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**Paper for the House Committee meeting
on 25 February 2011**

**Report of the Subcommittee on
Building (Construction)(Amendment) Regulation 2011**

Purpose

This paper reports on the deliberations of the Subcommittee on Building (Construction) (Amendment) Regulation 2011 (L.N. 3 of 2011) ("the Amendment Regulation").

Background

2. The structure of every building shall be capable of safely sustaining and transmitting the combined dead loads (e.g. the weight of walls, floors, roofs, etc.), imposed loads (e.g. the weight of occupiers, furniture, equipment, etc.) and wind loads to the ground. Regulation 17 of the Building (Construction) Regulations (Chapter 123 sub. leg. B) ("the Regulations") stipulates the design requirements of minimum imposed loads and specifies that the imposed load on any building, street, building works or street works shall be the greatest applied load likely to arise from the intended use or purpose of the building, street, building works or street works.

3. The requirements of imposed load on buildings were first introduced in the 1950s and the current imposed load requirements in the Regulations were made in 1990. In view of the advancement in building technologies, development of international building codes and standards, changes in occupation pattern and emergence of new uses of buildings, the Buildings Department ("BD") has commissioned a consultancy study on loading requirements for buildings with a view to ensuring that the local statutory requirements meet the modern-day needs of the society and are in line with

the standards of other developed countries. The consultancy study, led by a Steering Committee with members from the academia, professional institutions and relevant Government departments, has made recommendations to update the design requirements of imposed loads on buildings or streets under the Regulations.

Building (Construction) (Amendment) Regulation 2011

4. Based on the recommendations of the consultancy study, the Secretary for Development has made the Amendment Regulation under section 38 of the Buildings Ordinance (Cap. 123) ("BO") which covers the following key amendments:

(a) section 3(7) of the Amendment Regulation

Where the floor of a building is used to support any equipment, machinery or display item that will result in a greater imposed load than the minimum imposed load specified in the new Table 1 under regulation 17(1) of the Regulations, the load of any of those items has to be considered in determining the imposed load on the floor. Under the existing Regulations, only certain uses of buildings require the consideration of equipment, machinery or display items in determining the minimum imposed loads.

(b) section 3(8) of the Amendment Regulation

The floor uses of buildings and their corresponding minimum imposed load requirements are re-categorized from the existing 12 classes into eight classes in the new Table 1. The existing minimum imposed load requirements for certain uses (e.g. domestic use, restaurants, car-parking areas, etc.) are reduced. The Amendment Regulation also specifies the minimum imposed load requirements for some new floor uses (e.g. residential care homes for elderly persons, nursing homes, dance practice rooms, karaoke establishments, museums, etc.) and present-day building elements (e.g. utility platforms and balconies).

(c) section 3(11) of the Amendment Regulation

To disallow reduction of imposed load from partitions where the positions of which are not indicated on the plan of the building.

(d) section 3(12) of the Amendment Regulation

To revise the allowable reduction of total distributed imposed loads for buildings to be specified in the new Table 2 under regulation 17(2) of the Regulations allowing less load reduction in structural design for high-rise buildings.

(e) section 3(13) of the Amendment Regulation

To revise the minimum horizontal imposed load on protective barriers to restrict or control movement of persons by specifying a new category for "areas where people may congregate but overcrowding is not expected" in the new Table 3 under regulation 17(3) of the Regulations.

(f) section 3(14) of the Amendment Regulation

To combine the two mathematical formulae for calculating impact forces on vehicle barriers in regulation 17(4) of the Regulations into one single formula applicable to all situations.

5. The Amendment Regulation is proposed to take effect from 1 August 2011. Under section 39(2) of BO, where at the date of the coming into operation of any regulations made under BO any building works or street works are being carried out or consent to their commencement has been given, the provisions of the law prior to the coming into operation of such regulations shall apply to such works. The effect of this is that the Amendment Regulation will apply to new buildings and alteration and addition works in existing buildings.

The Subcommittee

6. At the meeting of the House Committee on 21 January 2011, a subcommittee was formed to study the Amendment Regulation. Under the chairmanship of Ir Dr Hon Raymond HO Chung-tai, the Subcommittee has held two meetings. The membership list of the Subcommittee is in the **Appendix**.

7. To allow more time for the Subcommittee to study the Amendment Regulation, the scrutiny period has been extended from 16 February 2011 to 9 March 2011 by a resolution of the Council passed on 16 February 2011.

Deliberations of the Subcommittee

Building safety

8. The Subcommittee in general is supportive of the Amendment Regulation which aims to modernize and update the minimum imposed load requirements for buildings with a view to achieving more economical design and construction of building structures in line with local conditions and international standards, as well as facilitating the process of structural design of buildings. At the same time, members stress the importance for the Amendment Regulation to ensure safety of buildings.

Re-categorization of minimum imposed load requirements and reduction in requirements

9. The Subcommittee notes that the Amendment Regulation will re-categorize floor uses of buildings and their corresponding minimum imposed load requirements into eight classes (new Table 1 of the Amendment Regulation), introduce minimum imposed load requirements for some new uses, and reduce the existing requirements for some uses. They have enquired about the reasons for the above amendments and how the amendments would ensure and enhance building safety.

10. The Administration has explained that while the minimum imposed load requirements in the existing Table 1 are categorized on the basis of the load requirement figures, the eight classes in the new Table 1 are categorized according to the floor uses. The new categorization will be more user-friendly and will facilitate building practitioners to ascertain the imposed load requirements for different uses of buildings. The specification of new uses of buildings and present-day building elements and their imposed load requirements in the new Table 1 will modernize the Regulations to cater for present-day activities in Hong Kong.

11. As regards the concern about the proposed reduction in minimum imposed load requirements for uses such as domestic use and restaurants, the Administration has advised that the proposed amendments will rationalize the requirements under the existing Regulations. The Administration has examined the local situations and made reference to the international standards. The consultancy study conducted by BD has looked into the actual loading situations of buildings in Hong Kong and the structural loading standards adopted by other developed countries including Australia, Singapore and the United Kingdom, as well as Mainland China. The study concluded that there is room to reduce the minimum imposed load

requirements on certain uses of buildings, such as domestic use, restaurants, car-parking areas, etc. The Administration has also pointed out that enhancement in building design, improvement in construction materials and computation methods of structural analysis and designs have enabled more precise calculation and accommodation for load requirements, thereby allowing reduction in loading requirements and at the same time without compromising building safety. The proposed reduction in load requirements will save the use of building materials, bring about more economical structural design and construction of buildings, hence have positive impacts on the environment.

12. Upon request of the Subcommittee, the Administration has provided information on the comparison of the minimum imposed load requirements between Hong Kong and other major countries. Members note that the requirements and the proposed adjustments are comparable to those of the United States of America, the United Kingdom, countries of the European Union, Singapore, Mainland China, Japan, Australia and Canada, and are about the average value of the standards of these countries. The Administration has assured members that the new requirements are adequate to ensure safe design of building structures. Moreover, the Administration will continue to undertake regular reviews of the requirements to ensure they are in line with international development and meet the changing local situations in Hong Kong.

13. The Subcommittee notes that the column on total load in kN to be applied on beams uniformly distributed over span in the existing Table 1 (i.e. the fifth column in the Table) will be removed. Members are concerned whether the deletion would have impact on the imposed load requirements on uses.

14. The Administration has explained that the fifth column in the existing Table 1 serves to cater for the local effect of imposed loads on beams of building structures. The loading requirements specified in columns 3 and 4 of the new Table 1 and the amendments in section 3(7) of the Amendment Regulation already cater for the safe design of floors (including floors with beams underneath) of building structures and associated areas. Section 3(7) of the Amendment Regulation provides that where the floor (including the part of the floor with beams underneath) of a building is used to support any equipment, machinery or display item that will result in a greater imposed load than the minimum imposed load specified in the new Table 1, the load of any of those items has to be considered in determining the imposed load on the floor (including the part of the floor with beams underneath). This already imposes control over the possible local effect on beams of building

structures. Separate imposed load requirements for beams are therefore no longer essential, and hence the fifth column in the existing Table 1 will be deleted. The Administration has also informed members that developed countries such as Australia, Singapore and the United Kingdom, as well as Mainland China also have no specific imposed load requirement on beams in their building standards or codes.

Minimum imposed load requirements for high-rise buildings

15. While appreciating that the minimum imposed load requirements in the Amendment Regulation will be in line with international standards, the Subcommittee considers it important for the requirements to cater for the situations in Hong Kong where there are a lot of high-rise buildings with different uses in floors. Members are also concerned about the safety threshold for loading in high-rise buildings and large commercial complexes which comprise retail shops, supermarkets, restaurants and recreation centres where heavy items are housed (e.g. equipments in gymnasias, furniture and kitchen equipment in restaurants), or where there are high density of people (e.g. crowds in discos and cinemas).

16. On the concern about ensuring loading safety of high-rise buildings, the Administration has explained that section 3(12) of the Amendment Regulation revises the allowable reduction of total imposed loads for buildings in light of the general increase in the number of storeys of buildings nowadays and to bring the allowable reduction in line with those in other developed countries. The amendment as shown in the new Table 2 allows less load reduction in structural design for high-rise buildings. Under the existing Regulations, the allowable percentage reduction of total distributed imposed load on all floors carried by a vertical member supporting five or more floors of a building is 40%. Under the Amendment Regulation, the percentage reduction allowed for classes 1, 2, 3, 4 and 7 of the uses (as specified in the new Table 1) will be lowered to 20% for a vertical member supporting five floors and a maximum of 40% reduction is prescribed for floors carried by a vertical member supporting more than eight floors of a building. This is compared to 40% for five or more floors under the existing Regulations. The effect is that the discount rate in load reduction will be tightened with less load reduction and this will enhance the structural safety of high-rise buildings and meet the present needs of Hong Kong.

Changes in floor uses resulting in increase in the loading of buildings

17. The Subcommittee has expressed concern about how the Amendment Regulation will affect changes in floor uses of a building. Some members

have expressed concern that changes in floor uses where permit or authorization is not required would pose risk to loading safety of buildings. The Subcommittee considers it important that to avoid overloading problems and to ensure building safety, property owners and users should be informed of the imposed load requirements for the different floor uses and the new requirements in the Amendment Regulation, in order to facilitate usage of the floors and planning of changes in use. Property owners and users should also be made aware of the maximum loading capacity of their buildings. While noting that certain uses of buildings are subject to approval of the relevant authorities or licensing systems and hence there will be control on the imposed load requirements, members are concerned about the control or monitoring of activities or uses in buildings which are not subject to prior approval or licensing requirement (e.g. gymnasias). In this regard, some members including Hon Miriam LAU, Hon Audrey EU and Hon Cyd HO, have suggested that consideration be given to including information on the authorized uses and the maximum loading capacity of a building in the Occupation Permit ("OP") for easy reference by property owners and users. They have also urged the Administration to take enforcement actions against unauthorized changes in floor uses and unauthorized building structures ("UBWs") which would pose risks to the loading of buildings.

18. The Administration has advised that in the Amendment Regulation, the minimum imposed loads of different uses of buildings are specified to ensure building safety. Occupiers carrying out activities in the building corresponding to the specified use are safe. Using a residential building as an example, the imposed load specified in the Amendment Regulation has already considered the general loads arising from daily domestic activities including the weights of occupiers, furniture, books and bookshelves, wardrobes, televisions, etc. As it would involve professional knowledge in the field of building structure and structural engineering for understanding the loading capacity of a building, the Administration has suggested that building occupiers should consult professionals for advice if they have doubts on the uses and loading capacity of their buildings, or they wish to make changes in use. Building professionals and members of the public can obtain detailed technical information regarding loading capacity of buildings through the plan viewing services of BD including accessing "BRAVO" system via the internet (<http://bravo.bd.gov.hk>) or visiting BD's Building Information Centre. In 2010, there were over 70 000 cases using such services to view approved plans and another 35 000 cases using the services to purchase copies of approved plans and related information.

19. Regarding members' suggestion to include information on loading capacity of buildings in OP, the Administration has explained that an OP for a

building is issued by the Building Authority ("BA") under BO upon the receipt of an application. The issuance of an OP implies that the new building can be occupied for uses as specified in the approved plans. As different areas of the floors of a building will be demarcated into different uses according to the approved plans (such as residential units, balconies, utility platforms, offices, store rooms, etc.), the actual locations of such uses and their corresponding designed imposed loads can only be accurately specified through indication on a plan. Hence, there will be practical difficulties to indicate in detail the designed imposed loads of different uses of a building on an OP.

20. On the concern about unauthorized changes in floor uses, the Administration has explained that section 25(1) of BO provides that prior notice shall be given to BA of any intended material change in the use of a building by the person concerned. BO stipulates that the use of a building shall be deemed to be materially changed if the carrying out of building works for the erection of a building intended for such use would have contravened the provisions of BO. Where in the opinion of BA any building is not suitable for its present or intended use by reason of its construction, he may issue an order under section 25(2) of BO to prohibit or discontinue such use of the building. As for the control of UBWs, the Administration has stressed that BD will accord priority to deal with cases involving changes in use of buildings which constitute obvious or imminent danger to life and property, or those which constitute serious environmental nuisance.

21. To enhance building safety in Hong Kong, the Administration has advised that it will continue to strengthen efforts in publicity and public education and mount large-scale public education campaign on building safety covering topics on change of use of buildings, alteration and addition works, building maintenance, removal of UBWs, community monitoring, etc., with a view to fostering a building safety culture in Hong Kong to increase the awareness of all stakeholders (including building owners, occupiers, building professionals, property management companies, contractors and workers) on building safety.

Methods for calculating the impact force on vehicle barriers

22. The existing regulation 17(4) specifies different methods for calculating the impact force on vehicle barriers for car parks, access ramps of car parks, straight ramps intended for downward travel which exceeds 20 metres in length and vehicle barriers in other areas. The Subcommittee notes that the new regulation 17(4) provides for a standard calculation method for vehicle barriers for carriageways, floors, driveways and ramps

used by vehicles. Members have enquired about the reasons for adopting a different approach in the new regulation.

23. On the adoption of a single formula for the calculation of impact forces on vehicle barriers, the Administration has explained that the mathematical formula for calculating impact forces on vehicle barriers stipulated in the new regulation 17(4) contains parameters covering the mass, velocity and deformation of vehicles as well as the deflection of the barrier under consideration. This formula is derived from established engineering principles and adopted for use in other international standards. The formula will cater for the design of impact forces on vehicle barriers for all situations, including car parks, access ramps of car parks or straight ramps intended for downward travel which exceeds 20 metres in length as stipulated in the existing regulation 17(4). Thus, the requirements in the existing regulation 17(4) are no longer necessary.

The impact of the Amendment Regulation on the construction cost of buildings

24. The Subcommittee notes that the reduction in the minimum load requirements will enable the use of less construction materials. Members have enquired about the impacts on construction cost and property prices.

25. The Administration has advised that construction cost of a building is affected by many factors, such as the design and structural form of the building, the selected construction materials, construction technique and method employed, labour cost, the site condition and constraints, etc. Using the construction of a typical 30-storey residential building as an example, as compared with the existing Regulations, the saving in imposed load estimated under the Amendment Regulation is approximately 5% of the total imposed load plus dead load. As a rough estimate, there will be a corresponding saving of about 5% in the cost of building structural materials. The Amendment Regulation will have no impact on other cost factors (e.g. labour cost, construction technique, etc.). As regards property prices, the Administration has pointed out that the sale price of a building in the property market will be determined by the owners taking into account different factors including the prevailing and anticipated market condition.

Proposed amendments

26. The Administration and the Subcommittee will not move any amendments to the Amendment Regulation.

Advice sought

27. Members are requested to note the deliberations of the Subcommittee.

Council Business Division 1
Legislative Council Secretariat
24 February 2011

**Subcommittee on
Building (Construction) (Amendment) Regulation 2011**

Membership list

Chairman Ir Dr Hon Raymond HO Chung-tai, SBS, S.B.St.J., JP

Members Hon James TO Kun-sun
Hon Miriam LAU Kin-yee, GBS, JP
Hon Abraham SHEK Lai-him, SBS, JP
Hon Audrey EU Yuet-mee, SC, JP
Hon CHEUNG Hok-ming, GBS, JP
Hon Cyd HO Sau-lan
Hon Alan LEONG Kah-kit, SC
Hon Tanya CHAN

(Total: 9 members)

Clerk Ms Connie SZETO

Legal Adviser Miss Kitty CHENG

Date 14 February 2011