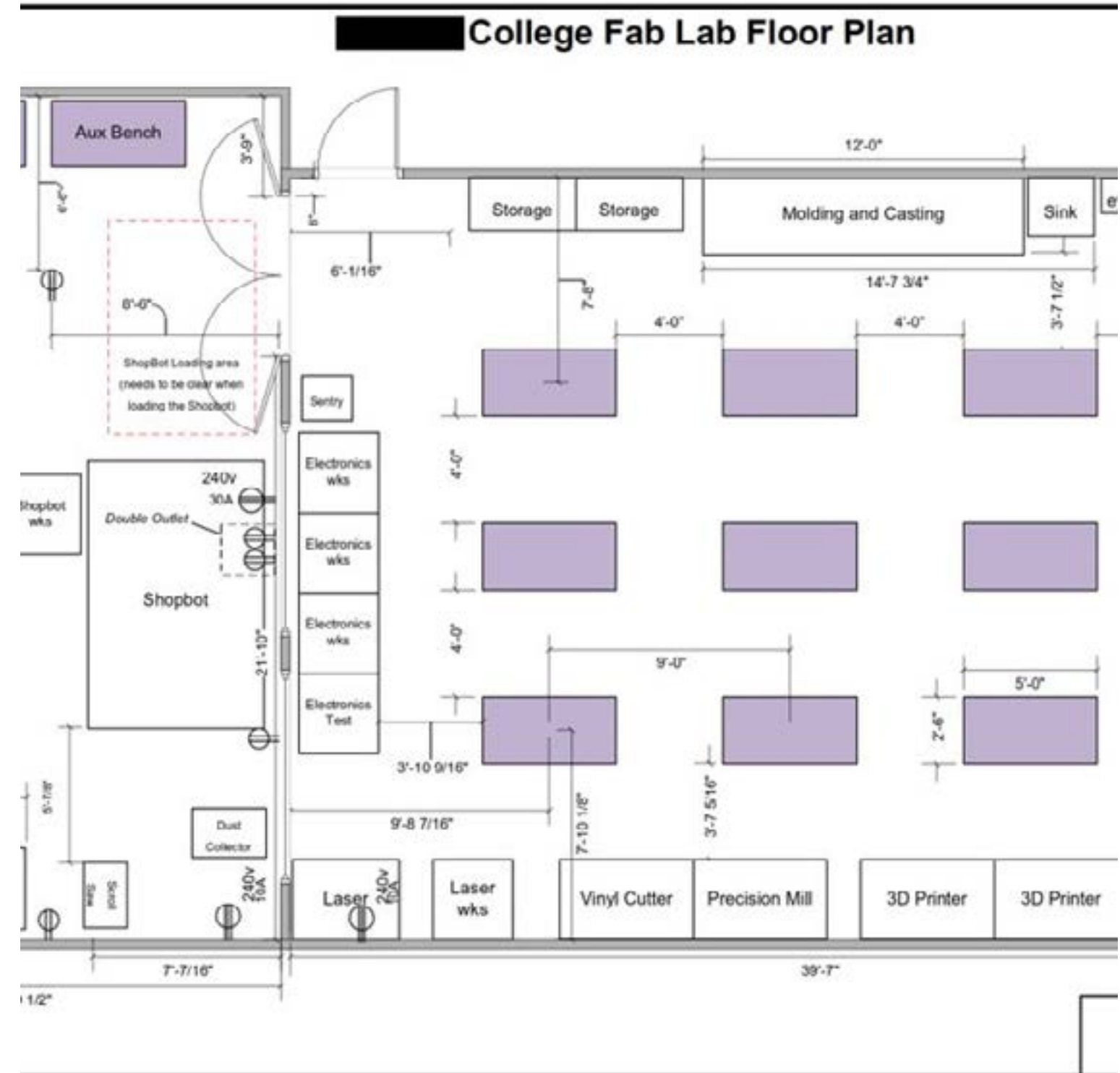
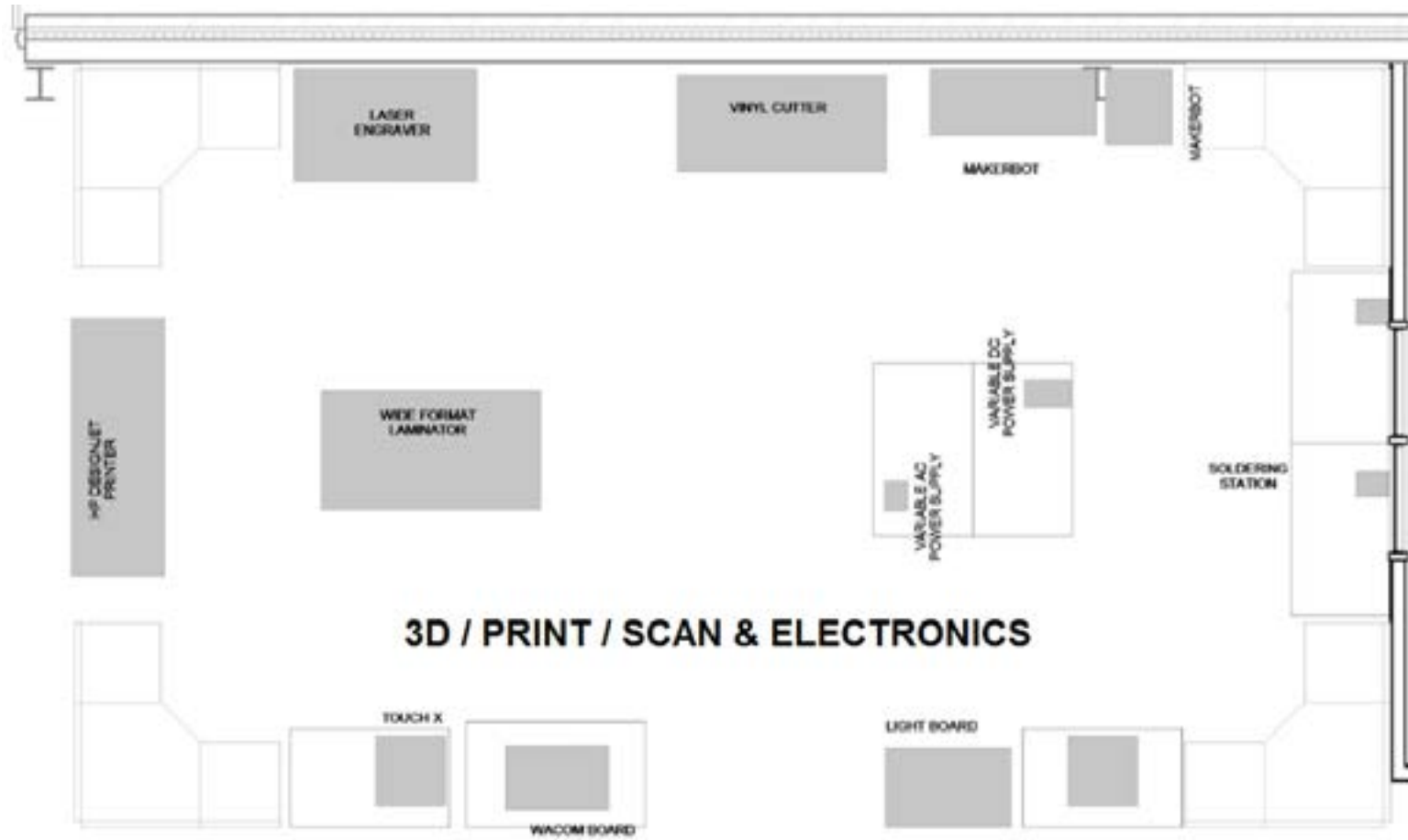


Work Flow Diagram:



Tech Lab

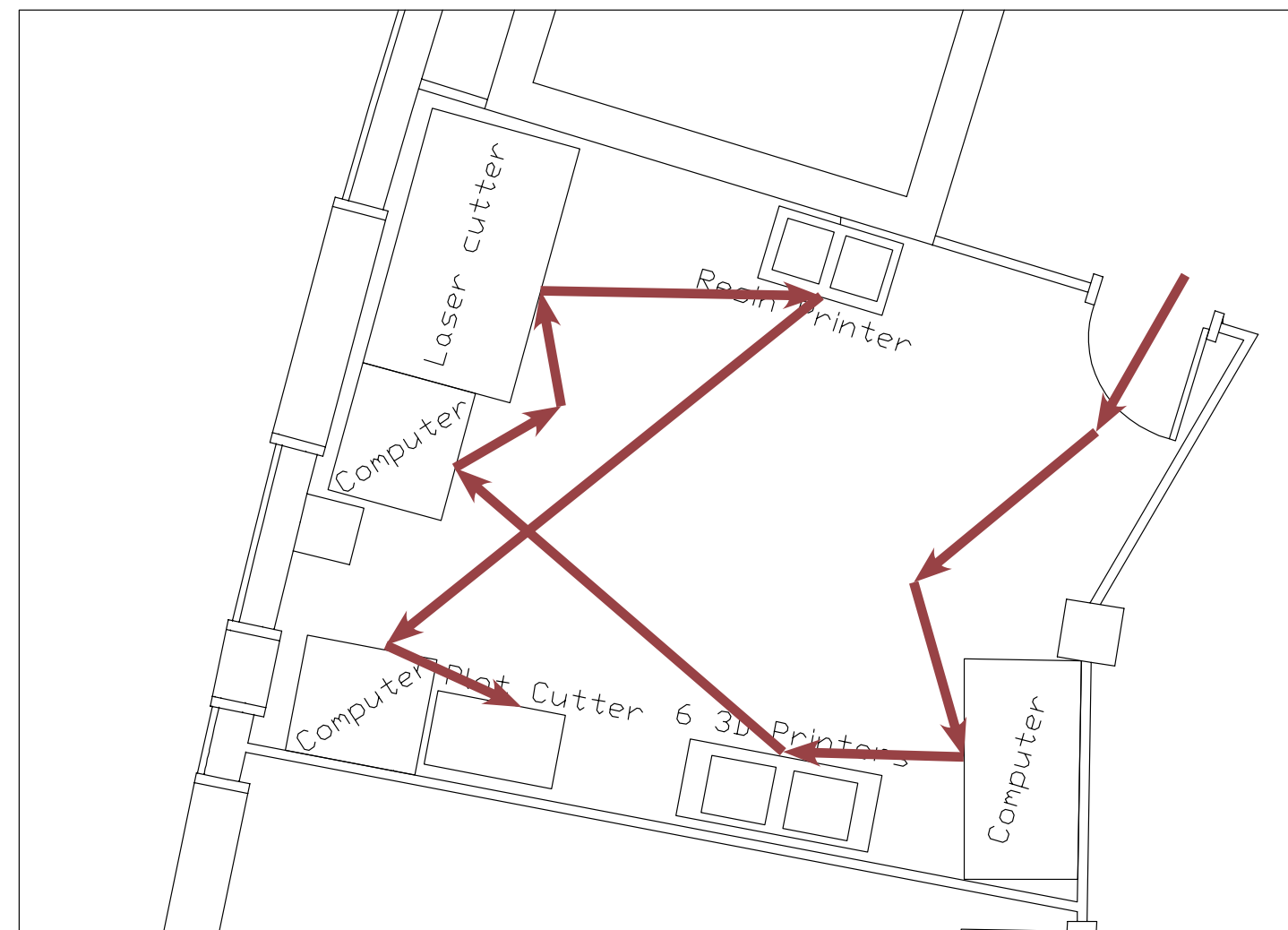
Layout Examples:



Actual Configuration:
Square Footage: 412 sqft.

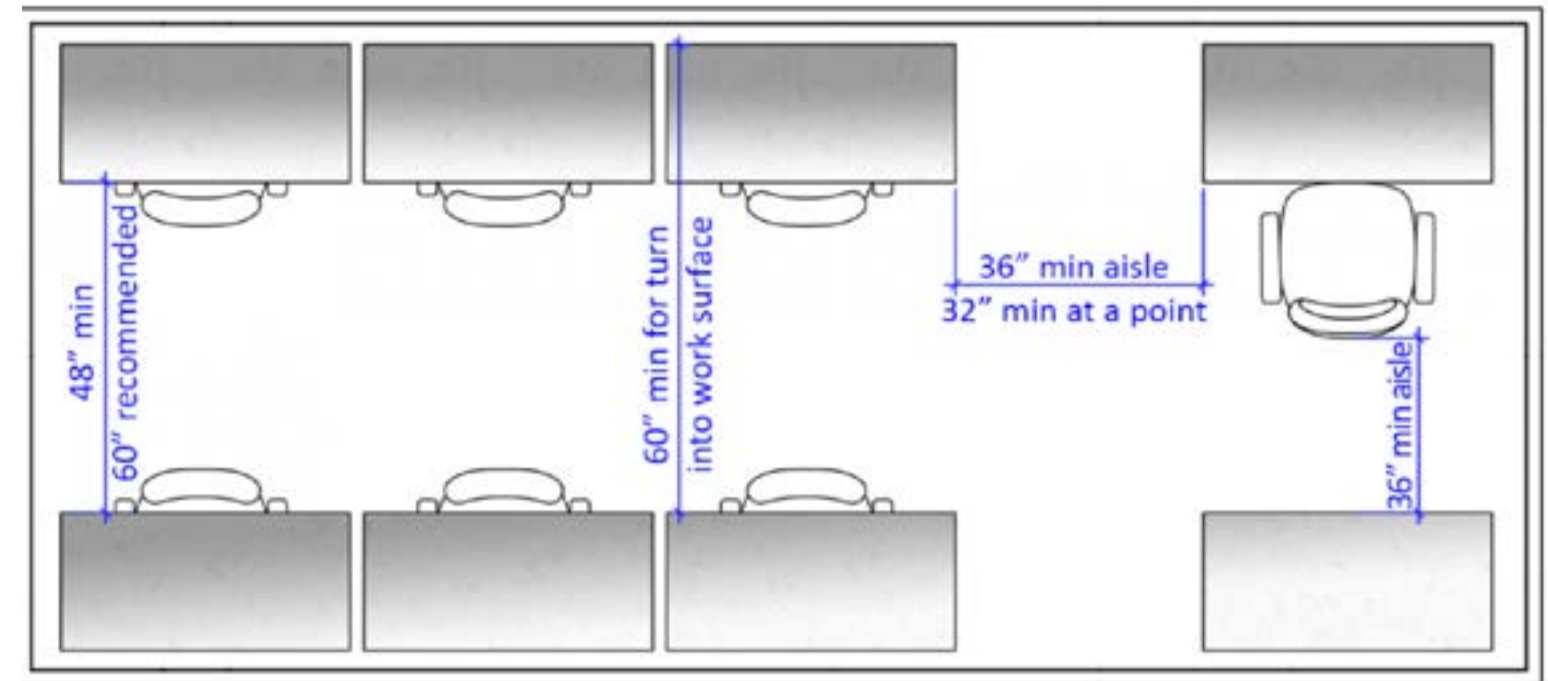
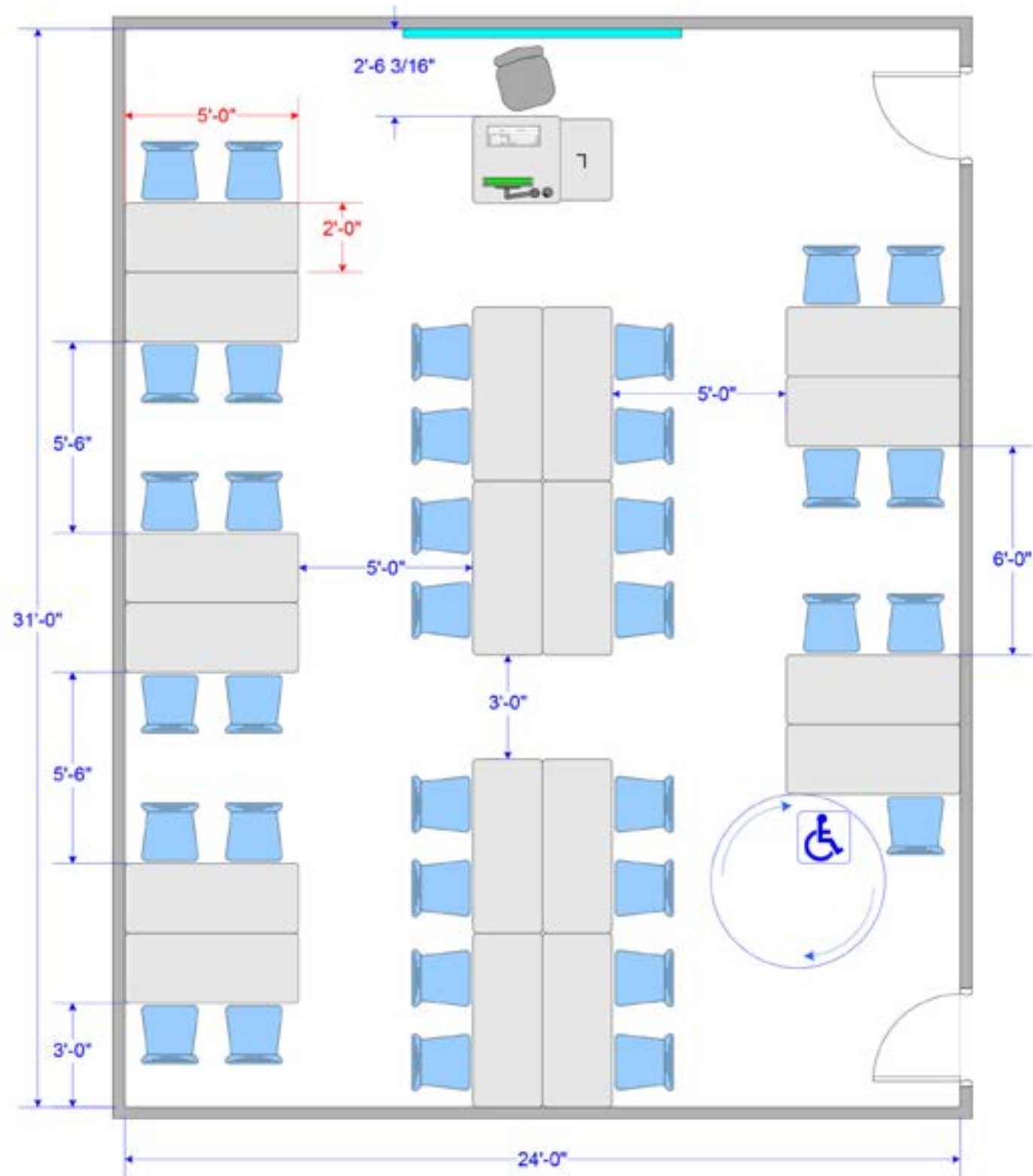


Work Flow Diagram:

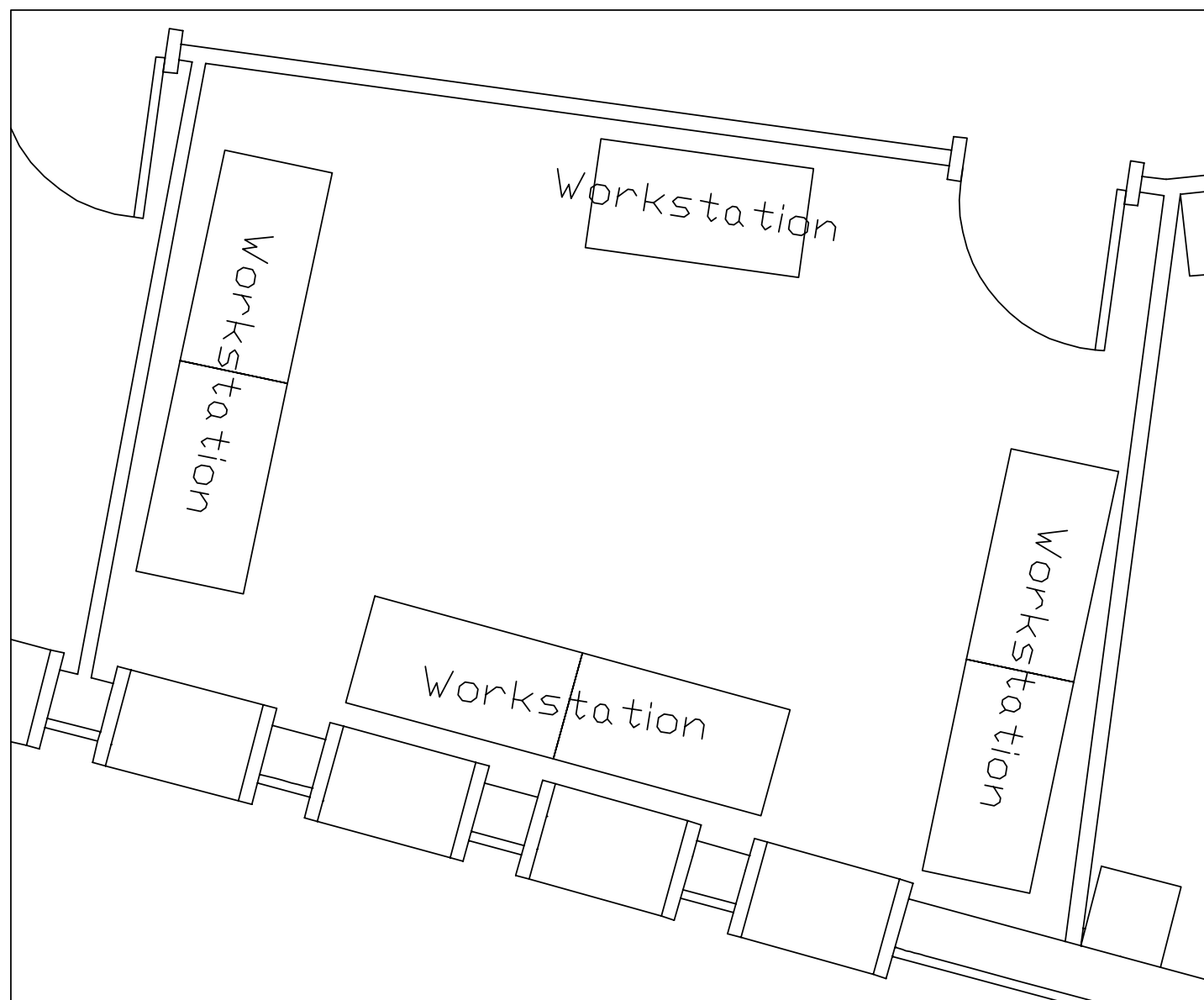


Graphic Design Studio

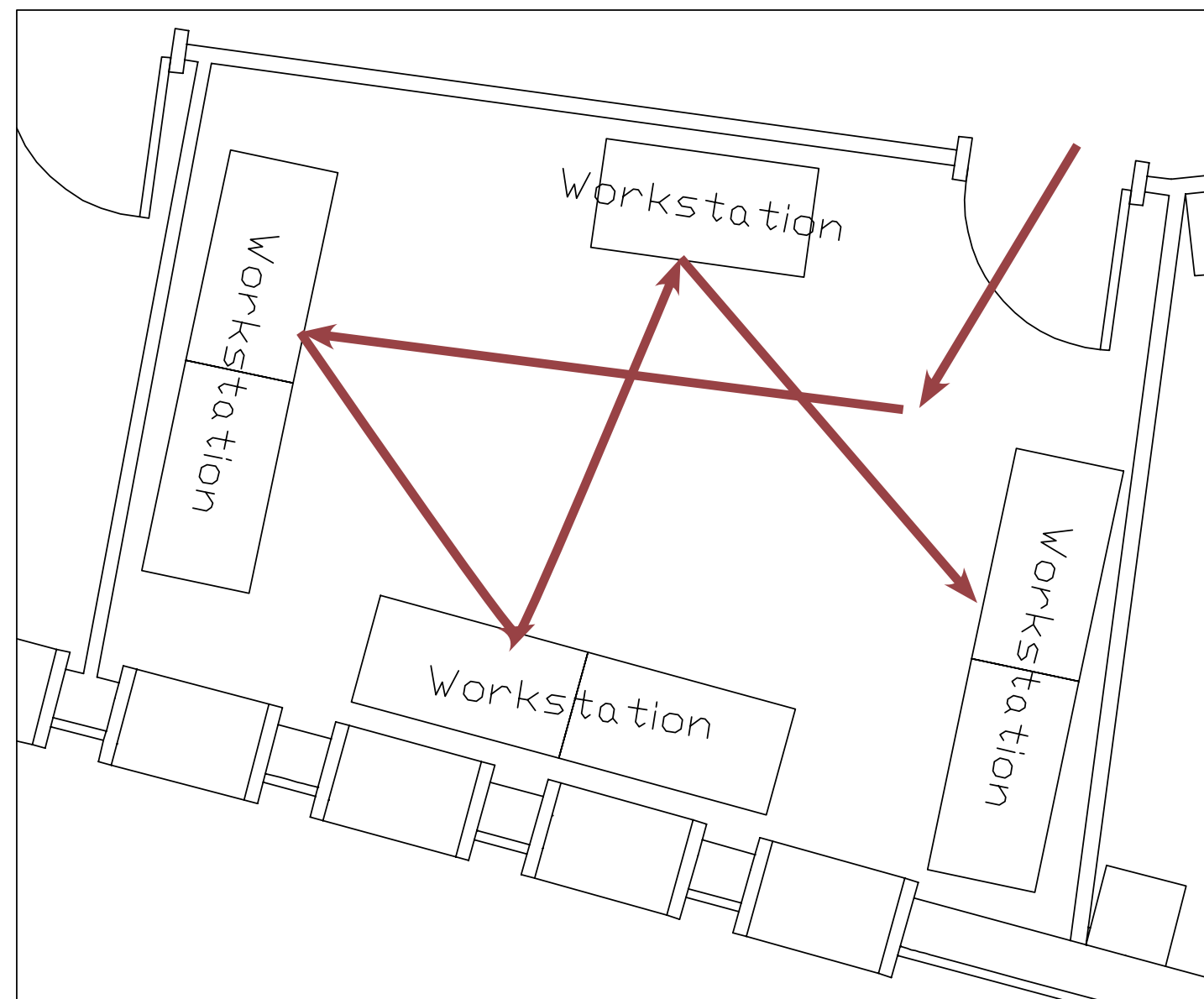
Layout Examples:



Actual Configuration:
Square Footage: 224 sqft.



Work Flow Diagram:

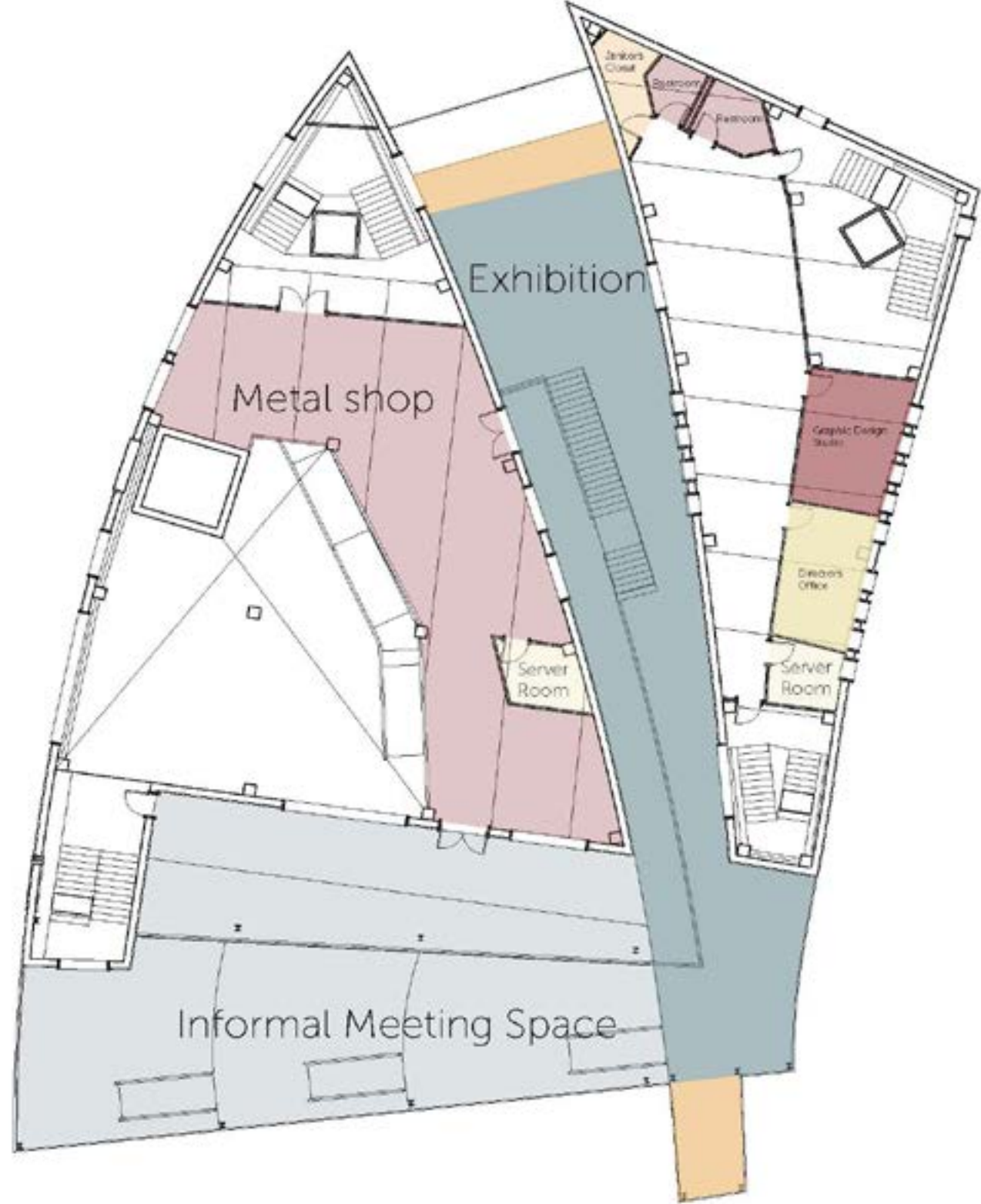


Building Program Diagrams

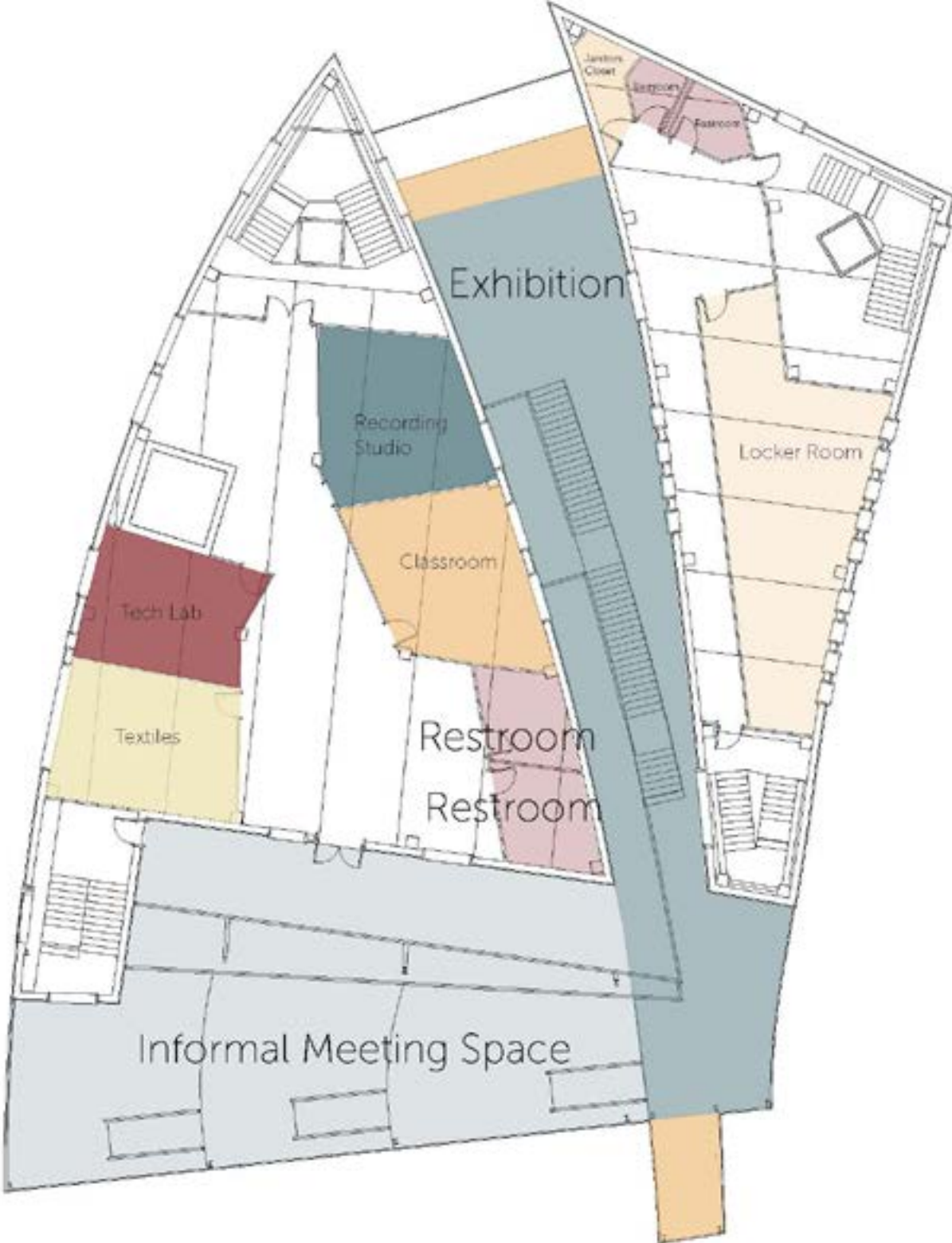
Ground Floor:



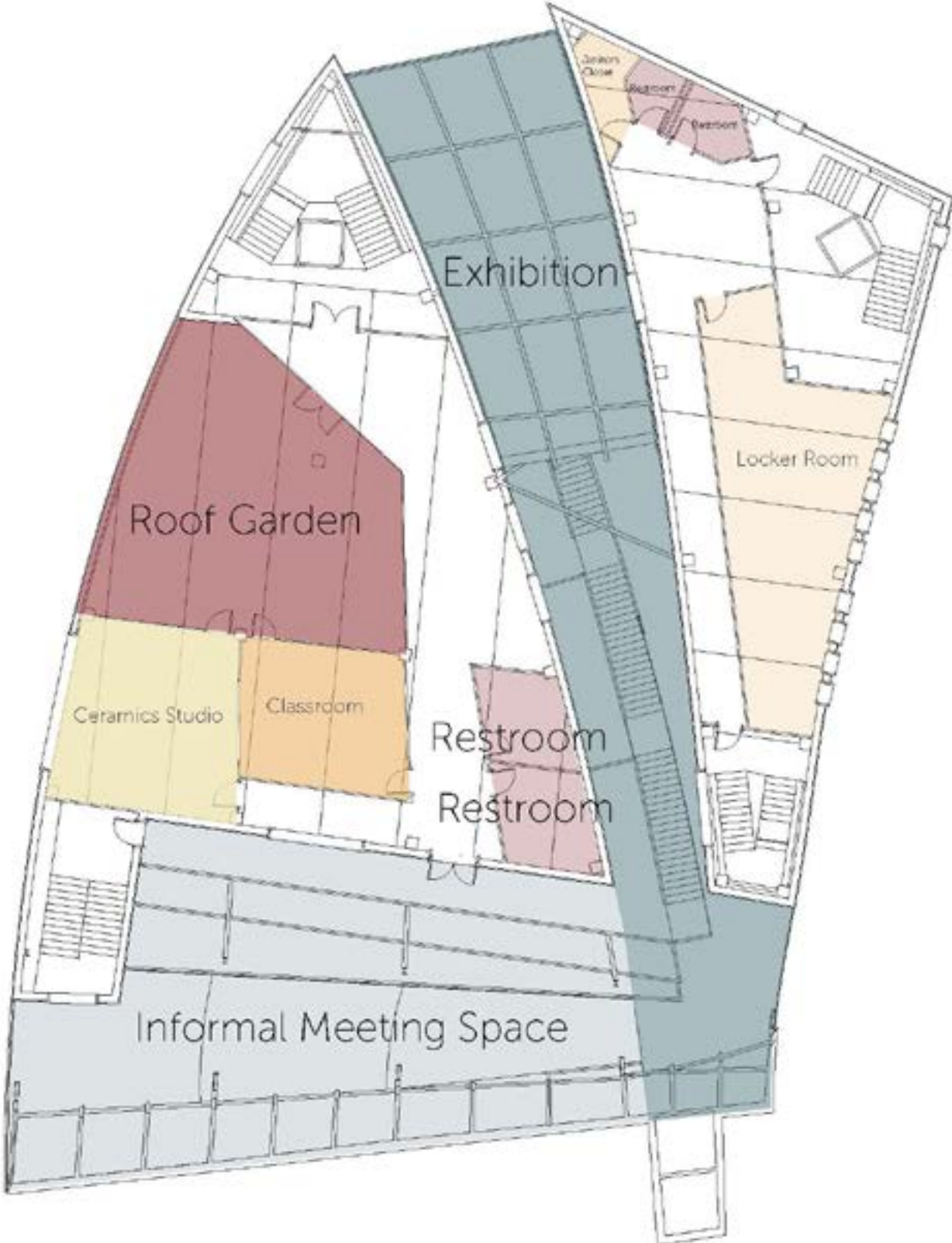
First Floor:



Second Floor:



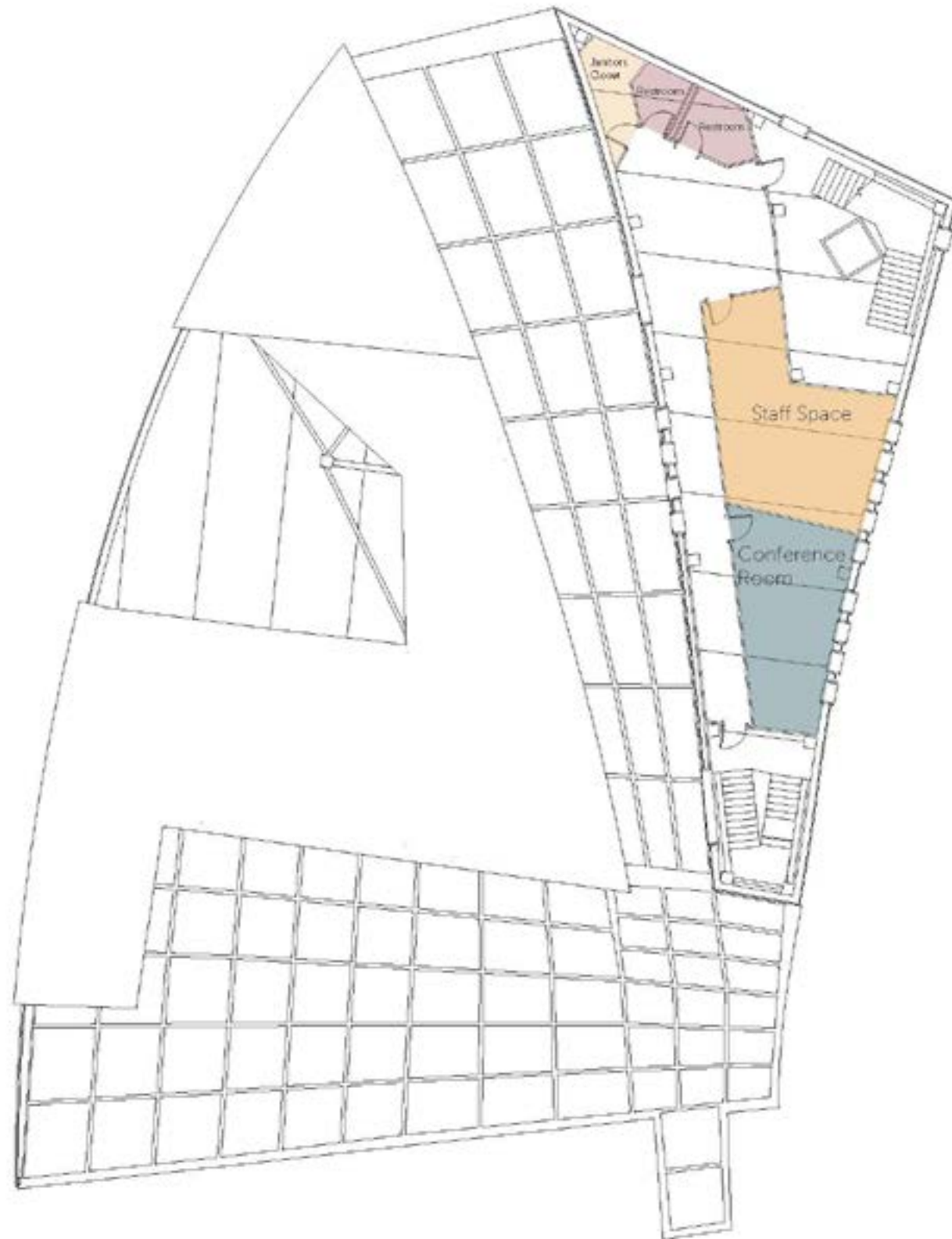
Third Floor:



Chapter 3

Use and Occupancy Classification

Fourth Floor:



F1	Woodshop
F1	Metal Shop
F2	Ceramics
F1	Recording Studio
F1	Textiles
F1	Tech Lab
B	Graphic Design Studio
A3	Exhibition Space
B	Classroom 1
B	Classroom 2
A2	Kitchen and Dining Area
B	Director's Office
B	Staff Support Area and Conference Room
A3	Informal Meeting Spaces

F1- Moderate Hazard Factory Industrial

F2- Low Hazard Factory Industrial

A2- Assembly Uses Intended for Food and/or Drink Consumption

A3- Assembly Uses Intended for Worship, Recreation or Amusement

B- Business

Chapter 5

General Building Heights and Areas

TABLE 506.2^{a, b} ALLOWABLE AREA FACTOR (A_f = NS, S1, S13R, or SM, as applicable) IN SQUARE FEET

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION	
		TYPE IV	HT
A-1	NS	15,000	
	S1	60,000	
	SM	45,000	
A-2	NS	15,000	
	S1	60,000	
	SM	45,000	
A-3	NS	15,000	
	S1	60,000	
	SM	45,000	
A-4	NS	15,000	
	S1	60,000	
	SM	45,000	
A-5	NS		UL
	S1		
	SM		
B	NS	36,000	
	S1	144,000	
	SM	108,000	
E	NS	25,500	
	S1	102,000	
	SM	76,500	
F-1	NS	33,500	
	S1	134,000	
	SM	100,500	
F-2	NS	50,500	
	S1	202,000	
	SM	151,500	

TABLE 504.3^a ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE IV
		HT
A, B, E, F, M, S, U	NS ^b	65
	S	85
H-1, H-2, H-3, H-5	NS ^{c, d}	65
	S	
H-4	NS ^{c, d}	65
	S	85
I-1 Condition 1, I-3	NS ^{d, e}	65
	S	85
I-1 Condition 2, I-2	NS ^{d, f, e}	65
	S	
I-4	NS ^{d, g}	65
	S	85
R	NS ^{d, h}	65
	S13R	60
	S	85

TABLE 504.4^{a, b} ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION	
		TYPE IV	HT
A-1	NS	3	
	S	4	
A-2	NS	3	
	S	4	
A-3	NS	3	
	S	4	
A-4	NS	3	
	S	4	
A-5	NS	UL	
	S	UL	
B	NS	5	
	S	6	
E	NS	3	
	S	4	
F-1	NS	4	
	S	5	
F-2	NS	5	
	S	6	

Chapter 6

Types of Construction

TABLE 601 FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^f (see Section 202)	3 ^{a, b}	2 ^{a, b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	3 ^a	2 ^a	2 ^a	HT	1 ^{b, c}	0
Bearing walls												
Exterior ^{e, f}	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^a	2 ^a	1	0	1	0	3	2	2	1/HT ^g	1	0
Nonbearing walls and partitions Exterior	See Table 705.5											
Nonbearing walls and partitions Interior ^d	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2 ^b	1 ^{b, c}	1 ^{b, c}	0 ^c	1 ^{b, c}	0	1 1/2	1	1	HT	1 ^{b, c}	0

For SI: 1 foot = 304.8 mm.

- a. Roof supports: Fire-resistance ratings of primary structural frame and bearing walls are permitted to be reduced by 1 hour where supporting a roof only.
- b. Except in Group F-1, H, M and S-1 occupancies, fire protection of structural members in roof construction shall not be required, including protection of primary structural frame members, roof framing and decking where every part of the roof construction is 20 feet or more above any floor immediately below. Fire-retardant-treated wood members shall be allowed to be used for such unprotected members.
- c. In all occupancies, heavy timber complying with Section 2304.11 shall be allowed for roof construction, including primary structural frame members, where a 1-hour or less fire-resistance rating is required.
- d. Not less than the fire-resistance rating required by other sections of this code.
- e. Not less than the fire-resistance rating based on fire separation distance (see Table 705.5).
- f. Not less than the fire-resistance rating as referenced in Section 704.10.
- g. Heavy timber bearing walls supporting more than two floors or more than a floor and a roof shall have a fire resistance rating of not less than 1 hour.

602.4 Type IV.

Type IV construction is that type of construction in which the *building elements* are mass timber or noncombustible materials and have *fire-resistance ratings* in accordance with Table 601. Mass timber elements shall meet the *fire-resistance-rating requirements* of this section based on either the *fire-resistance rating of the noncombustible protection*, the *mass timber*, or a combination of both and shall be determined in accordance with Section 703.2. The minimum dimensions and permitted materials for *building elements* shall comply with the provisions of this section and Section 2304.11. Mass timber elements of Types IV-A, IV-B and IV-C construction shall be protected with *noncombustible protection* applied directly to the *mass timber* in accordance with Sections 602.4.1 through 602.4.3. The time assigned to the *noncombustible protection* shall be determined in accordance with Section 703.6 and comply with Section 722.7.

Cross-laminated timber shall be labeled as conforming to ANSI/APA PRG 320 as referenced in Section 2303.1.4.

Exterior load-bearing walls and nonload-bearing walls shall be mass timber construction, or shall be of noncombustible construction.

Chapter 9

Fire Protection Systems

Automatic Sprinkler System: Required

Standpipe System: Not Required

Fire alarm and Detection Systems: Required

Chapter 10

Means of Egress

Section 1004: Occupancy Load per Floor

Function	Size (sq. ft.)	Occupant Load
Woodshop	4,383	22
Metal Shop	1,609	9
Ceramics	523	3
Recording Studio	435	9
Textiles	344	2
Tech Lab	412	3
Graphic Design Studio	224	2
Exhibition Space	2,400	80
Classroom 1	409	21
Classroom 2	377	19
Kitchen	285	2
Dining Area	1,371	92
Admin Building Bathroom (per floor)	162	
Maker Building Bathroom (per floor)	261	
1 Locker Room (2 total)	833	17
Directors Office	189	2
Staff Support Area and Conference Room	833	6
Informal Meeting Spaces	4,015	268
Mechanical Space	475	2
	Total	19,975

TABLE 1006.2.1 SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A, E, M	49	75	75	75*
B	49	100	75	100*
F	49	75	75	100*
H-1, H-2, H-3	3	NP	NP	20*
H-4, H-5	10	NP	NP	75*
I-1, I-2, I-4	10	NP	NP	75*
I-3	10	NP	NP	100*
R-1	10	NP	NP	75*
R-2	20	NP	NP	125*
R-3*	20	NP	NP	125**
R-4*	20	NP	NP	125**
S*	29	100	75	100*
U	49	100	75	75*

Travel distance:

The max. Travel distance from any accessible space to an area of refuge shall not exceed the exit access travel distance permitted for the occupancy in accordance with Section 1017.1

Stairway or elevator access:

Every required area of refuge shall have direct access to a stairway complying with Sections 1009.3 and 1023 or an elevator complying with Section 1009.4

Section 1007:

Where 2 exits are required from any portion of the exit access, they shall be placed a distance apart equal to not less than one-half of the length of the max overall diagonal dimension of the building or area to be served measured in a straight line between them.

Section 1009:

Stairways: Stairways between stories should have a clear width of 48" min between handrails and shall incorporate an area of refuge within an enlarged floor-level landing or be accessed from an area of refuge.

Areas of refuge shall be accessible from the space it serves by an accessible means of egress

Size:

Each area of refuge shall be sized to accommodate one wheelchair space of 30 in by 48 in for every 200 occupants or portion thereof, based on the occupancy load of the area of refuge and areas served by the area of refuge. Such wheelchair spaces shall not reduce the means of egress minimum width or required capacity. Access to any of the required wheelchair spaces in an area of refuge shall not be obstructed by more than one adjoining wheelchair space.

Separation:

Each area of refuge shall be separated from the remainder of the story by a smoke barrier complying with Section 709 or a horizontal exit complying with Section 1026. Each area of refuge shall be designed to minimize the intrusion of smoke.

Two-way Communication:

Areas of refuge shall be provided with a two-way communication system complying with Sections 1009.8.1 and 1009.8.2.

Should be provided on each accessible floor that is one or more stories above or below the level of exit discharge.

A two-way communication system is not required to be on the landing of the elevator if it is provided at the area of refuge.

They are also not required at freight elevators

Signage:

Signage indicating special accessibility provisions shall be provided as shown:

Each door providing access to an area of refuge from an adjacent floor area shall be identified by a sign stating:

AREA OF REFUGE

Each door providing access to an exterior area for assisted rescue shall be identified by a sign stating: EXTERIOR AREA FOR ASSISTED RESCUE

Directional Signage:

Directional signage indicating the location of all other means of egress and which of those are accessible means of egress shall be provided at the following:

At exits serving a required accessible space but not providing an approved accessible means of egress

At elevator landings

Within areas of refuge

Instructions:

In areas of refuge and exterior areas for assisted rescue, instructions on the use of the area under emergency conditions shall be posted.

The instructions shall include all of the following:

Persons able to use the exit stairway do so as soon as possible unless they are assisting others

Information on planned availability of assistance in the use of stairs or supervised operation of elevators and how to summon such assistance

Directions for use of the two-way communication system were provided.

Section 1010:

Determine the min. door widths (clear),
swing direction, fire rating

Doors:

The required capacity of each door opening shall be sufficient for the occupant load thereof and shall provide a min clear width of 32 inches.

Clear openings of doorways with swinging doors shall be measured between the face of the door and the stop, with the door open 90 degrees.

Where this section requires a min clear width of 32 inches and a door opening includes two door leaves without a mullion, one leaf shall provide a clear opening width of 32 inches.

The max width of a swinging door leaf shall be 48 inches nominal.

The height of door openings shall be not less than 80 inches.

Door swing:

Egress doors shall be of the pivoted or side-hinged swinging type

These doors shall swing in the direction of egress travel where serving a room or area containing an occupant load of 50 or more persons

Door opening force

The force for pushing or pulling open interior swinging egress doors, other than fire doors, shall not exceed 5 pounds.

For other swinging doors, as well as sliding and folding doors, the door latch shall release when subjected to a 15-pound force. The door shall be set in motion when subjected to a 30-pound force. The door shall swing to a fully open position when subjected to a 15-pound force. Forces shall be applied to the latch side of the door

Doors should have a one-hour firing rating

Section 1005 & 1011:

Determine min stair width and any other requirement:

Egress stair width is determined by the occupant load that the stairs are serving (occupant load x .3 inches).

Stairways serving an occupant load of less than 50 shall have a width of not less than 36 inches. But if it serves more than 50, the minimum width shall not be less than 44 inches.

Headroom clearance should be no less than 80 inches.

Section 1005.3.2 and 1020.2:

Determine min. egress corridor width:

To calculate minimum egress corridor width (occupant load x means of egress capacity factor of 0.2 inches).

The minimum width for an occupant load less than 50 is 36 inches

The minimum for everywhere else is 44 inches

Section 1017.2:

Determine the max. distance of travel to exit:

The max distance of travel in occupancies classified as A and F-1 is 250ft

The max distance of travel in occupancies classified as B is 300ft

The max distance of travel in occupancies classified as F-2 is 400ft