

**EUROPEAN AND MEDITERRANEAN MAJOR HAZARDS AGREEMENT (EUR-OPA)
CONFERENCE ON INCLUDING PEOPLE WITH DISABILITIES IN DISASTER
PREPAREDNESS AND RESPONSE
BRUSSELS, 4-5 DECEMBER, 2014**

DESIGN FOR ALL: EARTHQUAKE PREPAREDNESS INCLUDING PEOPLE WITH DISABILITIES

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DESIGN FOR ALL

- **DESIGN FOR ALL IMPLIES DESIGN FOR HUMAN DIVERSITY AND SOCIAL INCLUSION**
- **INVOLVES THE CONCEPTS OF ACCESSIBILITY, UNIVERSAL DESIGN AND INCLUSIVE DESIGN**
- **AT THE PRESENT MOMENT, MOST DESIGNERS, ENGINEERS AND ARCHITECTS IGNORE THE CONCEPT**
- **PEOPLE WITH DISABILITIES MUST BE INCLUDED IN THE DESIGN PROCESS FROM THE POINT OF INITIAL CONCEPTION ONWARDS**

DESIGN FOR ALL – CASE STUDY

Richard Attenborough Centre for Disability and the Arts, University of Leicester , UK



- You can touch, sniff or hear your way around:
- ✓ Gentle changes in surfaces and materials
- ✓ Varied wall surfaces
- ✓ Perfumed wall fittings in corridors
- ✓ Excellent acoustics

In addition:

- Exceptional lighting
- Connecting doors are enfilade
- No dead ends

(<http://www.independent.co.uk/arts-entertainment/art/news/let-there-be-light-1284760.html>)

DESIGN FOR ALL – CASE STUDY

The House of Organizations of Persons with Disabilities, Taastrup, Denmark

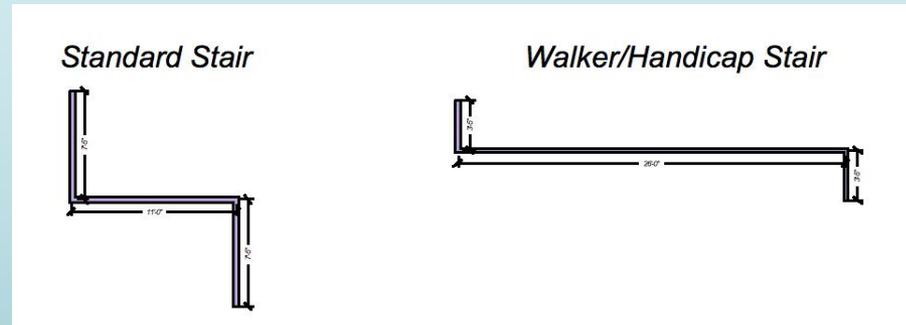


- Architects trained in accessibility before submitting tender
- Solutions integrated into the design in every aspect right from the beginning
- Central core, short travelling distances
- Every level the same
- Colour coded levels
- Drive through lifts
- No dead ends or turning

(<http://www.handicaporganisationernes.dk/in-english/architecture>)

DESIGN FOR ALL – DESIGN EXAMPLES

REDESIGN STAIRS



- ASSISTANCE FOR THOSE USING WALKING STICKS, CRUTCHES AND WALKING FRAMES

(<http://handicaphomemods.blogspot.gr/2013/02/ada-walker-handicap-stairs-instead-of.html>)

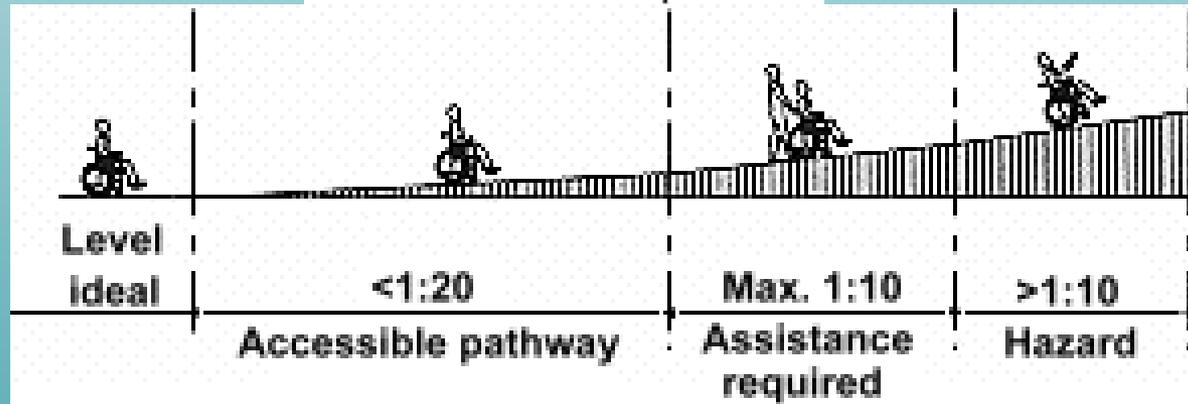
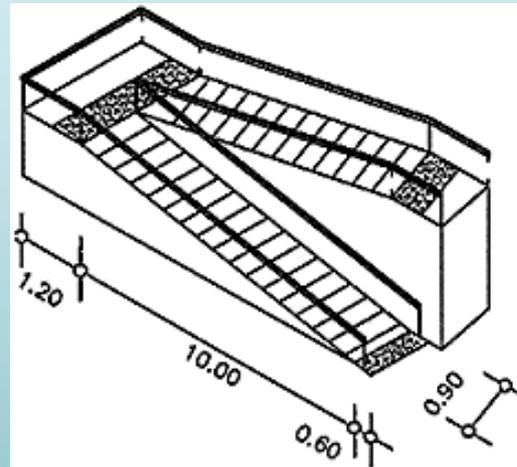


- ADAPTION OF ABOVE TO INCLUDE WHEELCHAIRS

(<http://www.yankodesign.com/2013/05/09/convertible-ramp/>)

DESIGN FOR ALL – DESIGN EXAMPLES

DESIGN OF RAMPS

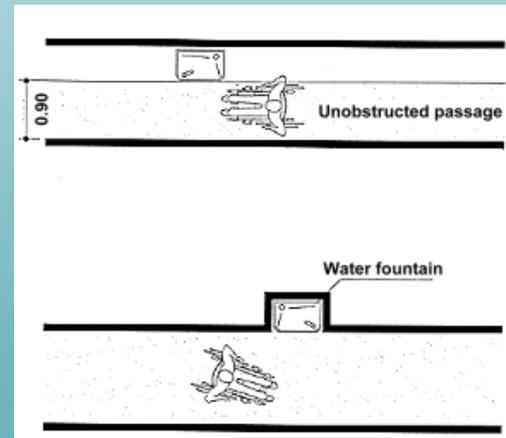
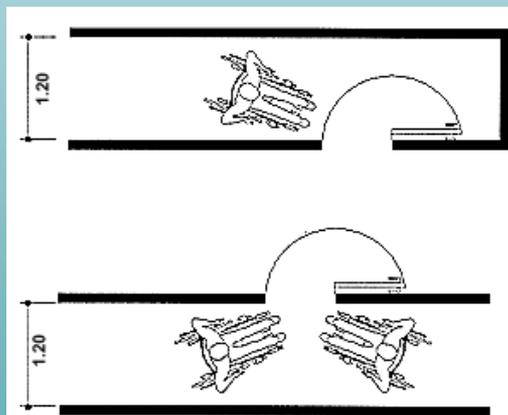
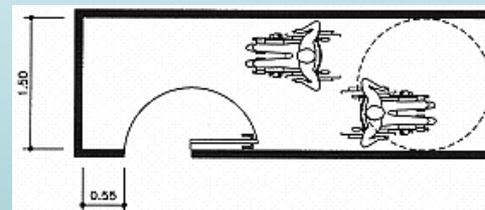
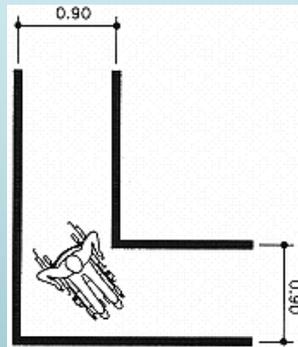


- **DESIGN CONSIDERATIONS, SPECIFICATIONS, GUIDANCE AND RECOMMENDATIONS**

(<http://www.un.org/esa/socdev/enable/designm/index.html>)

DESIGN FOR ALL – DESIGN EXAMPLES

DESIGN OF PUBLIC CORRIDORS



- **TURNING CIRCLES, DESIGN FOR DOORS, UNOBSTRUCTED PASSAGEWAYS**

(<http://www.un.org/esa/socdev/enable/designm/index.html>)

EARTHQUAKES

AFTER A DESTRUCTIVE EARTHQUAKE:

- RISK OF BUILDING COLLAPSE, RISK OF AFTERSHOCKS, POSSIBLE FIRE OR IT MAY HAVE BEEN A FORESHOCK
- EVACUATE THE BUILDING IN A QUICK BUT ORDERLY FASHION
- USE THE STAIRS
- DO NOT USE THE LIFT
- EVACUATION OF PEOPLE WITH DISABILITIES?

EARTHQUAKES

AFTER A DESTRUCTIVE EARTHQUAKE:

- A WHOLE REGION IS AFFECTED**
- EMERGENCY SERVICES WILL BE SEVERELY STRETCHED**
- THERE WILL BE MANY OTHER HIGHER PRIORITY LIFE THREATENING SITUATIONS**
- IT MAY BE SEVERAL DAYS BEFORE A NORMAL LEVEL OF EMERGENCY SERVICES CAN BE PROVIDED**

EARTHQUAKES

AFTER A DESTRUCTIVE EARTHQUAKE:

THE WHOLE POPULATION

- CANNOT EXPECT ANY IMMEDIATE SPECIAL ASSISTANCE WITH EVACUATION**
- THE WHOLE POPULATION MUST BE RESPONSIBLE FOR THEIR OWN EMERGENCY PLANNING AND EVACUATION**

THEREFORE, MEASURES PERFORMED TO ASSIST PEOPLE WITH DISABILITIES MUST BE BASED ON EDUCATING THOSE AFFECTED TO BE SELF-RELIANT

EARTHQUAKES

PEOPLE WITH DISABILITIES

- **1982 COALINGA CALIFORNIA EARTHQUAKE, 38% OF INJURED PEOPLE CONTACTED AFTER THE EARTHQUAKE WERE DISABLED (ARONI AND DURKIN, 1985)**
- **2011 GREAT EAST JAPAN EARTHQUAKE, MORTALITY RATE FOR REGISTERED PEOPLE WITH DISABILITIES DOUBLE THAT OF THE GENERAL POPULATION (KIYOSHI HARADA, JAPAN DISABILITY FORUM, 2013)**
- **THOSE WITH VISUAL OR MOBILITY LIMITATIONS EXPERIENCE THE MOST DIFFICULTIES (TIERNEY ET AL., 1988)**

EARTHQUAKES

PREPAREDNESS MEASURES

DESIGN OF A SURVIVAL SPACE



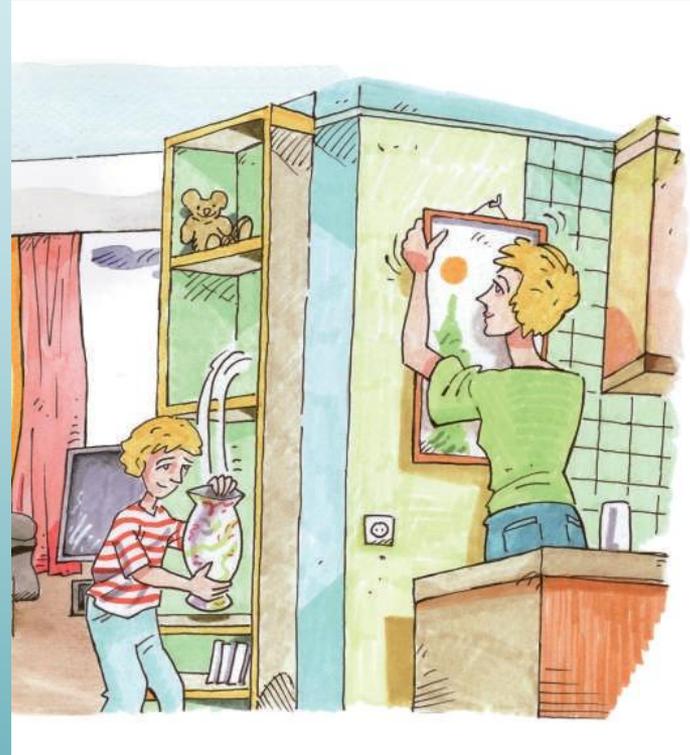
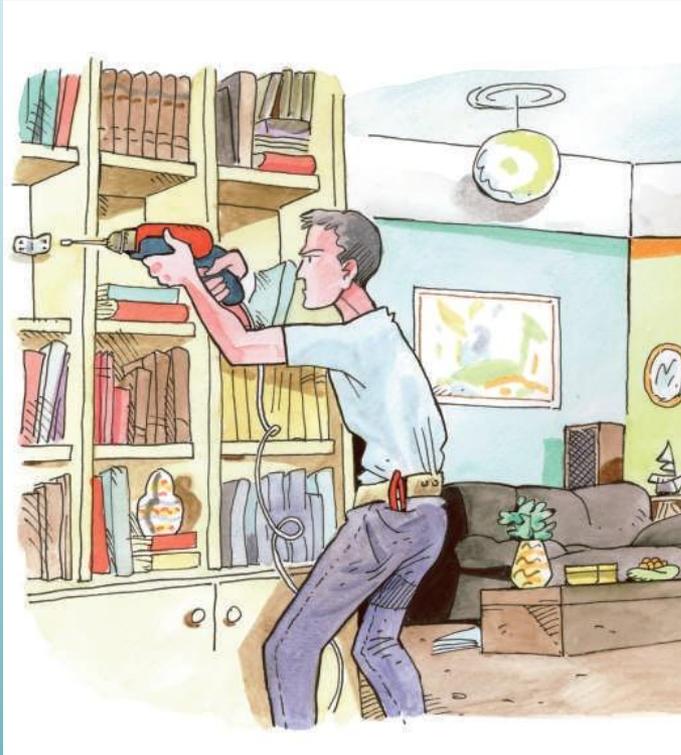
- **ABOUT ONE-THIRD CHANCE RESTING IN BED DURING EARTHQUAKE**
- **SURVIVAL REGARDLESS OF OUTSIDE DESTRUCTION**
- **EARTHQUAKE RESISTANT BED**

(http://www.lifeguardstructures.com/order/index.php?dispatch=products.view&product_id=48)

EARTHQUAKES

PREPAREDNESS MEASURES

SAFE FURNITURE



- BE AWARE OF SURROUNDINGS WHEREVER YOU ARE
- SECURE FIXING OF FURNITURES AND FITTINGS
- ASK TECHNICIANS AND ASSISTANCE FROM FAMILY/FRIENDS

(http://www.oasp.gr/sites/default/files/English_digital.pdf)

EARTHQUAKES

PREPAREDNESS MEASURES

EARTHQUAKE PROOF SHELTER AND RESCUE ROOM CONSTRUCTION



- STEEL OR STEEL SECTION CONSTRUCTION
- PROVISION OF SURVIVAL SPACE

(<http://www.city.hiratsuka.kanagawa.jp.e.di.hp.transer.com/kenshi/taishinsyeruta.htm>)

EARTHQUAKES EVACUATION PROCEDURES

EMERGENCY LIFTS

- INDEPENDENT, EQUITABLE AND DIGNIFIED EVACUATION IS REQUIRED FOR ALL**
- THE ONLY WAY TO EVACUATE PERSONS WITH DISABILITIES FROM MULTI-STOREY BUILDINGS INDEPENDENTLY AND WITH DIGNITY IS BY THE USE OF EMERGENCY LIFTS**

EARTHQUAKES

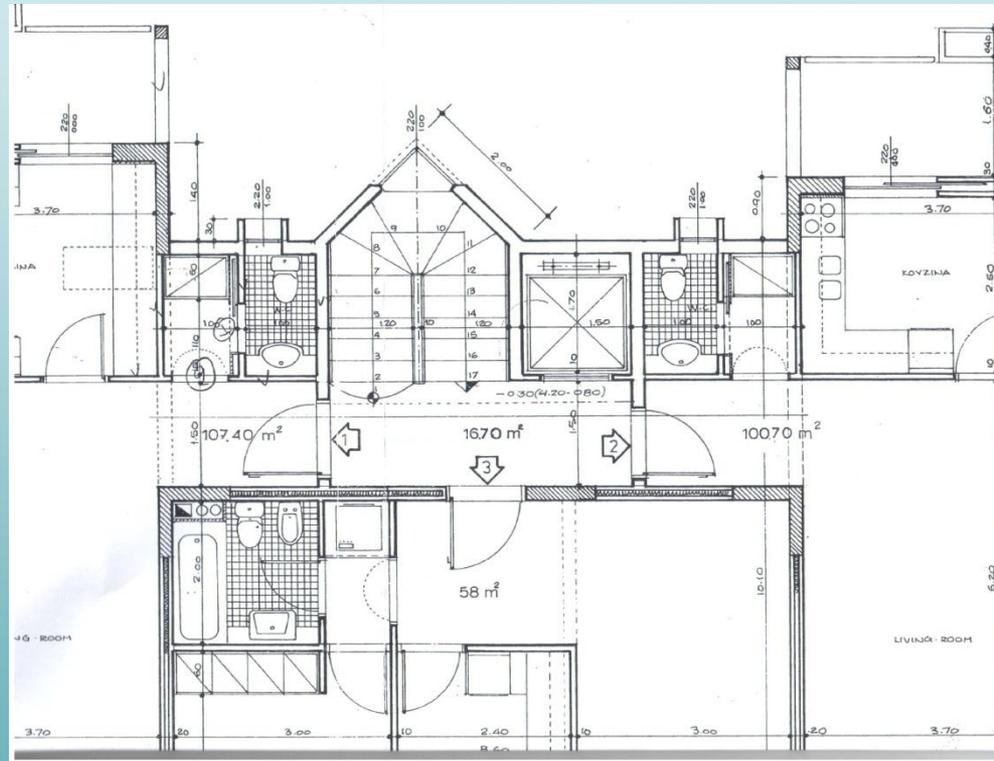
STRUCTURAL DESIGN FOR LIFE SAFETY

- **DESIGN FOR HIGHER SEISMIC ACTIONS**
- **ROBUSTNESS - REDUNDANCY**
 - **ALTERNATIVE LOAD-PATHS**
- **LIMITED DAMAGE ACCEPTABLE - FAILURE UNACCEPTABLE**
- **SEISMIC ISOLATION**

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

CASE STUDY – SIX LEVEL RESIDENTIAL BUILDING PATRAS



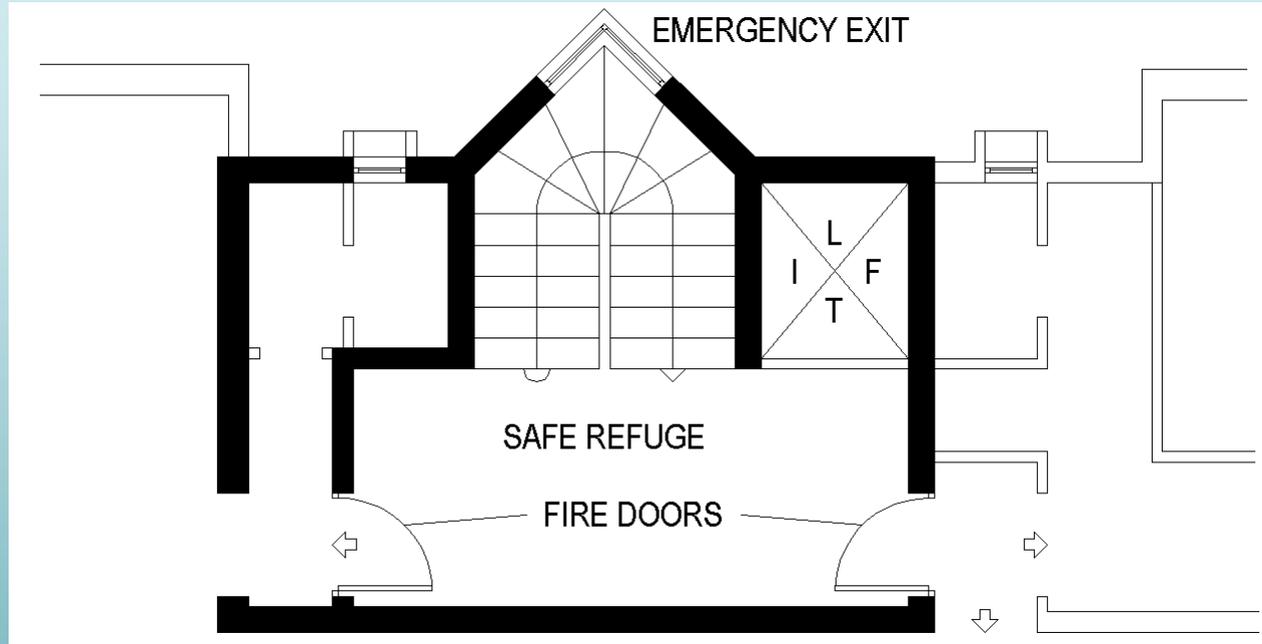
**PLAN OF
INITIAL
DESIGN**

(DESIGN OFFICE <http://www.koumoulos.com>, PATRAS, GREECE)

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

CASE STUDY – SIX LEVEL RESIDENTIAL BUILDING PATRAS



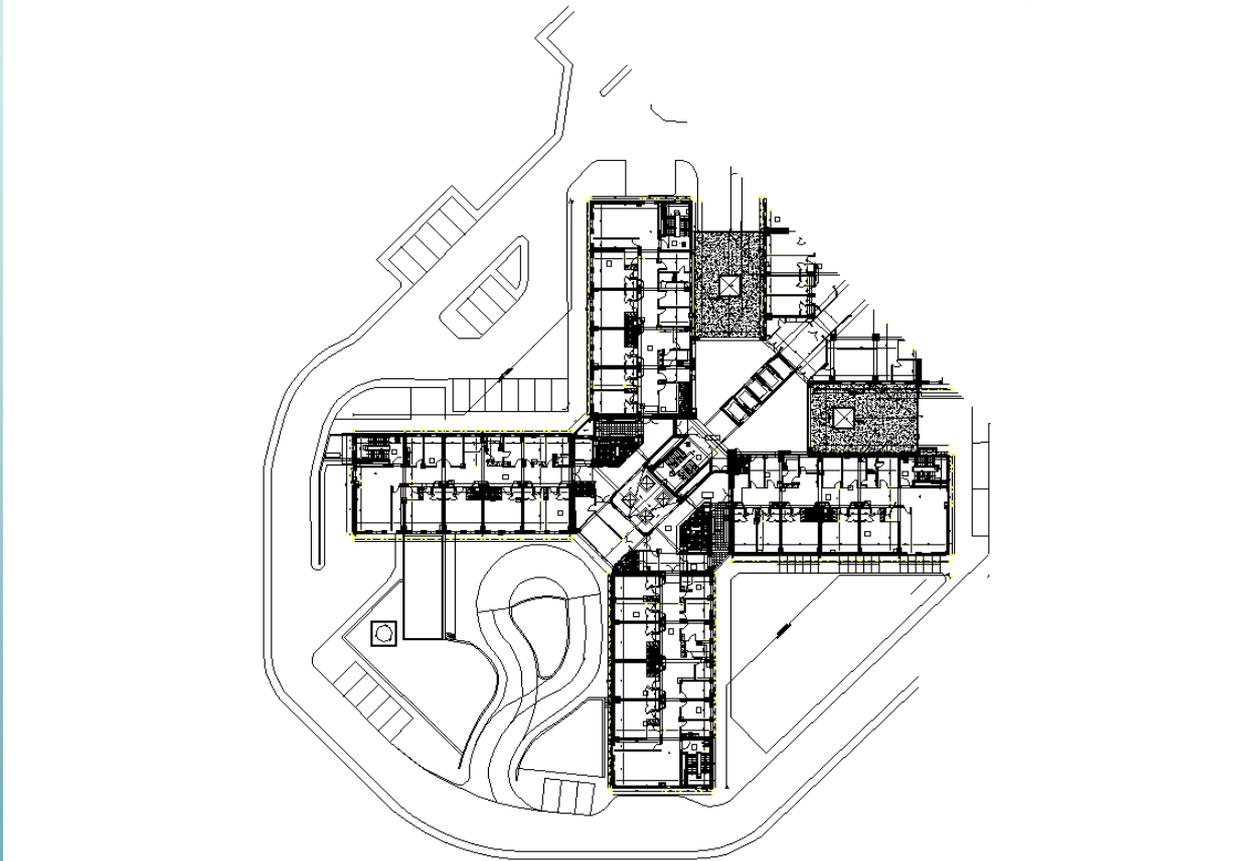
**PROPOSED
REHABILITATION**

- **INCREASED AREA FOR SAFE REFUGE**
- **EARTHQUAKE RESISTANT STRONG CENTRAL CORE,
.....OVER-DESIGN : 2-3 TIMES ABOVE CODE PROVISIONS**
- **FIRE DOORS, EMERGENCY LIFT AND EMERGENCY EXIT**

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

CASE STUDY – HOSPITAL KIFISIA, ATHENS



**NEW
DESIGN
FOR ALL
CONCEPT**

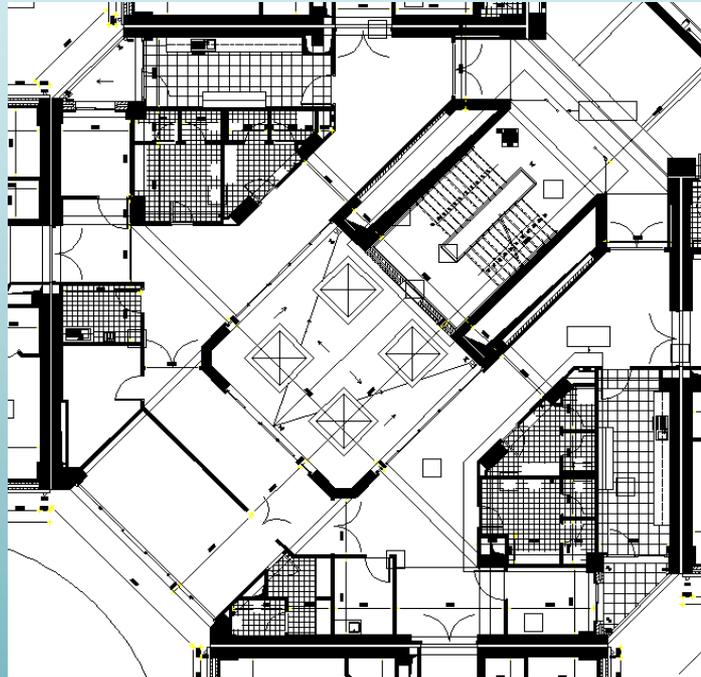
- **NO DEAD ENDS**
- **SHORT TRAVEL DISTANCES**

(DESIGN OFFICE <http://www.koumoulos.com>, PATRAS, GREECE)

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

CASE STUDY – HOSPITAL KIFISIA, ATHENS



**NEW
DESIGN
FOR ALL
CONCEPT**

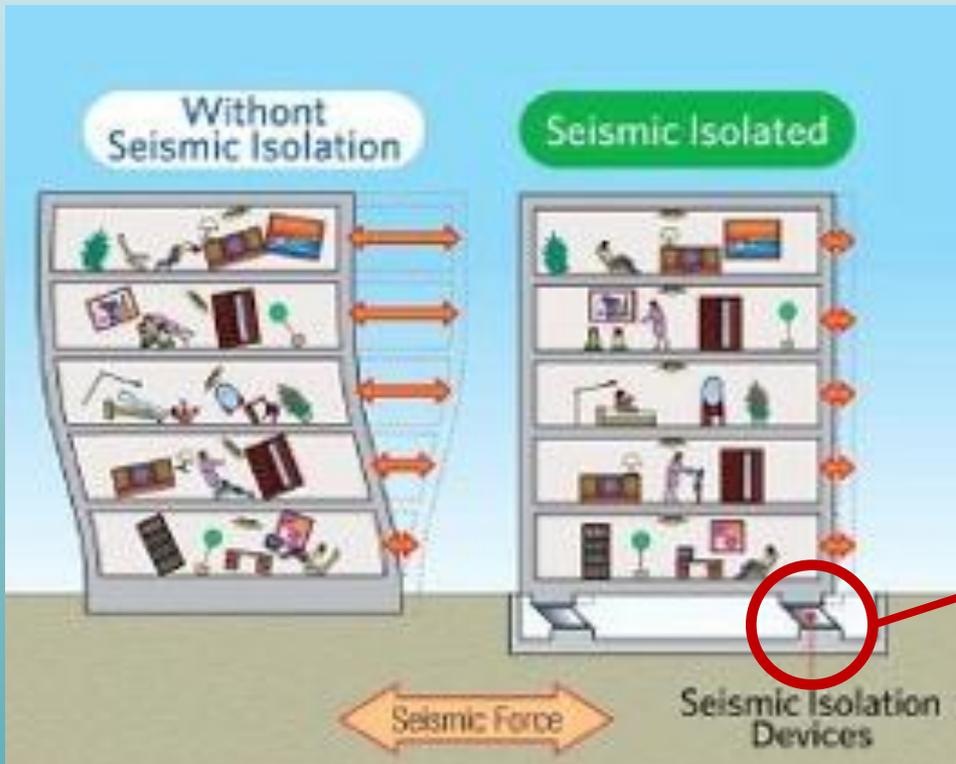
- **INDEPENDENT STRONG RESILIENT CENTRAL CORE**
- **SEISMIC GAP, SEPARATION OF BUILDINGS' STRUCTURES**
- **LARGE AREA FOR SAFE REFUGE**

“AGIOI ANARGYROI” GENERAL ONCOLOGY HOSPITAL KIFISIA
(DESIGN OFFICE <http://www.koumoulos.com>, PATRAS, GREECE)

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

THE SOLUTION: SEISMIC ISOLATION

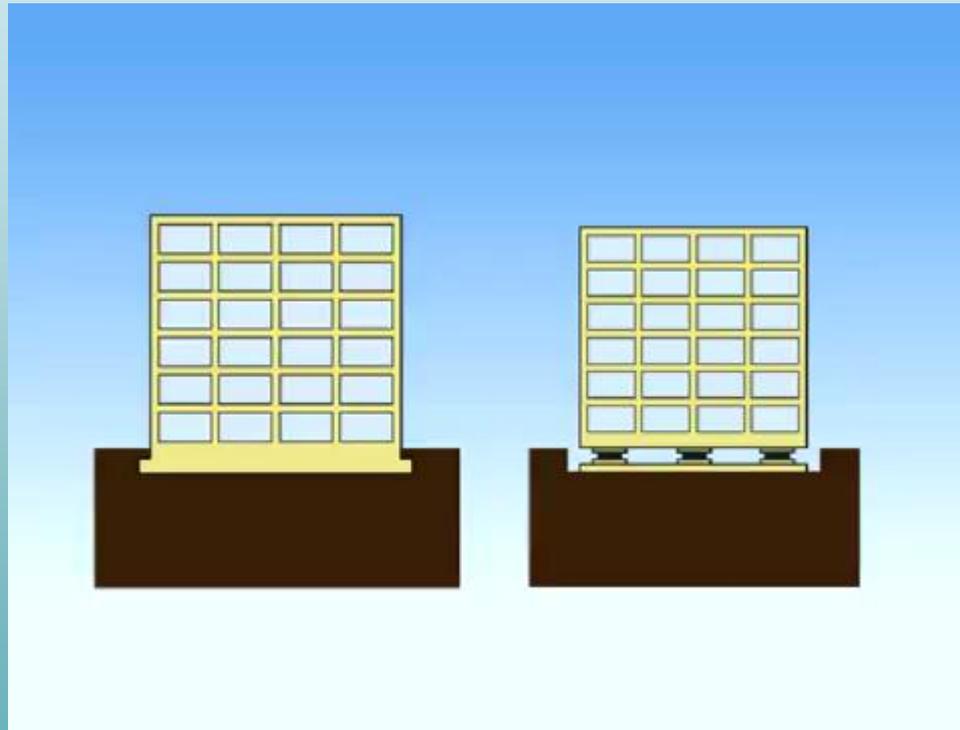


(<https://mathspig.wordpress.com/category/topics/differentiation/>)

EARTHQUAKES

STRUCTURAL DESIGN FOR ALL

SEISMIC ISOLATION ANIMATION VIDEO



(<http://www.youtube.com/watch?v=vtT9dN1g770>)

EARTHQUAKES DESIGN FOR ALL

- **GLOBAL APPROACH**
- **INCLUDES EVERYBODY REGARDLESS OF RESTRICTIONS**
 - **NOT ONLY PEOPLE WITH DISABILITIES** (NARROW DEFINITION)
 - **INCLUDES THE AGED AND CHILDREN**
 - **CROSSES LANGUAGE BARRIERS**
 - **MIGRANTS**
 - **REFUGEES**
 - **ASYLUM SEEKERS**

EARTHQUAKES DESIGN FOR ALL CONCLUSIONS

TWO MAIN APPROACHES:

1. CONVENTIONAL DESIGN

- INCREASE IN STIFFNESS TO MINIMISE DISPLACEMENT**
- OVERDESIGN OF SAFE REFUGE**
- PROVIDE FIRE DOORS, EMERGENCY EXIT DOORS,
EMERGENCY LIFTS, FIXED FURNITURE AND FITTINGS**

2. INNOVATIVE DESIGN

- SEISMIC ISOLATION:**

**PROVISION OF “SEISMIC BREAKER” (AS FUSE) INHIBITS
THE TRANSFER OF MOTION TO THE STRUCTURE**

**BOTH PREVENT DAMAGE TO STRUCTURAL
AND NON-STRUCTURAL ELEMENTS**

ANCIENT GREECE

PEOPLE WITH DISABILITIES

- ATTAINED HIGH SOCIAL POSITIONS OF RESPONSIBILITY (KINGS, POETS, ETC.)**
- WERE NOT CONSIDERED AS BEING DIS-ABLED**
- MADE MAJOR WELL RECOGNISED CONTRIBUTIONS TO SOCIETY**

**THEY WERE REPRESENTED BY A GOD
(HEPHAESTUS)**

ANCIENT GREEK OLYMPIAN GOD HEPHAESTUS



30 Hephaistos on a winged throne, Cup by the Ambrosios Painter, towards 510. Berlin, Pergamonmuseum F 2173.

Schefold, K., Gods and Heroes in Late Archaic Greek Art. English translation by A. Griffiths. (Cambridge, 1992))

- **POSSIBLE FIRST RECORDED EXAMPLE OF A WINGED WHEELCHAIR OR CHARIOT; INVENTOR? THE GOD EPHAESTUS!**
- **To compensate for his disability Hephaestus built two robots, one silver and one gold, to transport him (Homer, Iliad 750 BC).**

EARTHQUAKES

THE GREEK MYTH

The ancient Greeks represented the earthquake as the chief of the Giants named Egelados, who was attacking and punishing the people. The myth says that goddess Athena beat Egelados in a battle and imprisoned him in Mountain Etna, in Sicily. This is the reason why Etna erupts from time to time, as Egelados tries to escape. As Athena was the goddess of wisdom and knowledge, the myth's message is that people shouldn't be afraid.

**KNOWLEDGE AND WISDOM WILL WIN THE
BATTLE WITH THE EARTHQUAKE**



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<http://ecpfe.oasp.gr>

**Thank you
for your attention**