

# BRANCHING IN

creating an environmental education hub along the willamette river

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Sean Waldron

Project 4: Energy Program

Introduction & Summary

*Holistic understanding of the natural environment is becoming increasingly vital within the coming decades and is inadequately dealt with in an outdated educational system. I propose an educational hub for Portland Public Schools to teach children (k-8) the importance of a holistic understanding of our role within the world as well as push the boundaries of the current educational paradigm.*

The beginning of the twenty-first century has seen many changes regarding the way in which humans in general regard the planet. We have seen most of the world acknowledge and confirm human influence on major changes to the planet. The most recent Nobel Peace Prize was awarded to Albert Gore and the Intergovernmental Panel on Climate Change "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change" (The Norwegian Nobel Committee). Although the rhetoric may be becoming repetitive the fact remains that industrialized nations continue to rely on finite sources of fuel (British Petroleum, United States Geological Survey) for everyday "needs." Terms such as global warming, peak oil, overpopulation, and others are commonplace in a world where humans are starting to realize their role in their own future. The goal of this thesis project is to propose the next step in this continuing process.

The City of Portland recognized this paradigm shift by, through Portland Public Schools, setting up a magnet school in which children are educated in natural processes and holistic concepts such as "cradle-to-grave" and inherent energy. While this is a great first step, the influence of a program like this has a very narrow spectrum. To reach a broader spectrum of children, this thesis proposes the development of an educational hub focusing on the environment and serving all children from kindergarten through eighth grade within the Portland Public School system as well as the public in general.

This design must be sensitive to its own impact on the environment. While education is the top priority, it is irresponsible to create an institution that serves the environment intellectually without serving it physically. Conservation of energy and limiting energy consumption is a top priority in the design of this building because of its interrelationship with other values and goals being sought. In addition to environmental responsiveness, these goals involve the well-being of the occupants, providing an environment that facilitates learning, and not burdening the public with high operation costs.

With new technologies becoming available at what seems like an exponential rate, it is possible to explore and incorporate many strategies to achieve the goals listed above. It is a goal to implement chosen strategies in such a way as to enhance the educational nature of this design. For example, while daylighting is a key factor in the creation of spaces people want to be in, it may not be feasible to incorporate it into all aspects of the building. Therefore, the design must involve the creation of a hierarchy of educational spaces so that daylighting can be fully exploited in its ability to aid in the overriding goal of education. Other strategies to create an environment in which energy conservation strategies serve a dual purpose of environmental responsiveness and education might involve simply allowing these strategies to be visible to the occupants. This involves, then, strategies such as locating energy sources such as solar collectors or wind turbines in a location that would allow a visual association for the occupants. This involves instantaneous feedback devices such as energy meters (showing the use of grid fed energy versus on site energy generation) as well as simply making on-site energy generation sources visible and even physically accessible to the occupants. Strategies such these not only aid in the creation of an environmentally responsive design, but if applied strategically, aid in the education of the occupants which, after all, is the ultimate goal of the design.

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## **bibliography**

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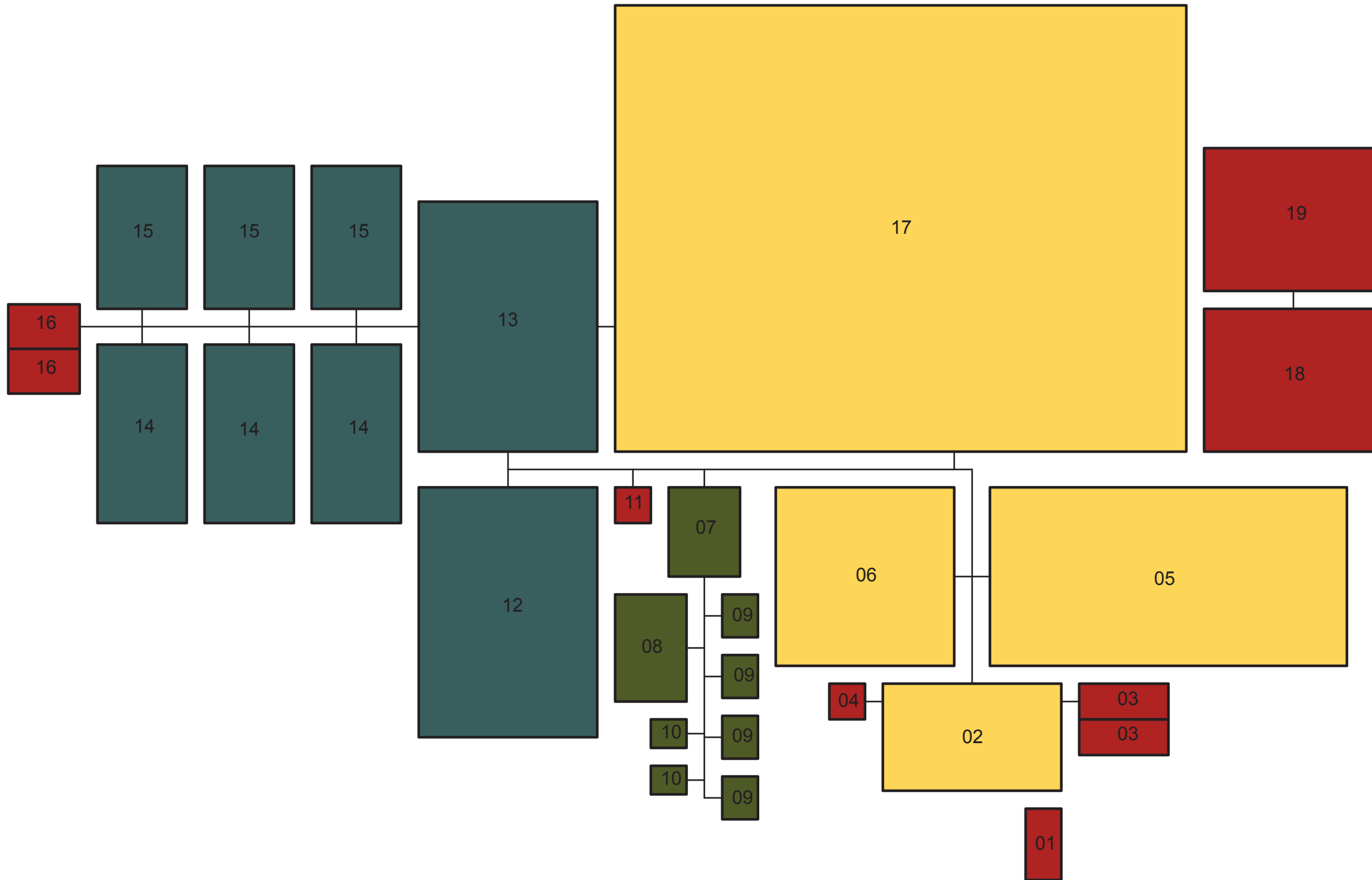
	experiential goals	functional	area	height	thermal	ECS criteria	access time	occupancy	equipment	functional needs & adjacencies	
educational	<b>seminar spaces (3)</b>	Open, soft light	Larger-sized rooms with adaptable characteristics	3,750	8'-0" - 12'-0"	highly controlled spaces with capability for thermal zoning	High daylighting levels with supplemental task lighting at workstations and visual & acoustic separation	8am-4pm	Capable of handling up to 25 students at a time with 3-4 educators	Computer workstations, projection equipment	Direct relationship to other educational functions as well as garden & entrance/exit
	<b>workshops (3)</b>	Open, soft light	Larger rooms with workstations for use of tools and educational toys	3,000	8'-0" - 12'-0"	highly controlled spaces with capability for thermal zoning	High daylighting levels with supplemental task lighting at workstations and significant ventilation capability	8am-4pm	Capable of handling up to 10 students at a time with 1 educator	Equipment varies	Simple access from general circulation. Direct access to garden
	<b>common space</b>	Quiet, protected spaces throughout building	Small, defined spaces to aid in classroom overflow as well as to provide quiet break/work space	10,000	9'-0"	moderately controlled	Broad lighting with limited task lighting	7am-6pm	Varies dramatically but capable of handling from two to 10 people	Comfortable seating and workspaces	Direct access to seminar spaces, workshops, and circulation
	<b>circulation</b>	Very open, light spaces with strong feeling of connection to uses and other people	Provide universal access to all spaces while allowing loitering and playing	5,000	8'-0" - ?	moderately controlled	High levels of daylighting with task lighting and supplemental general lighting	7am-6pm	All	Integration of multimedia equipment for projec display and building statistics	Direct access to all spaces with direct connections to other programmed circulation
	<b>bathrooms</b>	Privacy	Going potty	250	8'-0"	moderately controlled	Direct connection to core services including possible water reclamation and blackwater treatment	7am-6pm	Provide facilities for 5 people at a time		Connection to circulation and seminar spaces and workshops
	<b>library</b>	Create a space that is energized and open	Easy access to educational materials	3,500	8'-0" - 12'-0"	highly controlled spaces with capability for thermal zoning	Daylight reading spaces with task lighting at workstations. Acoustic separation between group and individual work areas	7am-7pm	Provide facilities for individuals or groups and educators/parents for 1-3 hours at a time	Computer workstations at focus with supplemental book shelves	Easy access to educational program as well as public
			25500								
public	<b>art/student garden</b>	Protected public space. Inviting yet enclosed	Provide public pause along Eastbank Esplanade and resource for student projects and studies	20,000	8'-0" - inf.	mostly uncontrolled	Outdoor, non-conditioned space with access to cover/shelter	6am-10pm	Provide access for all students and public visitors	No electronic equipment, but provide access for heavy-lifting machinery	Direct access to public space and integration into Eastbank Esplanade with access from educational space
	<b>entry</b>	Large, inviting space	Provide off-street access for public visitors with intuitive heirarchy of space for wayfinding	1,500	9'-0" - 15'-0"	moderately controlled with capability for thermal zoning	High daylighting levels with accoustic separation from adjacent functions.	7am-7pm	Space is provided for individual and group passage to public and private functions	Computer terminal fo receptionist	Central location with strong connection to all circulation spaces and public functions
	<b>lecture room</b>	Larger, soft, and comfortable space	Directional seating providing occupants with direct visual access to spaeaker and/or demonstration	5,000	12'-0" - 25'-0"	highly controlled	Limited daylighting required. General, adjustable lighting	8am-3pm (later if required)	Able to handle full school occupancy times 100% for public	Projection equipment and computer station at the podium	Direct access to other educational functions as well as public areas
	<b>gallery</b>	Inviting space, expressive of children's work and summary of educational functions. Public face	Provide quick an deasy access for public to understand and explore the work of the students	2,500	9'-0"	highly controlled	Conditioned space with limited daylighting. Able to handle plug loads. Controlled lighting	8am-6pm	Provision of space for groups of people for up to 90 minutes	No permanent required, but able to integrate multimetia presentation equipment	Strong relationship to entry/lobby and reception
	<b>circulation</b>	Pleasant but not grand	Provide clear access to public functions with acknowledgement of wayfinding heirarchy	2,500	12'-0"	moderately controlled	Provide ample daylighting. Limited conditioning of space	7am-6pm (later if required)	Universal access to public with supplemental access for students	Limited equipment. Multimedia fo displaying work/goals and building statistics	Direct access to all spaces with direct connections to other programmed circulation
	<b>bathrooms</b>	Privacy	Going potty	250	8'-0"	moderately controlled	Direct connection to core services including possible water reclamation and blackwater treatment	7am-7pm (later if required)	Provide facilities for 5 people at a time		Connection to circulation and seminar spaces and workshops
			31,750								
functional	<b>reception &amp; waiting</b>	Inviting space with stong sence of centrality	Provide easy access for students and public to address administrative questions of the school	500	9'-0"	highly controlled	Accoustical separation with daylighting when possible. Avoid direct sunlight. Conditioned space	8am-5pm	Capable of handling individuals and groups for short periods of time with supplemental waiting space	Computer station for receptionist	Direct access to other circulations as well as other administrative functions
	<b>admin. Offices (4)</b>	Private, separated spaces	Provide a quiet, personal space for public administration to perform daily tasks and school operation	600	8'-6"	highly controlled	Daylighting when possible but avoid direct sunlight. Acoustical separation between all other spaces	8am-5pm	Single occupancy rooms or, possibly, one, large office space with workstations	Computer terminal(s) for office administrators.	Direct access to other admin functions
	<b>break/conference</b>	Comfortable, private	Provide relaxation space for administration during breaks and adapt to accommodate meetings	600	9'-0"	highly controlled	Daylighting if possible. Conditioned, accoustically separated from other programmed spaces	8am-5pm	Comfortable seat all administration personnel at once for up to 90 minutes	Television for entertainment with ability to convert for presentation purposes	Direct access to administrative circulation but separated from reception area
	<b>circulation</b>	Utilitarian	Provide universal access for administration to administrative functions	1,500	9'-0"	moderately controlled	Daylighting if possible, but not necessary	8am-5pm	Single user or groups of two	None	Direct access to adadministrative functions and to other circulation spaces
	<b>bathrooms</b>	Privacy	Going potty	160	8'-0"	moderately controlled	Direct connection to core services including possible water reclamation and blackwater treatment	8am-5pm	Provide facilities for 5 people at a time		Connection to circulation and seminar spaces and workshops
			3360								
service	<b>mechanical space</b>	Celebrated space without being dominating	Provide comfort for building occupants and educational potential	2,000	undefined	unconditioned	n/a	As Needed	Accessed by 1-4 maintenance/repair staff for undetermined lengths of time	Varies too greatly to be listed here	Central to building operation and integrated into all building elements
	<b>storage</b>	Utilitarian	Provide storage of student projects, educational materials, and other intermittently-used items	2000	12'-0"	ability for high control levels. Thermally zoned	Little to no daylighting required. Zoned for varying conditioning requirements	As Needed	Accessed by individuals or small groups for short amounts of time	None	Adjacent to main circulations as well as art/student garden
	<b>bike storage</b>	Utilitarian but celebrated	Allow secure parking for bikes	200	undefined	unconditioned	Exterior, covered space with no conditioning	All Hours	Accessed by individuals or small groups for short amounts of time	Bike racks	Easy access to entry and art/student garden. May be broken up into stations if needed
	<b>janitorial (2)</b>	Utilitarian	Allow for storage and access of maintenance and cleaning supplies	200	9'-0"	loosely controlled	Daylighting not required. Conditioning and ventilation determined by nature of stored items	As Needed	Accessed by individual staff for short amounts of time	Storage shelving and sink with mop station	Easy access to all major circulation spaces
			4400								

65,010

# branching in

function & adjacency diagram

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01	bike storage	250 sf
02	entry	1500 sf
03	toilet room	250 sf
04	janitor closet	100 sf
05	lecture hall	5,000 sf
06	gallery	2,500 sf
07	reception/waiting	500 sf
08	break/conference	600 sf
09	office	120 sf
10	toilet room	80 sf
11	janitor closet	100 sf
12	library	3,500 sf
13	common space	3,500 sf
14	seminar space	1,250 sf
15	workshop	1,250 sf
16	toilet room	250 sf
17	project/art garden	20,000 sf
18	storage	2,000 sf
19	mechanical	2,000 sf

<span style="display: inline-block; width: 15px; height: 15px; background-color: red; border: 1px solid black;"></span>	service
<span style="display: inline-block; width: 15px; height: 15px; background-color: yellow; border: 1px solid black;"></span>	public
<span style="display: inline-block; width: 15px; height: 15px; background-color: teal; border: 1px solid black;"></span>	educational
<span style="display: inline-block; width: 15px; height: 15px; background-color: olive; border: 1px solid black;"></span>	operation

# branching in

energy heirarchy diagram

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## red

12,750 SQUARE FEET

- High Dependence on Lighting
- Tasklighting Required
- Large Equipment Load
- High Levels of Space Conditioning

## yellow

24,000 SQUARE FEET

- Moderate Dependence on Lighting
- Low to No Tasklighting Required
- Moderate to Low Equipment Load
- Moderate Space Conditioning

## blue

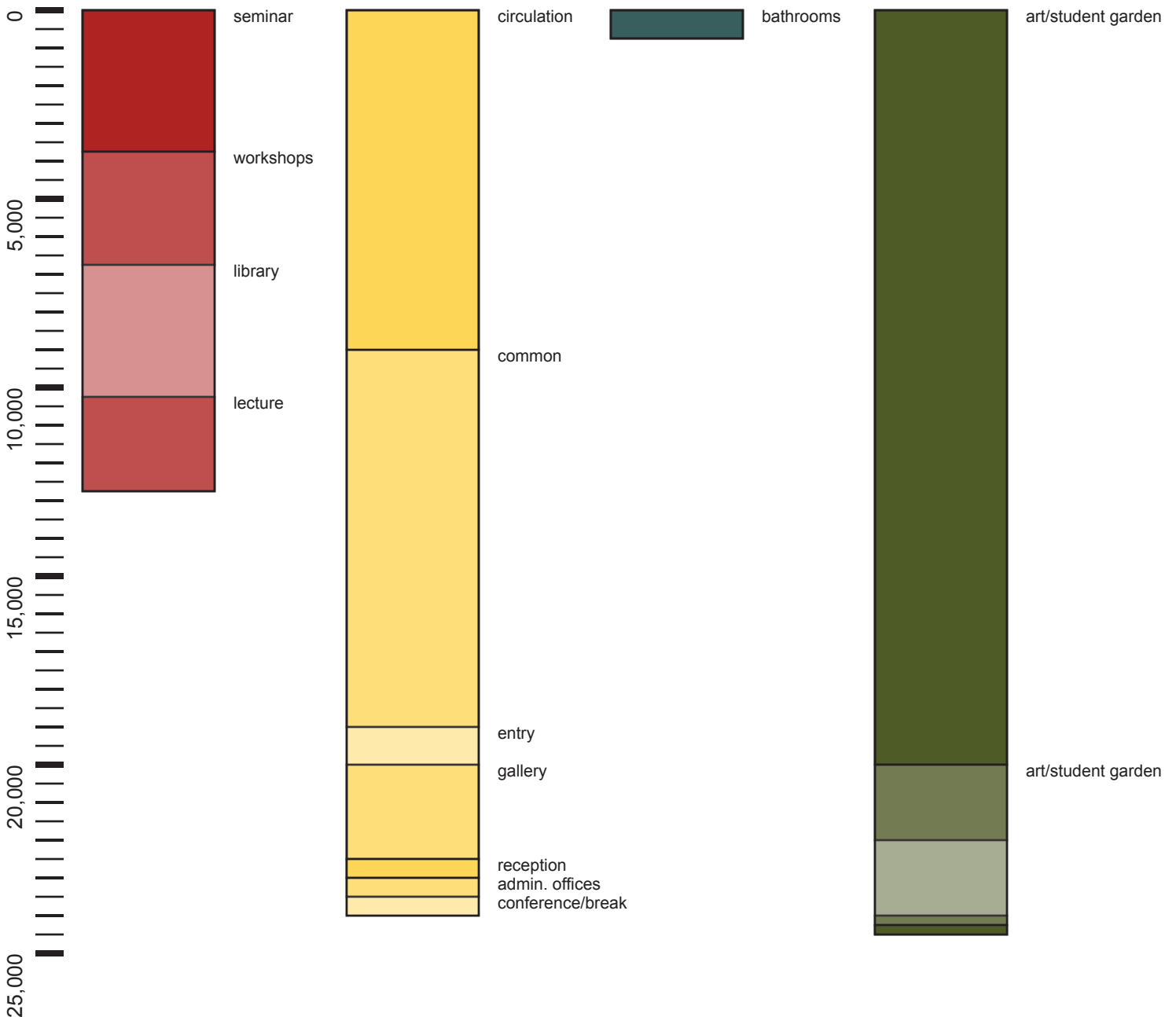
750 SQUARE FEET

- Moderate to Low Dependence on Lighting
- Low to No Tasklighting Required
- Moderate to Low Equipment Load
- Low Space Conditioning

## green

24,500 SQUARE FEET

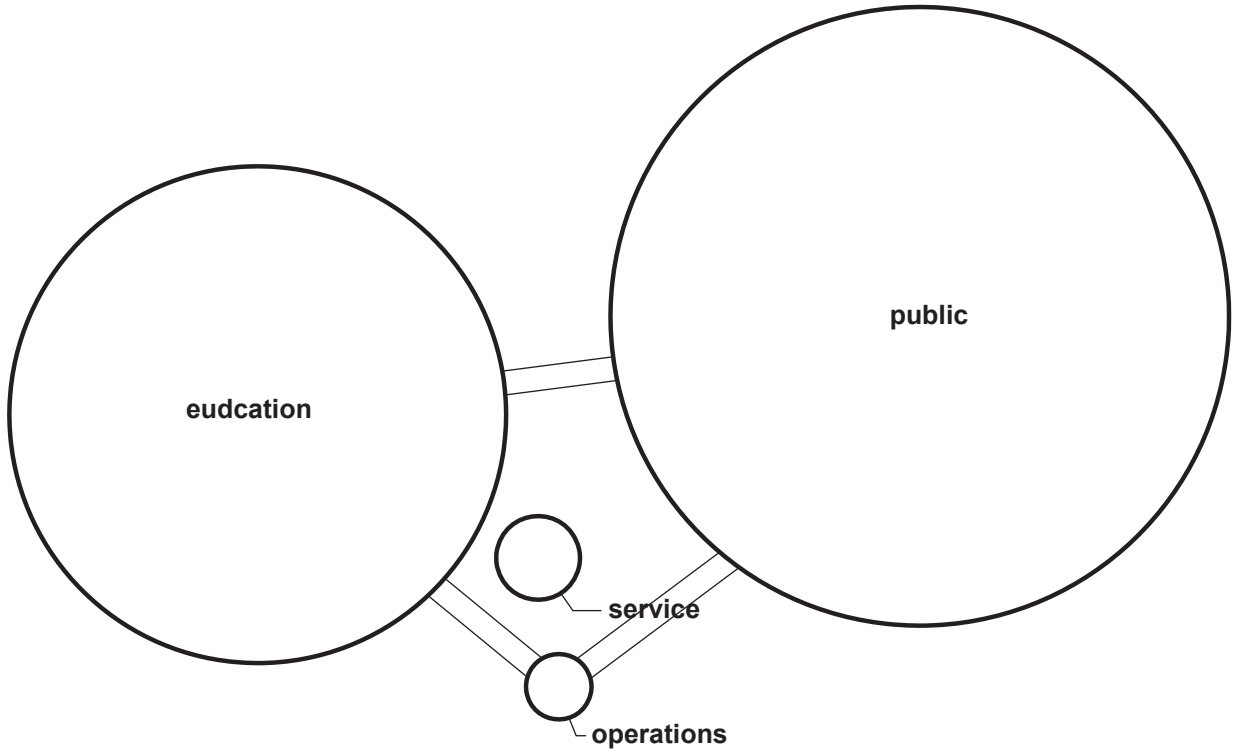
- Little Dependence on Lighting
- No Tasklighting Required
- Low to No Equipment Load
- Low to No Space Conditioning



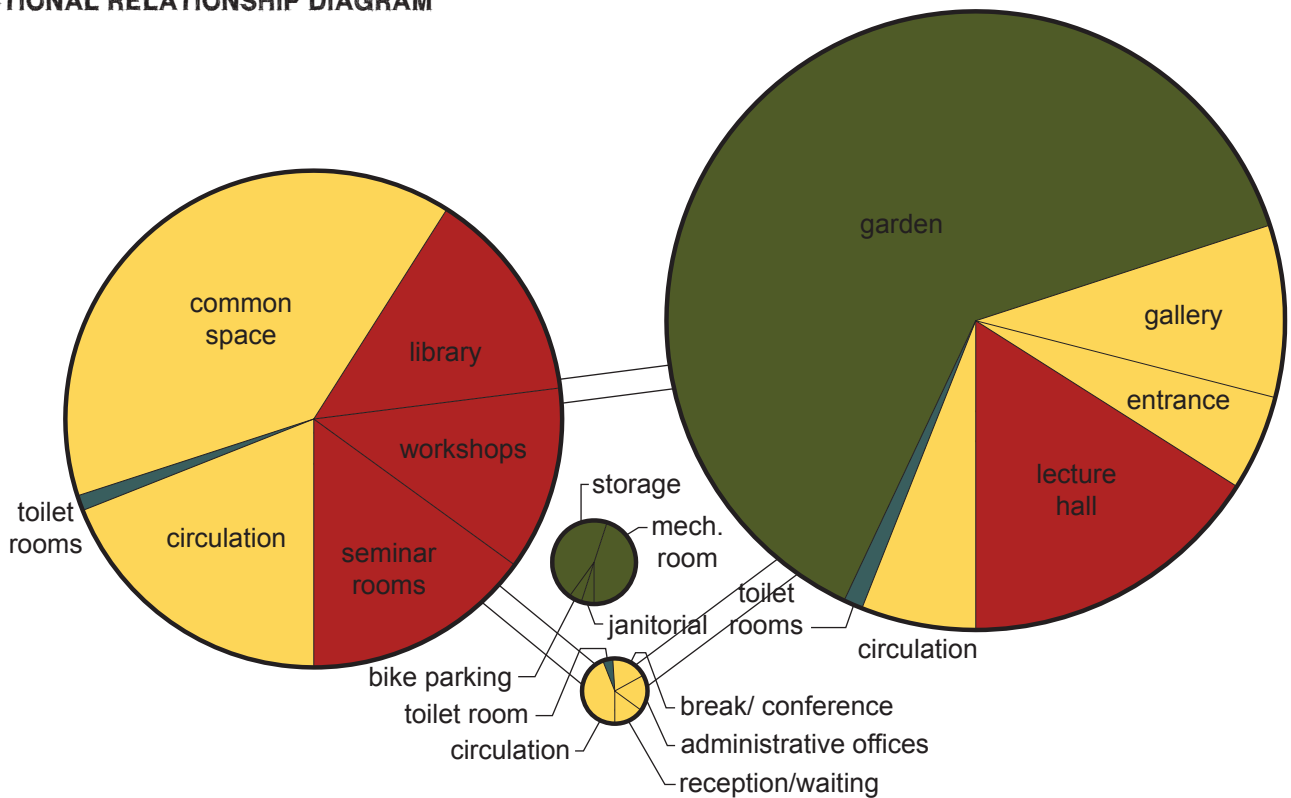
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function & energy diagram

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## FUNCTIONAL RELATIONSHIP DIAGRAM



## ENERGY DIAGRAM

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scheduling diagram  
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