

MATRIX MARINE, LLC

The Official Newsletter of Matrix Marine, LLC



Non-Ductile Concrete Building

by Behruz Vahdani. Managing Member

Ductility in a building describes the extent to which a structure can undergo a large displacement or deformation without causing a failing or collapse. Therefore the Non-Ductile buildings and especially the concrete ones do not perform well during a major earthquake. This is due to the lack of reinforcement in such areas as the concrete walls, columns, beams and the floor systems.

The stiffness of the existing concrete is a key factor in limiting the displacement or deformation of the structure to prevent the partial or complete collapse of the building.

Meaning the more stiffness in the concrete the less displacement in the building. On the flip side of the coin, the more stiffness in the concrete resisting elements, the more brittle the concrete may become which may cause a sudden rupture during a major earthquake with small displacement.

**HERE'S WHAT YOU
SHOULD KNOW:**

- Non-Ductile
Concrete Building
- Innovative Design
Approach



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Innovative Design Approach

Matrix Marine, LLC can address all your concerns about different methods of design, inspections, certifications and cost effective construction by utilizing a new design approach to strengthen major structural elements (columns, beams, connection of concrete floor to concrete walls, repairing of foundation, strengthening the retaining walls and repair of balconies) by use of patented FRP by QuakeWrap at a fraction of the regular construction cost.

The above picture represent strengthening the underneath of concrete roof for higher live load capacity, using FRP from QuakeWrap company.

Matrix Marine, LLC & Matrix Seismic Group Corp. can evaluate the structural conditions of your Non-Ductile, UMB, Soft Story buildings in a timely manor .

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Prior to 1975 building codes and construction standards in the U.S. did not have explicit ductility requirements.

As a result most pre- 1975 buildings have a lack of seismic resistance and are considered non-ductile buildings.

Retrofitting non-ductile concrete buildings can be quite expensive and disruptive. Possible retrofitting techniques may include the use of additional concrete walls, shotcrete the existing concrete walls, steel braced frames and use of FRP to increase shear capacity of the existing elements.

Although there are ordinances in some individual cities such as Los Angeles, which currently are in place for the retrofit compliance of Non-Ductile concrete buildings and in the Master Planning of the City of San Francisco, owners have been given an extensive amount of time to comply (20 years or more in some cases).

Each time a building changes ownership the lending agencies require a Probability of Maximum Loss (PML) report which they expect to see the amount of PML to be less than 20%. In the case of a non-retrofitted Non-Ductile concrete building it is impossible to obtain a 20% or less PML. The owner/investor should either retrofit the building or buy earthquake insurance which is quite expensive and usually carries a high deductible.