Arch 493 / 473 / May 2020

We the University of Waterloo School of Architecture acknowledge that we live and work on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes ten kilometers on each side of the Grand River.

RESILIENT COMPANIONS
Plant based architecture at Tommy Thompson Park

We aren't destroying the biosphere because we are selfish. We are doing it simply because we are unaware. I think that is very hopeful, because once we know, once we realize, then we change, then we act.
Greta Thunberg

How much does your building weigh?
Buckminster Fuller

Inspired by the unique wilderness of Tommy Thompson Park and motivated by global climate change our clients believes in the power of design to not only provide a social terminus for the spit but to also create a benchmark project that raises awareness about the importance of a life cycle approach to building. Our client is committed to creative and forward looking approaches to the relationship between materials, amenity and beauty, and sees architecture as an important voice in service of planetary betterment.

ENERGY, MATERIALS AND CARBON

Climate change is the fundamental design problem of our time. Not style, not fees, not education, not community, not health, not justice. All other concerns, many of them profoundly important, are nonetheless ancillary. The threat climate change poses is existential, and buildings are hugely complicit—even more so than that stock culprit, the automobile. As every architect should know, buildings consume some 40 percent of the energy in the U.S. annually, and they emit nearly half of the carbon dioxide (CO_2), through greenfield development, cement production, and the burning of fossil fuels such as oil, gas, and coal. Because CO_2 traps solar energy in the atmosphere, thereby heating the planet, it is the chief agent of climate change, making buildings—and by association, the architecture profession—profoundly responsible.
Alan Organschi
Gray Organschi Architecture

While opinions differ about the best way to measure energy, carbon capture and life cycle impact of buildings there is universal agreement that material choices have significant consequences.For example, it is widely accepted that timber has a smaller carbon footprint than other major construction materials, as well as being sustainable and reusable. An additional benefit of using timber is that through sustainable harvesting practices it has the potential to support better forest management and curb deforestation, both major climate change issues. For these reasons we are adopting " a plant based" or "biogenic" approach to building materials for this project. Where ever possible we want to choose materials that contribute to planetary balancing. https://www.arup.com/perspectives/publications/research/section/rethinking-timber-buildings

THE SITE

When architecture is at its best… you're coming up with something that is pure fiction
Bjarke Ingels

As a poet I hold the most archaic values on earth . . . the fertility of the soil, the magic of animals, the power-vision in solitude, the terrifying initiation and rebirth, the love and ecstasy of the dance, the common work of the tribe. I try to hold both history and the wilderness in mind, that my poems may approach the true measure of things and stand against the unbalance and ignorance of our times.
Gary Snyder

Originally conceived as a project to prevent sediment from blocking Toronto Harbour, Tommy Thompson Park, (a.k.a Leslie Street Spit) has become a remarkable lesson in biological resilience as millions of cubic meters of construction debris, earth fill and dredged sand have transformed into a thriving eco system. After 40 years the landscape of lagoons and sand peninsulas attracts hundreds of species of birds, mammals, fish and insects offering urban dwellers a respite from the ever densifying city. The site for our project is located at the tip of Tommy Thompson Park and can be accessed via a 5km hike or bike journey from the city's edge. Our site along with "The Beaches" and "The Island" reveal places where Toronto remembers and re-invents it's rich and complex relationship with Lake Ontario.

PROGRAM

Individuals living in 'greener' buildings reported more social activities, more visitors, knew more of their neighbours and had stronger feelings of belonging."
TRADA (2015) Case Study, Believe in Better Building, London, UK

The project is composed of three elements. First is a live /work space for 4 artists based on the City of Toronto's Artscape program (http://artscapegibraltarpoint.ca/artist-residences/) , where artists are awarded three month residencies on site. The second element is a year round cafe plus public sauna and seasonal changing rooms providing places for gathering, refreshment and repose. Finally a series of outdoor spaces serve to connect and or separate the inhabitable programatic spaces. These elements include places for bike parking, picnic areas, bird watching and a swim deck. The existing light house must be maintained and may be incorporated into your proposal.

A NOTE ON STUDIO INTENTIONS

Architecture has to be greater than just architecture. It has to address social values, as well as technical and aesthetic value.
Sam Mockbee

Arch 493 may be considered a somewhat non-traditional studio in that the assignments are highly prescriptive and there will be a serious inquiry into issues of architectural imagination, sustainability, comfort and material assembly. We are taking this approach because we believe these issues generate authenticity, character and quality in buildings and bring discipline to any architectural pursuit. We would also like to remind you that the "important" buildings that designers make an effort to visit, photograph, and even memorize, begin as great architectural ideas that survive the difficult and complex process of being built! Their ideas survive despite the inevitable constraints, scrutiny and challenges offered by budgets, clients, building codes and

construction techniques. Our hope is to bring some of the richness, complexity, and depth of this process into the studio.

The studio is organized around three exercises. The first exercise (P1) is a design project that generates the first schematic iteration of the studio. The second phase of the term calls for architectural detailing based on iterative development driven by the integration of sustainability goals as outlined in Arch 473. This will include structural, mechanical, and environmental systems as well as development of enclosure details. The final phase of the term is P3 and calls for a selective synthesis of your work, allowing for the integration of all salient design and technical components of the project. These two streams, Arch 493 and Arch 473 are intended to be inter-dependent, working in concert to enrich and inform one another.

THE PARTI - ITERATION

A great building must begin with the immeasurable, must go through the measurable means when it is being designed and in the end must be immeasurable.
Louis Kahn

Typically, an architectural parti expresses the organizational qualities, spatial ordering and the essential character of your building and helps guide its development. Usually missing from this approach is any conscious strategy about energy. Because we want to explore what happens when your architectural parti includes your sustainability strategy we need to ensure these two narratives are treated as creative equals. In fact, because form and energy use are ultimately inseparable, unlocking their potential friction or leveraging their interdependent relationship may become a source of design insight and inspiration. To demonstrate this undertaking, we require that your parti diagram (concise representation of a conceptual idea) deliberately articulates the marriage of both ambitions. Imagining the project in this way will require you to have a clear sense of your expectations about "comfort" for each of the programed spaces. The way your architectural narrative addresses sustainability will be a key focus of this studio.

P1: Assignment: Schematic Design
Submission uploaded to ARCH 493 LEARN due Sunday June 7th 9PM
30% of grade

Pare down to the essence, but don't remove the poetry.
Wabi Sabi for Artists, Poets and Philosophers
Leonard Koren

"…thresholds, crossings…the almost imperceptible transition between inside and the outside, an incredible sense of place, an incredible feeling of concentration when we suddenly become aware of being enclosed, of something enveloping us…"
Atmospheres, 2006
Peter Zumthor

The studio posits that designers like film makers, poets, novelists and sculptors, have something to say. This studio invites you to express your architectural experiences through the lens of our site and program creating a clear proposal that declares your design ambitions. Please take into account: Orientation, Massing, Envelope and Systems throughout the preliminary phase of your work. Ideas about structure, building envelope and energy use need to be inseparable from the formation of your architectural narrative. You may want to think of P1 in this way: "Will my presentation

give the client enough information to understand and have confidence in my proposal?" The key is to generate enough architectural content through drawings and models, to create a convincing and compelling architectural narrative and sustainability strategy. At P1 we expect a first draft of your architectural thesis that declares the critical ideas, strategies and issues of your project.

In a fragment of a second you can understand: Things you know, things you don't know, things you don't know that you don't know, conscious, unconscious, things which in a fragrant of a second you can react to: we can all imagine why this capacity was given to us as human beings - I guess to survive. Architecture to me has the same kind of capacity. It takes longer to capture, but the essence to me is the same. I call this atmosphere. When you experience a building and it gets to you. It sticks in your memory and your feelings. I guess that's what I am trying to do."
Peter Zumthor

P1 Presentation: (Minimum Requirements)
30% of Arch 493 Grade
1:200 plans, 1:200 sections x 2, 1:200 elevations x 4, 4 perspectives (two interior, two exterior), 2 building details 1:10, Site Plan 1:500 and 1:200 massing model.
One panel showing key developmental sketches and precedents.
One panel showing massing and orientation diagrams indicating the relationship of your building relative to local climate, wind conditions and currents. Clearly show the three dimensional implications of the building as an object in a specific location. This includes the need to clearly define potential passive strategies for heating and cooling your project. 200 word text outlining specific strategies for developing your buildings energy performance.

P1 Marking – 30% of total grade
40% Parti (ambition and clarity of the architectural parti / narrative and relationship to energy strategy and site)
30% Development (integration of orientation, massing, envelope and building systems) Resolution of architectural parti and energy strategy.
30% Craft, (communication, quality and completeness of presentation)

P2 Arch 473
TECHNICAL REPORT

Don't fight forces, use them.
Buckminster Fuller

ARCH 473 is a building science course embedded within, and running in concert with the ARCH 493 design studio. This course offers you the opportunity to integrate sustainability principles and technical issues directly into your studio project. In addition to examining the intersection of comfort and architecture, a key objective of ARCH 473 is to provide you with the tools to understand the impact of your decisions on reducing energy usage and improving human comfort. The primary assignment of ARCH 473 is a Technical Report composed of diagrams and architectural details that demonstrate your understanding of sustainability principles and strategies of your design.

Climate and Architecture addresses the architectural challenge of designing buildings, and especially their facades or climate screens, in order to maximize the potential of

local climatic conditions and their associated construction traditions, in order to save energy and give users the means to control their own interior environment. Such an approach provides the means to elevate climate to its primary position as one of the major influences on architectural expression whilst also enriching the experience of occupying buildings.
Climate and Architecture
Torbin Dahl, 2010 Routledge

The need to include sustainability as a fundamental basis of all design is now universally accepted, however the means of embodying these goals remains a matter of architectural debate and confusion. While sustainability typically implies minimizing the use of energy and materials - there is no agreement as to the best way to design a sustainable building or establish a universal metric for judging the "best" building in this respect. The contemporary sustainability discourse, which seeks to minimize energy use, may also obscure the ways architecture has traditionally been able to respond to the demands of climate and need for amenity. Often the ingenuous flexibility of vernacular buildings offers great insight into the dynamic and interdependent way in which design can be at the core of transforming energy use. For example, a well designed porch may extend interior space, provide valuable social space, and reduce cooling loads.

We believe that it is important that you be able to develop architectural strategies both conceptual and pragmatic with respect to the critical issue of energy performance for your project. Ultimately, the objective is to develop an understanding of how an architectural parti can also be the generator of strategies that work effectively to create a building that requires the least amount of clean and renewable energy, while offering the greatest amount of amenity and well being to its users. Working through and applying technical report requirements needs to be integrated into the design of your project and will be the focus of workshops seminars and consultations throughout the term.

A NOTE ON TERMINOLOGY

LIFE CYCLE
A buildings life expectancy is very important when assessing a buildings environmental impact. The longer a low energy building can be used , the lower the environmental impact of the materials that have gone into its construction.

EMBODIED ENERGY
Building materials require processing before they are incorporated into a building this inevitably requires the use of energy and results in waste generation.
Perhaps the single most important measure of an objects environmental impact is provided by the concept of "embodied energy." "Embodied energy" describes the amount of energy used to produce an object.

Technical Report
100% of Arch 473 Grade
Digital copy uploaded to LEARN ARCH 473 due Thursday July 9th at 9.00AM

The intent of the report is that as the details, systems, and strategies are clarified and tested they will demonstrate your understanding of principles that enhance the energy performance of your project and will become integral with your project at the P3 presentation.

The format of the technical report is to be a series of self explanatory drawings, diagrams and three dimensional illustrations. These need to explain the technical ambitions and sustainability strategies of your Arch 493 design. The use of drawings and diagrams is intentional and needs to be clearly organized in order to effectively communicate all sustainability principles and technical ambitions. Unless specified, text is not required except for the labeling of drawings and to communicate salient points in response to Technical Report requirements.

Arch 473 TECHNICAL REPORT REQUIRED TEMPLATE (Grading):
Submission Format: 11x 17

TECH REPORT

Part 1. Site Design (15)
Taking into account wind, sun and prevailing currents use diagrams and text to show how the orientation and massing of your project enhances user comfort and building performance. Use diagrams and text show how proposed landscape features such as terra forming, trees and planting mitigates impact of wind, sun and lake currents.
Part 2. Enclosure (15)
At 1:10 Show 2 contrasting (for example north and south) wall assemblies from roof to foundation that illustrate passive house standards.
Part 3.Systems (20)
Energy sources and systems (10)
Using diagrams and text explain the energy principles employed, illustrating both passive and active strategies for the building and the site strategies. Only clean electrical power may be used. Please note at least 10% of power must be generated on site via PV.
Water sources and systems (10)
Using diagrams and text explain your choices for black water, grey water, rain water and potable water treatment.
Part 4. Structure (20)
- provide framing diagrams that demonstrate a path for gravity loads from roof to foundations
- provide diagrams that demonstrate a lateral load resisting system and address stability issues
- provide details (key structural sections or axonometrics) that demonstrate an understanding of structural systems and connections.

Part 5. Life Cycle (15)
Using diagrams and text indicate expected lifecycles of the primary materials used for your structure (5), envelope(5) and roof(5) and indicate the potential for your building to be recycled.
Part 6. Costing (10)
Seminars on pricing and a spread sheet will be provided allowing you to complete a preliminary pricing of your project.

Appendix (not graded – but required with P2 Submission)
Include either a P1 record of your project (includes orientation and massing diagram) or if you have made significant changes to your design, a more recent iteration of the project. If you are unsure of what to include please consult with teaching staff.

Evaluation Criteria:
Completeness - have you addressed the requirements outlined above
Coherence - have you selected systems that make good sense

Complexity and Ambition – Excellent projects can occupy any position on the continuum between the vernacular and experimental systems, have you demonstrated an appropriately detailed understanding of the selected system.

Please Review:
Resources posted on Learn plus:
Thermal Delight in Architecture, Lisa Heschong, MIT (1979)
Climate and Architecture, Torbin Dahl, Routledge, (2009)
https://www.theb1m.com/video/dalston-lane-the-worlds-largest-timber-building
CMHC Building details:
https://chic.cmhc-schl.gc.ca/uhtbin/cgisirsi.exe/?ps=qNudq13n0b/CHIC/X/60/502/X
John Hardy:
https://www.ted.com/talks/john_hardy_my_green_school_dream?language=en
Green Building Journal
https://meridian.allenpress.com/jgb

P3: DESIGN DEVELOPMENT

Craftsmanship means dwelling on a task for a long time and going deeply into it, because one wants to get it right.
Shop Craft as Soul Craft
Matthew B. Crawford, Penguin (2009)

Verbalizing design is an act of design.
Kenya Hara

The final phase of studio is intended to allow you to incorporate Arch 473 research and expertise in your projects development. During P3 you are asked to integrate these elements as you to refine, edit and rework your P1 design proposal. The goal for this phase of work is to uphold the essential architectural character of the project while managing to integrate the implications of the P2 assignment.
By the end of P3, having developed a comprehensive strategy; understood how the materials go together; explored the implications of your architectural ambitions and your projects use of resources, and finally having made the corresponding adjustments - the project is ready to be assembled, fitted out and put together. The final presentation of the project is a re-adjusted, re-focused and refined iteration and is a comprehensive statement of your architectural ambitions. This assignment does not call for an evenness of detailing so much as an awareness of what is most important to your proposal and making sure that this aspect is fully rendered. Specialized seminars during P3 will offer you the opportunity to take your project into greater depth and refinement as we use the last month of the term to continue to evolve and integrate the ambitions of your project.

P3 Submission uploaded to ARCH 493 LEARN due Thursday July 30th at 9PM
P3 Marking - 70% of Arch 493 Grade

REQUIREMENTS:
Marking
20% Parti (ambition and clarity of the idea and site resolution)
40% Development of design ambitions - Integration of Orientation, Massing, Building Envelope and Systems and Final Energy Use Spreadsheet. 150 ekWh /m /yr. required.
40% Craft and Communication (presentation quality and completeness)
A student failing the final project, will fail the course. A final course grade of 42% will be applied.

In consultation and review with teaching staff, you will be encouraged to generate drawings, images and models that best express and explore your buildings intentions. We expect each student's project will have a different approach to their presentation, depending on each person's response to site, program and P2. We believe annotated plan, section and elevation drawings continue to hold great value in communicating architectural decision-making. These drawings serve to link your work to all architectural projects and despite constant changes in building technology continue to serve as the template for built work. This presentation should include all material necessary to communicate your architectural intentions and support discussions in relation to the intentions of your project. The critical issues of the building need to be presented. Each student will be responsible for negotiating with staff, the precise drawings, images, and models that best support their project. More precise requirements will be announced and discussed at the start of P3. Additionally, a record of student work may be requested for uploading as part of a new archive initiative at the School of Architecture.

IMPORTANT RESOURCES PLEASE VIEW:

WOOD
https://archleague.org/article/alan-organschi-building-a-global-carbon-sink/
https://www.theglobeandmail.com/business/industry-news/property-report/article-is-wood-the-new-steel-and-concrete/
https://www.masstimberinstitute.ca/resources/contacts-connections
https://www.arup.com/perspectives/publications/research/section/rethinking-timber-buildings

LIFE CYCLE
https://www.canadianarchitect.com/1003753921-2/
https://www.ellenmacarthurfoundation.org/explore/circular-design
https://www.bloomberg.com/news/features/2018-08-29/miami-s-other-water-problem

SITE
https://gem.cbc.ca/media/the-nature-of-things/season-59/episode-14/38e815a-0124bbde45f
https://tommythompsonpark.ca

Staff
TA: Kate Brownlie, Elizabeth Lenny, Alex Robinson,
Adjuncts: Walter Bettio, Jennifer Esposito, Angie Michael, Janna Levitt, Christie Pearson , Tim Scott, Salim Fiali
Andrew Levitt (co ordinator) alevit6071@rogers.com

Arch 473 Consultants
The University of Waterloo School of Architecture gratefully acknowledges the generous support of our professional partners. Their willingness to share their knowledge and experience is fundamental to the Arch 493 / Arch 473 learning experience.
Blackwell Bowick Structural Engineers. https://blackwell.ca
Integral group. https://www.integralgroup.com
RDH Building Science. https://www.rdh.com

Arch 493 / May 2020
Resilient Companions

PROGRAM

1. Cafe 48 SM
Kitchen / 12SM / Pantry 4SM / Storage 12SM
Accessible to service road
2wc gender neutral and barrier free
Outdoor sheltered sitting / picnic area
2. Office 10SM
3. Staff Changing Room 10SM
4.Recycling, Composting, Garbage Room 12SM
5. Public Sauna 2 x14SM
Sauna Change Room 2 @ 12M /2wc gender neutral and barrier free /
Sauna Vestibule with shower 2x 8SM
6. Co-op Art Studios
4 BR with WC x 32M with private entrance (one unit barrier free)
7. Communal dining / kitchen / living 36M / 1WC
8. Laundry 10SM
9. Archive 16SM
10. Shared Studio space 60SM / Studio Storage 16SM / *private entrance*
11. Utility Room 12 SM *with large sink / storage and counter*
12. Recycling, Composting, Garbage Room 12SM
13. Mechanical and Electrical Room (area dependent on system)

14. Public uninsulated swim changing rooms 2 x 14SM
15. Public insulated gender neutral and barrier free WC x 3 / outdoor showers x 5

Total 466SM x 25% (circulation and vestibules) 166.50SM = Total 572.50SM

Please Note:
All interior and exterior spaces to be fully accessible.
Existing Lighthouse to be maintained.
Cild and adult swim deck to allow access to Lake Ontario
Porch or shaded area required on swim deck
Covered bike storage for 40 bikes
Fire Pit / Stage

Arch 493/473
RESILIENT COMPANIONS
SCHEDULE

COMPREHENSIVE BUILDING DESIGN

P1 SCHEMATIC DESIGN

Week			
	1	Monday May 11	**STUDIO INTRO / SUSTAINABILITY**
		Thurs. May 14	**INTRO** / Seminars
	2	Monday May 18	VICTORIA DAY (no classes)
		Thurs. May 21	**SUSTAINABILITY** / Seminars
	3	Monday May 25	**STRUCTURE** / Desk Crit
		Thurs. May 28	**SUSTAINABILITY** / Desk Crit
	4	Monday June 1	**STRUCTURE / SUSTAIN /** Desk Crit
		Thurs. June 4	Desk Crit
	5	Monday June 8	P1 PRESENTATION

P2 TECHNICAL REPORT / DESIGN INTEGRATION

6	Thursday June 11	**Passive House INTRO /** Desk
	Monday June 15	**STRUCTURE** / **DETAIL /** Desk Crit
7	Thurs. June 18	**SUSTAINABILITY** / **DETAIL** / Desk Crit
	Mon. June 22	**STRUCTURE** / **DETAIL** / Desk Crit
8	Thurs. June 25	**SUSTAINABILITY / DETAIL** / Desk Crit
	Mon. June 29	**PRICING SEMINAR** / **STRUCT / DETAIL**
9	Thurs. July 2	**STRUCT.** / **SUSTAIN.** / **DETAIL** / Desk Crit
	Monday July 6	**PRICING /** Detail / Sustainability
10	Thurs. July 9	P2 SUBMISSION / GRADING

P3 DESIGN AND PRESENTATION INTEGRATION

11	Mon July 13	**DESIGN INTEGRATION INTRO /Desk Crit**
	Thurs. July 16	**STRUCTURE /** Desk Crit
12	Mon. July 20	**SUSTAINABILITY /** Desk Crit
	Thurs. July 24	**Desk Crit**
13	Mon. July 27	Desk Crit
	Thurs. July 30	**P3 Submission**
	Fri. July 31	P3 FINAL PRESENTATION

PLEASE NOTE:

Late Work
Project deadlines can only be extended in cases of illness or incapacity.
Requests for such extensions must be made before the project deadline to the studio coordinator.

Work submitted after the hand in date and time without a confirmed extension will be subject to a penalty of 5% reduction of the assessed grade and 5% per day thereafter, and after four business days a mark of zero will be recorded.
For example if a project is due at Monday at 5PM and it is handed in at 7.45PM on Monday a 5% penalty will result. If it is handed in on Tuesday a 10% penalty will be assessed.

Only in the case of a justified medical or personal reason will these penalties be waived, and only if these have been officially submitted to the Undergraduate Student Services Co-Ordinator and accepted by the Undergraduate Office.
Students seeking accommodations due to COVID-19, are to follow Covid-19-related accommodations as outlined by the university here: (https://uwaterloo.ca/coronavirus/academic-information#accommodations).
Academic integrity, grievance, discipline, appeals and note for students with disabilities:
Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]
Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.
Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.
Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals.
Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.
Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.
It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit the alternate assignment.