An Triantán, Station Road Housing, Kildare

Part 8 – Structural Basis of Design Report

Kildare County Council

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Executive Summary

The report outlines the Structural basis of the design strategy for the 30-unit housing development at Station Road, Kildare and forms part of the Part 8 submission package. The structural strategy for the development is a precast roof and floor panels supported on traditional masonry wall construction and assumed shallow concrete trench foundations. Additional secondary steelwork will be required in several areas to support any openings, walls above and resist wind loads where limited masonry returns are provided.

The construction of 30 social housing units to include:

- 5no. 3 bedroom two storey duplex apartments;
- 1no. 3 bedroom three storey house;
- 2no. 2 bedroom two storey houses;
- 2no. 2 bedroom single storey apartments;
- 4no. 2 bedroom 3 person single storey apartments;
- 6no. 2 bedroom two storey duplex apartments;
- 10no. 1 bedroom single storey apartments;

The construction of ancillary structures to include:

- ESB substation;
- Switchroom;
- Secure cycle storage rooms;

Associated site works to include:

- Demolition of 2no. existing cottages and associated ancillary structures on Station Road;
- Erection of new boundary treatment to south, east and north boundaries;
- New vehicular and pedestrian entrance from Station Road;
- 26no. vehicle parking spaces
- Of which 6no. provided with EV charging points
- 54 no. residents' bicycle parking spaces
- Of which 4no. suitable for adapted cycles/cargo bikes
- 16no. visitor bicycle parking spaces
- Of which 4no. suitable for adapted cycles/cargo bikes

New landscaping, internal vehicular and pedestrian shared surface route, public lighting, site drainage works, ancillary site services and development works above and below ground.

Contents

1.0

Structural Engineering

1.0 Structural Engineering

1.1. Overall Structural Strategy

The residential unit type has typically three stories. All the unit types are sufficiently similar such that the same structural strategy can be applied across the whole scheme with limited variations in structural sizes to suit specific geometry. Outline structural drawings for the typical unit types have been developed, with the overall strategy outlined in the below sections.

1.2. Geotechnical Engineering

Site investigation works took place on 20th June 2024, undertaken by IGSL. The geotechnical report was issued 11th September 2024, titled "*25468_An Triantan_IGSL GIR 11-09-24*".

The findings of the ground investigation works show the presence of firm to stiff clay beneath varying depths of made ground (up to 1.5m). A foundation solution of shallow strip footings and ground-bearing slabs will be used across the site, with localised areas of mass concrete beneath strip footings where required to reach competent natural ground.

It has been noted that Japanese knotweed exists on the site which is undergoing treatment. The overall strategy for treatment or removal is currently being detailed by others

1.2.1. Substructure Strategy

Given the scale and loading of the proposed development, the foundation solution is shallow, ground bearing, and strip footings, with mesh reinforcement on the top and bottom. Mass concrete will be used beneath strip footings in localised areas where additional depth is required to reach competent natural ground.

A mesh-reinforced ground-bearing concrete slab will be appropriate for the ground floor slabs.

1.2.2. Superstructure Strategy

During Stages 2 and 3, we have been exploring several structural solutions such as the use of CLT. However, following dialogue with the market and the minor variations in the blocks this may not be cost-effective so the base scheme design for houses is load-bearing masonry for the external walls and internal walls where support is required for the structure above. For this design, precast concrete floor slabs will be used for the first and second floors and the flat roofs. Stability will be provided by returns on the masonry walls acting as buttresses, and the precast floors will provide restraint to the walls at floor levels. Wind posts will be provided to break up the length of masonry panels, where required.

Following a review with a precast supplier, access openings within the roof have been sized to limit the requirement for additional structural support. This will be confirmed following final confirmation of roof loading due to unknown attenuation and PV requirements at this stage which may result in blue or green roofs.

This philosophy has been indicated in the current structural drawing set.

1.2.3. Key Structural Design Issues

Due to the location and size of the development, multiple boundary conditions are encountered. This discussion evaluates the most critical anticipated conditions and their implications.

Under the current proposed scheme, multiple new walls are positioned alongside the boundary line. In certain instances, the boundary itself includes a boundary wall, while in others, there is an existing building wall, such as the Sherry FitzGerald building wall. The design approaches taken for resolving these two scenarios vary and are indicated below and will be developed further once additional information is known:

- New structure adjacent to the existing building (Sherry FitzGerald building, off Station Road). A retaining wall will be required to avoid undermining the existing building, see Figure 4-1 below.
- New structure adjacent to boundary wall. The construction of a new structure could be resolved either by underpinning the existing wall, see Figure 4-2 below, or by including a temporary retaining wall, similar to the solution indicated previously.

A different scenario occurs between the backyard gardens of the proposed development and the neighbours' gardens, where boundary walls are not currently present and there is a level difference of circa 1m. In these cases, a new planter is proposed, which is to be formed with in-situ concrete walls. Alternatively, a vegetated retaining wall may prove to be a beneficial solution in this context and is suggested for consideration, as illustrated in Figure 4-3 below. Where there are no level or limited level changes a masonry wall will be used. The final solution for this is to be developed following receipt of survey information.

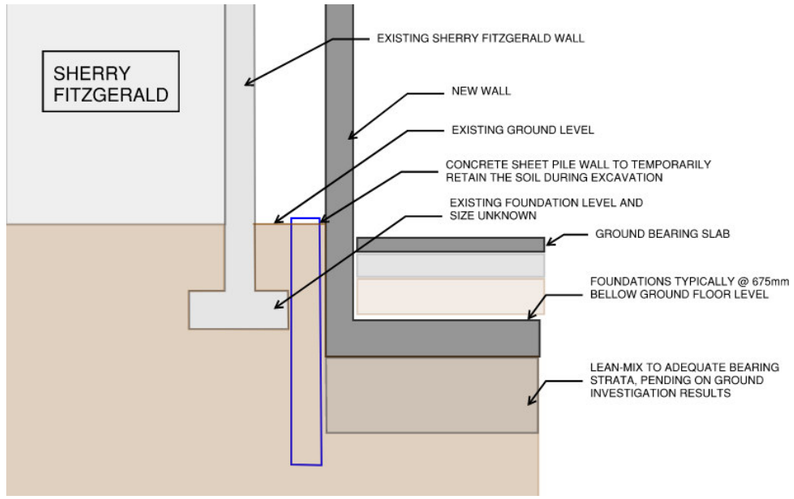


Figure 4-1: New wall adjacent to the existing building

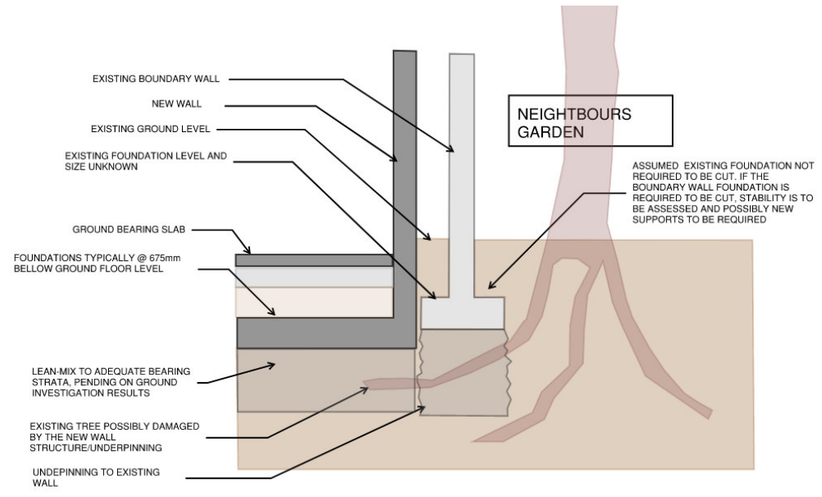
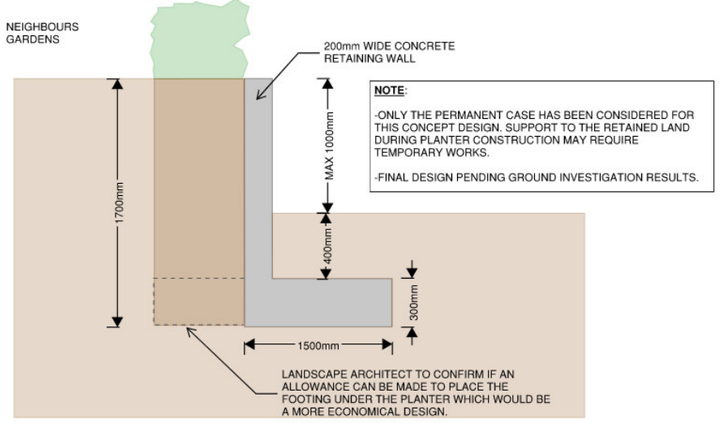


Figure 4-2: New wall adjacent to the boundary wall



https://www.gravitasint.com/products/flex-mse-vegetated-wall-system

OPTION 2 : VEGETATED WALL SYSTEM

Figure 4-3: Boundary condition with planter

The proposed scheme requires the demolition of the cottages situated adjacent to Station Rd. These cottages are presently attached to the Sherry FitzGerald building mentioned earlier. The method of connection between these two buildings is currently unknown, and as a result, it is uncertain whether any repairs will be necessary for the Sherry FitzGerald building after the demolition. Additionally, the current condition of the wall is unknown, but it is expected that some form of repair to this wall will be required. We would request that a trial pit be undertaken during the cottage demolition to assess the existing foundation details of the cottage.

1.3. Codes and Standards

The following standards are used for the design of the structure;

Table 4-4 - Design Codes

IS EN 1990	Eurocode 0 - Basis of Structural Design
IS EN 1991	Eurocode 1 – Actions on structures
IS EN 1992	Eurocode 2 – Design of concrete structures
IS EN 1993	Eurocode 3 – Design of steel structures
IS EN 1995	Eurocode 5 – Design of timber structures
IS EN 1996	Eurocode 6 – Design of masonry structures
IS EN 1997	Eurocode 7 – Geotechnical design
	Irish National Annexes to all codes

1.4. Loading

The Stage 3 design has been based on the following loadings;

1.4.1. Permanent Actions

Self-weight of materials is determined in accordance with IS EN 1991-1-1 Annex A and as noted in the table below:

Material	Material unit weight (kN/m³)
Normal-weight reinforced concrete (allowing for normal percentage reinforcement)	25
Normal weight unreinforced concrete	24
Steel	78.5
Solid blocks	20

Table 4-5 Material Densities

1.4.2. Variable Actions

Imposed loading on the structure is determined in accordance with IS EN 1991-1-1.

	Imposed Area Load (kN/m²)
Cat. A1 – Areas for domestic and residential activities – floors	1.5
Cat. A1 – Areas for domestic and residential activities – balconies/terraces	2.5
Cat H – Roofs not accessible except for normal maintenance and repair	0.6

Table 4-6 Variable Vertical Loading

1.4.3. Snow loads

In accordance with IS EN 1991-1-3.

1.4.4. Wind loads

In accordance with IS EN 1991-1-4.

1.5. Additional surveys required and points of concern

The following surveys will be required to finalise the Stage 3 design:

- Slit trenches to confirm GPR survey results over critical services / junctions.
- Updated topographical survey following site clearance.
- Confirmation of levels in neighbouring properties / gardens.

The items indicated below are the main points of concern at this stage of the project, although none of these are considered critical and can be resolved in the next stages of the design.

- Boundary solutions around the site perimeter.
- Unchartered services on the site.
- Slit trenches to confirm details of the foundations to Sherry Fitzgerald
- Demolition and retention of the existing building.

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