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Wednesday 27 February 2019
Job number SY182224

Sikh Grammar School
c/ PMDL Architecture & Design
17/124 Walker Street
North Sydney 2060 NSW

Dear Sir/Madam,

Sikh Grammar School
Structural letter in support of SSDA

We, Northrop Engineers, being professional engineers, confirm having been involved in the master-planning phase of the above project. We write in support of the proposed masterplan scheme for Sikh Grammar School.

We have provided structural advice throughout the master-planning phase of this project and have worked closely with PMDL to determine optimal and reasonable structural solutions. We confirm that there are logical and economic structural solutions to the architectural proposal presented.

We provide the following as an overview of the proposed structural systems for the Schematic Masterplan:

- **Gurdwara, Langar, multi-purpose hall and associated forecourt and basement**

  The gurdwara, langar and multi-purpose hall incorporate a suspended podium slab which is constructed over a basement car parking level.

  The basement will be constructed as a slab on ground suitable for light vehicles, with basement walls being constructed as formed concrete walls (Dincel, AFS or equivalent) installed under batters. We do not anticipate the shoring will be required for the installation of the basement. We also do not anticipate that hydrostatic tanking will be required to the basement or the basement walls.

  The podium slab will form the forecourt area as well as the ground floor of the Langar and entry foyer. The outdoor portion of the podium will be subject to overland flow and as such will require careful and considered coordination with the civil, hydraulic and landscape disciplines. The podium slab will be constructed as a post-tensioned slab which will transfer column and wall loads as required to suit the column locations above and below the podium.

  We advise that there will be a number of construction and movement joints located across the podium slab to assist in the construction staging and realistic pour sizes. These will be fire-rated and water-proofed using a suitable sealant system.

  The multi-purpose hall and Gurdwara form the first suspended level above the podium slab. This slab will be constructed as a post-tensioned slab supported on an agreed layout of columns. Tiered seating and structural framing for partitions will be constructed off the Level 1 slab using structural steel.

The roof framing for the Gurdwara is proposed to be structural steel portal frames or trusses as required, the roof and wall framing will be constructed off the Level 1 slab.

We have considered the lateral stability of the building and propose to utilize a sway frame structure, whereby concrete columns and walls form the main lateral stability system. Above Level 1 the structural steel portal frames will provide the lateral stability for the roof structure.

The façade is understood to be the most important component of the entire masterplan. We consider that a structural steel framed façade is a suitable solution. This framing would be connected to the edge of the Level 1 slab and then horizontally restrained at the roof pitching point. This would need to be coordinated with the hydraulic engineer and the architect to confirm the eaves and edge details are consistent with the architectural intent of the façade.

- **Bridge link and library (major link between primary and secondary school buildings)**

The bridge link is an elevated walkway with minimal supporting columns to minimise interference to the civic heart at the ground level. Concrete columns are in the order of 900mm in diameter in order to take the required increased loads and provide for lateral stability of the bridge link.

The bridge link slabs will be post-tensioned beams and slabs, with a higher imposed loading to accommodate the additional loads for library storage and the thoroughfare nature of the bridge link.

An additional link to the Gurdwara off the side of the bridge link will likely be constructed out of structural steel beams or trusses.

It is anticipated that there will be permanent movement joints at both ends of the bridge link to the primary and secondary schools. This will both facilitate staging and reduce the likelihood of cracking due to movement of the structure over time.

- **Primary school**

The primary school is a multi-storey classroom building incorporating classrooms, amenities and breakout spaces. The block is proposed to be a typical concrete framed building, with concrete columns, post-tensioned flat plate concrete slabs and a steel framed roof or light gauge trusses if the architecture permits.

The eastern end of the building is suspended over the basement noted above. This portion will also be post-tensioned and likely be poured as a part of the podium slab pours. This feature will necessitate jointing at the ground floor level but this jointing will not be required to carry through the height of the building

We have considered the lateral stability of the building and propose to utilize lift and stair cores and shear wall elements, whereby cores and shear walls form the main lateral stability system. Above the top level the roof framing will be braced back to the top floor slab with cross bracing within walls as required.

- **Secondary school**

  The secondary school is a multi-storey classroom building incorporating classrooms, amenities and breakout spaces. The block is proposed to be a typical concrete framed building, with concrete columns, post-tensioned flat plate concrete slabs and a steel framed roof or light gauge trusses if the architecture permits.

  A small portion of the building is suspended over an entrance to the basement noted above. This portion will be a reinforced concrete suspended slab.

  We have considered the lateral stability of the building and propose to utilize lift and stair cores and shear wall elements, whereby cores and shear walls form the main lateral stability system. Above the top level the roof framing will be braced back to the top floor slab with cross bracing within walls as required.

- **Boarding house**

  The boarding house incorporate a three suspended levels constructed over a basement car parking level, which is constructed into the slope of the site, such that the first suspended level is at the finished village green level.

  The boarding house is proposed to be a typical concrete framed building, with concrete columns, post-tensioned flat plate concrete slabs and a steel framed roof or light gauge trusses if the architecture permits.

  There may be a requirement for a small level of transfer for columns over the top of the car parking area as may be required to suit the column locations within the carparking areas

- **Early learning centre**

  The early learning centre is proposed to be a typical concrete framed building, with concrete columns, post-tensioned flat plate concrete slabs and a steel framed roof or light gauge trusses if the architecture permits.

  The roof-top play area is proposed to be post-tensioned concrete and will require to be specially waterproofed.

Other general considerations

- It is likely that all buildings will be built off piled footings, though this will need to be confirmed by geotechnical investigations. Depending on the ground conditions piles could be bored piles or group screw piles

- Geotechnical and environmental reporting will be required early in the design process. This will confirm the footing system for the buildings and will likely inform the requirements relating to the earthworks to the. This will provide guidance on retention of spoil on site, potential acid sulphate soils issues and other potential contamination issues

- Options exist to explore alternative structural arrangements including larger levels of offsite fabrication. These options included Cross Laminated Timber (CLT) framing, precast and prestressed products such as Hollowcore slab panels or structural steel composite framing. We have provided what we believe to be the most cost effective options for the Sydney market above, however there may be an appetite to utilize other progressive forms of construction

- Retaining walls and other bespoke landscape elements will be coordinated and detailed in consultation with the architect and landscape architect

We remain available to provide additional structural advice as required in support of this application.

Yours sincerely,

Rodney Pratt
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Associate / Structural Engineer
On behalf of Northrop Consulting Engineers Pty Ltd

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