CARLETON UNIVERSITY COMMITTEE ON QUALITY ASSURANCE
Cyclical Review of the undergraduate programs in Civil Engineering, Environmental Engineering and Architectural Conservation and Sustainability
Executive Summary and Final Assessment Report

This Executive Summary and Final Assessment Report of the cyclical review of Carleton's undergraduate programs in **Civil Engineering, Environmental Engineering** and **Architectural Conservation and Sustainability are** provided pursuant to the provincial Quality Assurance Framework and Carleton's Institutional Quality Assurance Process (IQAP).

EXECUTIVE SUMMARY

The undergraduate programs in Civil Engineering, Environmental Engineering and Architectural Conservation and Sustainability reside in the Department of Civil and Environmental Engineering, a unit administered by the Faculty of Engineering and Design.

As a consequence of the review, the programs were categorized by Carleton University's Senate Quality Assurance and Planning Committee (SQAPC) as being of good quality. (Carleton's IQAP 7.2.13-7.2.14).

The External Reviewers' report offered a very positive assessment of the programs. Within the context of this positive assessment, the report nonetheless made a number of recommendations for the continuing enhancement of the programs. These recommendations were productively addressed by the Department of Civil and Environmental Engineering and the Dean of the Faculty of Engineering and Design in response to the External Reviewers' report and Implementation Plan that was submitted to SQAPC on September 8, 2022.

UNIT RESPONSE AND IMPLEMENTATION PLAN **Programs Being Reviewed: Civil** **Prepared by (name/position/unit):**					
External Reviewer Recommendation & Categorization	**Unit Response (choose only one for each recommendation):** **1- Agreed to unconditionally** **2- Agreed to if additional resources permit (describe resources)** **3- Agreed to in principle** **4- Not agreed to** **Rationales are required for categories 2, 3 & 4**	**Action Item**	**Owner**	**Timeline**	**Will the action described require calendar changes? (Y or N)**
1. For each of the reviewed undergraduate program (Environmental, Civil, and ASCE), sufficient bona fide experiential and hands-on lab components should be designed and inserted in applicable course components to ensure students have the hands-on experience to succeed outside of a school setting. (Weakness)	*2 – Agreed to if additional resources permit*	*The Undergraduate Programs Committee (UPC) will work with the groups making up each program to analyze the current courses focusing on the experiential learning content in each program. Subject to this internal analysis of the experiential elements, the UPC will explore the conditions, requirements and constraints to support successful outcomes for developing experiential learning activities. Some of the issues include the available lab space, schedule, tools & equipment, and support staff. The expected learning outcomes and GAs will also need to be mapped.* *UPC will also hold consultations with the Department's Advisory Committee.* *It is expected that expansion of experiential learning activities will require additional lab space and staff. It is noted that work is underway to convert CB5301 into teaching lab. A request for one additional lab staff has already been made in the 2022-2023 budget submission to support current activities and more help may be needed if considerably more lab activities are developed.*	*CEE Associate Chair Undergraduate Studies (ACUS) Academic (as the Chair of UPC);* *Department Chair;* *Dean, Faculty of Engineering and Design*	*2024-2025 Calendar Year*	*Y*

2. The continual improvement process should include a method for gathering feedback from employers and recent graduates. The frequency of gathering feedback can be annual or every two years. (Weakness)	*2 – Agreed to if additional resources permit*	*The continual improvement (CI) process in CEE is closely tied to the other engineering programs. The Engineering Academic Planning Committee (APC) has recognized the need to collect feedback from current students, recent graduates, and employers.* *The co-op office collects feedback from employers. But we are not sure of the response rate and not all students are enrolled in the co-op program. So, conducting analysis (every year or every other year) based on feedback from co-op employers will likely be from a small data set. Data were collected in the past from current students and work is underway to collect more data from students (including graduating students) and co-op employers. Both the CEE Department Chair and ACUS-Academic are members in APC and will share this point with APC Chair (Associate Dean – Policy and Planning) and other members representing the other engineering departments for the identification, assessment and development of an efficient and effective system for engagement (mode and process for communications), and database management (survey mandate, confidentiality, security).*	*CEE Department Chair and ACUS-Academic; Associate FED Dean – Policy and Planning*	*2022-2023 Calendar Year*	*N*

3. The department leadership team should prepare collegial teaching and space allocation policies to be approved by the department council that consider the variability in the teaching loads among faculty members and providing perspicuous guidelines for faculty members to access and utilize individual and shared lab spaces. (Weakness)	*3 – Agreed to in principle*	*The teaching load is governed by the collective agreement and the available faculty complement. Individual faculty members are asked to submit their teaching preferences every year and the Department Chair tries to meet these preferences as much as possible. Still, the Department offers a number of service (ECOR) courses for all students in engineering, and these courses tend to have higher enrolment. Over the last two years, the Department has added more sections in most large-enrolment courses to reduce enrollment in each course and reduce workload on those instructors. It is also recognized that some courses in some programs have lower enrolment than the Department average due to the size of these programs.* *The Department has a considerable shortage in research space, with majority of space accessible to all faculty member based on the current need. The Department has a Laboratory Users and Space Committee (LUSC) with membership from all different research groups in the Department to provide recommendations and suggest policies related to lab use and space utilization. The LUSC will work to assess actions, guidelines or policies that may support faculty members to access and utilize individual and shared lab spaces.*	*CEE Department Chair* *CEE LUSC Chair; CEE Department Chair*	*N/A* *2022-2023 Calendar Year*	*N*
4. The department continual improvement process (CIP) is based on the measurement of graduate attributes in a subset of courses. A bona fide CIP process should consider all courses rather than a subset. (Concern)	*4- Not agreed to*	*We appreciate the feedback. However, the GA and CI process is developed according to the guidelines set by the Canadian Engineering Accreditation Board (CEAB) and many elements in the process are applicable for all engineering departments. The process has just been scrutinized in two separate accreditation visits in 2019 and will be reviewed in another visit in 2022. We also note that implementing this recommendation will increase workload on all instructors, which is an opposite outcome to the recommendation in point 6.*		*N/A*	*N*

5. Two departmental committees are responsible for changes to the program and academic planning committee, and the CEE-GAC. As there are three different programs administered by the two committees, the department would benefit from assigning 'directors' especially to the two smaller programs (ASCE and ENVE) overlooking program amelioration efforts and student concerns. (Concern)	*4- Not agreed to*	*We appreciate the feedback. However, many of the courses are shared between multiple programs, and it will be impossible for example to separate decisions related to ACSE from CIVE. Therefore, the different programs are represented in the two main academic planning committees in the Department.*		*N/A*	*N*
6. There are mixed experiences of faculty members regarding the distribution and reporting of graduate attributes using the GASSS system. Some faculty members find the process well organized, while others reported large number of graduate attributes in single classes and many measures that are not useful. (Concern)	*3 – Agreed to in principle*	*We appreciate the feedback. We recognize that GASSS (the electronic system to collect GA data) is not the most friendly system. The Faculty's APC has long recognized this and has been trying to work with ITS to introduce bug fixes.* *The exercise of the GA mapping in all three programs has been completed few years ago with full consultation with the faculty at the time. Balancing the load of GA data collection in the different courses was one of the criteria considered. The faculty members are asked to submit comments on the process every year and the CEE-GAC reviews these comments for possible changes.* *It is also noted that APC did discuss GA mapping changes for a potential reduction of the number of indicators. However, a subset of the GAs is analyzed every year, and we wanted to keep the current mapping until we complete the full cycle. APC can revisit the list of indicators and the mapping to courses, in a future cycle.*	*CEE Faculty; CEE-GAC Chair; CEE Department Chair; Associate FED Dean – Policy and Planning*	*2024-2025 Calendar Year*	*N*
7. There seems to be a slight disconnect between the central coop program and departmental or faculty level efforts to enhance coop students experience. (Concern)	*3 – Agreed to in principle*	*We are not sure what is raised in this point. While the Department strives to enhance the student experience in general, co-op is managed centrally through the co-op office. The CEE ACUS-Student Engagement will work with the co-op office to develop a working plan to enhance students' co-op experience.*	*CEE ACUS-Student Engagement*	*2023-2024 Calendar Year*	*N*

8. Students extracurricular design teams would benefit from increased support. (Concern)	*3 – Agreed to in principle*	*Students' extracurricular activities are currently very well supported financially and through faculty involvement and supervision. Student teams are supported for annual travel to compete in the Great North Concrete Toboggan Race (GNCTR), Association of Preservation Technologies (APT), Troitsky Bridge Competition, and CSCE National Capstone Project Competition. Additional teams have been formed for the Timber Fever competition and the Concrete Canoe competition. All teams were contacted in March for their space needs to ensure that they have adequate working space for the extracurricular activities in the new Engineering Design Center that will be operational in 2022-2023. CEE has a dedicated committee to work with students and student groups to review requests for support. A CEE faculty member was just awarded the Jim Simpson Award by the Carleton Student Engineering Society upon the recommendation of the concrete canoe team for his support of the team activities.* *The Student Experience Committee will approach the students' groups to collect and review requests for support.*	*Chair of CEE Student Experience Cmte; ACUS-Student Engagement; and Department Chair*	*2022-2023 Calendar Year*	*N*
9. All three programs revolve around "building preservation, structural engineering in heritage buildings and resilient infrastructure", students with other interests or opportunities need electives. (Concern)	*2 – Agreed to if additional resources permit*	*A review of the CEE program has been conducted in the 2020-21 Calendar year by the Undergraduate Programs Committee. The subcommittee was tasked to review and develop possible options for enhancement to the program for offering a wider range of electives by integrating a Pathway Options within the CIVE program. The ACUS-Academic will work with the UPC to assess possible changes to the ACSE, CIVE and ENVE programs. The primary resource constraints are accreditation requirements, faculty complement, and classroom and lab space.*	*ACUS-Academic; Department Chair*	*2024-2025 Calendar Year*	*Y*

10. Students reported that learning outcomes are not universally used in courses. When used, they found them very helpful in structuring their learning. However some professors simply list them in the course outline but do not link them to the actual content. (Concern)	*1 – Agreed to unconditionally*	*We acknowledge the importance of linking each course's learning outcomes to the course materials and the program's learning outcomes. Instructors will be reminded to link the learning outcomes of their courses to the materials covered. We recognize that the new Student Experience Questionnaire at Carleton will also help emphasize this point.*	*ACUS-Academic; Department Chair*	*2022-2023 Calendar Year*	*N*
11. Environmental engineering program students are a bit lost when it comes to the focus of the program. Perhaps the introduction of program learning outcomes specific To the Carleton program would help the retention of students in that program. For example students asked for more contact with the ENVE industry engineers to better understand opportunities where ENVE engineers graduating from the Carleton program fit into society. (Concern)	*3 – Agreed to in principle*	*We have recognized the side effects of having a large number of courses taken by environmental engineering students outside the Department in the first two years. It has been recognized that this is a significant issue potentially affecting the retention of the students. Starting 2019, ECOR 1055 has been introduced in first year for all engineering students to help students recognize the focus of their program, the potential career paths, and the links between their courses in early years and these career paths. ECOR 1055 also allows students in each program to meet each other on weekly basis, which may not be possible in the other courses in the first year. We recognize that the pandemic conditions have derailed this latter objective.* *CEE routinely organizes career nights (mostly focused on environmental engineering) where industry engineers talk to the students on the potential career paths.* *The Department will look into potential program changes to bring in focus of the program at an earlier stage.*	*ACUS-Academic; Department Chair*	*2024-2025 Calendar Year*	*Y*
12. ENVE4104 Environmental Planning and Impact Assessment and ENVE 4200 Climate Change and Engineering are in the 4th year. Students, particularly ENVE students, would benefit from these courses ahead of their 4th year capstone design experience. (Concern)	*3 – Agreed to in principle*	*As per the responses to Points 9 and 11, the Department will look into potential program changes to bring in focus of the program at an earlier stage.*	*ACUS-Academic; Department Chair*	*2024-2025 Calendar Year*	*Y*

13. Civil students expressed concern that most electives are all in the first term which limits access due to timetabling. (Concern)	*2 – Agreed to if additional resources permit*	*See response to Point 9.*	*ACUS-Academic; Department Chair*	*2024-2025 Calendar Year*	*Y*
14. Large class sizes and large teaching loads for new faculty members is a hindrance to their research aspirations in their early career. In particular, new faculty members have to teach 3 undergraduate courses plus 1 graduate course. Similarly, senior faculty members need to teach 2 undergraduate courses plus 1 graduate course in addition to as high as 4 capstone design groups. This heavy teaching load has precipitated in students reporting a delayed response from their instructors to their various course inquiries. (Concern)	*3 – Agreed to in principle*	*We appreciate the feedback. We note that the teaching load for new and senior faculty members is set by CUASA's collective agreement. The Department tries to help new faculty members whose teaching load in the first year is one-half reduced normal teaching load (i.e., 1.0 credit teaching load).* *With a number of new hires, the Department has recently split most large enrolment classes to 2 sections and increased the number of sections in other service ECOR courses. It is hoped that more faculty hiring in the future will allow further reduction in class size.* *Typically, faculty members supervise only 2 capstone projects (occasionally 3).* *Supervision of capstone projects requires PEng status as per the requirements of the Canadian Engineering Accreditation Board (CEAB).* *However, the Department is introducing in 2022-2023 co-supervision arrangements to allow new faculty members (without PEng status) to co-supervise capstone projects.*	*Department Chair*	*Already ongoing*	*N*
15. Comment from student "they leave it to the TA and then the TA doesn't want to do anything" (TA oversight?). This is again a reflection of the high enrolment.	*4 – Not agreed to*	*It is not exactly clear what this comment is related too. It may be one complaint from one student related to a specific course, but this is definitely not an acceptable mode of delivery in the Department.* *The comment will be relayed to all faculty members and will be reminded of the duties of the course instructor and TA.*	*Department Chair*	*2022-2023*	*N*

16. 6 students per capstone group may be too many students to effectively give them all the design experience intended. This is again a reflection of the high enrolment. (Concern)	*4 – Not agreed to*	*Target group size in the capstone project is 4-6 students. The capstone project is an integration, over the student's academic tenure through the first 3 years of the program of the cumulative knowledge base, and experience where the skills, attributes and capabilities are utilized and demonstrated.* *Large design groups enhance the capstone experience through diversity, leadership and team building. The experience can be adequately managed to reflect realities within the practicing profession where project teams are typically comprised of large, multidisciplinary groups.*			
17. The faculty is rapidly expanding the number of faculty members. This is an opportunity to decrease the class sizes enhancing the quality of delivery of the three programs. (Opportunity)	*1 – Agreed to unconditionally*	*See response to Point 14.*	*Department Chair*	*Already ongoing*	*N*
18. With the rapid increase in research capabilities within the faculty, there is an opportunity to engage undergraduate students in the recent research advancements in the fields of research of the different researchers. The only mechanism available is through coop opportunities for the very top students. However, there needs to be other mechanisms allowing students at all academic levels to volunteer and perhaps actively participate in the faculty's research activities. (Opportunity)	*4 – Not agreed to*	*We appreciate the feedback but coop is not the only way to involve students in faculty research. There are many opportunities available to integrate undergraduate students within the research experience including CEE Internships for first year students, Carleton University Research Experience for Undergraduate Students (I-CUREUS), and NSERC USRAs.*			
19. A formal strategy to adopt/initiate teaching best practices gained from the experience induced by the recent remote delivery may provide an improvement in student learning. (Opportunity)	*1 – Agreed to unconditionally*	*The Engineering Academic Planning Committee (APC) has discussed the potential of alternative course delivery modes in engineering courses. With the constraints of accreditation requirements, APC is working on a plan to explore the opportunities and challenges with remote course delivery and the potential application in delivering engineering courses.*	*APC*	*2023-2024 Calendar Year*	*N*

20. Expand the focus of the programs/faculty past "Ottawa", even just in the strategic documents. The impression that one gets from reading the Faculty and University documentation is a focus on service to Ottawa. (Opportunity)	*1 – Agreed to unconditionally*	*The CEE programs have alumni spread all over Canada and the world. We appreciate the comment and will note it in future communications.*	*CEE Faculty and Department Chair*	*Immediately*	*N*
21. Students indicated no emphasis on entrepreneurship; focus appears to be on getting a job (often a government job). There appears to be an opportunity to introduce leadership and entrepreneurship learning into the students' educational experience. (Opportunity)	*3 – Agreed to in principle*	*We appreciate the feedback. The ACUS-Academic and UPC will note the feedback in the ongoing exercise to review the 3 undergraduate programs in CEE.* *It is worth noting that CEE students are regular participants in the PEO Ottawa Chapter's Annual Innovation Challenge, which focuses entirely on innovation and entrepreneurship.*	*ACUS-Academic; Department Chair*	*2024-2025 Calendar Year*	*Y*