BUILDING SOLUTION FOR EARTHQUAKE PRONE REGIONS

UNIVERSITY OF TECHNOLOGY SYDNEY CONFIRMS THAT DINCEL WALL IS ADEQUATE FOR UP TO MAGNITUDE 9 EARTHQUAKE

(Download Report) University of Technology Sydney – Testing and Analyses of Dincel Wall System subjected to severe earthquake loads.

(Download Video) Dincel Earthquake Testing.

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IT IS A RARITY TO EXPERIENCE MAGNITUDE 9 AND OVER EARTHQUAKES. HOWEVER, SCIENTIFIC EVIDENCE CANNOT RULE OUT THAT ANY SUBDUCTION ZONE MAY PRODUCE EARTHQUAKES OF MAGNITUDE 9 AND OVER.

THE BIGGEST RECORDED EARTHQUAKE MAGNITUDE 9.5 ON THE RICHTER SCALE OCCURRED IN 1960 IN CHILE.

THE DINCEL-WALL SYSTEM HAS BEEN TESTED AND CONFIRMED BY THE UNIVERSITY OF TECHNOLOGY SYDNEY TO BE ADEQUATE FOR EARTHQUAKES OF UP TO MAGNITUDE 9.

Turkey Earthquake Magnitude 7.6

Courtesy ofto http://www.eas.slu.edu/Earthquake_Center/TURKEY/

Dincel is a Solution for Earthquakes up to Magnitude 9

At the request of Dincel Construction System Pty Ltd, the specialist consultants at accessUTS were engaged to test and analyse the adequacy of Dincel-Wall for use in seismic regions. The testing and analysis program was designed and completed over a period of 20 months.

The 1940 El-Centro California and 1995 Kobe Japan earthquakes are two of the recorded most destructive earthquakes. The tests incorporated conventional concrete and Dincel samples to be compared against the abovementioned earthquake conditions.

The testing program comprised of shake table and push over testings of full scale samples. Additional testing included flexural beam testings as well as out of plane deformation level testing on the shake table.

The result of the test demonstrated that conventional concrete sample displayed a maximum of top displacement of 70mm (deformation level of 2.1%) before being declared as unsafe while a similar specimen made up of Dincel system was able to demonstrate a maximum top displacement of 145mm (deformation level of 4.4%) before being declared as unsafe.

A ratio of more than 2 to 1 in accommodating large displacement is a testimony to Dincel Walls' superiority as an effective aseismic system. This performance level will be particularly important to strengthen existing buildings and building structures which require post disaster functioning. An obvious advantage of the Dincel Wall system is the provision of sound confinement to the concrete by the outer polymer skin. Such a system will prevent the deterioration of stiffness and possible collapse by not allowing the concrete to spall even beyond the 4.4% displacement level which well exceeds the total failure of conventional building structures. This performance is not achievable with conventional materials when displacement levels exceed 2.5%.

The conventional concrete structures are considered to be in the collapse range when displacement level exceeds 2.5% (refer FEMA 273/274, 1997 – Performance Levels).

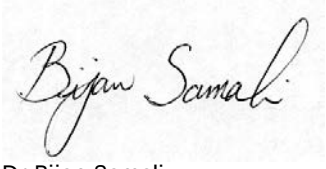
The testing programs have clearly demonstrated the following:

1. **The lateral stiffness of Dincel Wall system is the equivalent of a comparable conventional plain concrete wall.**

2. **When an adequate length of reinforced Dincel Wall is used as an earthquake resisting shear wall in a building structure, the reinforced Dincel Wall is capable of addressing the structural safety required to protect human life in damaging earthquakes with up to MAGNITUDE 9 on the Richter Scale.**

3. **When buildings incorporate Dincel shear walls of Item 1 above, the remaining load bearing building walls can be constructed out of unreinforced Dincel system without concern of wall collapse for earthquakes up to magnitude 9 on the Richter Scale.**

The undersigned have no reservation in recommending the Dincel Construction System to the global community on the basis of its proven performance under most hostile earthquake loading environments.



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INTRODUCTION

From a simplistic standpoint, an earthquake places a sideways load on a building. Where this load exceeds a certain level it causes the building fixtures, walls and finally the structure to collapse. The most important earthquake engineering design principle is to design structures to resist sideways forces where the building's occupants will have enough time to vacate the building to safety. This is most effectively done by tying walls, floors and foundations into a rigid box.

The worst, but still the most commonly used earthquake affected building system incorporates concrete column-slab and masonry infill walls. The presence of masonry infill walls in between the concrete columns is recognised to be the most important reason for exacerbated building damage resulting in walls falling like a pack of cards. **The falling building walls are the most important cause for loss of lives during earthquakes. Structures consisting of load bearing concrete walls are recognised as the best earthquake resisting system rather than adopting the column-slab system irrespective of the type of infill walls** (Refer Figure 1). This is true for buildings having regular designs without soft storeys. **(Download – The Roles of Masonry Infill Walls In An Earthquake).**

The load bearing concrete walls are not commonly used because of their construction cost associated with formworks installation, removal, handling, storage and construction time.

There is a clear need for ductile, non-brittle, cost and time effective load bearing walls which will not crumble and collapse even after the wall has been significantly cracked during a strong earthquake motion.

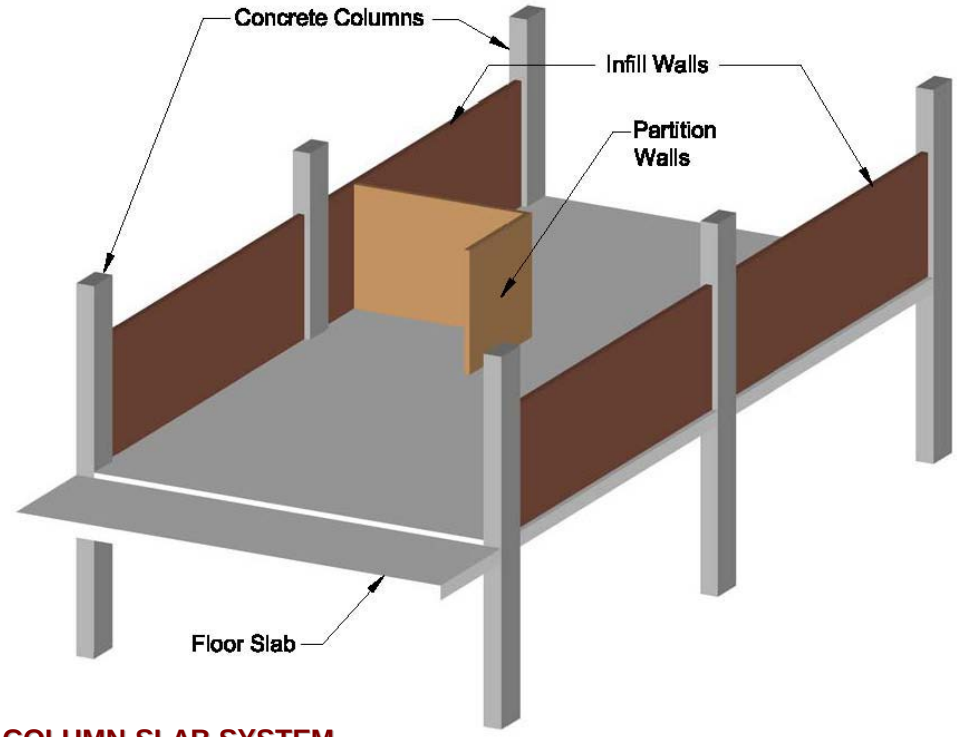
Dincel Wall eliminates the cost and construction time that is usually associated with conventional concrete walls. It consists of permanent waterproof, **(Download – Waterproof Walls)** and resilient polymer formwork with superior fire safety **(Download – Dincel Wall Fire Assessment)**. When filled with concrete, the resilient polymer form and concrete infill works compositely. **The end result is a ductile and non-brittle polymer-concrete composite which will not crumble and collapse even if the concrete within the Dincel Wall is fully cracked under an extreme earthquake event as confirmed by the tests conducted by the University of Technology Sydney. This is the behaviour that is required to save lives and prevent the collapse of buildings.**

The University of Technology Sydney was engaged to test and certify this superior behaviour of Dincel Construction System.

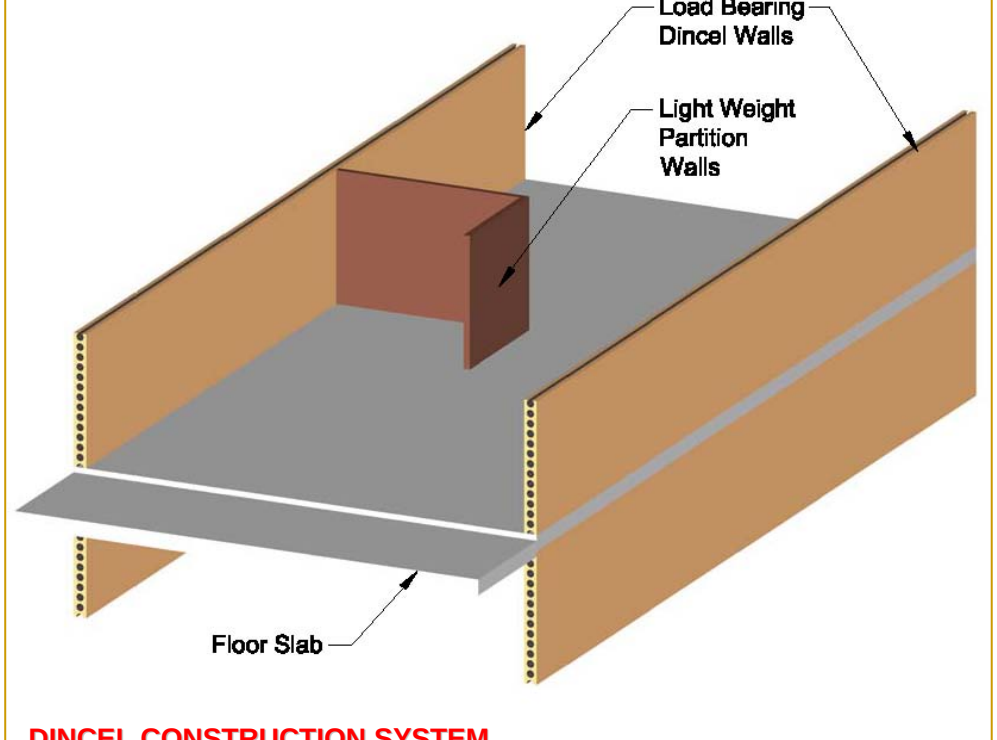
The following are related documents.

- ☐ **University of Technology Sydney – Testing and Analyses of Dincel Wall System subjected to severe earthquake loads. (Download)**
- ☐ Earthquake Hazard Risk Prevention for Developers and Building Professionals. **(Download)**
    - ☐ Australian Earthquake Design and Brick Walls. **(Download)**
    - ☐ The Roles of Masonry Infill Walls in an Earthquake. **(Download)**
    - ☐ Common Engineering Questions **(Download)**

LOAD BEARING DINCEL-WALLS PROVIDE THE MOST EFFECTIVE EARTHQUAKE SOLUTION



COLUMN-SLAB SYSTEM



DINCEL CONSTRUCTION SYSTEM

FLOOR SLABS CARRIED BY LOAD BEARING DINCEL-WALLS

WILL ALWAYS RESULT IN THE MOST COST EFFECTIVE AND SAFEST SOLUTION

Refer Dincel website: "COSTING ANALYSIS"