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The Commonwealth of Massachusetts

STATE BOARD OF BUILDING REGULATIONS AND STANDARDS

CODEWORD

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BBRS CHAIRMAN TSUTSUMI HONORED

All too frequently, most of us are only familiar with a name and sometimes with a face, but we really don't know much about the person himself. Because of this, we thought you would be interested in this background information on Kentaro Tsutsumi, Chairman of the Board of Building Regulations and Standards (BBRS), as it appeared in the 1988 Fall issue of "Civil Engineering Practice" to announce that Ken - as he likes to be called - was one of four engineers who was made an Honorary Member of the Boston Society of Civil Engineers Section/ASCE (BSCES). This is the highest level of acknowledgement granted its outstanding members based on their contributions to the BSCES, the engineering profession as a whole and society.

A professional engineer, teacher and inventor for more than 50 years, Kentaro Tsutsumi is a nationally recognized authority on isolating and stabilizing vibration. With his teaching deeply rooted in professional experience, Prof. Tsutsumi has taught students from all over the world and even the children of his students over his long career, instilling in them his clear sense of design and precision about the art of engineering.

Born in Hawaii, Prof. Tsutsumi received his B.S. in civil engineering from the University of Hawaii in 1936 and an M.S. in civil engineering from MIT in 1938. His contributions to engineering education started in 1939 when he taught structural analysis and design courses for the Massachusetts Dept. of Education, Division of University Extension. Prof. Tsutsumi also had teaching appointments at Northeastern University and for the Tufts University Engineering Science Management War Training Course during World War II. He returned to Tufts in 1963 as Associate Professor of Civil Engineering and was promoted to Professor in 1966.

Demonstrating the breadth of Prof. Tsutsumi's vision as a teacher, he taught an analog computer course for engineers and scientists at Tufts in 1965. This course was the first of its kind in New England. Later on, in 1981, he introduced personal computers in the undergraduate engineering laboratory. Prof. Tsutsumi also incorporates the writings of the 12th century Persian poet and scientist, Omar Khayyam, into his classes. Another topic he has introduced is the analysis of a Picasso painting in structural engineering terms.

CHAIRMAN TSUTSUMI (continued)

His professional career ranges from the design of buildings and bridges, foundation design and hydraulic design to the design of a stable test platform for the calibration of inertial guidance systems. Holder of two patents, Prof. Tsutsumi worked on the design of several Boston Edison buildings in the 1940's and along with LeRoy Hersum, a consultant he knew from MIT, he helped rebuild Massachusetts bridges, and other structures, damaged or destroyed by the hurricane of 1938.

His longstanding consultant career includes work for MIT's Draper Laboratory, Jackson & Moreland, NASA, Raytheon and Itek. His expertise in vibration isolation and instrumentation has been evidenced in his work for Draper Labs. He has designed such test equipment as gyro test foundations, optical equipment test foundations, elastic limit testers, radial force testers, axial force testers, centrifuges, and shock and vibration isolation analyses for components. His "Type T" (named after him) isolation pier that utilizes ordinary building materials isolates movements to a millionth of an inch. In 1964, he invented an instrument testing platform that is not affected by the random tilting of the earth. And in 1944 he designed a 634-foot wind tunnel that generates winds up to 600 mph and which he recently refined to generate supersonic wind speeds.

Prof. Tsutsumi retired from Tufts in 1986. He is currently chairman of the Massachusetts State Board of Building Regulations and Standards and serves on the Mayor's Advisory Board of Public Buildings for the City of Newton. He is involved with a number of professional organizations including ASCE, the American Institute of Steel Construction (AISC), the Society for Experimental Stress Analysis, the American Institute of Aeronautics and Astronautics, American Geophysical Union and the Seismological Institute of America. Author of many papers and articles, Prof. Tsutsumi has been awarded the Tufts Service Citation and AISC's Special Citation Award for Exceptional Professional Achievement.

In addition to all of the above, we learned that during World War II, Ken designed analog computers to simulate the flight of an airplane before being built (flight simulator) for the U.S. Navy and Air Force and worked on the underwater navigation of submarines. His public service record also includes his donating his time since 1975 to serve as Chairman of the Construction Materials Safety Board, which advised the former State Building Code Commission and now the BBRS on new construction products, materials and construction techniques. Needless to say, we are very proud of Kentaro Tsutsumi, as well as the other three engineers who were so honored and who have also donated time to serve on the BBRS Seismic Committee for many years: John T. Christian, William J. LeMessurier and Maurice A. Reidy, Jr.

NEW ELEVATOR CODE EFFECTIVE

The Board of Elevator Regulations has adopted by reference the ASME/ANSI A17.1, 1987 edition, of "The Safety Code for Elevators and Escalators" (with modifications) to become the Massachusetts' Elevator Code. This Elevator Code (524 CMR 35:00) became effective on January 20, 1989 and is effective concurrently with the "old" Elevator Code (524 CMR) until July 1, 1989, at which time the provisions of the ASME/ANSI A17.1 (as modified) must be exclusively followed for new construction.

APPLYING THE CODE TO SMALL STRUCTURES

The State Building Code regulations encompass an abundance of different types of buildings and structures. High rise buildings, backyard tool sheds, stadiums, tents, shopping malls, swimming pools, theaters, grain elevators and service stations are just some examples of the diverse kinds of structures which are subject to the building code. It is fairly obvious that, while there may be some similarities between these widely varying structures, there are many ways in which portions of the code are inapplicable or inappropriate for some of these structures. Just to cite a few examples:

- How would you provide exit doors from a swimming pool?
- How do you insulate a tent to satisfy energy conservation standards?
- Are two means of egress really necessary from a tool shed?

While these examples may seem particularly ridiculous, there are some situations which can puzzle the most experienced code official. In some cases, the building code makes explicit provision for unique situations encountered with special structures through the insertion of special use and occupancy provisions, which are contained in Article 4 of our State Building Code. In other situations, the code may reference standards of accepted engineering practice, which are applied in addition to code requirements. However, when dealing with small structures such as sheds, playhouses, gazebos or decks, there is another approach which should be used. The building code (Section 211) contains a classification called Use Group T (temporary and miscellaneous uses) intended to encompass accessory buildings and structures such as those described above. Section 211 gives the building official discretionary power to apply those portions of the building code which are commensurate with the fire and life hazard incidental to the use of such structures. This discretionary power, wisely applied by the building official, allows the application of only those code requirements necessary for safe construction and use of a structure, and avoids ludicrous, costly, and unnecessary requirements such as footings and secondary means of egress for tool sheds.

KNOW YOUR CONSTRUCTION SUPERVISOR

The building official plays an extremely important role in the Construction Supervisors Licensing program. Just as workmanship must be combined with good materials to build a superior building, we rely on building officials to properly apply and enforce the licensing provisions contained in the State Building Code. A significant number of complaints which have led to the suspension or revocation of licenses have originated from concerned building officials, and the testimony of building officials is heavily relied upon by the Board of Examiners when suspension or revocation is considered. Aside from the complaint procedure, we also rely on building officials to perform several other important functions related to licensing. Perhaps the most important "other function" is the proper identification of the supervisor.

The building official must see that the supervisor is identified on the permit application. Section 2.16 of the Licensing Rules (see State Building Code App. Q) requires that the permit application contain the name, license number, and signature of the construction supervisor. If the homeowner is to act as his own supervisor, we strongly suggest that the homeowner exemption form (see page 8, Oct. '87 CODEWORD) be completed to verify this fact. We also strongly recommend that the building official require the supervisor to produce his license (Sec. 2.14 - Rules) and other photo identification to verify that he holds a valid license. We have received numerous complaints upon which we could take no action because the individual named was not clearly designated as supervisor on the application. Several cases have also been reported where unlicensed individuals have fraudulently misrepresented themselves as being licensed. Proper identification of the supervisor by the building official is necessary to prevent this type of problem from occurring.

RECENT STATE BUILDING CODE APPEALS BOARD DECISIONS

Section 127.7.11 (Contents of Decision) of the Code states, "Any decision shall not be considered by any person or agency as a precedent for future decisions."

Appeal Docket #87-127

The building official upon review of plans for a single family residence refused to issue the building permit citing a failure to comply with Section 2102.5, Waterproofing. The building official from his familiarity with the site and his review of engineering documents (percolation test data, groundwater levels data) determined the site to be subject to high groundwater conditions and required drains as required by the section to be installed.

The Applicant, who intended to build fifty single family residences in this area, provided engineering to support an alternative method of waterproofing, as permitted by Section 2012.6.2. This engineering method, submitted by hydraulic engineers and further certified by a consulting engineer, required that each lot be individually evaluated such that the underside of the basement floor be elevated no less than eighteen (18) inches above the calculated high groundwater elevation, that the foundations be dampproofed, that each residence be constructed with gutters, downspouts and splash blocks, and that a three (3) percent downward slope of grading be maintained for a distance of ten (10) feet from the foundation.

The Board evaluated the proposed alternative(s) and found it to be a method of water dispersal equivalent to the requirements of Section 2102.5. The Board accepted the alternative, requiring that each site plan contain the attestation of the engineer that in his opinion the structure has been placed upon the lot in such a location as to minimize the potential of flooding.

Appeal Docket #87-132

The building official refused to issue a building permit for the second phase of construction of a five story, Construction Type 2A, apartment building (R-2 Use Group). This building had been constructed into the side of a hill, such that the roof of the structure was at grade at the top of the hill and provided access to the apartments below. The second phase of construction proposed the construction of six (multiple) two story single family dwellings side by side (Use group R-3, Construction Type 4B) to be placed partially upon the roof of the R-2 structure (one third of the floor area) and partially upon grade at the hill top (two thirds of the floor area). The building official cited Section 305.3 (Table 305), Height limit, Section 214.3, Minimum requirements (Construction Classification) and Section 2200.3.5, Additions (to Existing Buildings). It was the interpretation of the building official that as the single family dwellings were to be (partially) supported by the apartment building below they must be considered as part of that structure. Considered as such the (now) seven story structure (approximately 70' in height) must be classified as Construction Type 4B and as such be considered in violation of the height limitations of Table 305. If considered as "additions" to an existing structure, the single family residences would violate Section 2200.3.5.

The Appellant argued the unusual siting of the structure (as it was constructed into the hillside) allowed direct access at grade to the "sixth" story (the first wood frame story) of the building for fire fighting purposes. Additionally, the roof/ceiling assembly of the apartment building upon which the single family dwellings were to be supported was to be constructed to achieve a two hour fire resistance rating, and the only area of the apartment building below the single family residences was a fully suppressed, one hour fire resistance rated, exitway access corridor.

The Board voted to support the interpretation of the building official. While the Board recognized the unusual nature (siting) of the construction they were unable to consider the roof/ceiling assembly as sufficient separation to allow an interpretation that there were two separate structures. The Board noted that the paths of egress from the apartment building and from the single family residences were intertwined (egress from the apartments discharged between units of single family residences, and egress from the single family structures was in part over the roof of the apartment building). The Board noted that (notwithstanding the unusual siting) the proposed construction would be no different than the illegal practice of constructing wood frame "roof structures" (penthouses, additions, etc.) on top of buildings of superior construction types.

"WILL SUBDIVIDE TO SUIT TENANT"

An increasingly common practice among developers of commercial structures is to construct buildings without initially dividing them into tenant areas for specific occupants. This results in an (often large) area, built "on speculation", to be progressively subdivided into offices or stores to meet the area requirements of future tenants. This practice provides the developer with the flexibility to construct areas to the "demands" of the tenant, and often provides the building official with a splitting headache and a major code enforcement problem.

The following is a short list of Code requirements and suggested procedures to help the building official successfully cope with this phased building process:

1. The Use Group and Construction Type Classification as stated by the applicant on the original permit application will control throughout the construction. If Mixed Uses are proposed the applicant should clearly identify all uses and specify which option under Section 213 will be used for compliance. For example, including a retail store in a "spec" office building may cause the resultant mixed use building to violate height and area limits.
2. The "Description of Work" and "Plans and Specifications" required by Sections 113.4 and 113.5 should completely describe all work to be done in the "first phase", i.e. construction of the "shell" and any tenant spaces for which Certificates of Use and Occupancy will be requested. The original permit will allow construction of only those parts of the structure indicated. For each subsequent tenant space (or group of such spaces) to be created, a separate "Alteration Permit" should be issued which describes and limits the construction in that phase.
3. Individual Certificates of Use and Occupancy for each tenant space (or group of such spaces) should be issued under Section 119.4, Temporary occupancy. No certificate can be issued until, "...such portion or portions may be occupied safely prior to full completion of the building or structure without endangering life or public welfare, and provided that the agencies having jurisdiction for permits issued under other applicable codes are notified of the decision to issue a temporary certificate."
4. The "Contents of certificate" (Section 119.5) should clearly indicate, "...the occupancy load in the building and all parts thereof...", in this case the limited occupancy for the completed portion of the structure, and include the special stipulation that all other parts of the structure are to be considered "Under Construction" and no use or occupancy of any kind is allowed in these areas. This prohibition includes the use of unfinished areas for "storage" by the tenants. If a "storage" area is desired it must be the subject of an additional Alteration Permit, and the building official's determination of its Use Group.
5. Upon completion of the project, a record set of "as built" plans should be submitted with the application (request) for a final Certificate of Use and Occupancy for the entire building. This certificate should be issued only after appropriate testing (re-testing) of building-wide systems (mechanical, detection, alarm, suppression, etc.) has satisfied the building official that these systems are fully functional.

WELCOME, FRED BARTON

The Division of Inspection, Engineering Section, welcomes Mr. Fred Barton as its new Supervising District Engineer. Mr. Barton brings to the Division twenty years experience in international inspection including both "operational" and "manufacturing/shop" inspections. For the last ten years Mr. Barton has been active in the American Society of Mechanical Engineers (ASME) in their Boiler and Pressure Vessel Code researches. Fred is currently Vice Chairman of the Section Four (heating boilers) Subcommittee of ASME.

A native of Quincy, Fred is happy to return to his home state. Fred looks forward to working with the Inspectors of the Engineering Section and having the opportunity to contribute his expertise to the efforts of the Division as a whole.

CODEWORD

This issue's "CODEWORD", while not a technical code term, contains some of the most important information in the Code: the "CODEWORD" is the term NOTES, as it is used in the phrases, "Notes applicable to Table 214," and, "Notes applicable to Table 305."

These Tables, which are the "cornerstones" of the Code and the starting points of any plan review, present a great many Code requirements in a concise and convenient fashion. As the Notes expand, explain, provide exceptions and, sometimes, qualify the information presented in the Tables, they are vital to the correct use of the Tables. The Notes will often direct the person who conscientiously reads them to other applicable sections of the Code, and save that conscientious person a "hunt" through the Code in search of the controlling section.

Ignoring Note "j" to row "6" of Table 214 would lead the building official to require a one hour fire resistance rating in all exitway access corridors regardless of occupancy load. By taking the few seconds required to check the Note and read the referenced section of the Code, the careful building official would be directed to an important exception to the Table:

Note j. Exitway access corridors serving thirty (30) or less occupants may have a zero (0) fire resistance rating (see Section 610.4).

Section 610.4 Enclosures: All corridors serving as exitway access shall be enclosed in fire separation walls having a fire resistance rating of at least one (1) hour when serving an occupancy load greater than thirty (30).

The few seconds spent in reading the Note and the confirming section of the Code could save embarrassment and preserve credibility. For example, the careful and conscientious building official who takes the time to read the Notes will know that "N.P." (see Note at top of Table 305) does not stand for "No Problem".

BBRS FEE INCREASES

The Commonwealth recently increased some of its fees, but the Construction Supervisor's Licence fee WAS NOT raised to \$400.00 as "rumor" had it. Listed below are the current fees associated with this licensing program. These fees became effective February 3, 1989:

	<u>Current Fee</u>	<u>Old Fee</u>
Initial License	\$150./3 years	\$150./5 years
Renewal of License	\$100./2 years	\$ 60./2 years
Duplicate License	\$ 25.	\$ 10.
Masonry Only Examination	\$ 25.	\$ 10.

As you can see, the annual increase is \$20., but the initial license is now a three-year license rather than a five year one. Essentially, the fees are now at the level supported by the industry back in 1980 when the program was initiated.

One other fee increase of which you should be aware is the fee for filing an appeal with the State Building Code Appeals Board. The fee, effective February 3, 1989 is \$150. per filing (instead of \$100.).

DO WE NEED MORE BUILDING SAFETY LAWS?

Put yourself in the lawmaker's shoes. A vote comes up in the Legislature on a new bill to add a requirement to provide "safety in building construction". The bill comes with a favorable recommendation from committee, and is one of thousands of bills which you must act upon during the legislative session. Some group with legitimate concern for the public safety is actively lobbying for the bill's passage. On the surface, it would seem that this type of legislation harms no one. Why not vote it in?

There are, in fact, several reasons why such bills are often harmful. They may:

- Unnecessarily increase construction costs without corresponding benefit
- Result in non-uniform practices in neighboring communities through "home rule" or "local option" provisions
- Establish standards of practice in the law which eventually become obsolete, difficult to change, or even dangerous
- Provide unwarranted preferential treatment for a product or class of products
- Delay or prevent the acceptance of new technologies which can provide greater safety or promote affordable housing through decreased costs

How can legislators provide for safe construction yet avoid the types of harmful consequences described above? The answer is that they already have! The Board of Building Regulations and Standards was empowered by the General Court (Massachusetts General Laws, Chapter 143, Section 95) with broad regulatory powers to promote uniform, technically sound, modern construction rules, to adopt cost saving new methods which maintain or improve building safety, and to eliminate regulations which are obsolete, restrictive, conflicting, unnecessary, or technically biased.

At the Board's first public hearing in November, 1985, Mr. Dan McGee of the American Iron and Steel Institute made a suggestion that we think had merit then and still does. Here's what Dan said:

"I'd like to make a suggestion, and I personally think the legislature would listen to you. The legislators have every right to introduce special laws, whether it be requiring special smoke detectors, sprinklers or whatever. But, I think if you spoke with them, they would be more than willing to perhaps adopt a resolution instead outlining what shortcoming they feel has to be corrected, and give you perhaps 180 days to adopt it in some form and include it in the building code so that they don't have to keep adopting special laws to correct things that the legislature sees as a problem, perhaps before you people do."

We think Dan's idea is right on the mark. It wouldn't prevent the lawmakers from exercising their ultimate authority to deal with a situation when they feel the Board's actions are somehow not appropriate. But it would eliminate some harmful legislation, and just as importantly it might help to give our representatives a little relief from a busy agenda and keep some of the special interest groups and lobbyists at bay.

The Board of Building Regulations and Standards holds semi-annual public hearings in May and November. Anyone seeking consideration of a code change proposal need only file a proposal with the Board on forms provided by the Board. Chapter 143, Section 97 requires that proposed changes be submitted at least sixty (60) days before the public hearing, and any action to adopt the proposal must occur within ninety (90) days of the public hearing. The process is open and fair, with complete opportunity to all to express their points of view, and prompt action required by law. We urge lawmakers and those who would promote new building safety laws to try the regulatory approach first.

BACKFILLING OF FOUNDATION WALLS

The "Spring" (better known to building officials as the "Foundation Season") will soon be upon us and with it comes the need for caution and proper procedures in the backfilling of foundation walls. Table 2102-1 lists the maximum height of unbalanced fill permitted for unreinforced masonry and concrete foundation walls. This Table is based on the assumption that the wall will carry the lateral soil pressure in bending in the vertical direction; generally the shortest and strongest span. In order for this assumption to be valid, the wall must be supported at the top and bottom prior to placement of the backfill.

The top of the wall should be supported by temporary bracing, or the first floor framing should be in place prior to backfilling to provide lateral support at the top of the wall. Lateral support at the bottom may be provided by keying the wall to the footing, dowels connecting the footing and the wall, the placement of the basement slab or temporary bracing. Lack of such bracing is often the cause of dangerous foundation wall failure. It is, therefore, critically important that during the "Foundation Season" the building official emphasize to foundation contractors the importance of adequate bracing prior to backfilling.

CONSTRUCTION SUPERVISOR'S LICENSES REVOCATIONS AND SUSPENSIONS

On February 8, 1989 the Board of Examiners of the State Board of Building Regulations and Standards convened to hear testimony and to vote on the recommendations of the Board of Survey in four cases. The results follow:

Construction Supervisor's License #025062, Mr. Kenneth Gosselin
License revoked (February 8, 1989) pending re-examination.

Construction Supervisor's License #043830, Mr. Richard Hadge
License suspended for ninety (90) days to commence March 8, 1989.

Construction Supervisor's License not to be issued to:
Mr. Elbert Lynde who may reapply for examination with sufficient
proof of experience.

Construction Supervisor's License #045264, Mr. Frelston Mewborn
License suspended for one (1) year to commence February 8, 1989.

BBS PRODUCT APPROVALS

Acting on the recommendations of the Construction Materials Safety Board, the BBS at its meeting of February 28th approved the following products for use in Massachusetts:

The assemblies of equipment identified as Circle Combustion Corporation Direct Exhaust Oil and Gas Fired Boilers/Furnaces: Boiler Models CC2A-4,5,6,7,8,9,10 and 11; Furnace Models CCHB90 and 125 and CCLB-90 and 125, as specified in the application materials.

The assemblies of equipment identified as Field Controls Power Venters for through the side wall venting of gas and oil fired heating and domestic water heating appliances; Models PVE-1,PVE-2,PVE-3,PVAE-1,PVAE-2 and PVAE-3 as specified in the application materials. Required in the "power venter" assemblies approved are the safety controls identified in The Field Controls Co., Power Venter System Manual, P/N 46115300 Rev. A.

The approval of both products require installation subject to conformance with all other applicable State and Federal regulations as well as conformance to the requirements of the manufacturer.