Research Assessment Exercise 2020
Impact Overview Statement

University: The University of Hong Kong
Unit of Assessment (UoA): 16 Civil Engineering (incl. Construction Engineering & Management) and Building Technology
Total number of eligible staff of the university in the UoA: 20

(1) Context

The Department of Civil Engineering (CivE) at HKU was founded in 1912. Since its establishment CivE has contributed significantly to the development and enhancement of Hong Kong's infrastructure and environment (both the built and natural environments). CivE staff have produced novel solutions, designs, products and management methodologies for a wide range of civil and environmental engineering topics in the broad disciplines of structures, geotechnics, water, transportation, sustainability and project management. Opportunities for impact have been cultivated through research and consultancy projects, in conjunction with CivE's traditional links with key stakeholders in the construction industry, consulting companies, government departments, etc. CivE and HKU also continuously provide funding for equipment and administrative support for these activities. CivE also provides strategic direction by prioritising research to address society's key needs and focuses on guidance from its Advisory Committee, staff involvement with government and industry committees and international collaboration and networking.

(2) Approach to Impact

CivE's research activities primarily focus on areas that address Hong Kong's challenges and opportunities in developing its urban, rural and coastal zones to meet its economical and societal needs in a sustainable manner. To deliver these activities in 2012-13 CivE re-focused its strategic research direction under the over-arching research theme of 'Engineering for Urban Sustainability'. To deliver this strategic focus two key research centres were established within this research theme, including: the Centre for Innovation in Construction and Infrastructure Development (CICID) and the Centre for Water Technology and Policy (CWTP). While CWTP is still nascent, CICID is a source of high impact research, including the recent development of a modular integrated construction (MiC) method, which the Government is currently piloting and promoting.

Impact-related activities are supported by both the University and CivE. HKU's Knowledge Exchange funding for impact development allocated HK$300K to CivE to help staff develop their engagement and impact with key stakeholders. Impact is also part of the performance review, with extra credit awarded for impact projects and patents. Moreover, the government's new Research Impact Fund, to help scholars deliver impact from research, awarded HK$9.88M to CivE in 2019 for the above MiC research project.

CivE also encourages impact through funding administrative and logistical support for a wide range of impact-related activities. For example, during the reporting period CivE organised 237 professional seminars with speakers from CivE, other Hong Kong and Mainland China universities, industry, government departments, etc., as well as international experts; 13 workshops and forums were attended by circa 2,000 professionals; 15 Continuing Professional Development courses were delivered to over 1,200 attendees; 4 prestige lectures were presented to over 950 professionals; as well as a number of lectures being given to the general public.

A key pathway for translating research into impact is facilitated through CivE's Advisory Committee. This committee formally meets bi-annually, with its current 14 external members being from senior levels in industry, such as: AECOM, Arup, Hong Kong Airport Authority and MTR Corp Ltd, and government departments, such as: Development Bureau and Environmental Protection Department, etc. CICID and CWTP also have stakeholder members on their management committees. In addition,

CivE has 48 Adjunct Professors from industry and government departments. Many of these external committee members also interact regularly with individual staff, in addition to the formal committee meetings.

CivE staff also share and discuss their expertise and research findings as members of key industry and government department committees. 13 staff currently serve on committees of the Construction Industry Council (CIC), Hong Kong Institution of Engineers, Green Building Council, Hong Kong Science and Technology Park, etc. Staff also serve on technical committees of the Buildings Department, Transport Department and other key government departments, and are appointed to government committees, such as: Town Planning Board, Advisory Council for the Environment, and Advisory Committee for Water Supplies. Research impact is also disseminated to the public through seminars, exhibitions, press releases and media interviews.

Consultancies and contract research also contribute to CivE's impact portfolio. During the reporting period, CivE staff undertook 68 such projects, with a total value of HK$52.2M. Invitations to participate in such projects mainly come through direct approaches to individual researchers, or government departments may also approach CivE directly for consultation. For example, the Highways Department invited Prof FTK Au in 2019 to help investigate the post-tensioning and related problems of the Shenzhen Bay Bridge Hong Kong Section.

Industry also engages with CivE staff to apply their research to specific projects. For example, Prof ZQ Yue's research on a cost-effective soil nail design for analysing slope stability was applied in more than 500 construction projects in Hong Kong during the period 2013-19. This research-led application enabled savings of more than HK$45M. A number of CivE staff have also been commissioned by companies and organisations based outside Hong Kong, in such places as Mainland China, Austria, Singapore, Saudi Arabia, etc.

Academic staff are encouraged to apply for patents for their inventions. During the reporting period, with assistance from HKU's Versitech, 4 CivE researchers registered 17 patents, mainly for membrane and water filter technologies. Prof CY Tang developed a patented portable water filter that can produce clean water for use after natural disasters, which won the Gold Medal at the 2019 Geneva International Exhibition of Inventions; the filter has attracted considerable industry interest.

(3) Strategy and Plans

CivE cultivates impactful research by providing direction and material support. The 'Engineering for Urban Sustainability' research theme has given a focus to CivE's work and was backed in 2012-15 with HK$2M allocated to research on "water and environmental engineering" and "sustainable infrastructure engineering and development". For example, this support benefited Prof TST Ng's carbon labelling work (Case Study 1). In 2019, another HK$3 million was allocated to promote impact in sustainable water resources, MiC and renewable energy systems.

CivE also increasingly encourages interdisciplinarity as another pathway to impact. The CWTP was established with the Faculty of Social Sciences to focus on water security and sustainability in Hong Kong. CivE has also created a new joint faculty position on "green materials" with Architecture.

(4) Relationship to Case Studies

The Case Study on carbon labelling methodology was driven by contract research supported by the CIC. CivE played a proactive role in providing support, such as organising forums, workshops, etc., and, in particular, the Case Study benefitted considerably through close interaction with the external management committee members of CICID.

The Case Study on Novel Coupling Beam demonstrates strong international impact with the research being taken up for the design of high-rise buildings for extreme wind and/or earthquake loads in a number of overseas countries – as well as Hong Kong.