



Report For: 50 Dunboyne Road
CCUK Project ID: [REDACTED]
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The Brief: We have been contacted by Mike Smith from Lesli Drew consulting engineers and surveyors for advise on strengthening of raft slab at 50 Dunboyne Road. Mike is working on behalf of Whymark and Moulton on instructions of London Borough of Camden.

50 and 51 Dunboyne Road are maisonette flats occupying part of the ground and first floors of a linear four storey block of 16 similar flats built in the late 1960's; eight flats occupy the lower two floors and eight the upper two. The block is about 52m long (N-S) and 8m wide (E-W). The floors are split -level (reflecting a slight rise in ground levels to the west, perpendicular to the north-south axis of the block. The construction comprises load-bearing dense concrete block cross party walls and timber intermediate floors. The roof is presumed to be reinforced concrete, as is the party floor at second level.

The whole development is grade 2 listed.

No 50 at the southern end of the block has sustained quite extensive Category 2 damage. The pattern of damage is directly consistent with settlement of the end wall relative to the main body of the building. Lesser similar damage is also present in the adjacent flat at no 51.

An over-arching factor is that this end of the development was built directly over a Victorian rail tunnel. The portal is only about 25m or so to the east. At this position so close to the portal, the tunnel construction was probably cut and cover. The depth to the tunnel crown is unknown (it's probably about 2m, maybe even less). A void has opened beneath the end of the building extending about 2.5m back from the end wall.

The ground floor 600 mm thick RC raft is assumed to be cantilevering over the underground railway tunnel and generates hogging moment.



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We have been asked for advice on strengthening the slab for additional hogging moments generated in slab. The engineer has provided the information related to the slab and loads.

Our Assessment: We have reviewed the information provided and based on this we have carried out our preliminary assessment. Within this we have used following information/assumptions:

- The strengthening is required at raft.
- The span of strengthening is around 13.0 m.
- The total width of area is 6.0 m.
- The existing slab is 600 mm thick.
- The grade of concrete is 35 MPa
- The grade of steel is assumed to be 400 MPa.
- The analysis is done using section analysis method.
- FIBRWRAP CFRP STRENGTHENING SYSTEMS is designed to provide additional moment of resistance.
- The slab is assumed to be safe in serviceability and fire limit state loading without any strengthening.
- Concrete cover is assumed to be 30 mm.
- The screed above raft is 75 mm which will be removed for application of FRP.
- Fibre Anchors will be used to transfer strengthening from one room to another without any need to taking the block masonry wall down.

Our Proposal: We have done a preliminary assessment based on information provided and assumptions made. Based on our assessment we found that it is feasible to strengthen the raft with Fibrwrap strengthening systems. Our proposal is as following:

- **(a) Using Fibrwrap CFRP (Wrap) strengthening system:** The total generated hogging moment is 860 KN-m/m and the moment of resistance of slab with Y 20 bars @ 150 c/c is found to be around 370 KN-m/m. We found that the raft will require 5 layers of Fibrwrap CFRP strengthening system to achieve this moment of resistance. As the strengthening is required to pass through the block masonry wall, we propose to use Fibrwrap CFRP anchors 1.25" diameter and 1.30 m long. This will save us taking the wall/blocks of wall down for passage of FRP.
- **(b) Using Tyfo Fibrwrap CFRP plates (200 GPa):** This option of strengthening requires application of Tyfo Fibrwrap plates 2.80 mm thick @150 mm c/c. The width of plate is 100 mm and 2 plates will be stuck together to get the required thickness. The plates will be required to pass through the wall so we will need access through wall in form of removal of wall or alternative blocks to continue the strengthening system.
- **(c) Using Tyfo Fibrwrap Ultra High modulus (460 GPa) plates:** This option of strengthening requires application of Tyfo Fibrwrap plates 2.0 mm thick @250 mm c/c. The width of plate is 100 mm. The plates will be required to pass through the wall so we will need access through wall in form of removal of wall or alternative blocks to continue the strengthening system.



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