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| Structural crack propagation of the building main column and beams at basement | |
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|  | C:\Users\User\AppData\Local\Microsoft\Windows\INetCache\Content.MSO\26CDC254.tmp |

To rehabilitate the area below are our recommended approach and that need to be included in the scope of the work.

1. Since the concrete has been significantly damaged with its reinforcement rusted significantly, additional columns will need to be introduced to reduce the loads on the existing beams. This can be done using either steel H columns or even concrete columns.

2. Before the columns are added the beam will need to be rehabilitated by first removing the bad concrete and reinforcement and replacing it with new concrete and new reinforcement. For the beam it may be necessary to use either shotcrete or SCC poured through a hole.

3. The new reinforcement added to the beam must be connected to existing good quality concrete. This can be done by using anchor bolts or by drilling and then casting in rebar using high strength mortar. These anchors will then be tied with the new reinforcement.

4. The existing column should also be repaired. The damaged concrete and reinforcement should be completely removed and new reinforcement to be added around the column tied to anchor bolts or anchored bars. We recommend to use T10 bars at 150mm c/c for shear links minimum and longitudinal bars to be T16 minimum for both beams and columns. It should be noted that the damage should be repaired all the way up to foundation. Furthermore any newly added column must reach the foundation depth and must have a new footing to support the loads.

5. Similarly the damaged slabs should also be repaired.

6. Before any repair works are executed the damaged area will need to be temporarily supported using GI pipes or steel H columns. These must be spaced very close together and must have a stable base.

7. The area will need to be fully inspected and any masonry wall, service pipes, or other structures should be removed / rewired before repair works on the RC structure is executed.

8. Because the damage is so extensive I also suspect the quality of concrete may have deteriorated in other parts of the basement and also the building, particularly areas hidden from view. We recommend a thorough inspection of the entire basement (and building if necessary) and if damage is found elsewhere those damages must also be repaired.

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| **Quantification of area affected** | | | | |
| Premises: IGMH | |  |  |  |
| Structural Crack of Beam and Column | |  |  |  |
| No | Sizes | Qty | Unit | Remark |
| 1 | Beam |  |  |  |
| 1.1 | 300mm\*250mm\*13ft | 2 | Nos |  |
| 1.2 | 300mm\*250mm\*17ft | 1 | Nos |  |
| 2 | Column |  |  |  |
| 2.1 | 600mm\*600mm\*12 ft | 1 | Nos |  |
|  |  |  |  |  |
| Note: | Most critically affected area has been quantified and it might vary upon the intensive inspection of the root cause analysis. Also, the slab area needs to be quantified during the site visit. | | | |