STRUCTURAL ENGINEERING DESIGN STATEMENT
FOR
PHASE 6, SMITHFIELD, NORTHERN QUARTER, MANCHESTER
FOR
MUSE DEVELOPMENTS

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1.0 Description of the structure

In general, the building consists of a split level mixed use development. The east wing consists of a total of three residential floors with ground floor retail and basement car parking. The west wing consists of nine floors of residential with ground floor retail and basement car parking. The site is encompassed on all sides by private and adopted roads / footways.

The main frame of the building is intended to be a flat slab insitu concrete construction, using rectangular columns for vertical support and lift / stair cores & walls for horizontal stability against notional and wind loadings. At roof level, typically these areas are also designed as flat concrete slabs due to the presence of plant and external terraces, although in general flat roof areas these are intended to be constructed in lightweight construction.

The building will be designed / detailed against the effects of disproportionate collapse with each slab/column connection designed against the appropriate shear and tension values as specified in BS5950-1. It will ultimately be the responsibility of the main frame designer to ensure the compliance with the required documentation, although the performance documentation will clearly highlight the requirements.

The building will be supported directly onto piled foundations taken down to the underlying sandstone rockhead. The proposals are to utilise a CFA type pile in order to mitigate vibration on the basis of the city centre location.

Around the perimeter of the building sheet piling is to be utilised to form the basement walls. These are to be designed to allow for nominal vertical loading whilst also accounting for all horizontal earth pressures, water pressure and imposed loading. The wall will be designed to comply with all statutory undertakers and MCC Highways requirements.

It is anticipated that the perched water table is relatively high and thus localised dewatering will likely be required during construction.

2.0 Vertical Loading

The loading from all floors is transferred to the columns via the flat slab plates. The reinforcement content within the flat slabs will allow sufficient stiffness to restrict the vertical deflections to within allowable limits, whilst also transferring all vertical forces into the columns below. Typically all columns line through the building thus transferring all vertical loadings direct to the foundations which then transfer the loadings into the piles which act in friction and end bearing to resist these high loads. In isolated locations, columns do not line through the building and thus it is necessary to provide transfer beams in order to redistribute the vertical loadings into the adjacent columns. Such instances are isolated only, with the majority of the structure requiring no transfer.

The retaining walls to the perimeter not only supports the adjacent ground but are also designed to take the applied vertical loading from small sections of ground floor slab / external areas. However, the sheet piled wall will be designed to take only this nominal loading, with the wall being located in isolation to the main frame columns in order to avoid significant vertical loadings being transferred to the sheet piled wall.

3.0 Wind Loading

The concrete frame has been designed to carry all horizontal wind loading via the lift cores and walls as cantilevers. Floor plates will act as stiff diaphragms to transmit all wind loadings through the floors and into the cores and walls. The cores will resist all loading through the shear action of the walls, transferring the load direct to the foundations as horizontal and bending moments. The foundation base then transfers this loading as a series of vertical and horizontal loads to the piles.

Any notional horizontal loadings will naturally be checked to ensure that they can also be resisted by the walls and thus within the design limits of the building.