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.
## Program - Complete Housing Block

<table>
<thead>
<tr>
<th>Type</th>
<th>Space</th>
<th>Dimensions (LxWxH)</th>
<th>Area</th>
<th># Units</th>
<th># Users</th>
<th>Schedule*</th>
<th>Temp. Needs</th>
<th>Lighting Needs</th>
<th>Total Area</th>
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<tbody>
<tr>
<td>Residential</td>
<td>Kitchen</td>
<td>6'x12'x8</td>
<td>96</td>
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**Subtotal**  

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**Subtotal**  

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<td>Storage</td>
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**Subtotal**  

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<th>Space</th>
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**Total**  

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*Note: SCHEDULE* refers to the operating hours of the space, where 12HR indicates 12 hours per day.
Programmatic/Functional Adjacency One Unit

- Commercial Space
- Residential Support Space
- Residential Space

Indicates physical adjacency
Indicates story jump
Lighting needs one unit
**SPACE NAME**  | kitchen  
**AREA**  | 96sf  
**SPACE USE**  | cooking, cleaning  
**Lighting rate**  | 2.2 w/sf  
**Recommended Light Levels**  | 14fc  
**Equipment**  | stove, oven, refrigerator  
**Temperature Range**  | high  
**Winter Optimum Range**  | 70F  
**Summer Optimum Range**  | 74F  
**Winter Temperature Range**  | 66-75F  
**Summer Temperature Range**  | 69-85F
SEARS MIXED-USE MULTI-FAMILY COURTYARD HOUSING
2730 SW MULTNOMAH BLVD
PORTLAND, OR

SEARS MIXED-USE MULTI-FAMILY COURTYARD HOUSING
2730 SW MULTNOMAH BLVD
PORTLAND, OR

ROOM SHEET

SPACE NAME: bedroom
AREA: 140sf

SPACE USE: sleeping, relaxing

Lighting rate: 1.6 w/sf

Recommended Light Levels: 10fc

Equipment: heater

Temperature Range: low

Winter Optimum Range: 70F
Summer Optimum Range: 74F
**SEARS MIXED-USE MULTI-FAMILY COURTYARD HOUSING**

**2730 SW MULTNOMAH BLVD**

**PORTLAND, OR**

**JON VANN**

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**ROOM SHEET**

**SPACE NAME** | bathroom | **AREA** | 65sf
---|---|---|---
**SPACE USE** | bathing | **Lighting rate** | 4.2 w/sf
**Recommended Light Levels** | 35fc | **Equipment** | shower, sink
**Temperature Range** | high | **Winter Optimum Range** | 70F, 66-75F
| | | **Summer Optimum Range** | 74F, 66-85F
**SPACE NAME**

lobby

**AREA**

600sf

**SPACE USE**

greeting, exhibition

**Lighting rate**

1.6 w/sf

**Recommended Light Levels**

10fc

**Temperature Range**

low

**Winter**

Optimum Range: 70F

**Summer**

Optimum Range: 74F
SEARS MIXED-USE MULTI-FAMILY COURTYARD HOUSING
2730 SW MULTNOMAH BLVD
PORTLAND, OR

ROOM SHEET

**SPACE NAME**  | management office  | **AREA**  | 400sf
**SPACE USE**   | files, receipts, records |
**Lighting rate** | 1.6 w/sf |
**Recommended Light Levels** | 10fc |
**Temperature Range** | low |
**Winter Optimum Range** | 70F | 66-75F |
**Summer Optimum Range** | 74F | 66-78F |
SPACE NAME: bike storage

AREA: 900sf

SPACE USE: storing bikes, etc

Lighting rate: 1.6 w/sf

Recommended Light Levels: 10fc

Temperature Range: low

Equipment:

Winter
Optimum Range: 66-70F

Summer
Optimum Range: 66-75F
**SPACE NAME** | open retail | **AREA** | 700sf
---|---|---|---
**SPACE USE** | display, eating, etc | **Equipment** | lights, TV's, computers, etc
Lighting rate | 4.2 w/sf | **Winter** | 70F
Recommended Light Levels | 20fc | **Summer** | 74F
Temperature Range | low | **Winter Optimum Range** | 66-70F
| | | **Summer Optimum Range** | 66-75F
SPACE NAME: retail office
AREA: 120sf

SPACE USE: filing, records, calls

Lighting rate: 3.1 w/sf

Recommended Light Levels: 20fc

Equipment: computers, printers, etc

Temperature Range: low

Winter Optimum Range: 70F
Summer 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.