

The ABCDE principle for BUILDING BACK SAFER SHELTER

A NCHORAGE

Each part of shelter and the entire structure as a whole **MUST** be anchored to some secure point that is capable of resisting any uplift, sinking or lateral movement thus ensuring stability. This is generally the foundations.

B RACING

Bracing refers to the cross members of a structural frame that ensures that frame of the structure cannot collapse, tilt, slide or crack. Diagonal wooden members, steel wires and walls can be used as bracing.

C ONTINUITY

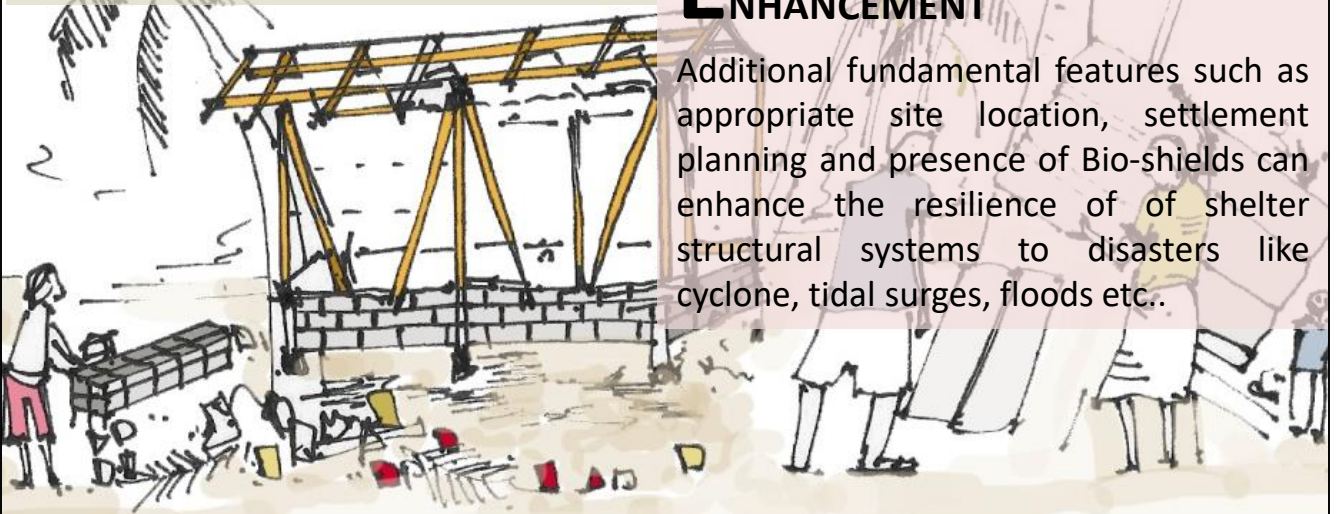
Every part of the structure **MUST** be properly connected in a **continuous** line from roof cladding to the foundations. If one takes the analogy that a building is a chain with a pull applied at one end, then if a single link is missing or of inadequate strength, the chain will break. Continuity **MUST** be ensured both vertically from roof to foundation and also horizontally tying all the walls at the plinth, lintel and roof levels.

D UCTILITY

The material of the structural frame or the load bearing members **MUST** be ductile to allow elasticity. Timber including coco-lumber, bamboo, steel, Reinforced Cement Concrete etc. are ductile. Unreinforced masonry and concrete is brittle. Ensuring ductility is a **MUST** for all natural disasters, particularly earthquake.

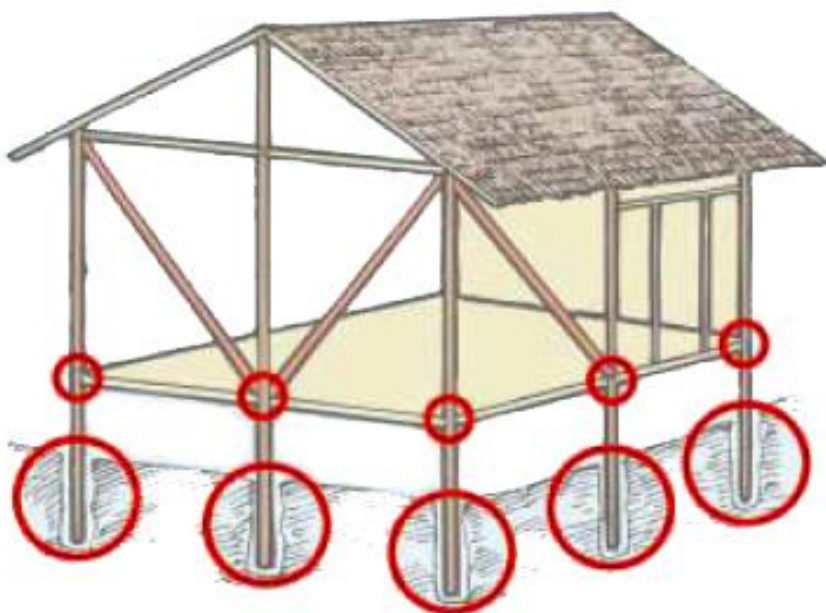
E NHANCEMENT

Additional fundamental features such as appropriate site location, settlement planning and presence of Bio-shields can enhance the resilience of shelter structural systems to disasters like cyclone, tidal surges, floods etc..



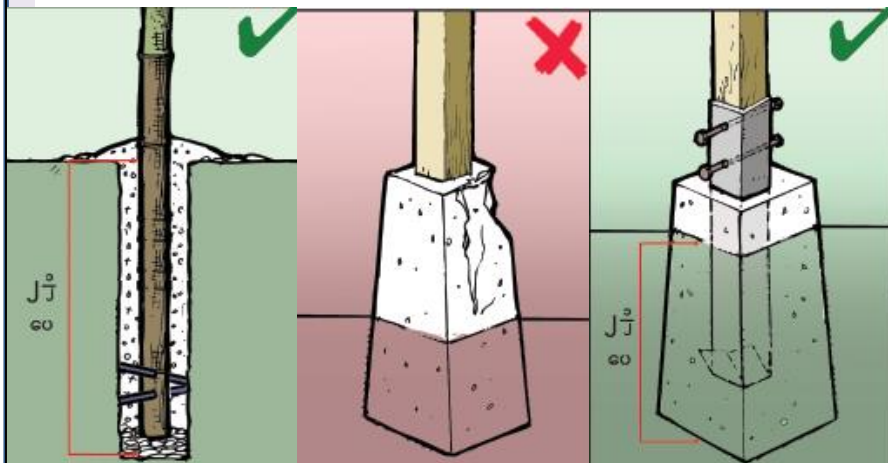
The ABCDE principle for BUILDING BACK SAFER SHELTER

Ensure anchorage by having STRONG Foundations



A nchorage

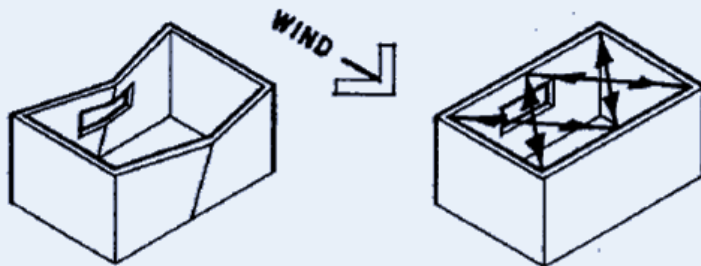
METAL STRAP
USED TO TIE POST
WITH CONCRETE
BASE



ENSURE THE
FOUNDATIONS ARE AT
LEAST 2 FOOT 6
INCH DEEP.

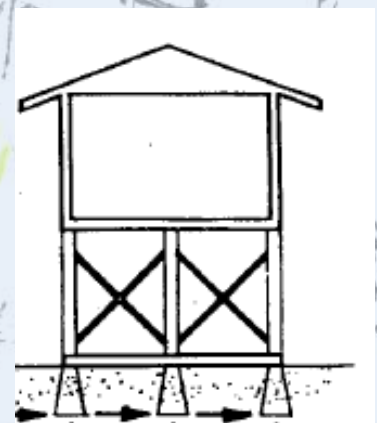
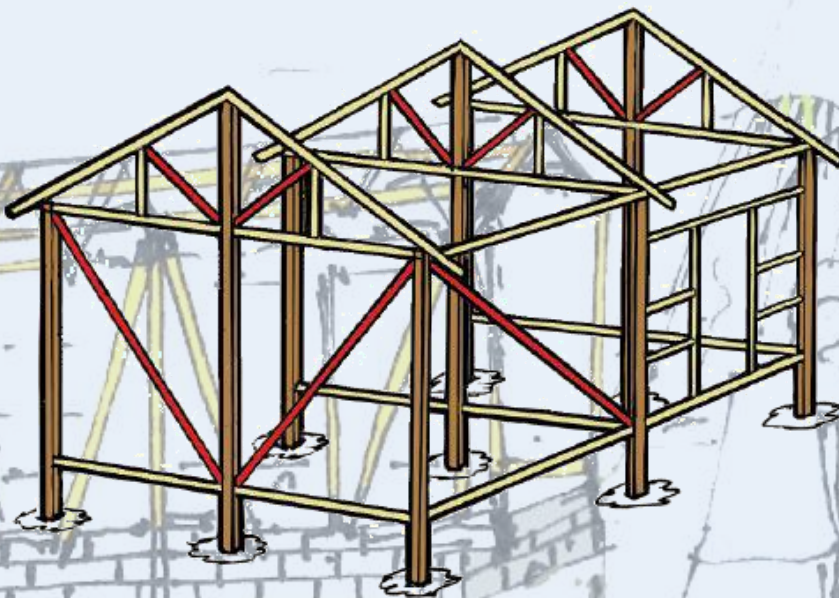
FOUNDATION

The ABCDE principle for BUILDING BACK SAFER SHELTER



B racing

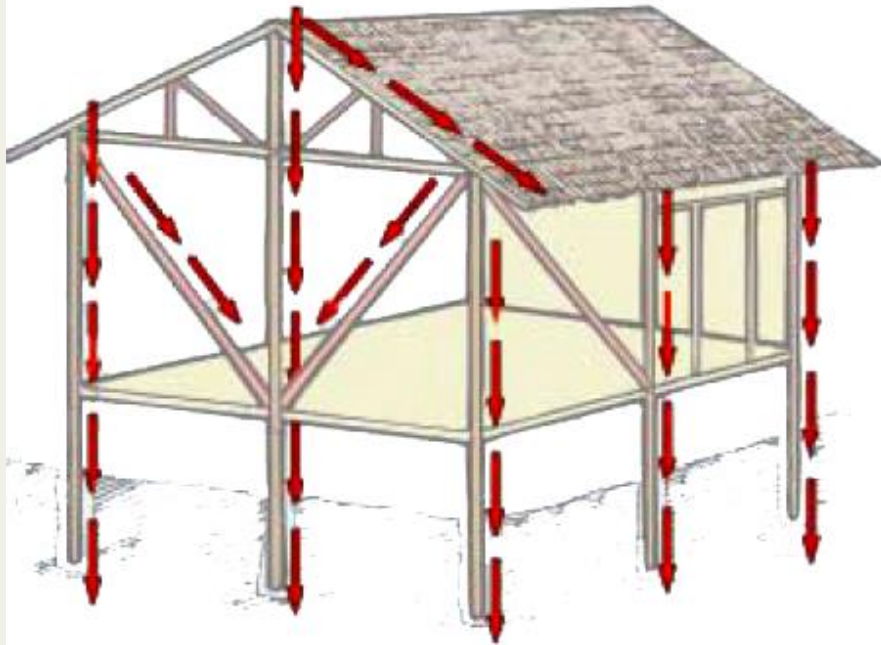
HORIZONTAL FORCES TRANSMITTED TO WALLS TEND TO BEND IT, BRACING TAKES THE LOAD AND PREVENT WALL FROM DISTORTING.



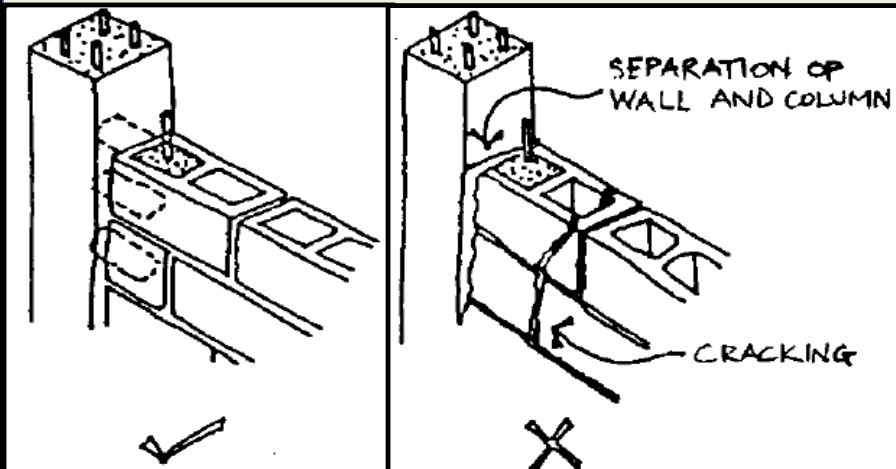
BRACING TYPES



The ABCDE principle for BUILDING BACK SAFER SHELTER



Connection- Block wall to Column



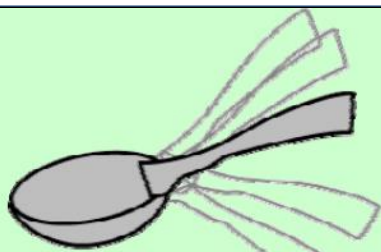
C

Continuity

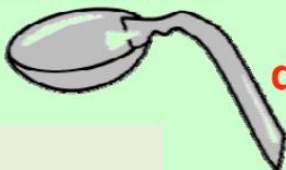
THE CONNECTION OF ROOF FRAMING TO THE VERTICAL LOAD RESISTING ELEMENTS I.E. WALL OR POST, BY PROVIDING PROPERLY DESIGNED ANCHOR BOLTS AND BASE PLATES IS EQUALLY IMPORTANT FOR OVERALL STABILITY OF THE ROOF.



The ABCDE principle for BUILDING BACK SAFER SHELTER



bent metal



ductile

broken plastic



brittle

Ductility

THE MATERIAL SHOULD BE DUCTILE TO ALLOW ELASTICITY. TIMBER INCLUDING COCO-LUMBER, STEEL, REINFORCED CEMENT CONCRETE ETC. ARE DUCTILE. BAMBOO IS KNOWN FOR ITS EXCELLENT DUCTILITY.

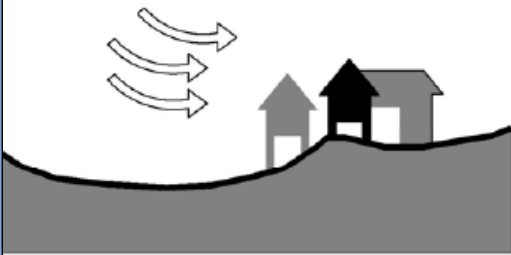


The ABCDE principle for BUILDING BACK SAFER SHELTER

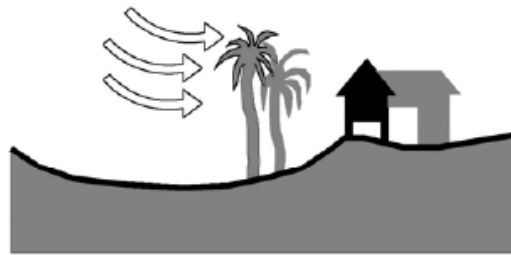


E

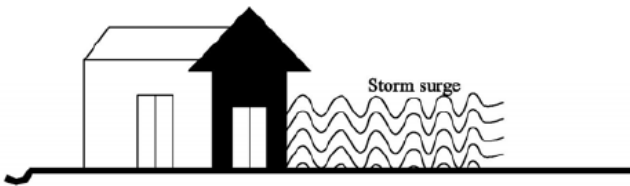
enhancement



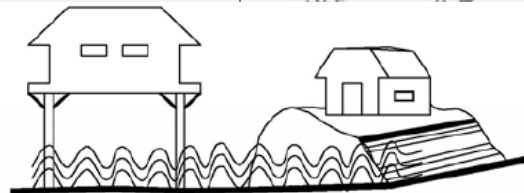
ROW OF TREES PLANTED UPWIND WILL ACT AS A SHIELD



SHIELDING OF HOUSE BY HILLOCK

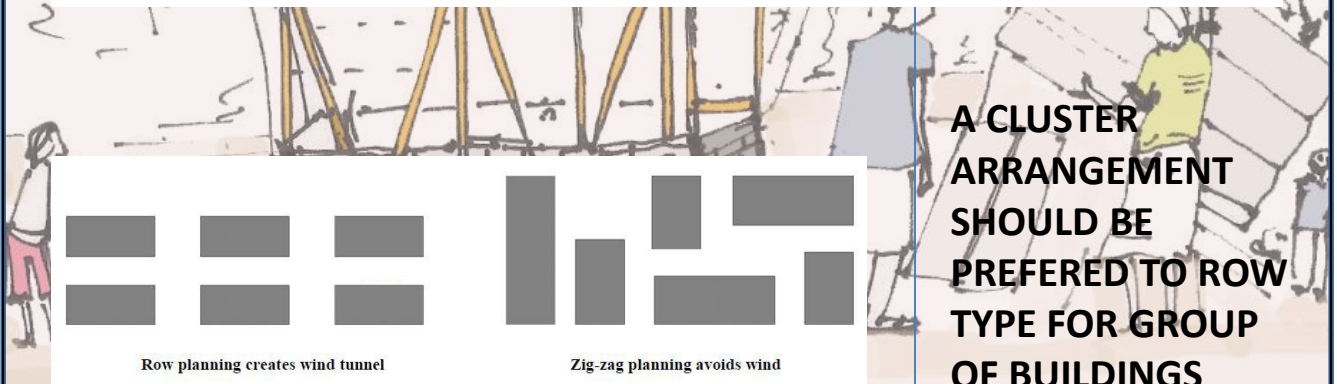


Construction at ground level risk of inundation



Construction on stilts or artificially raised earth mounds

CONSTRUCTION SHOULD BE DONE ON STILTS WITH NO MASONRY UP TO MAXIMUM SURGE LEVEL



Row planning creates wind tunnel

Zig-zag planning avoids wind

A CLUSTER ARRANGEMENT SHOULD BE PREFERRED TO ROW TYPE FOR GROUP OF BUILDINGS