

BEARS MIXED-USE MULTI-FAMILY COURTYARD HOUSING

2730 SW MULTNOMAH BLVD

PORTLAND, OR

JON VANN

ENERGY PROGRAM



Portland has a dearth of attainably-priced housing within city limits that serves the needs of families. There are detached, single-family homes in the suburbs, and apartments in the city, but few options that combine the advantages of these two housing types. The suburban house provides privacy and outdoor space, a particularly valuable amenity for families with children. However, these homes, at least those in a price range that is realistic for middle-income families, tend to be far from the amenity of the city itself, in socially isolation developments. Within the city, detached single-family homes have reached astronomical prices, while traditional apartments don't serve the needs of families. This trend will be countered with the design of mixed-use, multi-family housing, integrating courtyard housing and commercial space with a vibrant network of pedestrian access and open space.

The proposed site is the current Jerome Sears Military Reserve Center on SW Multnomah Blvd, between SW 34th Ave. and Barbur Blvd. Currently, the area is a “drive-by” zone of no attraction or use to those who don't work there. However, the base is slated for decommission by the US Military, and is to be the site of a new development with a “social” aspect – this could be a school, a park, a homeless shelter, or in this case, affordable and attainable housing. A courtyard housing development of the type mentioned above will bring life to a heretofore lifeless quarter of the city, as well as providing a model of well designed, medium-density multifamily housing that supports families while remaining in the city.

If this is to be attainable housing, part of that means designing for people- people who don't have a lot of disposable money. That means that a reduction in energy use has an immediate effect, beyond the typical “sustainability” tag. With lower energy use comes lower cost to the consumer. Further, as an infill project, there is an onus on responsible energy consumption. One of the primary selling points of the infill development as a typology is that it counters the negative aspects of suburban sprawl. From an energy consumption standpoint, one of these negative aspects is the embodied energy of suburban sprawl. As a counter example, infill housing should make concrete, measurable strides towards reducing the energy footprint of a given housing development. This can serve as a model of more responsible housing, exploring ways that energy efficiency can be integral to housing design.

Some of the possible energy conservation strategies that can be implemented in the project include:

Thermally massive structure – The use of thick, heavy material, frequently concrete, to absorb heat and regulate temperature change within a space. This is typically achieved with wall and floors. Here, the walls separating the retail units is the most likely candidate for this treatment, and their southern exposure works well for this strategy.

Grey water reuse – This is a strategy in which the waste water from processes such as showers, dishwashers, etc, is moved through the plumbing system such that the heat that is still within the water can be harvested. In this case, the outgoing water pipes would be laid directly beneath the flooring, to capitalize on heat transfer from the water through the pipe and into the space. In the mixed-use block, it's possible that grey water from the commercial use on the first floor could be used to help heat the residential space above.

Daylighting – This is a matter of thoughtful design rather than technology. Of course plentiful daylight is desirable, but in the particular case of courtyard housing, the way in which the windows are designed and how privacy gradients are achieved is of prime importance. With a relatively large amount of people in a relatively small space, much of which is outdoor space, there is a need to provide windows that border that outdoor space with privacy. If this is not done, it becomes irrelevant how much daylight exposure a space has, since people will simply leave their blinds drawn. This is where a simple screening element can be especially effective.

MASSING RELATIONSHIP



RESIDENTIAL



COMMERCIAL

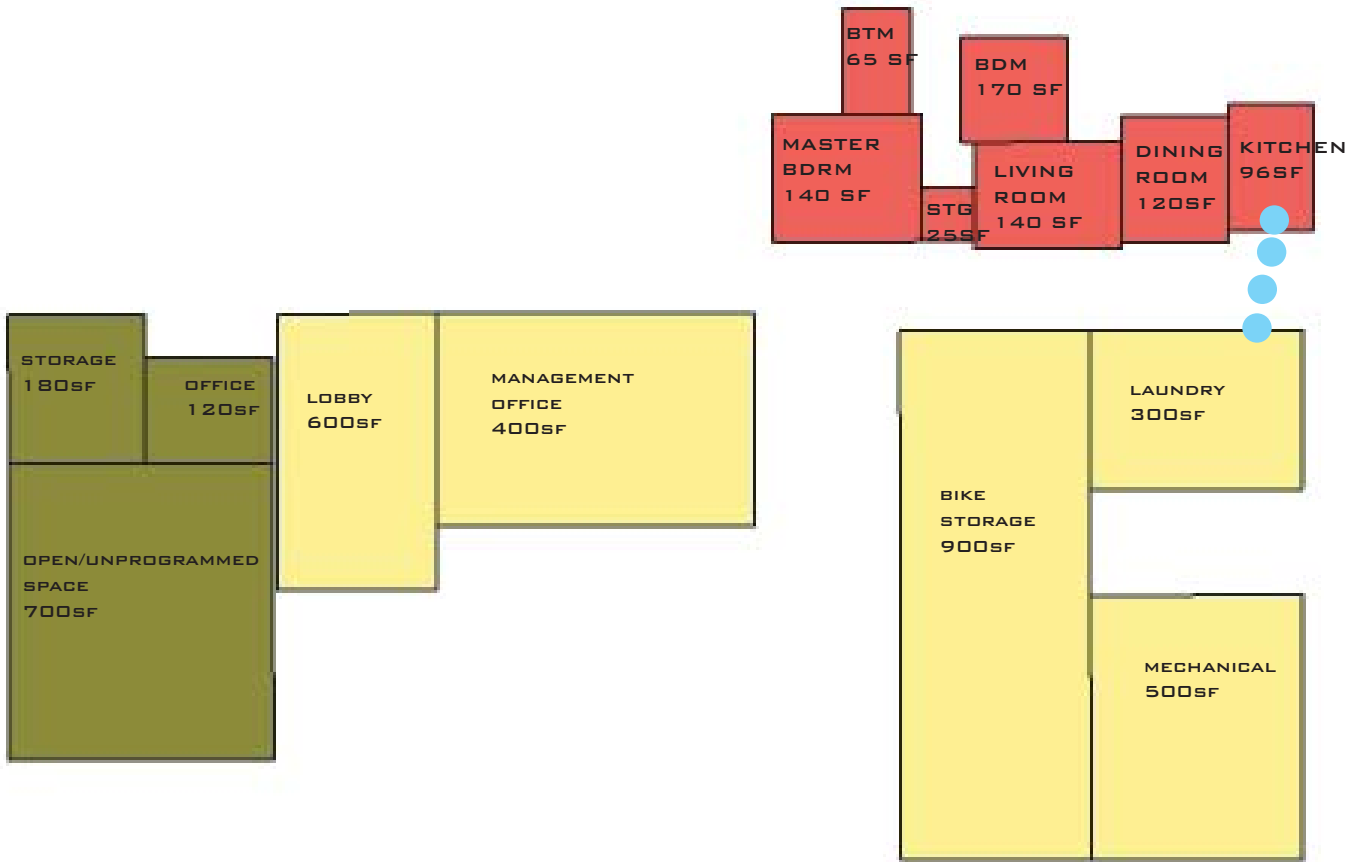
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PROGRAM - COMPLETE HOUSING BLOCK

TYPE	SPACE	DIMENSIONS (LxWxH)	AREA	# UNITS	# USERS	SCHEDULE*	TEMP. NEEDS	LIGHTING NEEDS	TOTAL AREA		
RESIDENTIAL	KITCHEN	8x12x8	96	22	6	15HR	70	HIGH AMBIENT	2112		
	DINING ROOM	10x12x8	120	22	8	15HR	70	LOW AMBIENT	2640		
	LIVING ROOM	14x10x8	140	22	8	12HR	70	LOW AMBIENT	3080		
	BATHROOM	6.5x10x8	65	33	1	24HR	70	HIGH TASK	2145		
	MASTER BDRM	14x12x8	140	11	2	12HR	70	LOW AMBIENT	1870		
	BEDROOM	10x10x8	170	22	2	12HR	70	LOW AMBIENT	3080		
	STORAGE	5x5x8	25	22	0	12HR	<70	HIGH TASK	550		
	SUBTOTAL									15477	
										25% CIRCULATION	3869.25
	TOTAL									19346.25	
RES. SUPPORT	LOBBY	30x20x15	600	1	15	12HR	70	LOW AMBIENT	600		
	MGMT. OFFICE	15x26x15	400	1	5	12HR	70	LOW AMBIENT	400		
	BIKE STORAGE	18x50x15	900	1	7	24HR	<70	LOW AMBIENT	900		
	LAUNDRY	20x15x15	300	1	4	24HR	70	LOW AMBIENT	300		
	GARBAGE/MECH	20x25x15	500	1	1	24HR	<70	HIGH TASK	500		
	SUBTOTAL									2700	
										25% CIRCULATION	675
TOTAL									3375		
COMMERCIAL	PRIMARY OPEN	25x28x15	700	22	15	12HR	70	HIGH AMBIENT	15400		
	SUPPORT/OFFICE	12x10x15	120	22	2	12HR	70	LOW AMBIENT	2640		
	STORAGE	13x14x15	180	22	0	12HR	>70	HIGH TASK	3960		
	SUBTOTAL									22000	
									20% CIRCULATION	5500	
TOTAL									22000		
TOTAL									44721.25		

PROGRAMMATIC/FUNCTIONAL ADJACENCY ONE UNIT



COMMERCIAL SPACE



RESIDENTIAL SUPPORT SPACE



RESIDENTIAL SPACE



INDICATES PHYSICAL ADJACENCY



INDICATES STORY JUMP

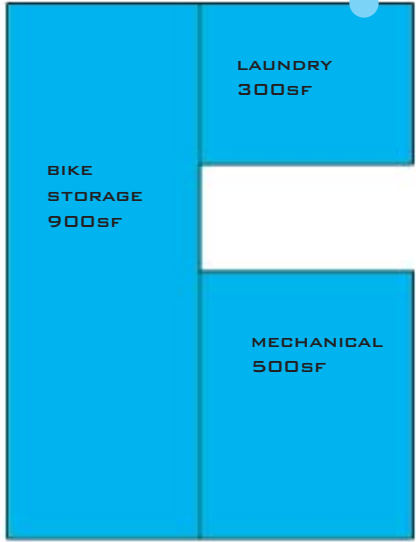
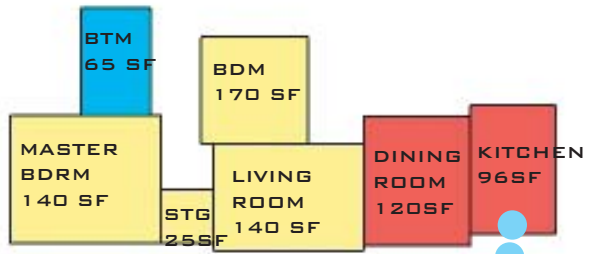
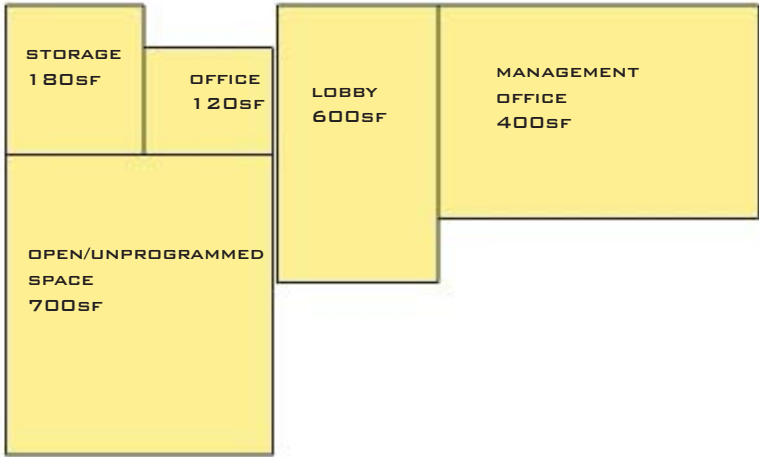
LIGHTING NEEDS ONE UNIT



-  HIGH AMBIENT
-  LOW AMBIENT
-  HIGH TASK

 INDICATES STORY JUMP

OCCUPANCY SCHEDULING ONE UNIT



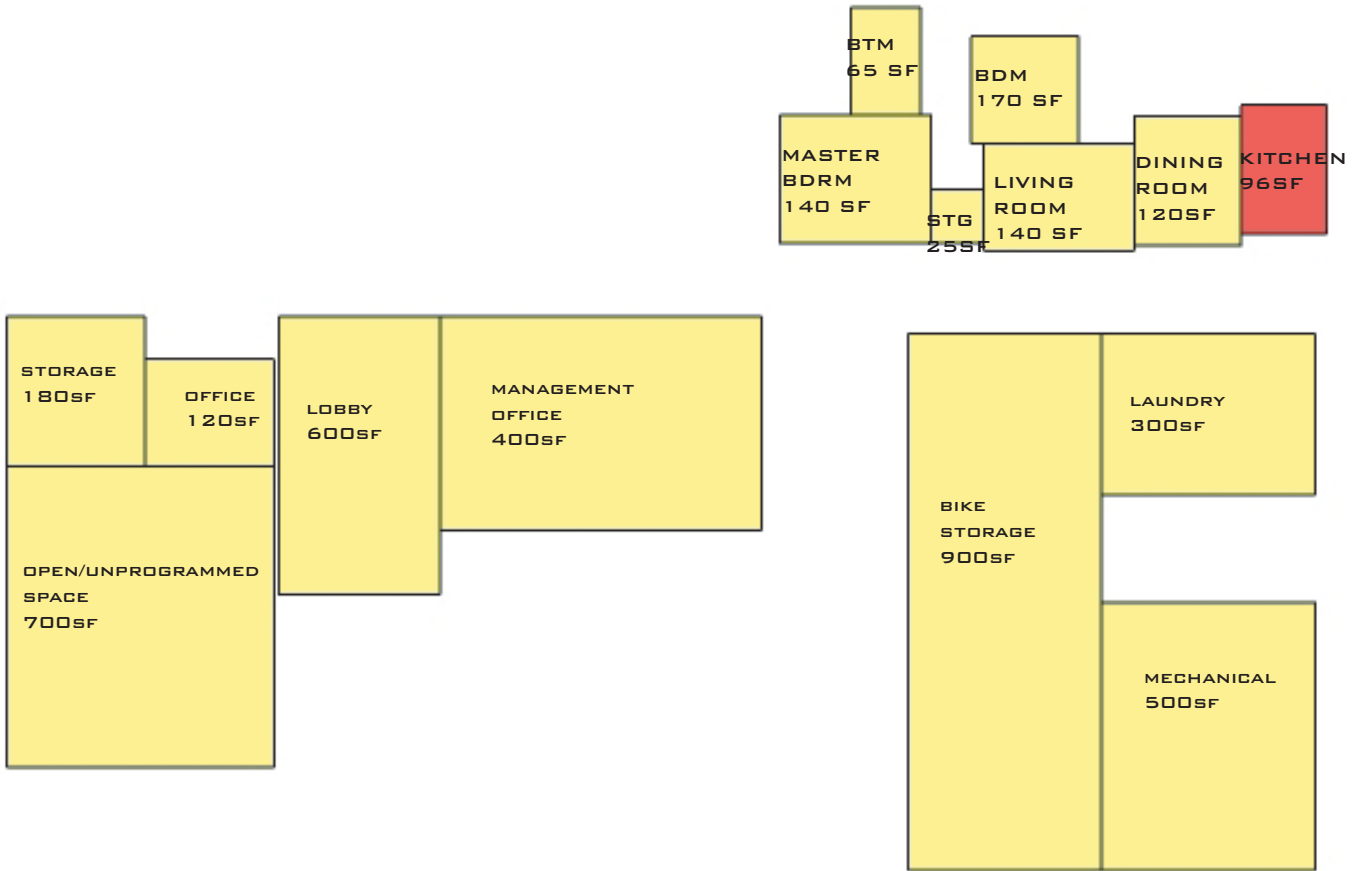
12HR (9AM-9PM)

15HR (6AM-9PM)

24HR

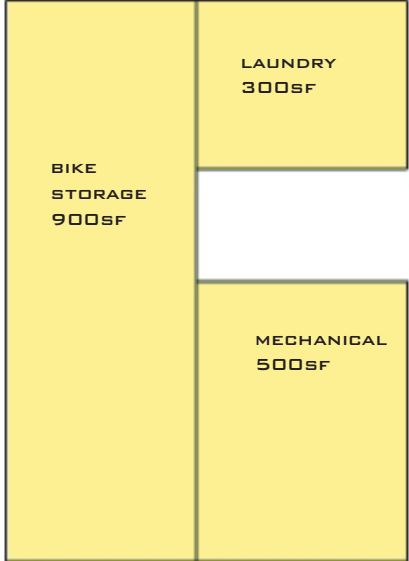
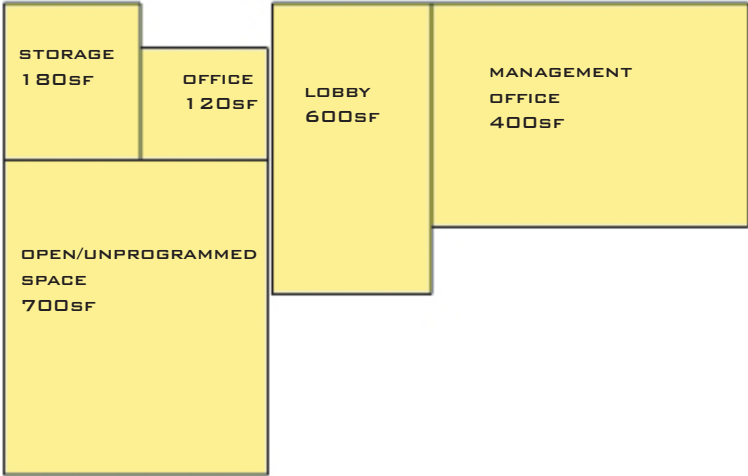
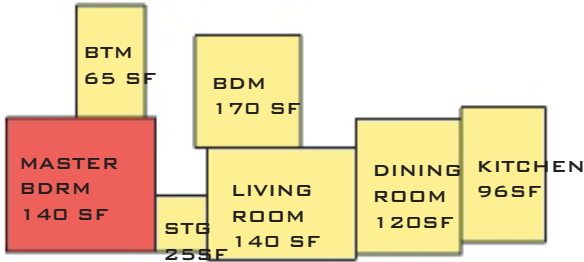
INDICATES STORY JUMP

ROOM SHEET



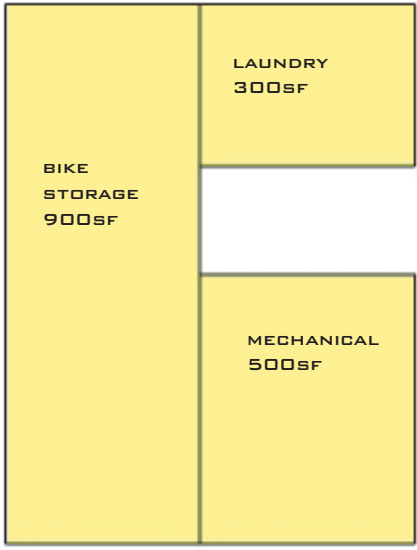
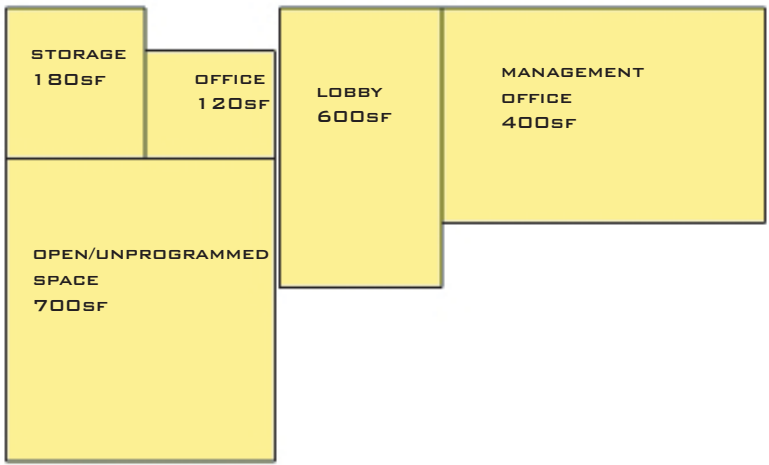
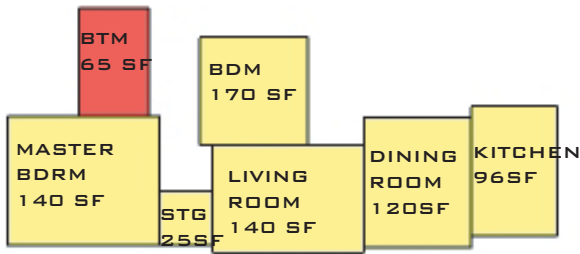
SPACE NAME	kitchen	AREA	96sf
SPACE USE	cooking, cleaning		
Lighting rate	2.2 w/sf	Equipment	stove, oven, refridgerator
Recommended Light Levels	14fc		
Temperature Range	high	Winter Optimum Range	Summer 74F 69-85F
			70F 66-75F

ROOM SHEET



SPACE NAME	bedroom	AREA	140sf
SPACE USE	sleeping, relaxing		
Lighting rate	1.6 w/sf	Equipment	heater
Recommended Light Levels	10fc		
Temperature Range	low	Winter Optimum Range	Summer Optimum Range
		66-75F	74F 66-78F

ROOM SHEET

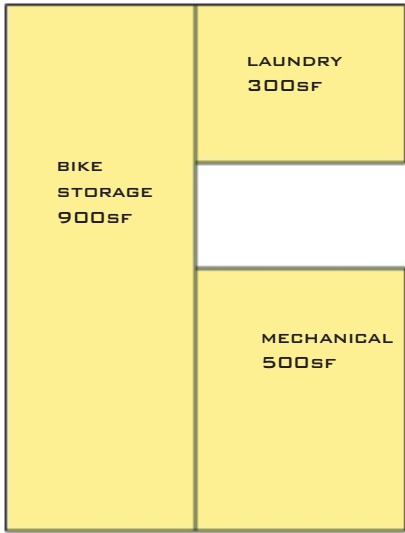
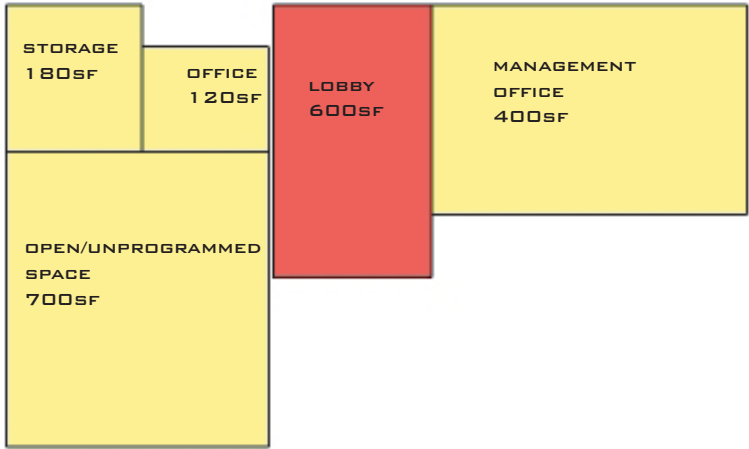
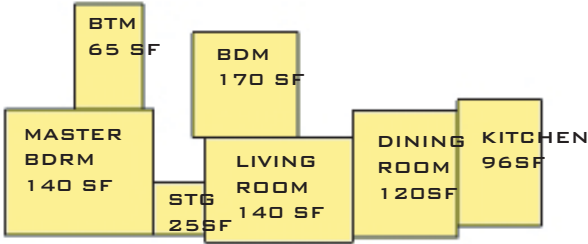


SPACE NAME	bathroom	AREA	65sf
SPACE USE	bathing		

Lighting rate	4.2 w/sf	Equipment shower, sink
Recommended Light Levels	35fc	

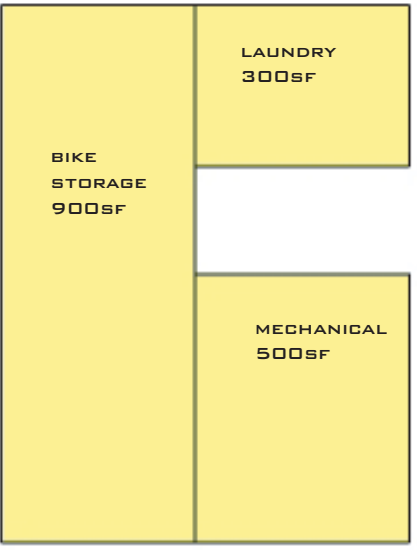
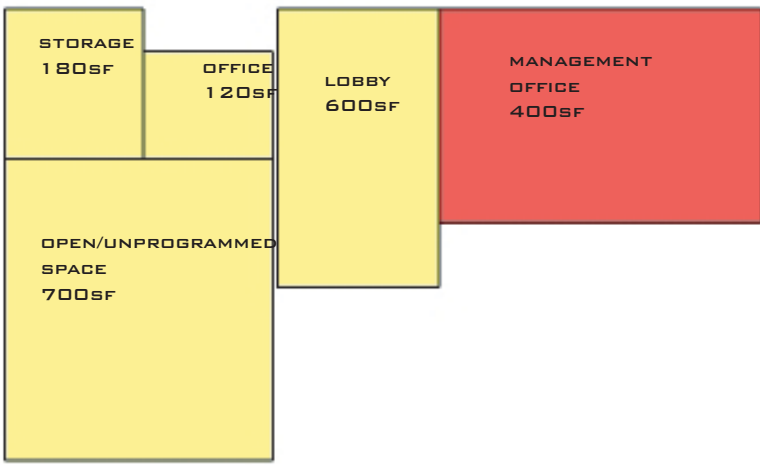
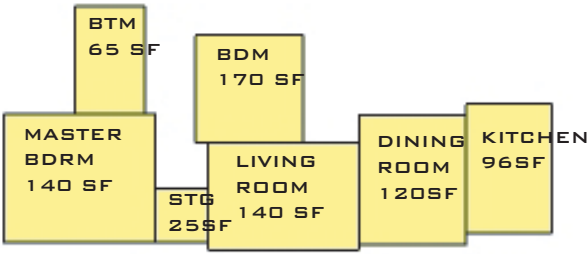
Temperature Range	high	Winter	Summer
		Optimum	70F 74F
		Range	66-75F 66-85F

ROOM SHEET



SPACE NAME	lobby	AREA	600sf
SPACE USE	greeting, exhibition		
Lighting rate	1.6 w/sf	Equipment	lights
Recommended Light Levels	10fc		
Temperature Range	low	Winter Optimum Range	Summer 74F 66-78F

ROOM SHEET

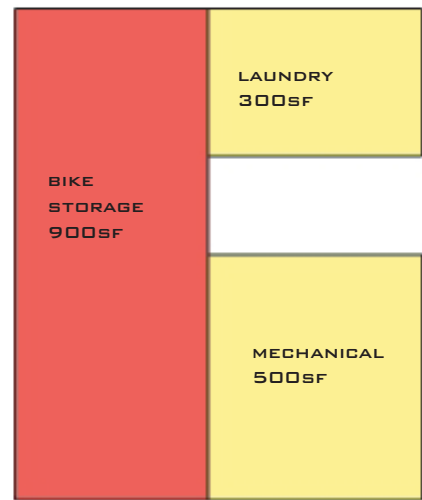
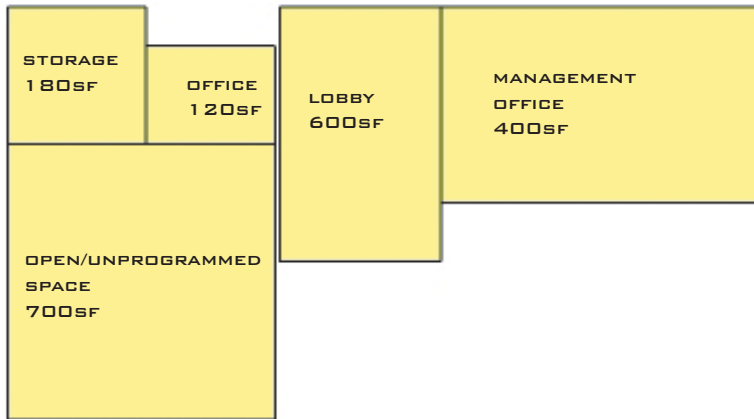
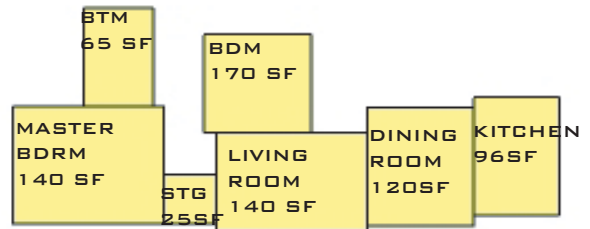


SPACE NAME	management office	AREA	400sf
SPACE USE	files, receipts, records		

Lighting rate	1.6 w/sf	Equipment computers, copiers, task lights
Recommended Light Levels	10fc	

Temperature Range	low	Winter Optimum Range	70F 66-75F	Summer	74F 66-78F
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ROOM SHEET



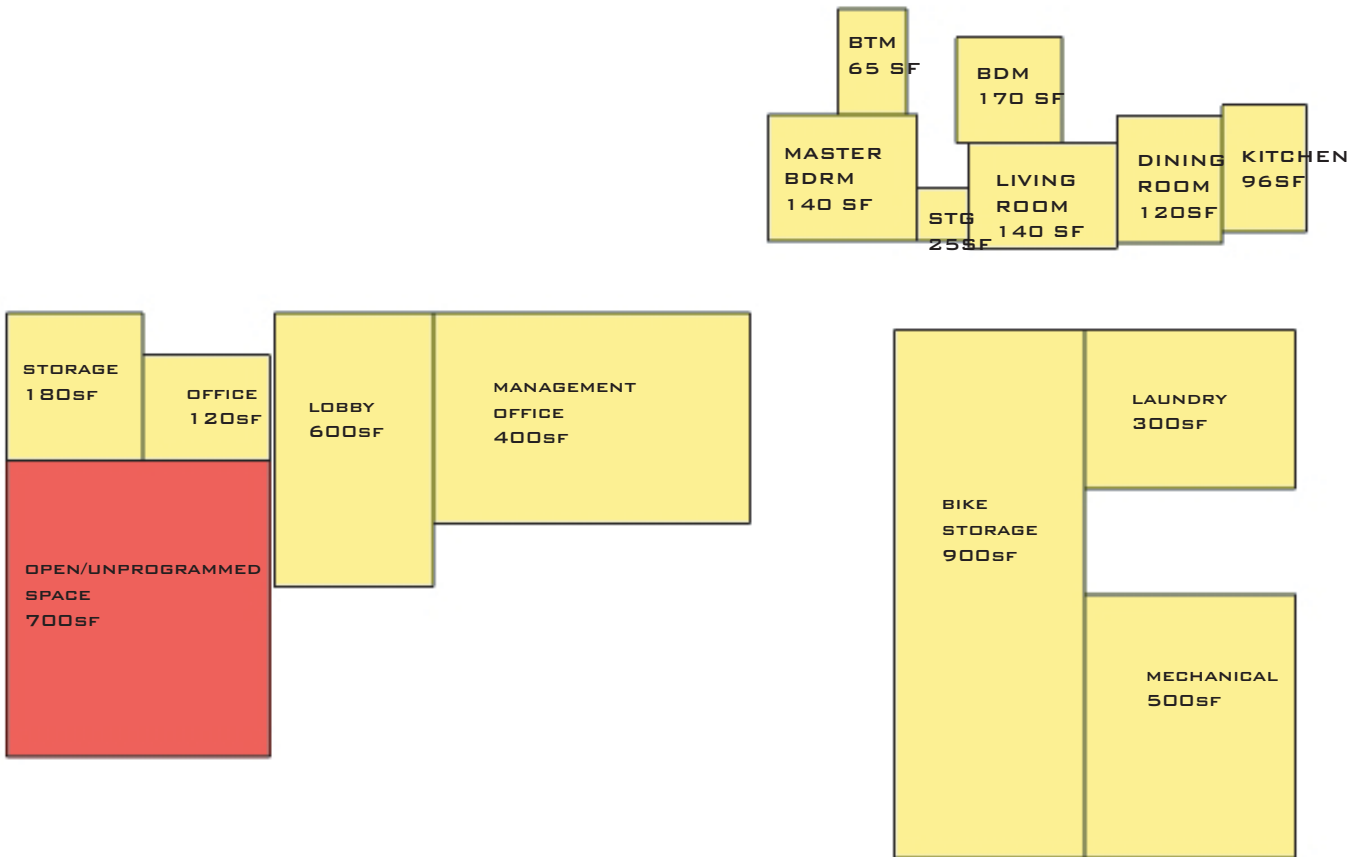
SPACE NAME	bike storage	AREA	900sf
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SPACE USE	storing bikes, etc
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Lighting rate	1.6 w/sf	Equipment
Recommended Light Levels	10fc	

Temperature Range	low	Winter Optimum Range	70F 66-70F	Summer	74F 66-75F
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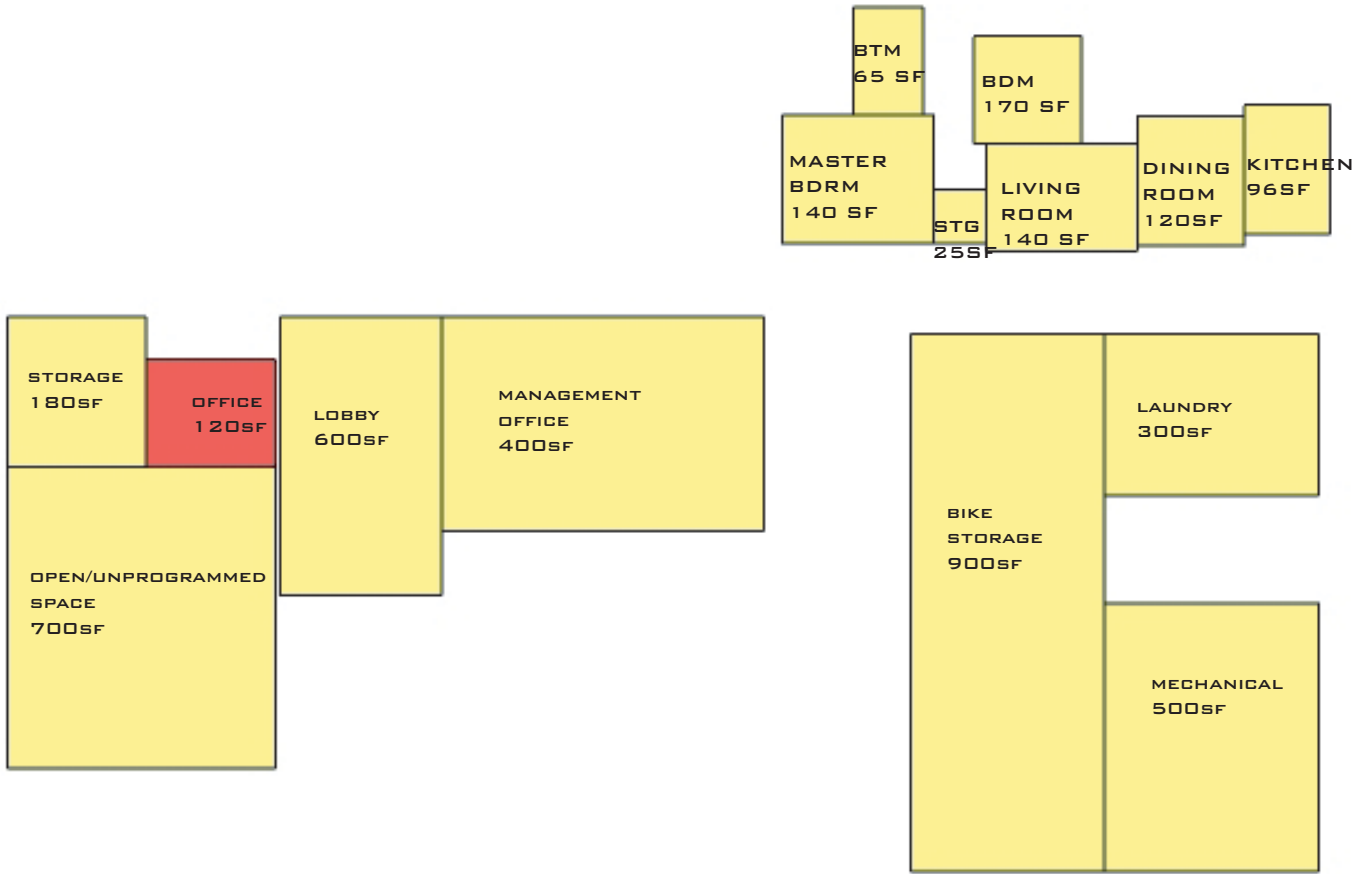
ROOM SHEET



SPACE NAME	open retail	AREA	700sf
SPACE USE	display, eating, etc		
Lighting rate	4.2 w/sf	Equipment	lights, TV's, computers, etc
Recommended Light Levels	20fc		
Temperature Range	low	Winter Optimum Range	Summer 74F 66-75F

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ROOM SHEET



SPACE NAME	retail office	AREA	120sf
SPACE USE	filing, records, calls		

Lighting rate	3.1 w/sf	Equipment	computers, printers, etc
Recommended Light Levels	20fc		

Temperature Range	low	Winter Optimum	70F	Summer	74F
		Range	66-70F		66-70F

Conclusions

The spaces should be grouped according to lighting load, when possible. Since thermal demand is approximately equal for all spaces, this is not an issue. Further, the study suggests that thermally massive walls in the retail space are an appropriate response to the conditions, as they would help passively regulate temperature in spaces with a 12 hour cycle. In the spaces with a longer cycle, such as the residential spaces, heat flushing via operable windows is an appropriate summer time response. For winter, the southern exposure should be exploited to increase heat gain from the sun. Further, the residential spaces will need operable solar shading, as the “low ambient” light level will be difficult to maintain during the day without sun control. In the support spaces, equipment exhaust should be located on the periphery of the building where possible, to effectively flush equipment heat from those spaces.