

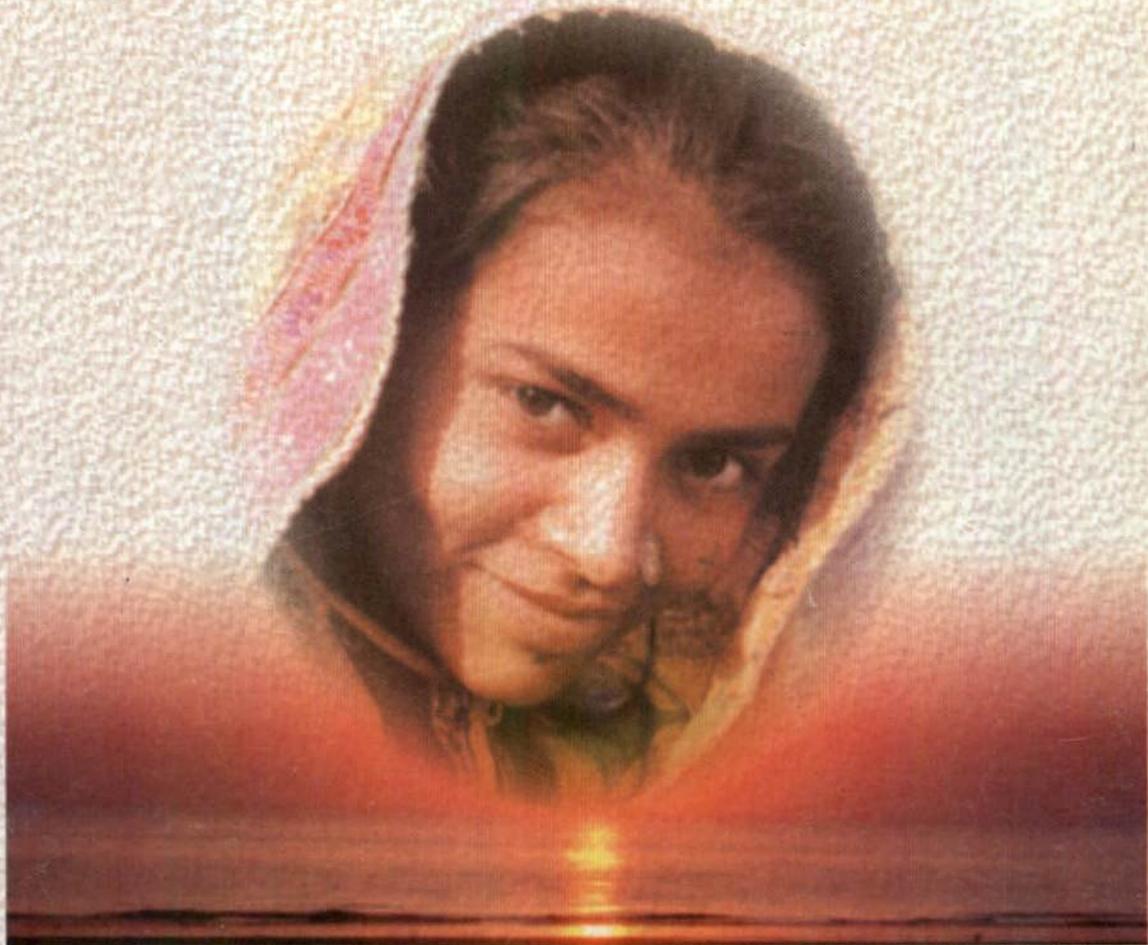
Plain Truth



The Gujarat State Disaster Management Authority

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A compilation issue on second anniversary of 26th Jan'01 earthquake



A walk down the memory lane...



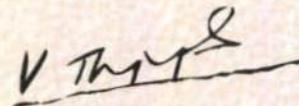
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Two years have passed since the occurrence of the earthquake. After rescue and relief, the Government of Gujarat launched a massive reconstruction and rehabilitation program with Gujarat State Disaster Management Authority as a nodal agency. Plain Truth was launched with a view to provide the donors, funding agencies, partners and public at large the details of the progress in reconstruction and rehabilitation from time to time. Plain truth brought to you not only facts and figures but also the policy, approach, struggle, efforts, constraints and resilience of the people as well as government in making the biggest ever reconstruction program a success story.

The evolution and implementation of the reconstruction program and the evolution and growth of plain truth are one and the same. At the end of two years it is necessary to take a walk down the memory lane to understand the program and the progress. This issue is an attempt to take such a walk. Selecting the best from the back issues is not easy. Like a mother who finds it difficult to tell which child she loves more, an editor also finds it difficult to select the best from the back issues. However the best human-interest stories, informative and educative articles have been selected to make up this compilation.

I hope that you will enjoy your walk.



V. Thiruppugazh (Editor)

THE POLITICS OF ACCEPTABLE RISKS

by Alpa Sheth (Structural Engineer, Partner-Vakil Mehta Sheth Consulting Engineers)

We take risks in every walk of life. When we step out on the street. For example, we are aware of the possibility of being run down by a speeding vehicle whose brakes may fail at the crucial moment.

And yet we go out onto the street. Not just that, at most times we are not even overly perturbed or conscious of the risks we undertake because there is a tacit understanding. There is trust.

Trust that each person will be responsible enough to mitigate such risks as it is within his power to do so and to the best of his ability. We thus trust that people check their brakes before they unleash their vehicles on the roads. On our part, we look both sides before crossing the road. The risk of an accident due to a faulty vehicle is very 'perceptible'. We have all seen accidents, we all know of at least someone who has died or been injured in a road accident. And yet we do not feel the need to tell any car owner to keep his brakes in top shape. He knows that of course. It is common sense, we would say. That is how any civilised society works, we would insist.

One would thus extrapolate that in a civilised society we are all sensitive to the rights of every person to live and let live. A doctor takes his job of saving the life of his patient very seriously. Similarly, a builder must take his job of providing safe homes seriously. Or so we believe. And yet this seemingly obvious hypothesis turned out to be quite ill-conceived when put to test on January 26, 2001. There were more than 700 lives lost in the city of Ahmedabad alone in what appeared to be

completely avoidable collapses of multi-storey buildings.

Much has been written and said about that. But barely has the dust settled on the debris than one hears the refrain rising again in the community of builders, engineers and architects, "There is no demand for earthquake engineered construction" or "Earthquakes are a risk people are willing to take."

While there are daily reminders of the hazards of road travel, the loss of life and property damage in each such accident is limited. But in an earthquake, tens of thousands lose life and property and this happens each time there is an earthquake. We have seen many examples in India of late. The Killari quake, the Chamoli earthquake and the recent Bhuj earthquake to name a few. And the economic setback in each earthquake is more than a million times what you would have in a road accident. So why do we still have this *laissez faire* attitude?

The issue we should discuss here is, 'Should we give people a choice?'

Does a homeowner have the right to decide whether his home should be designed for earthquakes or not? In the urban milieu the answer comes across as a resounding 'No'.

Because by living in a home prone to significant damage and collapse, he is not only making himself vulnerable but also endangering the lives and property of those around him and entailing large costs to the government machinery by other incidental damages. We know of many instances during the recent

earthquake where structures collapsed due to falling debris of neighbouring buildings. It is also fairly evident that if a home buyer was made aware of the cost-benefit ratio of a building designed for earthquakes versus that not designed for earthquakes, he would not mind spending another Rs 30-40 extra per sq. ft. for a building designed for seismic loads, knowing that he and his property would be well-protected in a seismic event of expected magnitude. Over time, people will learn to accept that when one lives in a seismically active area, one needs to pay a price for it. Just as you would need to take life-long medication for a chronic ailment like diabetes. There is no choice available. Simply put, earthquake engineering is not and must not be treated as a commodity driven by market demand. There is a dangerous trend to table it as such and this tendency must indeed be nipped in the bud.

The real issue is - Does a buyer, be it a homeowner or business establishment think about what kind of a structure he is really investing into? There is an underlying faith, vague and obfuscated, in the mind of the buyer that the building will be designed as per the rules of the land. He believes that the rules of the land ensure reasonable safety against most commonly perceivable risks from both a societal as well as a technical perspective.

In reality, those that must follow these rules, and those who run the implementation machinery get carried away by the infrequent incidence of events such as earthquakes. There

is a general tendency to get lax and irreverent about these rules. It suits everybody. The designer who saves time, the builder who saves money and also the buyer to whom some of the saving is passed on. "Earthquakes don't happen here" was the general feeling before the earthquake because most people had not experienced a major one in their lifetime.

And today it is "Now that one has happened recently there is very little chance of another one happening for the next 50 years." We all tend to be incorrigible optimists.

Let's go back to our analogy of road travel. Consider the perceptible risks in two cases: a) Not wearing a helmet whilst driving a two-wheeler and b) Not having proper brakes in one's car. Both the cases are fraught with major hazards but in the former you are endangering only your life while in the latter you are putting at risk your life as well as that of others. Not building for earthquakes in seismically prone areas is akin to the latter. It is what one may call a societal risk versus a private risk. Hence the decision of designing for earthquakes cannot rest with the private individual alone but must rather be one taken by the community as a whole. And what is scary is that unlike in the car industry, where the car manufacturer has vested interests and will recall a defective car immediately else it will affect his sales, the buildings are not put to test until the BIG one comes along. It is too late by then.

On one hand, we expect the government to safeguard our interests at all times. We would feel fairly outraged if we were told that government facilities and buildings are not designed for earthquakes. We believe "they" have all the resources necessary for doing things right and hence we are not ready for any

compromises on that end. On the other hand, when it comes to our own homes, we are easily taken in by the sales pitch. We are happily seduced by the accouterments-the anodised aluminum windows, the marble flooring, the granite kitchens. Cosmetics take over and the inherent health of the structure is given short shrift. Or rather we assume what suits us. We do not dwell on the uncomfortable questions about building design and quality assurance, about earthquakes.

Someone somewhere must have done his job right, we assure ourselves. What we don't know, can't hurt. Hence we buy into the lie of beautiful homes being safe homes.

And what now? Now that we have found that the homes we live in are unsafe, where do we go from here? The issue becomes sticky when we have to make a Hobson's choice. What do we do with the existing stock of buildings that have not been designed for earthquakes? We cannot simply raze them to the ground or even attempt to retrofit every one of them. The exercise is Herculean and a mechanism to make such a program viable is not immediately apparent. Then we are called in to play God. We need to decide what are the risks we find acceptable to take. How best can we stretch our rupee to achieve maximum coverage of safety to human lives and optimise the cost-benefit ratio. These are decisions that are governed by socio-economic and political issues. Hard choices are called upon. In the midst of this we wonder with regret how little of the fraction of the retrofit cost it would have taken to build the structures right the first time around. Hind sight is of course 20-20. The debate of acceptable level of risks will continue on. The levels of acceptable risks are functions of, and unique to each society-the

available resources, its level of economic and social development, the value it puts on each citizen's life, its culture and the collective will of its people.

The decision has to be made from within the society. It cannot and must not be made from without as it could be fraught with many dangers-

a complete misinterpretation of that society and its priorities on one hand or on the other hand a patronizing attitude towards a still developing community.

So we go back and review our situation. We find we have a 1920's vehicle clearly not designed for the roads of the 21st century. It does not have the short braking distance that we need for our kind of speeds, our type of highways. Since we cannot afford to change the vehicle, we learn to take public transport, we restrict the use of our vehicle to the neighbourhood grocery store. It is a decision we make. We do not need a regional transport office or the traffic police to monitor us for this. And yet, in case of buildings, we put the onus on the government. If there is a non-conformance to seismic safety issues, we blame the governmental implementation agency for non-rigorous enforcement of rules. While in the immediate future it may be beneficial to enforce a stricter implementation policy, rules succeed only if there is a political will of the people to follow them, to insist they be followed. It must, one may repeat, come from within, and not without.

What is needed is a sea change in the attitude of people. Demanding what is their right. It is all about loving yourself a little bit more and believing you deserve a lot more.

Issue dated April 2002

WHY PEOPLE ENJOY MISHAPS?

by *Bertrand Russell*

February 10, 1932: It is a curious fact that nine people out of ten become happier when faced with some small misfortune. On my first visit to America, thirty five years ago, a train in which I was traveling got stuck in a snowdrift so that we did not arrive in New York until a great many hours after all the food on the train had been eaten up. I was beginning to expect that the passengers would draw in the best of spirits. People who would have hated each other in ordinary circumstances found each other quite agreeable, and everybody reached an obviously exceptional level of happiness. I have observed the same thing in a really bad London fog. An ordinary fog is a mere nuisance, but a fog so bad that you cannot see your own feet brings consolation even to the most melancholic. People begin to speak to complete strangers---- a thing which in London is not much done. They recall the far worse fogs that they remember in their youth; they tell of friends who got lost at Hyde Park Corner and were only found again by accidentally running into a policeman in quite another part of the town. Everybody laughs, everybody is jolly-- until fog clears, when they again become sober, grave and responsible citizens. Unfortunately this

mood, which is appropriate enough for small mishaps that cannot be prevented, is apt to extend itself to larger misfortunes that could have been avoided. I have never been in a shipwreck, an eruption or a serious earthquake, and I am prepared to believe that these experiences are not wholly pleasant. But I do remember the beginning of the Great War, and everybody's mood then was almost exactly what it is in a bad fog--- one of hilarious and excited friendliness. In the first horrors to come. Light--hearted confidence was the order of the day in all the countries concerned. There are two reasons for this curious excess of happiness in circumstances where the opposite would seem more natural. The first is love of excitement.

Most of us go about the world oppressed by boredom; if an elephant falls into our coal cellar or a tree crashes through our plate-glass windows and smashes our best drawing-room furniture, the incident is, of course, in itself regrettable, but the mere fact that it is unusual redeems it.

We have something to tell our neighbors about and may hope to be a centre of interest for the next 24 hours. Excitement in itself is agreeable, though of course it would be pleasant if the

excitement had a pleasant source, such as inheriting a fortune from a millionaire uncle the cases of the snowdrift, the fog and the war, there was however, another element-- namely, the fact that everybody was feeling alike, as a rule, each of us is occupied with his own concerns; other people may hinder us, or bore us, or fail altogether to attract our notice, but there are occasions on which a common emotion in itself is not pleasant, the fact that it is shared gives a peculiar happiness not obtainable in any other way. If we could all be habitually in a state of collective emotion, we should all be always happy, always co-operative and always free from boredom.

Perhaps the government psychologists of the future will obtain this result. Public holidays will begin with huge sky writing, saying: 'the Martians are attempting to invade you. Every man, woman, and child can do his, her, or its bit.' Toward evening it would be announced that the attack had been repulsed. In this way everybody would be sure of a happy holiday.

But there are among the triumphs of science for which the world is not yet ripe.

Issue dated July 2001

LIQUEFACTION AND IMPRESSION IN BHUJ

by *C.S. Shah, Superintending Engineer (GEO), Central Design Organization*

Earthquake is considered as an independent natural phenomenon of vibration, of the ground. Earthquake becomes a dangerous phenomenon, primarily considered in relation to the structures. The problem is of structure under seismic excitation and not the earthquake itself. This is because the structural system, is normally designed, for gravity loads and not for horizontal inertia loads, that are generated due to ground acceleration during an earthquake.

Besides deaths and damage to buildings,

several economic, social, psychological and political effects are caused due to the earthquake. The magnitude of an earthquake on the Richter scale is measured in terms of energy release at its point of origin. An increase in the magnitude of the earthquake results in an increase of energy by about 28 times. Therefore, the destruction caused by an earthquake, although partly related to its magnitude, is also a function of many other parameters. Such as the focal depth, distance from the epicentre, soil

conditions and mechanical properties of the structures (strength, natural period, ductility etc.).

Intensity of the earthquake is measured by the consequences that the earthquake has on people and structures of a certain area. Damage is usually qualitatively estimated, using empirical intensity scales. The most common macroseismic scales, that are used today are Modified Mercalli (MM) scale and the

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Medvedev-Sponheur-Karnik (MSK) scale, both of which have one to 12 intensity grades. An earthquake has only one magnitude, but different intensities, from one place to another. The intensity generally attenuates, as the distance from the epicentre increases. Soil conditions have a significant effect on the distribution of structural damage.

Bhuj earthquake

The earthquake in Bhuj (Kachchh) recorded a magnitude of ML 6.9 on Richter scale (MW 7.7 moment magnitude) on January 26, 2001 at 8:46 am. Its epicentre was located about 12 Km NNW of Bhachau town, about 65 Km east of Bhuj in Kutch district. The main shock had a focal depth of about 25 Km. It has been an extremely damaging earthquake and the largest seismic event in India in the last 50 years, which involved perhaps for the first time (1) Large population of many urban centers, (2) Collapse of a large number of multi-storeyed buildings, (3) Profuse liquefaction in an area of about 50,000 km and (4) Damages to a large number of embankment dams in the region.



Liquefaction

The recent earthquake has caused profuse liquefaction in an area of about 50,000 km.

It has been observed, in the form of numerous sand blows/sand boils, craters, ground fissures, lateral spreads and many more.

These are located mainly in Holocene deposits of the Rann of Kachchh, within an area of intensity eight, nine and ten.

Liquefaction is defined as "An act or process of transforming any substance into liquid." This transformation in cohesion less soils, from solid to liquefied state is a result of increased pore pressure, which decreases effective stress during an earthquake. Completely saturated soil and generally clean cohesion less sand, which may include some gravel, may be liquefied during shaking by cyclic loading due to the upward propagation of shear waves. This can raise pore pressures to value, as high as overburden pressure, effectively "floating" the sediment and its overburden.

The upward flow of slurry of water and sand, from an underlying layer of cohesion less soil, with high pore pressure to the ground surface, produces 'sand blows', 'Lateral spreads' are a result of liquefaction of cohesion less soil, which results in the downslope of transport of its overburden cap. Such lateral spread is clearly observed in the agriculture farm of Morgar



village (N 23 degrees 20.532, E 70 degrees 11.878) near Bhachau, near Manfara, and near Moti Boru (N. 22 degrees 28.089, E 72 degrees 21.43). Intense liquefaction, in the form of ground fissures or sand blows have been observed at the following locations.

Surjarbari Creek, Lodai, Khengalpur, Amarsar, Vantra, Bherandiala, Chobari, Near Bhadreshwar, Navalkhi Port, Balambha etc. Such liquefaction was also observed near the base of the U/S slopes of Tapar dam, Chang dam, Fatehgadh dam and others.

Large scale craters, 4 to 6 m dia each and about 1.5 m deep aligned roughly along E-W direction were observed in a length of about 20 Km or so near the international border of Pakistan, near Vighukot Chowky.

Issue dated October 2001

WHY BUILDINGS FAIL?

by Mr. P.C. Purabia, Chief Engineer, GSDMA

Failure of buildings frequently occur, but some of them are brought to focus for structure analysis of causes of failure. This is because of the tendency of the parties concerned to hush up matters. Failures should be analysed & reason should be pinpointed for lesson to the people or practicing engineers.

Earthquake in Gujarat and it's consequences has scared the people and taught useful lessons

for the future in design and construction.

An interesting feature that has come to light is that public (government) buildings, which had been given the mandatory design check by the authorities concerned, have withstood the effects of the quake. Failures were mostly in the case of private buildings, as there was no check of design, supervision & quality audit.

Reasons Attribute

- Because of faulty design not considering the forces/loads according to the prevalent codes, not assessing precise soil bearing capacity. (The coastal areas of Gujarat are subject to very severe wind force. If a building had been designed for this condition it would have without the seismic effect).

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- No proper bar detailing in working drawing.
- Lack of strict supervision.

From the photographs published it could be perceived that multi-storeyed apartment buildings were founded on loose or soft soil with shallow open footings. Some buildings had not been provided tie/ plinth beam. No proper bar provision at the junction of beam & columns.

Lesson learnt & some precautionary measures

(A) Design of structure: It is pertinent that the design work is entrusted to a competent structural Design Engineer, having good knowledge & experience of codes/ static loads & vibrating loads. Correct design philosophy must be adopted with proper understanding of the forces in place and the structural behaviour of the different members including the foundations. Proper identification of the seismic zones and wind incidence must be made and no chances should be taken.

If the site is in a location where there is a doubt about the zone then the more severe zone should be considered.

The building having G+3 storeys or more should be analyzed as frame, considering horizontal & vertical loads. On looking to the size of the column, it appeared that only vertical loads might have been considered in many designs with nominal reinforcement, not designed for any moment.

Columns are sized in a manner so as to avoid projections (for example 230 x 230 mm are adopted to match with brick work.). The columns are only the main supporting structural members hence, no liberty or inadvertent should be allowed in the design of columns with respect to –Size and reinforcement. It may be known that corner columns are under bi-axial bending and projections are unavoidable.

One may adopt "L" or "T" shaped columns properly tied with main rebars. The "L" beam

must be analysed in shear stress due to torsional effect of the projection, and stirrups are accordingly provided. RCC T beam with slabs is very stiff as compared to the column and the column sections just below floor level are vulnerable points in the event of quakes and hence require special attention.

It is a common practice to construct water tanks with plastered brick walls on RC slab on terraces. In the event of an earthquake such a construction may cause disastrous effect on the whole building. It must be insisted that water tanks are designed in accordance with I.S.3370 and fully loaded tank must be considered for seismic analysis.

One notable feature was that most of the multi-storeyed buildings had floating columns. This is not sound engineering practice. The column must be founded on solid foundation. Floating columns, starting from the top of the beam / bracket, may create moments, shear during rotation due to horizontal loads in the supporting beam / brackets. Provision of a properly designed RCC plinth beam is a must. This helps reduce the unsupported height of column & thereby decreasing slenderness ratio.

A competent structural design engineer ought to certify compliance with a detailed list of codes, also:

- Cross checking by another consultant.
- Civic authorities should not give approval to construction unless the above are satisfied.
- Proper Reinforcement detailing.

B) Foundations: Foundation is very important part of the structure. A proper preliminary investigation with bore-log details is a must for any building of height 12 m or more. Very often we come across multi-storeyed buildings standing on open footings at shallow depth even in areas, which were once paddy fields, irrigation tank beds, made-up soil.



Site having liquefiable type of soil, should be avoided or special care by consulting experts should be taken.

Soil bearing capacity by considering shear failure or settlement criteria should be accounted for & minimum of these two values is to be taken for design purpose in worst combination of loading. Position of water table during the year under the building is also taken into design, because water table has considerable effect on SBC (Soil Bearing Capacity) for example if water table touches the base of foundation, the SBC is reduced to 50% resulting in failure of structure.

C) Construction: Even a sound and well checked design and detailed drawing would be of no use if construction is not done properly. The following are essential:

- Good supervising personnel with proper understanding of the structural behaviour of the different elements should be at site. For example the site engineer should have proper appreciation of where the rebar should be located.
- Concrete should be of proper mix design and properly controlled at site. Preferable to get RMC for all-important concrection.
- Concrete should be properly placed and compact ensuring the specified cover to the rebars. Special attention must be given at the junctions.

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The structural designer must exercise supervisory check periodically, in particular before every important concreting work besides the regular supervision by the site engineer. Concreting by use of ready mixed concrete would be preferable in the interest of better quality.

There are other points no less important that require detailed attention:

- Before laying foundations the strata must be inspected by a competent engineer, preferably a geo-technical specialist and only after his certification further work must be done.
- Filling in foundation pits and for plinth should be in layers with selected earth and every layer duly compacted.
- Damp proof course is properly done
- *Brickwork*: Generally 230 mm thickness for

peripheral walls and 115 mm for inner partitions are adopted. Partitions require to be strengthened with reinforced mortar bands at every 4th layer. Since RC frame work would have already been constructed before brickwork the latter has to be fitted into the panel space available and the topmost layer does not get properly built and as a result this is a source of rainwater seepage with its long-term bad effects on the building.

- Provision of continuous RC lintel would enhance the structural behaviour.
- Water proofing of terrace and bath rooms should be done properly ensuring proper slope and drainage and all plumbing joints should be ensured to be water tight.
- Leakage if any detected should be arrested



immediately.

- Curing to cement works is to be carried out as per IS code.

One must remember that Quality Control is three pronged action of:

1. Contractor
2. In-charge Supervisor
3. Quality Control Team

Buildings in quake prone zone must be suitably insured.

Issue dated December 2001

THE PHYSICS OF SEISMIC EFFECTS ON STRUCTURES

by CVR Murty, IIT, Kanpur

In the Gujarat earthquake of 2001, numerous buildings collapsed in Bhuj. They collapsed because of the failure of the ground storey columns.

Discussing the phenomenon of seismic effects on structures in the September issue of Construction Materials Purchase, Prof. Murty states, walls or columns are the most critical elements in transferring the "inertia forces". But in traditional construction, floor slabs and beams receive more care and attention during design and construction than walls and columns.

Walls are relatively thin and often made of brittle material like masonry. They are also poor in carrying horizontal earthquake inertia forces along the direction of their thickness. "Failure of masonry walls have been demonstrated in many earthquakes in the past". Similarly, poorly designed and constructed reinforced concrete columns could be disastrous.

Earthquake causes ground shaking. When the ground shakes, a building resting on it would experience motion at its base. As per Newton's First Law of Motion, even though the base of the building moves with the ground, the roof has a tendency to stay in its original position.

But since the walls and columns are connected to it, they drag the roof along, like when the feet of a passenger standing in a bus begin to move when it suddenly starts. However the upper part of the body tends to stay back making him fall back. This tendency to remain in previous position is known as Inertia. Since the walls or columns in a building are flexible, the motion of the roof is different from that of the ground.

When the ground moves the building is thrown backwards just similar to what is experienced by the passenger. As a result, the roof experiences a force, which is Inertia force. If the roof has a mass M and experience acceleration A , then according to Newton's second Law of Motion F is

mass M times acceleration A and its direction is opposite to that of acceleration. Since more mass means higher inertia force, lighter buildings sustain the earthquake shaking better.

Structural deformations

The Inertia force experienced by the roof is transferred to the ground through the columns, causing forces in the columns. Given a free option, columns would like to comeback to the straight vertical position, that is, columns resist deformations. In the straight vertical position, the columns carry no horizontal earthquake force through them. But, when forced to bend, they develop internal forces. The more relative horizontal displacement between the top and bottom of the column, larger is this internal force on columns. Also, the stiffer the columns are, large is this force. For this reason, these

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internal forces in the columns are called stiffness forces.

Shaking effects

Earthquake causes shaking of the ground in all three directions, along two horizontal directions (X and Y) and the vertical direction (Z). Also the ground shakes randomly back and forth along the three directions. All structures are primarily designed to carry the gravity loads, that is, they are designed for a force equal to the mass M (this includes mass due to own weight and imposed loads) times the acceleration due to gravity g acting in the vertical downward direction. The downward force Mg is called the gravity load.

However, horizontal shaking along X and Y directions remain a concern. Structures designed for gravity loads in general may not be able to safely sustain the effects of horizontal



earthquake shaking. Hence it is necessary to ensure adequacy of the structures against horizontal earthquake effects.

Designing for safety

Under horizontal shaking of the ground, horizontal inertia forces are generated at level of the mass of the structure (usually situated at the floor levels). These lateral inertia forces are

transferred by the floor slab to the walls or columns, to the foundations, and finally to the soil system underneath. So, each of these structural elements (floor, slabs, walls, columns and foundations) and the connections between them must be designed to safely transfer these inertia forces through them.

Issue dated October 2002

BEYOND GOOD AND EVIL

by V. Thiruppugazh, Joint CEO, GSDMA

He was in tears. His house collapsed in the earthquake killing his only son. He asked me, "Why did this happen with me?". There was anger in his voice. "I have never harmed anyone in my life, I have lived honestly in every possible way, I have helped others all through my life in whatever way I could. Did you see? Every thing is gone now." He repeatedly asked me why should a good man like him suffer and why God punished him like that. He may not be the only person with this question. There must be thousands of others with the same question. Earthquake or no earthquake, this question looms large over the humanity.

Why do the good and honest suffer while the bad seem to have a happy life? Has truth failed? Has evil won? It happens that a man is most punished for his virtues.

The question why the good suffer cannot come from a happy person, good or bad. A happy

person has no time for philosophy. He will not go into the question of good and bad. This question can only come from a good man who is suffering or to put it correctly, from a person who is suffering and who has an image of himself as a good person.

Many will agree that the question is valid. The good suffer. Why? Should we take refuge in the theory of karma and console ourselves, or explain that the devil is playing its role and ultimately truth will win, or declare jihad against the evil?

Has goodness anything to do with happiness? If goodness is something cultivated, or forced from within, if it is the result of suppression and repression in the name of God, fear of evil, parental conditioning and all the rest of it, then one will not be happy. In that case what is needed is not an inquiry into ethics, but a prolonged psychoanalytic treatment.

The question is even if goodness is not imposed from within, if it is not the result of suppressions and repressions, will one be happy? We see that the good are tested, put in difficult situations, face defeat and downfall. The question is not why? The question should be why not? Why should they not suffer? Why should they not face defeat and downfall?

Does goodness guarantee happiness? Does truth promise victory? If goodness and truth guarantee happiness then everybody would be good. After all people want only happiness and peace. Can one be good, honest and truthful knowing that it may not lead to peace, happiness and success? Goodness and truth cannot be reduced to merely a means to an end. It would be a bargain to exchange peace and eternal joy for goodness and truth.

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I still hold that a good man will not suffer, not because God takes care of a good man or nothing bad will happen to him.

Suffering has nothing to do with pain, agony, failure and loss. Suffering springs from the ego. It is the ego, which feels that "I am an honest man, good man, how can I suffer"? The ego feels that he should be placed above the rest. He is the best of men. How can he be put to test? How can he be punished?

One should realize that in the scheme of the vast universe, individual goodness and honesty does not count. God does not need man's honesty, in fact, no one needs it. Goodness is not a

conscious choice. If there is a choice between good and bad and if one chooses the good instead of bad, one will regret if success and victory does not ensue. There are no two paths to choose. A mind which chooses between good and bad is a confused mind and such a choice will result in sorrow and suffering if it compares itself with those who have chosen the bad instead of good.

The problem is that we want goodness and success, honesty and money, integrity and approval. We want everything, all that the inner world can offer and all that the outer world can offer. The so called bad persons want only

wealth. The good man is greedier. He wants both wealth and goodness. Wealth cannot be a by-product of honesty, happiness cannot be a by-product of goodness and peace cannot be a by-product of values. One does not lead to the other.

A man is not rewarded for his goodness and punished for his sins. One is rewarded by one's virtues and punished by one's sins. The moment we understand this, the question dissolves. We don't ask why the good suffer. There may be suffering, but there is no one to suffer. What will remain is mere goodness responding to the situations of life spontaneously.

Issue dated February 2002

HELPING HAND OF NGOs IN RESURRECTION OF EARTHQUAKE RAVAGED GUJARAT

by Arvind Joshi, I.A.S., Director (Admn.), GSDMA

Gujarat, the land of Mahatma Gandhi and Sardar Vallabhbhai Patel, is proud of the excellent tradition of NGOs that have relentlessly worked in social sectors such as health, water supply, afforestation, rural development, social services etc.

The NGOs of Gujarat have earned the credit of contributing positively as well as substantially in relief and rehabilitation activities also whenever such catastrophes take place within or outside the country.

Gujarat witnessed one of the worst natural calamities of recent years when the earthquake struck the state on 26th January. The degree and extent of damage, to life and property shocked the world.

It was a matter of great comfort that the entire national as well as international community rose to the occasion to support Gujarat. The surge of humanity was overwhelming Gujarat.

There was a spontaneous response from national and international communities. Rescue and medical teams arrived from a number of countries. NGOs like Ramkrishna Mission, Sewa Bharti, Mata Amritanandmayi Math, Akshar Purshottam Swaminarayan

Sanstha, Kutch Navnirman Abhiyan, Kutch Jain Samaj as well as Industrial Organisations like FICCI, IFFCO, etc. did their best by contributing immediate relief and rescue to the affected people. UN, USAID, RED CROSS and other donor agencies airlifted equipment, medicines, tents, blankets and other necessary household materials. World Bank and the Asian Development Bank have also contributed by financing rehabilitation and reconstruction work.

For the task of long-term rehabilitation of the villages with a view to encouraging the NGOs, the Gujarat Government has launched a scheme called "Public-Private Partnership Programme". It envisages to ensure people's participation through the NGOs in the earthquake affected areas so that the rehabilitation process gets expedited within a definite time frame. It encourages NGOs, industrial houses, co-operatives, religious organisations, etc. to come forward and participate in the scheme with 50 per cent partnership with the Government. The Gujarat Government has formulated detailed procedures and guidelines for the guidance of the NGOs that are partnering in this scheme.

In order to ensure effective coordination at the district level, a District Level Advisory Committee has been constituted under the chairmanship of the minister in charge of the district. Likewise, in order to ensure effective co-ordination at the village level, Gram Navrachna Salahkar Samitis have also been constituted. A regular dialogue is being maintained with the partnering NGOs from the state level to sort out implementational issues.

Born out of a genuine concern to help, these NGOs have become the harbingers of hope for the devastated villages under the "Public-Private Partnership Programme" for total rehabilitation of villages. There are a few examples where certain NGOs have completed construction of permanent shelters in a very short span of time. 108 houses in Ravapar Nadhi (Taluka Morbi, District Rajkot) were constructed in less than 2 months and villagers are ready to live in their new permanent disaster resistant homes within three months of the devastating earthquake of Gujarat, thanks to the efforts of the Mayur Foundation, which could make this possible. Likewise, an NGO called

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Manav Sadhana constructed 432 permanent houses in Ludia village of Bhuj taluka. An NGO called Rashtriya Swabhiman completed 600 permanent shelters in village Dudhai of Anjar Taluka. Vibhas Trust could complete 106 permanent houses in Hingaria village of Abdasa taluka and Ms. Jay Prakash Industries could complete 524 permanent shelters in Kakarva village of Bhachau taluka. Thus, it is a matter of great satisfaction that a few NGOs were in a position to complete building houses in a time-based manner. In the coming months, several more villages will be added to this list. This amply shows the capabilities of our NGOs in involving the village communities in the rehabilitation process.

As per the latest information available, about 64 NGOs are quite active in about 174 villages under the "Public-Private Partnership Programme". Besides, some NGOs have shown interest in comprehensive village development by bearing 100 per cent costs on their own.

The interest shown by the NGOs and their herculean efforts in reconstruction and rehabilitation work in the earthquake-affected areas deserves all praise.

Issue dated September 2001



PUBLIC PRIVATE PARTNERSHIP

HASTE MAKES WASTE

by Dr. Anand S. Araya, Seismic Advisor, GSDMA

Expert warns citizens against cosmetic repairs of quake hit houses



Dr. Anand S. Araya

During my recent visits to Bhuj, Gandhidham and Rapar areas what I saw people doing by way of repair or retrofitting was a bit shocking, because all the information conveyed on this aspect through a number of brochures and guidelines issued by the GSDMA seemed to have been either not understood or ignored. In one such case, the building had been constructed without providing any reinforcing bars at the corners of the building.

When I asked why it was not done? The seemingly innocent reply was there is not enough money. How much four bars of 12mm diameter would have cost?

When I asked him, were four bars costlier than the risk to life? Could he not postpone some part of plastering or a part of flooring for future and provided the four bars needed for safety of the house? He had no answer. In another village in Rapar, a person had repaired his home just by plastering over all the cracks and found that in one of the after shocks the walls were cracked.

In another village, a person was reconstructing his hut using stone masonry in mud mortar, he did not have any idea of providing the 'through' stones and the 'long stones at the corners' which are so vital for the stability of such stone walls!

It therefore appears to me that some of the basic

concepts of repair restoration and seismic strengthening (retrofitting) may merit number of repetitions.

In this short note I will therefore try to explain their concepts and importance for the safety of the occupants.

Let us first distinguish between the three operations called Repair, Restoration and Retrofitting.

Repair

The main purpose of repairs is to bring back the architectural and aesthetic shape of the building so that all services start working and the functioning of the building is resumed quickly. The repair actions will include the following:

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- Patching up of defects such as cracking and falling of plaster.
- Repairing doors, windows, and replacement of glass panes.
- Checking and repairing electric wiring.
- Checking and repairing water pipes and plumbing services.
- Rebuilding non-structural walls, parapets, boundary walls etc.
- Replastering of walls if required.
- Rearranging disturbed roofing tiles.
- Relaying cracked flooring at ground level.
- Redecoration- white washing, painting etc.

It is very important to note that the architectural repairs as stated above do not restore the original structural strength of cracked walls or columns. Such repairs may prove very illusive, since the redecorated building will hide all the weaknesses and the building will suffer even more severe damage if shaken again by an equal or even a smaller shock since the original energy absorbing capacity will not be available.

Restoration

It involves restoring the strength what the building had before the damage occurred. This type of action only will however suffice when there is evidence that the structural damage had occurred due to exceptional phenomenon which will not be likely to happen again and the original strength provides adequate level of safety in the remaining life of the building. The main purpose of restoration is to carry out structural repairs to load bearing elements.

It may involve cutting portions of the elements and rebuilding them or simply adding more structural material in such a way that the original strength is more or less restored.

The process may involve inserting temporary supports, underpinning etc. in the following approaches:

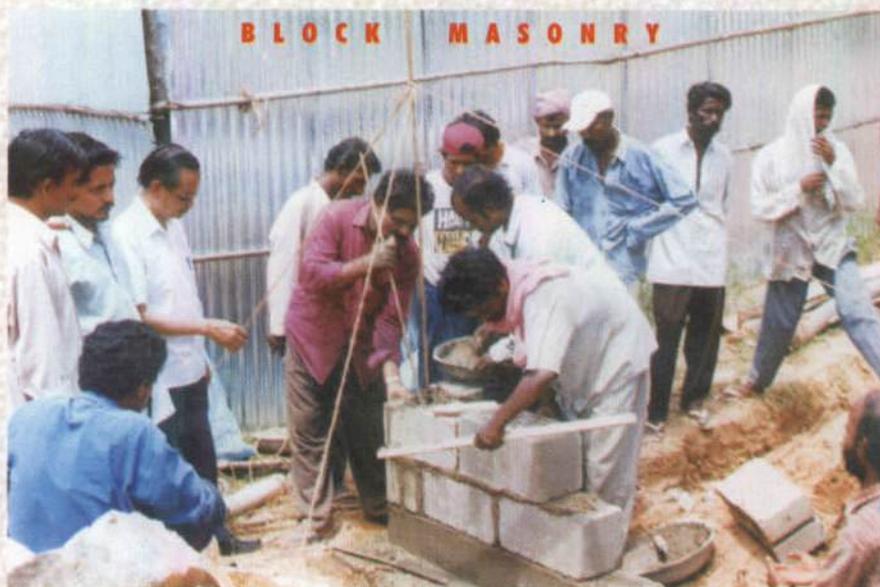
- Injecting non-shrink cement grout or epoxy like material, which is strong in tension, into the cracks in walls, columns, beams etc.
- Removal of portions of cracked masonry walls and piers and rebuilding them in richer

mortar than used originally. Use of non-shrinking cement mortar will be preferable.

- Addition of galvanized reinforcing mesh on both faces of the cracked wall, holding it to the wall through spikes or bolts and then covering it suitably by rich mortar or micro-concrete.

Where structural repairs are found necessary, these should be carried out prior to or simultaneously with the architectural repairs so that total planning of work could be done in a coordinated manner and wastage is avoided.

Seismic strengthening or retrofitting buildings



Making a corner bar truly vertical and block masonry plumbing

The seismic behavior of buildings, in a moderate to severe earthquake is affected by their original structural inadequacies, material degradation due to time and alterations carried out during use over the years, such as making new openings, addition of new parts inducing disymmetry in plan and elevation etc.

The present Kutch earthquake has clearly brought out the structural weaknesses in the construction technologies, which lead to their catastrophic behavior.

These buildings which have been damaged to G1, G2, G3 categories will not only need repair and restoration but also seismic strengthening (retrofitting) so as to upgrade their strength to safe levels against future earthquake.

Replacing them with new earthquake resistant buildings will not usually be feasible or not found appropriate, due to historical, artistic, social and economical reasons. Therefore seismic strengthening of existing damaged or undamaged buildings is a definite requirement in the earthquake-affected areas in Gujarat.

Many people argue that since a major earthquake has happened already the next one may come only after a hundred years so, why should they spend money on retrofitting but they should know that smaller earthquakes can occur at different places more frequently which could also cause severe damage to weak buildings as happened in 1956 in Anjar.

Moreover it may be mentioned that the additional expenditure on the retrofitting in the Kachchh area will not cost more than Rs.250 to Rs.300 per square meter of the plinth area. That is providing seismic safety in a house of 50 square meters of area. The extra cost will not be more than Rs.15,000.

There are only two critical elements in retrofitting of masonry houses. The first is the seismic belt constructed just above the doors and windows in all the walls on both faces, so as to achieve complete integral behaviour of the walls like a rigid box which will prevent the falling apart of the walls under strong earthquake shaking and also minimize damage

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by cracking.

The second element is the provision of vertical bar of only 12 mm diameter one in each corner of the room from below ground to the roof level and connected to the walls by means of additional dowel bars.

The beauty of the procedure is that this can be done after the cracked building has been restored, people live in the house and the retrofitting can be carried out room by room so that the inmates of the house do not have to leave the house during retrofitting.

I would like to strongly advise that people should not carry out only cosmetic repairs in haste because that will be unsafe and a waste of money which could be better spent in first restoring the house and then strengthens it to withstand future earthquakes.

Issue dated September 2001

TOWARDS A CULTURE OF SAFER BUILDING PRACTICES

by Rajib Shaw, United Nations Centre for Regional Development, Kobe-Japan

"This approach, together with community confidence building, can be a possible tool for the dissemination of Culture of Safer Building Practices".

Recent earthquakes in different parts of the world have highlighted the need and importance of promoting a "Culture of Safer Building Practices". This is of specific relevance to developing countries, where the use of building codes and regulations are often neglected.

The problem occurs where structures are "non-engineered", that is, houses built with stones, unburnt bricks, clay, or thatch and grass. They are constructed by house owners and masons (informal sectors) without any monitoring and inspection during construction.

It has however been found, that safer construction techniques have succeeded, wherever there is awareness about them and proper technical skills have been transferred to masons through training. The awareness and training, have acted as confident-boosting measures to the community for effective use of safer techniques.

Demonstration Testing

The main concern in the current context is to formulate a strategy for the effective disaster reduction, which can be applied to a wider geographical area with different cultural and socio-economic conditions.

The key point is the transfer of experiences gained in using safer building practices in construction, to nations prone to earthquakes in Asia-Pacific region. What is needed is a "demonstration testing" to measure their impact on the community and how they contributed to effective confidence building.

The other concern is the "Risk Management Framework" and its application in the real world scenario. Through the demonstration testing and impact analysis, the "Context" for disaster reduction is needed to be established.

A two-step approach is envisaged for this purpose. The first step involves the study of housing adoption process, as evidenced from the experiences in the past earthquakes in India. The second step is to transfer the skills through the demonstration testing.

Together, the two processes will provide insights into how safer housing practices are "adoptable" for other areas in the Asia-Pacific region. The risk management process can be exemplified in the framework of the post-disaster scenario by involving different stakeholders, based on the local needs and priorities.

Building Stocks

In India, building stocks can be divided into four categories — A, B, C and X. Category A are buildings made of fieldstones, un-burnt bricks and clay structures. Brick buildings fall under category B. Category C consists of reinforced concrete and well-constructed wooden buildings. Category X includes buildings constructed with materials like grass and thatch.

Category A and X can be considered as non-engineered, Category B as less-engineered and Category C as engineered. The most vulnerable types for earthquakes are category A and B, since the materials used are heavy consisting of stones, mud or brick walls, with RC slabs as the roof in some areas. The building stocks show that almost 50% of Indian houses fall under category A, 35% in category B, 4% in C and 11% in X respectively.

The rural and the urban construction in India have its characteristic features and are reflected in the building blocks. In a typical rural housing, 60% can fall under category A, 35% in B, 2% in C and 3% in X. In contrast, in the urban house (in Ahmedabad in Gujarat), category A accounts

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for 24%, B accounts for 71%, C for 4%, and X for 1%.

In rural areas, the building materials used are mostly local and/or indigenously produced. In most cases, the construction is done by the house-owner, and sometimes by the local masons. In contrast, in urban areas, the contractor does the construction with mason and helper from different areas, with little or no involvement of the house owner. The involvement of the house owner is regarded as one of the key factor for the non-engineered housing.

Gujarat Scenario

Most of the buildings in the earthquake affected areas of Gujarat, are "traditional housing", made up of stones and timbers. The "traditional housing" has two basic attributes, namely, "Spatial Planning" and the "Building System". Both these are products of evolution over hundreds of years. As a result, they both are optimized for the prevailing local context.

The "Spatial Planning" conforms to the lifestyle of the people that is primarily that of an agriculturist. It also helps to conform the life to the local environment. The "Building System", on the other hand, protects the house against the elements such as the rain, wind, sun etc. In some rare cases, bricks are used. In such cases, the use of corrugate galvanized iron sheeting (CGI) is a common feature.

It has been observed that the damages to these buildings are mainly due to failure of the walls and roofs. The roofs being heavy cause much damage to the structures. The walls are not joint properly, and therefore, each wall behaves

differently during the shaking, causing the failure of structures. Sometimes, smaller fragments of stones are used to infill the walls, which have usually two bigger stones for inner and outer walls. These smaller stones often fail to retain the cohesion, resulting in splitting into two segments. Apart from these traditional buildings, the damaged structures also include those made of stone with cement mortar, or those made of bricks in mud and cement mortar.

Two Tests

To demonstrate the efficacy of improved methods of construction using the seismic

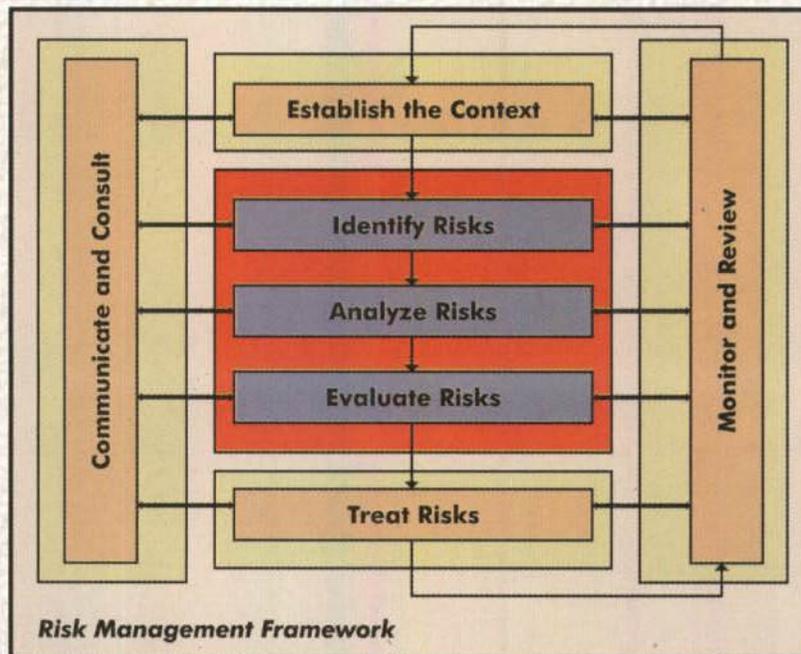
the actual impact of the testing on the community and to see its sustainability.

In the tests conducted so far, un-coursed rubble masonry were used with the mud mortar. Now three more tests are being planned to show the efficacies of:

1. Un-coursed rubble masonry with cement mortar (normal versus improved).
2. Burnt brick masonry against concrete block masonry (both improved).
3. Concrete block masonry (normal versus improved).

Conclusion

The "Demonstration Tests" have been found to be fruitful in Gujarat and appropriate. To study the adaptation and adoption process, a close monitoring is required through on-site inspection and interviews of the different stakeholders. Thus the "Demonstration Testing" is regarded as a useful tool to demonstrate and disseminate safer building practices for rural housing to the community and the house owners.



elements, such as, "reinforced concrete stitching elements", "gable guy anchors" and "vertical corner reinforcement" over traditional methods of construction, two tests were carried out employing the "Shake Table" demonstration.

The demonstrations were conducted before a group of masons, local government engineers, academicians, local government decision makers, media, non-government organizations and the local community including women.

A monitoring system and impact analysis mechanism had been established to understand

Another feature of safer building practices is the generation of local industries and economic activities with the rehabilitation programme. A typical success story in this regard is the promotion of building centres in Chamoli, following an earthquake there in 1999.

The centre is a joint venture of the government and non-government sectors. It acts as a training conduit for the local masons leading to dissemination of safer building practices through the wider communities with appropriate incentives.

Issue dated September 2002

PEOPLE'S PERCEPTION

Dalit families from Bhuj District speak their mind

"We are poor people from Dalit community with hardly any landholding. We basically subsist on casual agriculture labour. Our houses were semi-pucca with stone and tile construction. Being large families, living in a single house was a problem. Although most of us have small pieces of land that can be used for house construction, we could not think of investing in building houses due to lack of funds. When the earthquake destroyed our houses, our names were listed in the panchayat list with two options to choose from. One, we could join the reconstruction scheme adopted by the NGOs with no options for employment of local labour as the reconstruction work was awarded to

external contractors, and the second was the government scheme.

Most of our people opted for the government scheme for number of reasons, one of them being employment for our people, as during the period of disaster, work for casual/agricultural labour was very scarce. The other important reason was the choice of designing our own houses with technical inputs from the government engineers. The housing design provided by the NGOs did not have any space for horizontal and vertical extension. Other important aspects such as provision of lofts for utensils was also not included in the design. As

we are used to living in open houses with lot of space to move about, their fixed design did not suit us. Another important reason for going for the government scheme was the consideration of social and cultural aspects while designing our own houses. This option was not available with the NGOs' reconstruction scheme.

Overall, reconstruction under the government scheme is preferred by the people of the area, and with the installments for construction being received regularly in the stipulated time, the scheme is playing a catalytic role in the overall rehabilitation process of the area and people."

Issue dated March 2002

* Case Study by BBTIE India on Beneficiary Preference across six villages.

HOUSING INSURANCE : A STEP TO TRANSFER RISK

by J.G. Pandya, Director, GSDMA

Kudos to the people of Gujarat who despite being invariably affected by natural disasters, still maintain the pride of having their state as one of the most progressive states of India. A peep into the past: Earthquake of 1956—7 magnitude on Richter Scale (RS) with epicentre at Anjar; Cyclone of 1998-Kandla; Earthquake of 2001—magnitude 6.9 on RS with epicentre at Bhuj and the list goes on and on. The estimated loss in the recent earthquake of 2001 is of the tune of Rs.15,000 cr. And if one takes into account the non-financial loss i.e. social, psychological etc. then the loss is unfathomable.

The earthquake of 2001 proved to be the last straw on camel's back and The Gujarat State

Disaster Management Authority (GSDMA) was formed to meet challenges thrown by these disasters. One sector that gets highly affected by any of these disasters is that of 'Housing'. In Rehabilitation and Reconstruction (R&R) programme, this sector got highest attention and more than fifty-percent of money allotted to R&R has been kept for it. One of the mandates of GSDMA is to prepare long term disaster preparedness, and accordingly it has prepared guidelines for retrofitting and for construction of earthquake resistant houses. These guidelines make the base to any construction activity taken up under this programme and for future too.

Leaving no stone unturned for reducing the

vulnerability of people of Gujarat to future disasters, GSDMA has gone one step ahead by planning the insurance of houses. The basic tenet behind this step was to make people self reliant without putting them under financial burden and thus reducing strain on state exchequer.

Terms and Conditions of housing insurance

GSDMA asked for expression of interest from Insurance Companies which were ready to co-insure dwellings with General Insurance Fund (GIF). The companies have been already allotted with areas for insurance. The Oriental Insurance Co. Ltd. will work in Bhachau

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(Kachchh), United India Insurance Co.Ltd. in Rajkot, National Insurance Co. Ltd. in Rapar, Patan, Mundra and Mandvi (Kachchh) and others. Apart from these, The New India Insurance Co. Ltd. has responsibility for Surendranagar and Jamnagar and IFFCO-TOKIO General Insurance Co. Ltd. for Kachchh except Mundra, Mandvi and Anjar.

One time premium for sum insured of Rs.1,00,000 is Rs.349.10 which is prescribed by Tariff Advisory Committee. Under this policy, 14 types of risk including fire, earthquake, explosion, cyclone, flood, etc are covered for a period of ten years. Premium will be paid to the companies from the third instalment of G-5 category housing assistance.

All the G-5 category houses (approximately

2.33 lakhs) would be covered under this scheme and houses under other categories like G4, G3, etc. may also insure their houses though it is not mandatory.

Modus operandi of housing insurance

Village wise list of G-5 category beneficiaries would be prepared and it will be insured under group insurance. The group-insured list would be at the Taluka office and individual beneficiaries would also be given a certificate each stating the insurance of house. These provisions have been made for the reason that people may lose their insurance certificate or may not be able to approach the insurance company for claim against loss due to disaster.

Officials at Taluka level would help such people in getting their insurance claim against loss due to disaster, with the help of Group insurance certificate. Provision of certificate to individuals has been done so that individual beneficiary could directly approach the insurance company.

Present status

When readers would be going through this article, all the five companies would have started working in the area allotted to them. Taking clue from this initiative of GSDMA, several NGOs such as UNDP have also approached GSDMA to understand the modus operandi of housing insurance so that the houses built by them also get insured. Thus, one more step for long term disaster preparedness has been made.

Issue dated July 2002

CAPACITY BUILDING: TRAINING OF PROFESSIONALS BY NCCBM

by Our Correspondent, Gandhinagar

The National Council for Cement and Building Materials recently organised a three-day training program on 'Design and Construction of Earthquake Resistant Concrete structures.' The three-day training program concluded on 11th July 2001, laid emphasis on construction of earthquake resistant structures and buildings in seismic zones of the country.

The programme also viewed to impart specialization in various fields to engineers and architects.

The training covered design principals, requirements for seismic design, codal practices, post damage assessment and retrofitting of structures.

Mr. Frank Polman, resident representative of the Asian Development Bank, inaugurated the programme. Shri M. Sahu Additional Chief Executive Officer of Gujarat State Disaster Management Authority and Director General Mr. D.B.R Rao, and other representatives of the

NCCBM were also present.

Senior project implementing officer of the ADB Mr. Alex Jorganson while addressing the participants stressed the need to implement the National Building Code and building by-laws to ensure in future safe and earthquake-resistant structures/ buildings in the country.

The programme was attended by more than 100 engineers from the government and private organisations.

Technical sessions were addressed by eminent experts from the Earthquake department of University of Roorkee, Central Building Research Institute, Central Design Organisation of CPWD, Structural Engineering Research Institute and other reputed institutes specializing in earthquake resistant construction.

At the concluding session participants expressed their satisfaction on having acquired knowledge



in the areas of design and construction of hazard resistant buildings and structures. NCCBM has also been appointed as the quality auditors by GSDMA.

NCCBM will ensure quality through checks of samples by their mobile laboratories.

This would be the first of its kind in this part of India.

This was done with a view not only to ensure quality control and quality assurance during construction of earthquake resistant buildings and structures, but also for technical audit at construction sites as well.

Issue dated August 2001 (Issue-3)

SEEING IS BELIEVING: AN IEC CAMPAIGN ON RECONSTRUCTION

by Our Correspondent, Gandhinagar



Convoy of mobiles carrying the message

GSDMA in collaboration with the Information Department and Government of Gujarat launched a massive Information, Education and Communication campaign for earthquake resistant reconstruction and retrofitting in 1,159 worst affected villages of Gujarat.

This massive campaign was launched for 15 days from 8th July, 2001. 27 teams were formed, each team comprising of officers from the Information Department, Social Scientists and trained engineers along with local officials. Two video cassettes specially prepared on Reconstruction, Repairs and Retrofitting by Dr. Rajendra Desai were screened.

The village community was informed before hand about the screening of the videos and 27 mobile vans covered 1,159 villages in 15 days. Two video films were screened and the technical aspects of retrofitting and reconstruction were explained to village community by special trained engineers. The students of Social Science Department, Gujarat Vidyapith volunteered as Social Scientists to facilitate the

two-way communication.

The drive elicited positive response villagers, from beneficiaries, NGOs etc. A wooden model was specially prepared with the help of which, the engineers demonstrated earthquake resistant construction to the

public. Mr. Dinakar Dave, a Social Worker, working in the earthquake affected area says, "It is a very good initiative on the part of the Government. The people in the villages are interested in these mobile vans and asked lot of

questions to the engineers and the team. They are interested in building safe and earthquake proof houses". The mobile vans also carried printed literature, posters and pamphlets on earthquake resistant construction, which were displayed and distributed to the village community.

The intense IEC drive launched on the principle "Seeing is Believing" created not only enthusiasm, but also lot of awareness about the need to construct earthquake resistant buildings and retrofitting techniques for safe homes.

The Information Department did a wonderful job by planning, mobilising and carrying out the drive with total commitment. GSDMA plans to launch such massive IEC campaigns in the coming months to ensure earthquake resistant construction, repair and retrofitting in the affected areas.

Issue dated August 2001 (Issue-3)



Awareness campaign through bus panels

There is a contented smile on Bhavsarbhai's face as he surveys the temporary settlement near Bhuj town. Bhavsarbhai has reasons to be satisfied.

There has been a perceptible turn around in the living conditions at the "settlement". What is more, as a member of the GIDC Action Committee, he too, could contribute to the marked improvement in the area.

A spruced up, hygienic "settlement" is what a visitor now sees. The cesspools that spread stink in the area have virtually disappeared. And from a newly constructed Bal Mandir, laughter of Children reverberate, enlivening the whole environment.

That is not all. A stream of doctors frequently visit the "settlement" and provide a healing touch to the sick. There is better mobility with more buses pressed into service.

Earlier there was no postal service. Postal services have now been initiated. There was only a wireless telephone (WLL). Now the STD and PCOs have been introduced with the support from telecom department making communication easier and faster.

As for electricity the Gujarat Electricity Board has sanctioned meters for household connections. And, with a police chowki (station) functioning

in the area, there is now a sense of security.

The current environment is in stark contrast to what prevailed in April. Earlier it was different and to improve the situation, a 27-member Action Committee including Bhavsarbhai was formed. Of the total, five were women members. The first act of the committee was to organize a rally demanding improved civic amenities. But, as the rally did little to improve matters, the committee changed its approach and began to seek solutions through dialogue.

This shift to a constructive approach led to meaningful interactions between the Action Committee on the one hand, and the newly constituted Bhuj Development Council (BDC), the Department of Telecommunications, the Gujarat Electricity Board, the Gujarat Water Supply & Sewerage Board and the Gujarat State Disaster Management Authority (GSDMA) through its camp office at Bhuj on the other.

The interactions were very productive. The two sides, acting in a collaborative spirit, brought about improvement in the working of the amenities. GSDMA funded the installation of drainage system in the area. With improved living conditions, the community embarked on the next step: Sustaining the improvement. "The Committee only needs to focus on the

maintenance of the services. The Committee and the Community is all geared up for the same" says Bhavsarbhai.

The changes created a positive impact on people. With the quality of life showing distinct improvement, Bhavsarbhai could now discern, among the people, a sense of growing "attachment" for the area.

The improvement has nudged 500 more families to move into the area where only 1300 families had moved in earlier. The development is a significant pointer to the success of Community Participation programme, a corner stone of Gujarat's earthquake rehabilitation initiative.

With a proposal for a wholesale market for the area under consideration to provide convenient marketing, the "settlement" is poised to generate additional livelihood opportunities. Bhavsarbhai and the Action Committee could not have asked for more.

There are about 4500 houses in the "settlement". The area is divided into 18 sectors based on Gnatis (communities). Of the total, the United Nations Development Programme has build 1950 houses. The various community groups have constructed the remaining houses.

Issue dated September 2002

A JOURNEY TOWARDS NEW BEGINNINGS

by V. Thiruppugazh, Joint CEO, GSDMA

We drove all the way from Ahmedabad to Bhuj. I had come here one year before, immediately after the earthquake in the first week of February 2001. I saw total devastation, nothing but rubble everywhere, people eating in community kitchens, dead bodies being pulled

out of the debris, hundreds of injured treated, complicated cases operated upon and all other painful events that follow a major disaster.

A year after, I could hardly believe my eyes. The road we traveled on was newly done and the

ride was smooth. As we entered the town, I could see it buzzing with activity everywhere. It was difficult to believe that it is the same town. There was no rubble anywhere and it was very

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clean. Yes. There were people living in tents and intermediate houses (they would start on permanent shelters immediately after the town planning is over within a month or two), but that is a sight one comes across in any city, with or without an earthquake.

One could understand that the will, grit and resilience of people contributed to this metamorphosis, but the role of government cannot be understated.

For many days, immediately after the quake, lakhs of families lived on the streets and in the open. Even those whose houses were not damaged stayed outside and ate in community kitchens. What is the single most important factor in instilling courage and confidence in the people, so that they could shed all their fears and phobias and start normal activities? It is the Government of Gujarat, together with the help of all those who extended their hands in co-operation, that brought about this metamorphosis.

The relief operations were launched on a massive scale. Power was restored within 18 hours in Bhuj, water supply within 36 hours and telecommunication and road and rail transport in 48 hours. The Bhuj airport was made ready for flights to land and take-off in just 48 hours. Thousands of doctors and paramedical staff were rushed to the affected areas. More than 5000 heavy machines, earthmovers, cutters and JCBs were pressed into service. More than 25000 civil servants and thousands of armed personnel were deputed for relief and rescue. The restoration activity which was done within 36 hours is by any means better than the international norm of 72 hours for external assistance in major calamities.

Rehabilitation packages were declared within a month and the rehabilitation program was launched within the first month. Loan

agreements were signed quickly with World Bank and Asian Development Bank in the shortest possible time, which is a record not only for the state, but also for the funding agencies. The comprehensive reconstruction program aims at not only recreating the buildings but also rehabilitation of livelihoods, human resource institutions, social rehabilitation and long term disaster management planning.

The program aims to go beyond brick and mortar to rebuild lives, hope, faith and confidence.

Recovery is a painful process. After losing one's house, shop or a family member, it is not easy to jump back to normalcy, nor be satisfied with the assistance provided by government or any other agency. When your grief becomes big, the world becomes small. It is not easy to look at things as they are, objectively, if there is too much joy or sorrow. Only a moron, with no understanding of human psyche, will ask an affected person if he is happy with the assistance provided by government for housing, or livelihood, and look for a positive reply. Truth goes beyond words and subjective expressions of satisfaction and dissatisfaction.

When one talks about the assistance provided, one should not think about only one household and say that assistance is less or not sufficient to build a house. Many aspects have to be understood and in the right perspective. Government is not compensating the loss but providing assistance for construction or repair of a damaged house. One should also keep in mind that more than 12 lakh houses are being provided assistance. The fact is that the damaged schools, health facilities, public infrastructure must also be restored. More individual housing compensation means more money, more money means more borrowing and more loans mean that future generations

have to bear the burden of repayment. So, when one looks at the issue of rehabilitation one should look at the big picture, the foreground along with the background. If one looks at the foreground only, the vision will become blurred after some time.

Time is activity. Without activity time has no meaning. Looked at this way, the time period between 26th Jan 2001 and 26th Jan 2002 does not signify the passage of only the chronological year. The time by watch between two Republic days still remain the same, but if you look at the activities done in one year, the time gap between Jan 2001 and Jan 2002 is the longest one year we have ever had in the history of Gujarat.

More than 12 lakh houses were assessed for damage and more than 11 lakh houses were disbursed an amount of Rs. 1129.25 crores.

A total of about 8.5 lakh houses have been restored, by repair and reconstruction. The figures are impressive, but still they do not convey the amount of work and struggle behind making these houses livable.

To instill confidence in the minds of people who were living outside their houses gripped by fear, more than a million pamphlets, thousands of posters, technical books and instructional manuals were prepared and distributed. Through a series of campaigns, using audiovisual shows, folk art, folk music and even jokes, an awareness was created on earthquake resistant construction and repair. Confidence followed knowledge.

In a state where there are no trained engineers and masons capable of multi-hazard resistant construction, mere awareness creation would not have done the job. Government undertook the massive job of training thousands of masons and engineers. Qualified training institutions

like NCCBM, IITs and experts from India and abroad were roped in and hundreds of training programs were launched, training manuals prepared. So far more than 27000 masons and more than 5000 engineers have been trained.

Damage assessment of 12 lakh houses through house-to-house visits, opening of 660000 bank accounts, removal of 17 lakh truckloads of rubble were all done simultaneously along with the training programs and disbursement of installments for repair and reconstruction.

The fastest way to finish a reconstruction program is to out source the activity of building from big companies who have the expertise and capacity. They would have finished the job in 6 months, wound up and disappeared, saving the government from allegations and criticism, but that would have resulted in untrained local masons and engineers without the required capacity for quake resistant construction. People would not have understood the need and method of construction for hazard resistant houses, leaving the future generation as vulnerable as ever.

Government took the hard way and opted for owner driven houses so that disaster management capacity can be built for generations to come.

Government started material banks to supply cement and steel at subsidized prices. More than a crore cement bags have been distributed, providing a subsidy of about Rs. 50 crores.

By adopting a policy of owner driven construction, government did not absolve itself of the responsibility of facilitating reconstruction of multi-hazard resistant houses - 2700 engineers were appointed to supervise the building of houses, to give technical inputs and ensure multi-hazard resistant constructions.

Assistance for major repairs and reconstruction is being disbursed in three installments to ensure houses constructed follow prescribed safety norms. The buildings are inspected at three stages - plinth, slab and after construction.

A third party quality audit is conducted through a consortium, the NCCBM (National Council for Cement and Building Materials), for newly constructed houses. Mobile testing laboratories conduct site visits to test the quality of sand, cement and other building materials used.

Government is aware that it is a mammoth task. Training, capacity building and awareness creation is being taken up on a continuous basis.

Reconstruction is the fine art of balancing between perfection and practicality. It is aiming at long term results without losing sight of immediate needs.

In order to facilitate this, government consciously evolved a three-stage strategy of providing temporary shelters, intermediate shelters and ultimately, permanent shelters. This is to facilitate the construction of relatively time-consuming, multi-hazard resistant structures, so that people can live in intermediate shelters until their permanent residences are completed.

What the Government proposes to do for the four worst-affected Municipal towns of Kachchh, viz. Bhuj, Bhachau, Anjar and Rapar, is even more ambitious. The need of a perspective beyond mere reconstruction was felt - to encompass a better and safe living environment too. Thus was born the idea of town planning involving the people, the ones with major stake in any town development process.

The prime issue faced by the authorities was whether to relocate or build in situ. More than

18 studies, including geological, geomorphologic surveys and soil data analysis undertaken in the region, reveal that urban areas of the four towns are fit for human habitation with appropriate planning and application of proper technology standards and codes.

Special area development authorities, formed for all the four towns, are setting in motion a comprehensive reconstruction effort incorporating safety, multi-hazard resistant structures, efficient planning, robust infrastructure and scope for future expansion. Such in-situ reconstruction will be done at a cost of about Rs. 470 crores.

Rs. 133 crores have been earmarked for the reconstruction and rehabilitation with improved infrastructure of other worst affected Municipal towns and corporations.

When the eye sees into the distance, one gets the big picture. Instead of rushing into short-sighted interim solutions, affected towns will benefit from long term vision and meticulous implementation to serve as models of reconstruction for the entire world. To reach such levels, adequate time frame has to be set. They will then spring up not only with new structures but with renewed hope.

While it is understood that there are miles to go, it should also be understood that a journey of thousands of miles has to be covered step by step.

We are not traveling on a royal highway. In fact, we are creating a new path as we travel.

There are issues, hurdles and surprises around every corner. Housing recovery is the toughest task in any reconstruction programme.

With our steady steps we are sure to complete our journey: the journey towards new beginnings.

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