

THE URBAN INDUSTRY INCUBATOR

A DISCUSSION OF ENERGY USE ISSUES

FOR AN

INDUSTRIAL CONDOMINIUM

IN

PORTLAND'S CENTRAL EASTSIDE INDUSTRIAL DISTRICT

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PROGRAMMING WORKSHOP

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The Urban Incubator

THESIS STATEMENT

The Urban Incubator (UINC), takes its place in the Central Eastside Industrial District (CEID), between the river and downtown to the west, and urban neighborhoods to the east.

The UINC will be an ideal place for established small businesses to own their own premises and develop their trade over time. While the legal structure of the UINC will be private ownership of units through a condominium arrangement, the spatial arrangements will acknowledge the value of community and collaboration between businesses, and workers, similarly to the way that research institutions are designed with common spaces that facilitate interaction and exchange of ideas and information. This may take place in expanded “circulation” spaces, or through a street level cafe’ in proximity to the main entrance

Likewise, the relationship of the industrial building to the street will be re-examined, and enhanced. Business activity will be allowed to spill over on to the street and allow an interesting pedestrian environment without relying on an inappropriate level of retail for an industrial district.

ENERGY USE IN THE URBAN INCUBATOR

Energy use costs money: therefore a competitive advantage is to be had by minimizing its use. As a place to do business, therefore, the urban incubator saves energy in order to save money. Decisions about which technologies to employ will ultimately be based on their cost to benefit ratio.

ENERGY SAVING STRATEGIES

SOLAR ENERGY (PHOTOVOLTAIC)

- . At present, any photovoltaic system has a very long payback time, and current technologies don't make sense at current energy prices, but given the likelihood of change in both energy prices and solar technology, it makes sense to provide a suitable surface to mount solar panels upon in the future, when it makes economic sense. This implies either a roof surface that slopes facing south, or a convenient way to mount a sloped framework on a flat roof.

GEOHERMAL HEAT SINK.

- . a geothermal heat sink is a convenient way to bring the building closer to the ground temperature of 50 degrees Fahrenheit, which is cooler than the summer air, and warmer than the winter air. This is accomplished by running water through a labyrinth of pipes underground, and then using this water to warm or cool air. This implies allowing mechanical space for such a system

EXHAUST AIR HEAT RECOVERY

- . By running intake air in thermally conductive channels adjacent to exhaust air, it can be either pre-heated, or pre-chilled, depending upon the season. Architecturally, this implies careful location of mechanical systems and intake/ exhaust vents.

DAYLIGHTING

- . Ideally, all spaces in the building should be day lit, both for aesthetic and energy use reasons. This implies that the maximum depth of individual spaces adjacent to the exterior envelope be kept in proportion to the height of the space- probably about 30' in this case, and that spaces not adjacent to the building envelope may need to share light from outer spaces through interior windows that may also be operable for ventilation.

STACK EFFECT VENTILATION

- . In a multistory building, the stack effect can be a very effective way to generate the energy necessary to move air for ventilation. This implies that each space must have openings for air that connect with vertical shafts that eventually reach the top of the building. The stairs, and halls of the building can be designed to accommodate this, perhaps incorporating the interior windows mentioned in # 4.

NIGHT COOLING / AUTOMATIC VENTILATION

During Summer months, the thermal mass of the building can be cooled considerably during the cool temperatures of the night, and sometimes during the day. This process can reduce the cooling load of the building during the day, since the building will effectively be pre-cooled. This implies that there be some kind of automated system that opens vents or windows that allow in cool air which must flow freely across the thermal mass of the building. Further, this thermal mass (cement floors, ceilings, walls, etc) must not be too insulated from the flow of air by carpets, drop ceilings, etc.

PROGRAM ELEMENTS SPREADSHEET 1

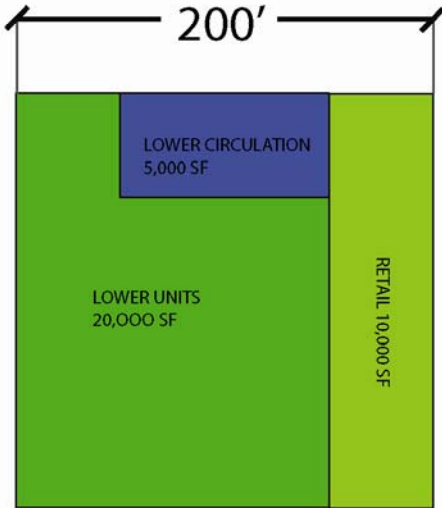
NAME	UPPER UNITS	UPPER CIRCULATION	LOWER RETAIL
ACTIVITY	WORK		CAFÉ
AREA	58,800 SF	4,800 SF	3,000 SF
OCCUPANTS	*****	*****	*****
HEIGHT	20'	20'	20'
LIGHTING	H AMB, H TASK	L AMB L TASK	L AMB H TASK
SCHEDULE	7AM - 7PM M-F	7AM - 7PM M-F	7AM - 7PM M-F
TEMPERATURE RANGE	LOW	HIGH	LOW

PROGRAM ELEMENTS SPREADSHEET 2

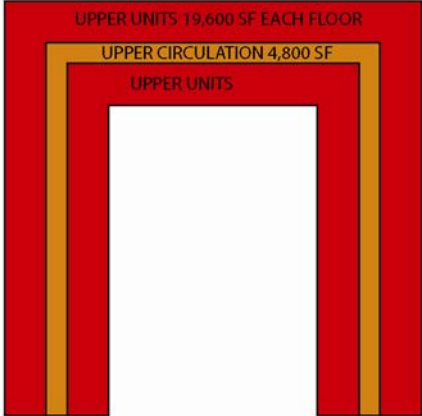
NAME	LOWER UNITS	LOWER CIRC
ACTIVITY	WORK	
AREA	34,500 SF	2500 SF
OCCUPANTS	*****	*****
HEIGHT	20'	20'
LIGHTING	H AMB, H TASK	L AMB L TASK
SCHEDULE	7AM - 7PM M-F	7AM - 7PM M-F
TEMPERATURE RANGE	LOW	HIGH

DIAGRAMS OF PROGRAM

KEY



LOWER FLOOR

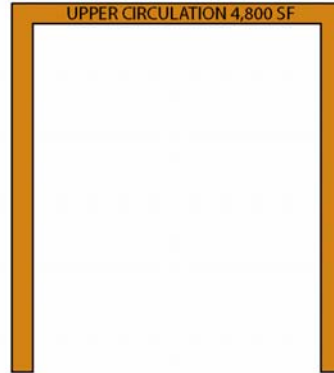


TYPICAL UPPER FLOOR

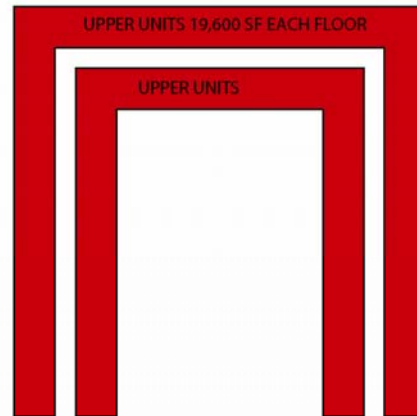
DIAGRAMS OF PROGRAM

FUNCTIONAL NEEDS

CIRCULATE



WORK



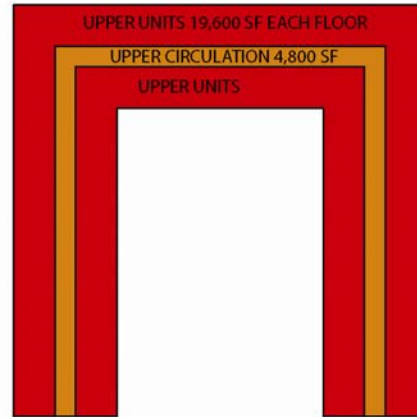
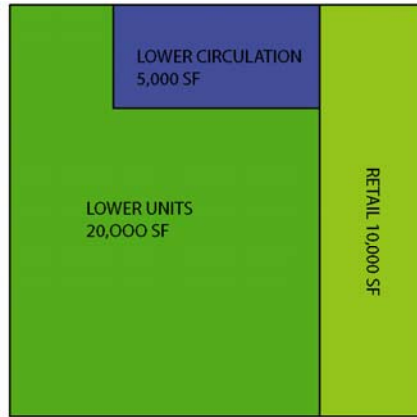
SELL/ CONSUME



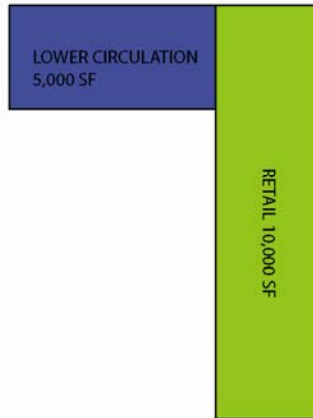
DIAGRAMS OF PROGRAM

SCHEDULE / DAILY

DAY

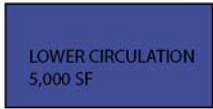


NIGHT

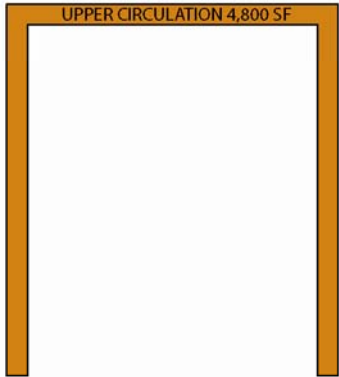


DIAGRAMS OF PROGRAM

ENERGY



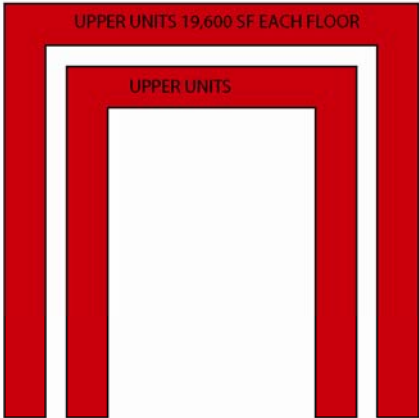
LOW



LOWER FLOOR

TYPICAL UPPER FLOOR

HIGH



CONCLUSIONS/ ANALYSIS

The diagrams make clear some of the energy liabilities of the UINC which reflect in part the difficulties of the industrial zoning of the CEID: it is difficult to find complementary uses for buildings if they are required to be used only for work. Possible strategies for improving the energy and use efficiency on a scheduling basis include seeking a change in the zoning law which would allow live work units to exist in the UINC. However, this arrangement might be detrimental to the industrial employment center concept of the CEID. Another possibility is the night-time use of the district as an entertainment center with nightclubs and theaters bringing people into the district primarily at times that existing businesses are closed.

The potential for night-cooling however would seem to be improved if the building were vacant during the evenings. Likewise, if the building is vacant at night, there is reduced need for artificial light. However this is hard to conceive of as a real savings.

With a minimally complex program and a small site, the potential for additional efficiencies on the basis of grouping similar energy needs would seem to be minimal: First, the circulation spaces by nature cannot be grouped together. Second the units make up the remainder of the space, and cannot be further consolidated.

Organizing the upper floors around an open courtyard has several implications for energy use. First, it allows every unit to have a proportionally great surface area, which aids the daylighting concept. Second, this same increased surface area also implies a potentially great energy transfer through the building envelope. This might be addressed by adopting a very efficient envelope technology for the building.

A further improvement in the quality and efficiency of the daylighting strategy would be to adjust either the unit depth or the floor to floor height of the units based on the solar orientation. This implies deeper or shorter units on the south, east and west faces, and taller or shallower units on the northern faces and those facing only the light court.