

Investigations on a distressed reinforced concrete building and its rehabilitation

Dear Sir,

This has reference to the comments of Er. Deepak B. Dave that appeared in the discussion forum of The Indian Concrete Journal (May 2010) on the paper titled "Investigations on a distressed reinforced concrete building and its rehabilitation" by Er. Dhruva Tara *et-al* (ICJ March 2010). As a rejoinder to the comments referred to above, I am pleased to let the readers know of a similar work undertaken by me on a couple of occasions two decades back. Although I am a regular reader of the journal, I happened to miss the above paper since I was on transit from one place to another during March last. Hence my late response. The details of the work executed by me are annexed to this letter.

Way back during late 80's, I undertook renovation of two distressed columns interconnected by a beam supporting a roof slab above. These columns were jacketed by me, not with PCC but using RCC. The jackets were designed as hollow columns with their footings spreading beyond the bases of the respective distressed columns and these column jackets were joined by a beam at a level slightly lower than the ceiling level for facilitating pouring of concrete during construction. The vertical gap between the old and new beams was filled with necessary masonry construction for facilitating transfer of the forces and moments to the new beam and the jacketing columns in case the inner core fails totally and becomes inactive. This stands erect as a monument for twenty plus years without any sign of crack.

Round about the same time, I have executed jacketing work using RCC for a couple of columns supporting a small portico slab in yet another case. A first floor was constructed at this stage, besides further extension of the then existing portico slab. Unlike in the first case, the old columns under reference were not distressed ones and hence the arrangement made it possible to render both the columns active. Care was taken not to transfer new loads to the old columns over and above what they discharged previously. The additional loads added to the structure from first floor and portico slab extensions executed during renovation alone were directly transferred to the jackets. This arrangement is perfectly healthy even now. This provides ample proof that jacketing technique may come in handy as a suitable answer at such times of need.

The steel props may serve the purpose alright since these can be rendered to discharge moments also. But in any case, it renders the arrangement totally clumsy. Moreover, with any such arrangement, the structural failure sustained by the structure after construction, and the crisis management exercise undertaken later on, will stand miserably exposed to any new onlooker. But the method adopted by me, might render it appear as though the arrangement is altogether original. Moreover, hollow columns are extremely efficient in discharging moments and this advantage is totally derived with this arrangement.

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The authors' reply

The authors thank Er. V. Sundararajan for the keen interest in our paper and for sharing the experiences.

Jacketing of columns is an effective technique to rehabilitate reinforced concrete structures as mentioned by Er. Deepak B. Dave and Er. Sundararajan. It is deployed widely for its effectiveness and simplicity. However, it is essential to ensure positive connection between the inner column and the new structural system.

Er. Sundararajan mentioned filling up the gap between old and new beams by masonry to transfer the load. Loads normal to the layer axis can be transferred by the infill. It is a common practice in American countries to fill up such gaps with stiff epoxy mortar by ramming into the space. The transfer of moments is ensured by fixing adequate reinforcement in the holes drilled into old and new structural segments.

The authors are happy that Er. Dave and Er. Sundararajan emphasise the need to transfer loads effectively to the new segments cast to ensure safety even when the old segments fail completely. In the absence of adequate reinforcement connecting old and new segments, only


axial forces can be transferred to the new segments cast but not moments and shear forces. The structure will be adequate for gravity forces, but lateral forces (wind and seismic loads) that induce moments at the beam-column joints cannot be transferred to the new segments. These aspects are to be considered in rehabilitation and retrofitting of structures.

Thanking you,
Yours sincerely,

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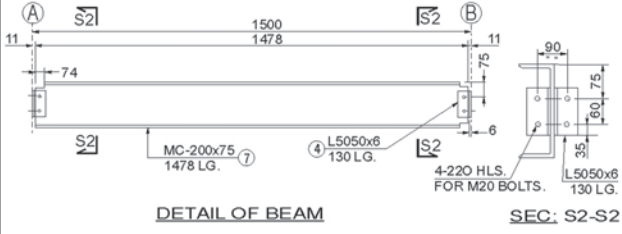


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