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Report

On the Condition

of the

Existing Boundary Wall

at

Day Care Facilities

Seamus Quirke Road

Galway

March 2022

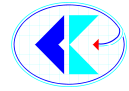
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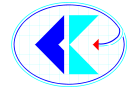
Directors:
Brian Coyle BE CEng MIEI MStructE
Tadhg Kennedy BE MEngSc CEng MIEI MStructE





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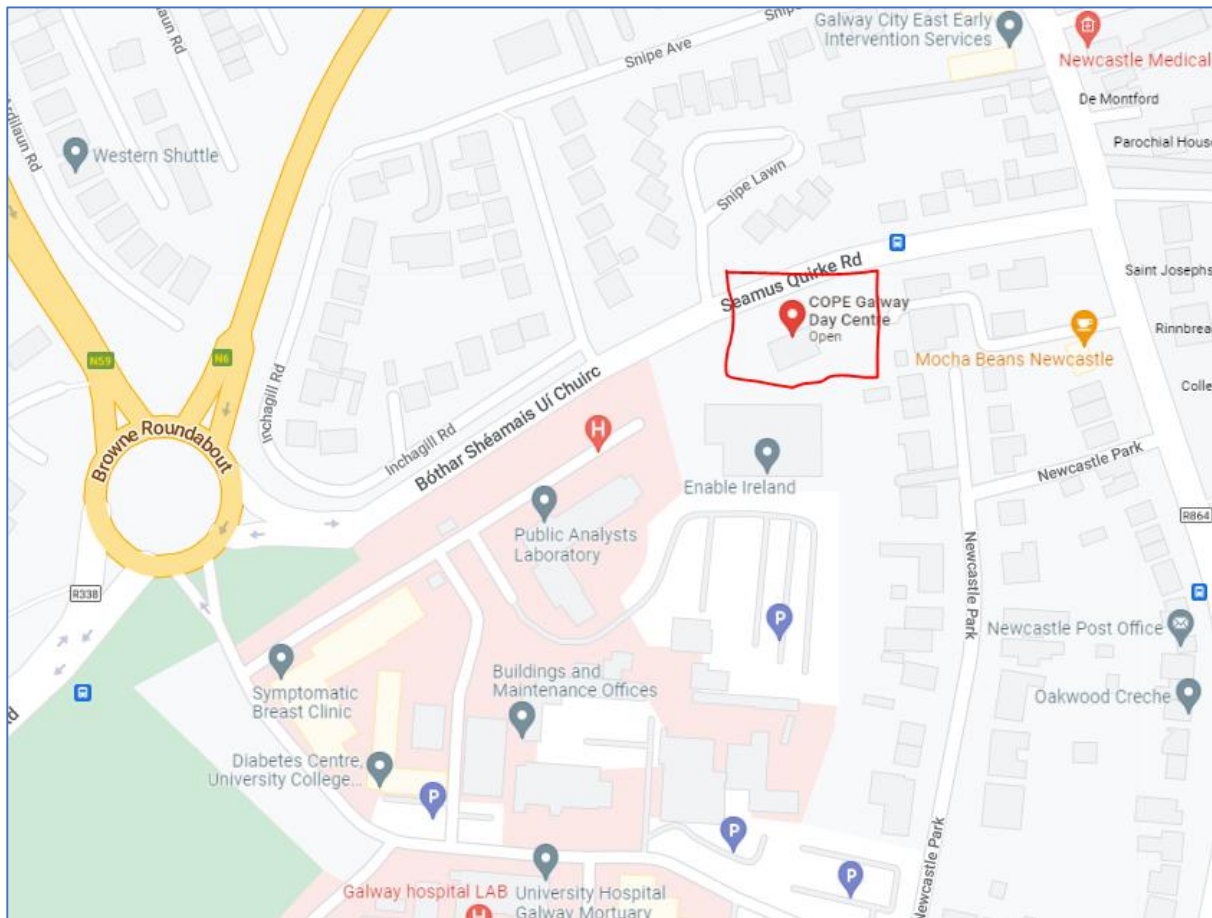


Introduction

Coyle Kennedy was requested by Galway City Council to prepare a structural assessment of the existing boundary wall (above ground level) at the Day Care Facilities (Cope), Seamus Quirke Road, Galway. A site visit took place on the 23rd of November 2021 to review the structural characteristics of the wall.

Location

The site is located in a built-up sheltered area on the South Side of Seamus Quirke Road between the Browne Roundabout and Newcastle Road.



Site Location Map – Google Maps

Boundary Wall Type

The existing Boundary wall is constructed from Masonry Blockwork Panels and Piers. Its height above ground varies from 1m - 2.6m with intermittent masonry piers and expansion joints generally every second pier. The masonry wall is constructed with 100mm block on edge. Most of the piers are constructed with 450mm masonry block on flat with expansion joints at every other pier. Some piers are smaller than 450mm deep. The boundary wall is constructed above what appears to be a masonry retaining wall on the East boundary of the site. No assessment can be made of the retaining element of the wall as to its structural integrity thickness or actual height as its below ground and inaccessible.

Site Survey (PK Survey)

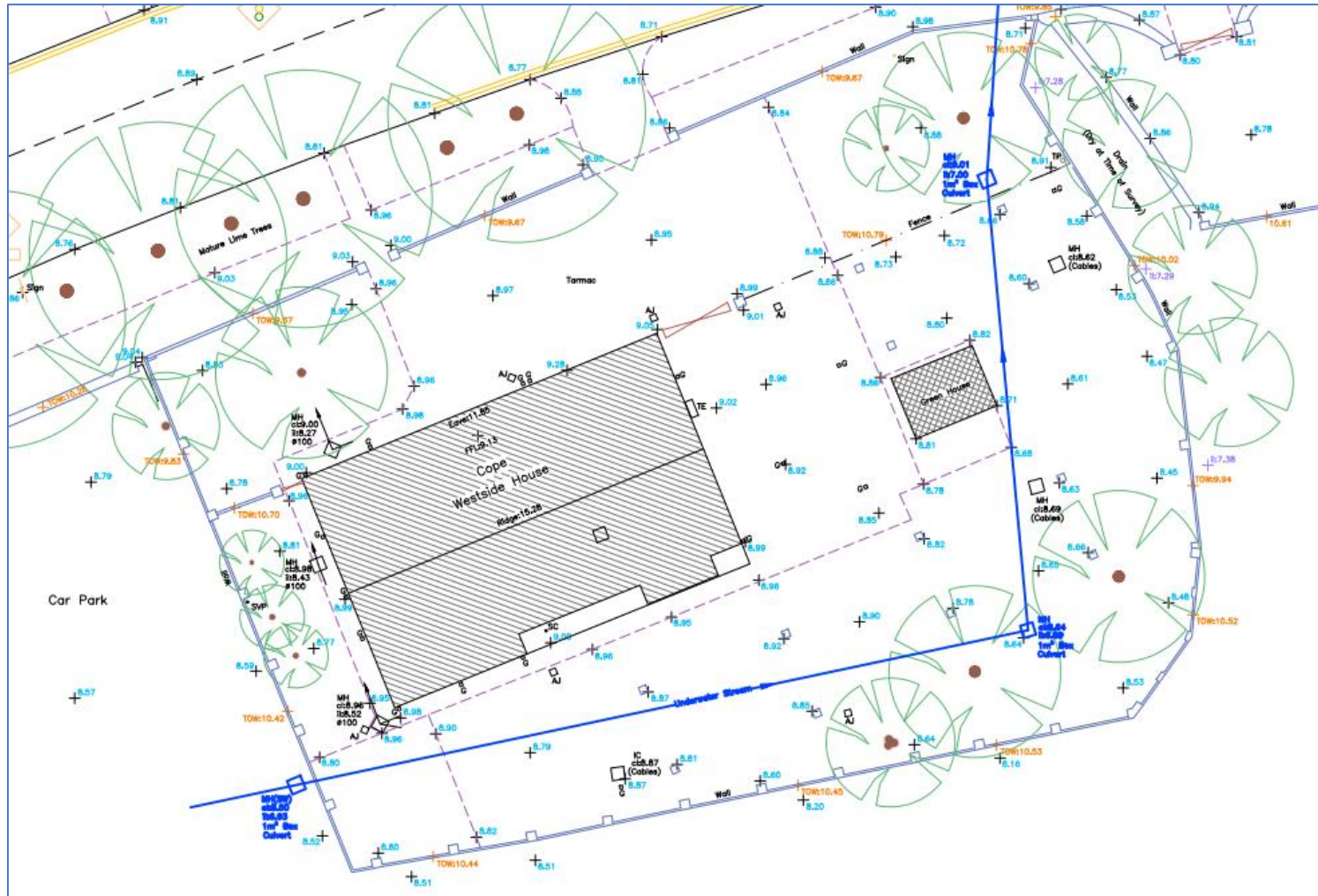
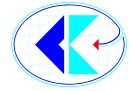
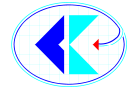


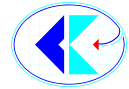
Fig 1. Site Survey Drawing Indicating Existing Building, Site Boundary Wall with Piers and Underground Culvert



Photographs of Boundary Wall (November 2021)







Site Characteristics, Shelter Factors and Free Standing Wall Zones

The site characteristics are considered in terms of elevation, shelter and the direction of the wind loading when assessing various lengths of boundary wall. Shelter factors in the form of walls and fences upwind can be considered and are significant in terms of the effect of reducing the wind loading. The code of practice recognises that free ends of boundary walls and sudden changes in direction of the wall (corners etc) all imply a greater wind loading acting on the wall at such locations. The code of practice states that Shelter factors (in the form of walls or fences) should not be applied to the free end of a wall. Sheltering from trees, hedges etc (while beneficial) is silent within the code of practice and therefore are ignored in this assessment.

Extract from EN 1991-1-4

EN 1991-1-4:2005 (E)

7.4.2 Shelter factors for walls and fences

(1) If there are other walls or fences upwind that are equal in height or taller than the wall or fence of height, h , under consideration, then an additional shelter factor can be used with the net pressure coefficients for walls and lattice fences. The value of the shelter factor ψ_s depends on the spacing between the walls or fences x , and the solidity ϕ , of the upwind (sheltering) wall or fence. Values of ψ_s are given in Figure 7.20.

The resulting net pressure coefficient on the sheltered wall, $c_{p,net,s}$, is given by Expression (7.6):

$$c_{p,net,s} = \psi_s \cdot c_{p,net} \quad (7.6)$$

(2) The shelter factor should not be applied in the end zones within a distance of h measured from the free end of the wall.

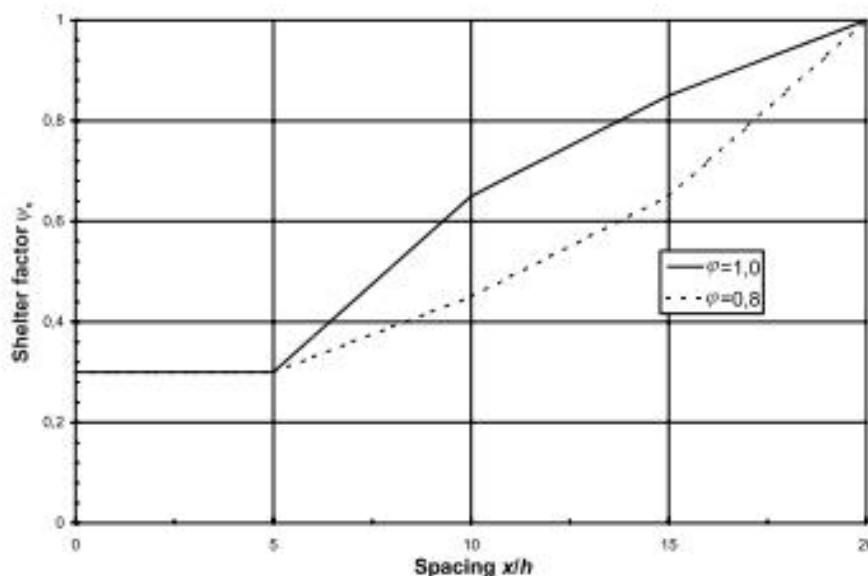
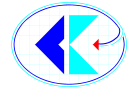


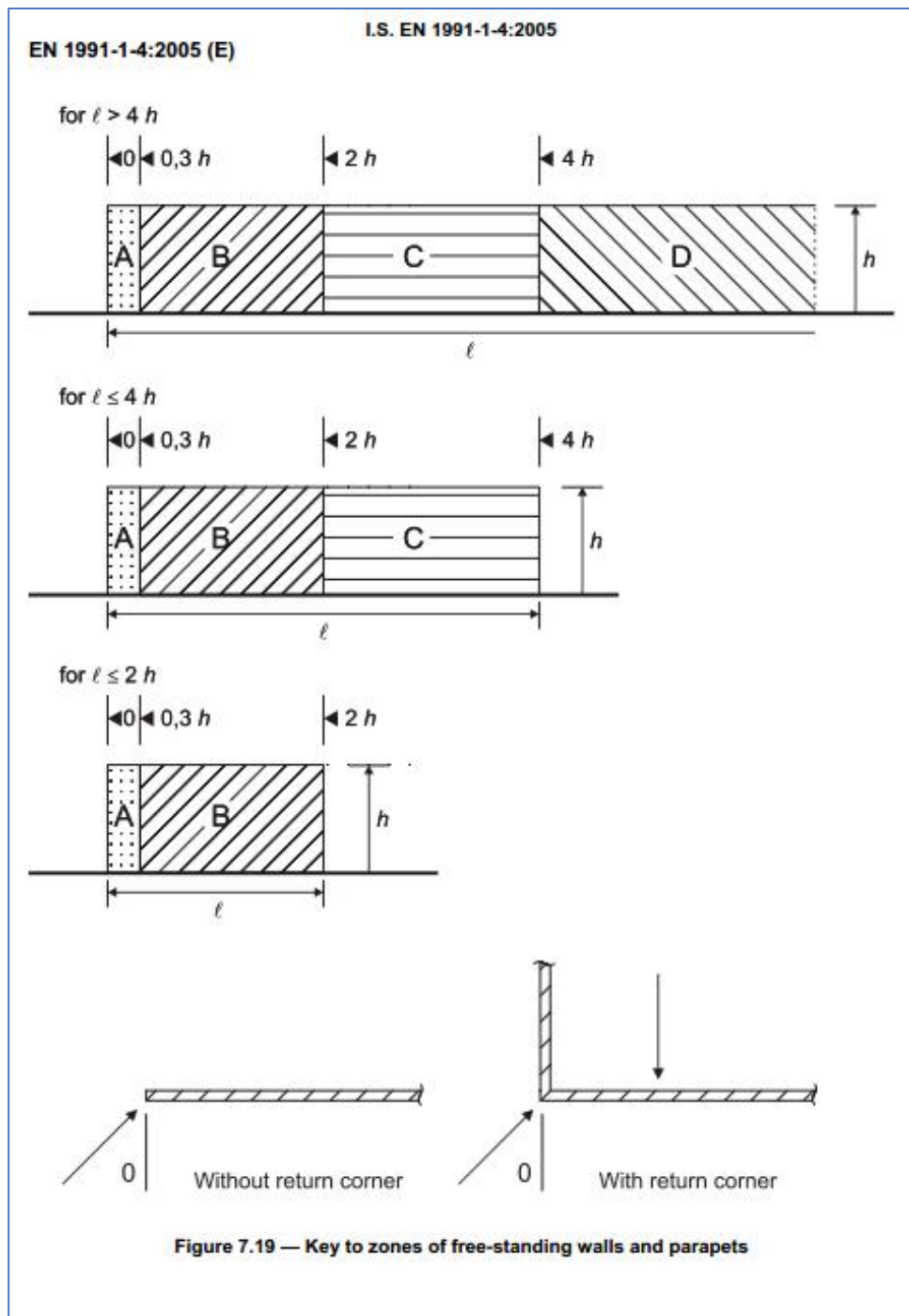
Figure 7.20 — Shelter factor ψ_s for walls and fences for ϕ -values between 0,8 and 1,0



The masonry boundary wall will therefore be considered to be Sheltered from Wind by walls and fences and buildings from Wind blowing from the South and East but not from Wind blowing from the West as it is bounded by an open surface carpark on the West.

Free Standing Walls Zones

The code of practice identifies various zones along the length of a free-standing wall where various pressure coefficients can be applied. The following figure 7.19 identifies the various zones that existing along a free standing wall where various pressure coefficients apply.



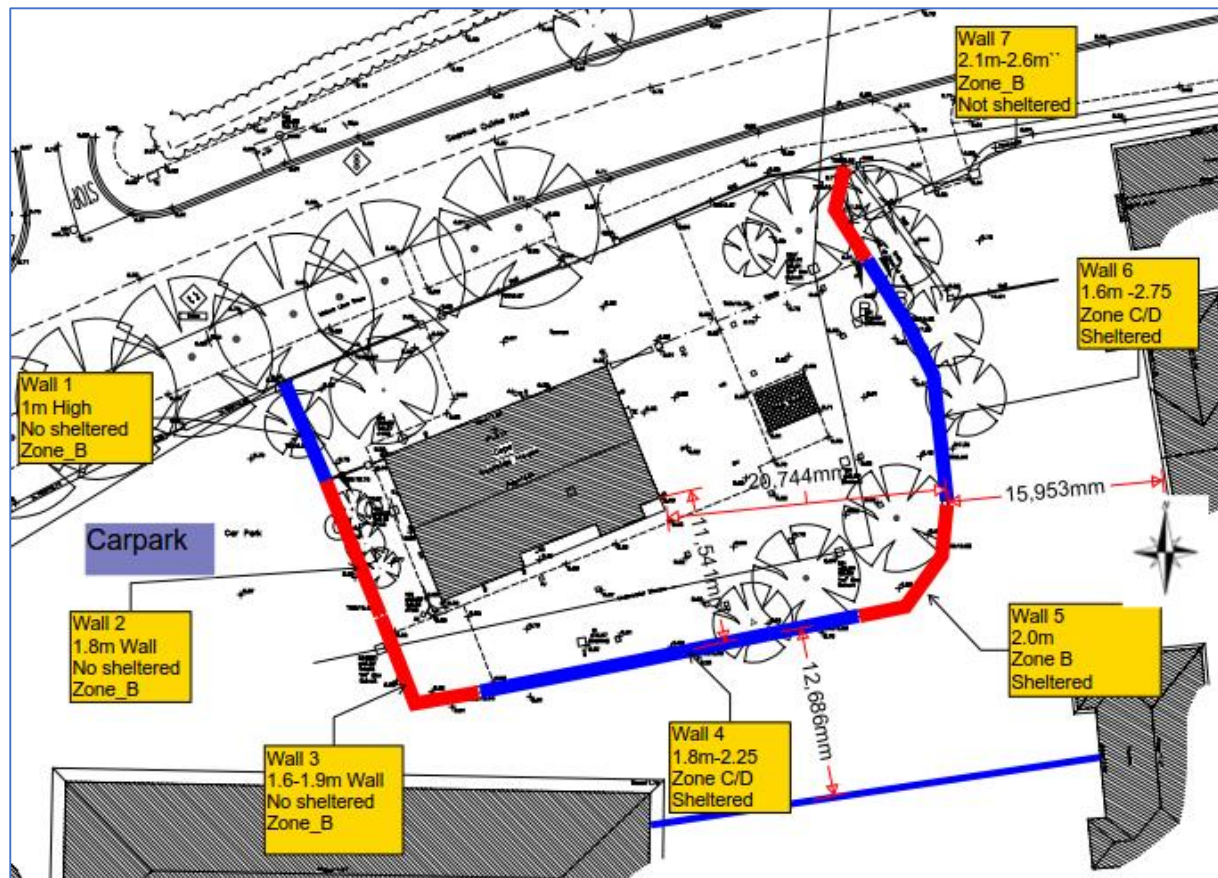
The following table outlines the recommended Pressure Coefficients for the various zones along the length of a free standing wall.

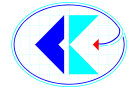
Table 7.9 — Recommended pressure coefficients $c_{p,net}$ for free-standing walls and parapets

Solidity	Zone		A	B	C	D
$\phi = 1$	Without return corners	$l/h \leq 3$	2,3	1,4	1,2	1,2
		$l/h = 5$	2,9	1,8	1,4	1,2
		$l/h \geq 10$	3,4	2,1	1,7	1,2
	with return corners of length $\geq h^a$		2,1	1,8	1,4	1,2
$\phi = 0,8$			1,2	1,2	1,2	1,2

^a Linear interpolation may be used for return corner lengths between 0,0 and h

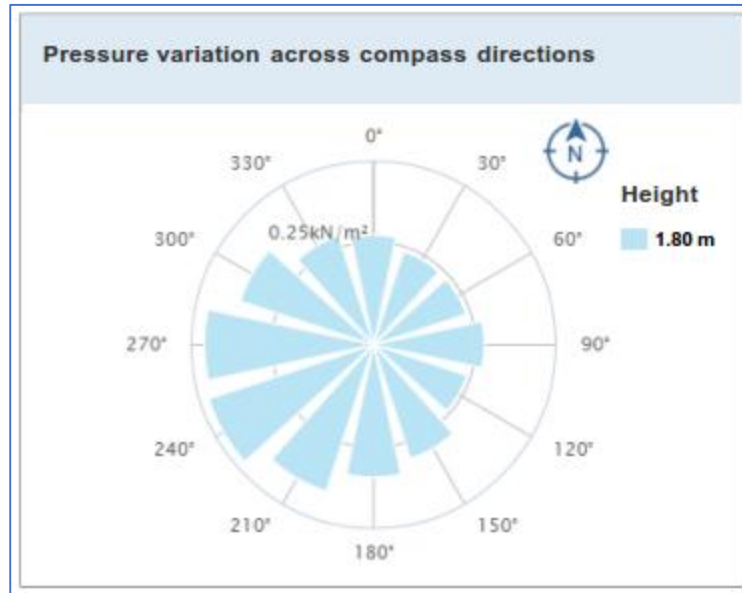
Having considered all of the above in terms of Height of Wall above ground, location, shelter factors and pressure zone coefficients an arrangement of zones can be identified on the existing boundary wall. A Loading can then be determined for various zones along the free-standing masonry wall.





Peak Wind Velocity Pressure

The Peak Velocity Pressure for the site has been calculated based on site specific location, height of wall and wind direction.

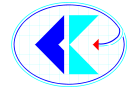


Peak velocity pressure variation with height across all wind directions

Structure height/Direction	Peak velocity pressure (kN/m ²)											
	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12
	0°	30°	60°	90°	120°	150°	180°	210°	240°	270°	300°	330°
1.8 m	0.267	0.239	0.239	0.272	0.241	0.291	0.322	0.375	0.426	0.415	0.344	0.279

Ultimate Wind Loading Acting on the Free-Standing Boundary Wall – Table 1

	Reference	Height m	Shelter ing Factor	Wind Load kN/m ²	Zone Factors	Ultimate Load kN/m ²	Notes
West Wall	Wall 1	1	1	0.415	1.4	0.87	** *Retaining Wall at Base *Retaining Wall at Base *Retaining Wall at Base
West Wall	Wall 2	1.8	1	0.426	1.4	0.89	
West & South West Wall	Wall 3	1.8	1	0.426	1.8	1.15	
South Wall	Wall 4	1.8-2.25	0.4	0.375	1.4	0.32	
South East Wall	Wall 5	2	0.62	0.415	1.8	0.69	
East Wall	Wall 6	1.6-2.75	0.62	0.426	1.4	0.55	
East Wall	Wall 7	2.1-2.6	1	0.426	1.8	1.15	
* Retaining Wall at Base onto Drain; Structural Integrity, Capacity and Characteristics cannot be assessed **							



Capacity of the existing Free Standing Masonry Wall

Based on our assessment and information available to us using some basic assumptions for mortar and masonry strength, The capacity of various free-standing walls of varying height, 100mm thick with 450mm piers at 3.25m centres is as follows.

A 2.25m high wall with 450mm piers	0.35kN/m ² (Slenderness failure)
A 1.8m high wall with 450 piers as surveyed is circa	0.42kN/m ²
A 1.6m high masonry wall with 450 piers as surveyed is circa	0.53kN/m ²
A 1.4m high wall with 450 piers is circa	0.63kN/m ²

Conclusion

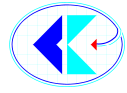
Having visited site and carried out an assessment of the existing boundary wall, using the site characterises and the shelter factors available it has been determined that the load capacity of the existing wall is less than the design loading (as calculated and included in Table 1 above). Only the 1m high wall at the front on the West boundary of the building is in our opinion satisfactory.

Proposed Boundary Wall (Throughout the Site)

To make a boundary wall certifiable around this site, we are of the opinion that the existing wall should be demolished and replaced with a new 1.8m high, 215mm wide solid Masonry Wall with 450wx550d Piers at centres no greater than 3.5m on a 900mm wide x 250mm deep RC strip foundation.

Proposed Retaining Wall (East Boundary of the Site)

We are of the opinion that, the existing retaining elements along the East boundary of the site (onto an open drain) should also be replaced, and the new retaining structure could be formed from a number of basic structure types (unreinforced masonry, reinforced masonry, concrete, etc.). However, based on the current market conditions and having provided numerous options to clients and contractors recently on other projects for retaining wall elements, we are of the opinion that an allowance should be made for a New 300mm thick Reinforced Concrete retaining wall with a 300mm thick 1.5m long retaining wall base below ground level. We are of the opinion that this type of retaining wall adjacent to a water course required to have a design life of 50 years is preferable and remain economical in such market conditions.



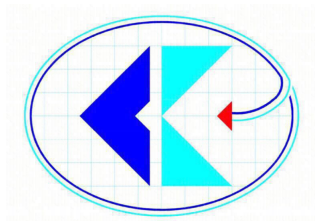
Appendix A – Site Survey Boundary Wall Report

PROVISION OF EMERGENCY ACCOMMODATION

Proposed New Building @Seamus Quirke Road

21-147-220301-01RP

Galway City Council c/o Emmet Humphreys (Galway City Council)



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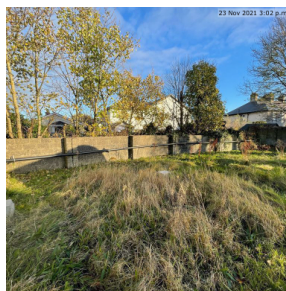
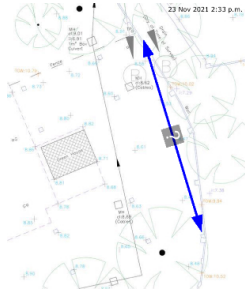
01 Mar 2022

Project Details



Name:	Provision of Emergency Accommodation	Client Company:	Galway City Council
Summary:	Proposed New Building @Seamus Quirke Road	Client Name:	Galway City Council c/o Emmet Humphreys
Reference:	21-147-220301-01RP	Client Telephone:	091536400
Description:	Existing Boundary Wall- at Site for Provision of Day Centre Facilities and Emergency Temporary Homeless Accommodation	Client Email:	Emmet.humphreys@galwaycity.ie
Status:	New (23 Nov 2021)	Auditor Company:	www.coylekennedy.com
Total Issues:	6	Auditor Name:	Coyle Kennedy Consulting Engineers

Boundary Wall



Created: 23 Nov 2021

Priority: No Priority

Status: New

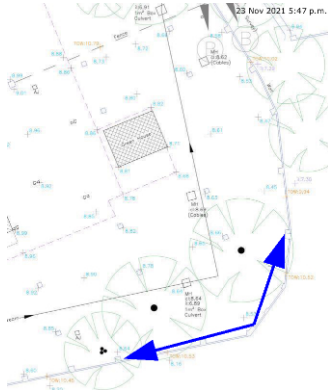
Tags: No Tags

Description: 2.6m high 100mm thick masonry wall in the over grown area and 1.6m on the site side. It is retaining an estimated 1m height.

Assigned To: No Assignment

Comments: 23 Nov 2021
100mm thick masonry Wall. 2.6m high on the neighbouring side and 1.6m high on site side. It cannot be established what type of retaining structure is resisting the ground loads.

Boundary Wall Part 2



Created: 23 Nov 2021

Priority: No Priority

Status: New

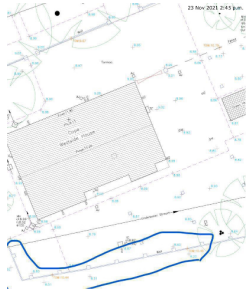
Tags: No Tags

Description: 100mm thick wall. 1.8m on the site side and 2.35 on neighbours side.

Assigned To: No Assignment

Comments: 23 Nov 2021 at 5:43 p.m.
100mm wide wall. 1.8m high on the site side and 2.35m high on neighbours side.

Boundary Wall Part 3 (Painted White)



Created: 23 Nov 2021

Priority: No Priority

Status: New

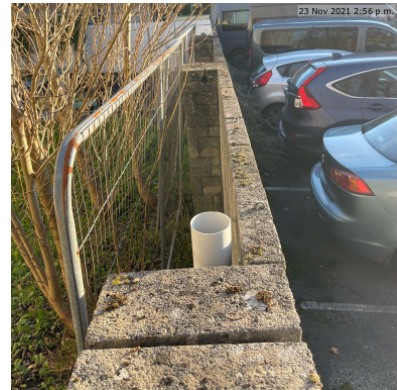
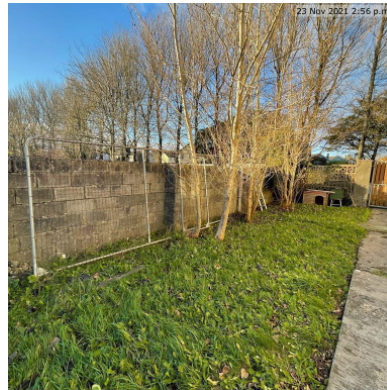
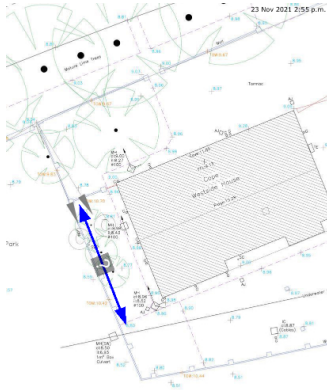
Tags: No Tags

Description: 100mm thick solid Blockwork. 1.875m high on Site side and 2.2m high -1.9m on the neighbour side

Assigned To: No Assignment

Comments: 23 Nov 2021
100mm thick solid Blockwork. 1.875m high on Site side and 2.2m high -1.9m on the neighbour side

Boundary Wall Part 4



Created: 23 Nov 2021

Priority: No Priority

Status: New

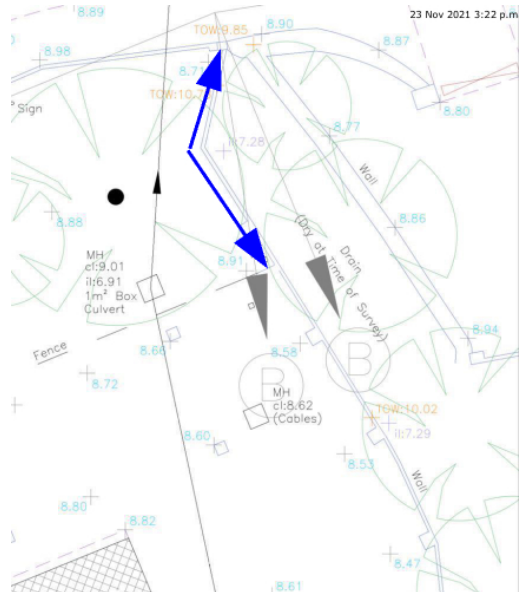
Tags: No Tags

Description: 100mm wide solid masonry wall. 1.750m high on site side and 1.775m high on neighbouring side . Expansion joint ever 2nd pier

Assigned To: No Assignment

Comments: 23 Nov 2021
100mm wide solid masonry wall. 1.750m high on site side and 1.775m high on neighbouring side . Expansion joint ever 2nd pier

Boundary wall Front



Created: 23 Nov 2021

Priority: No Priority

Status: New

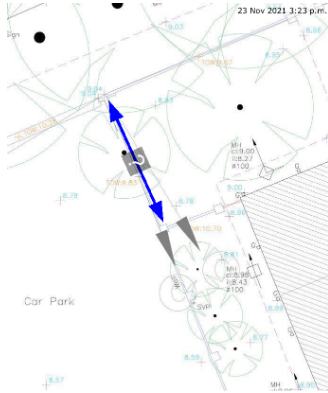
Tags: No Tags

Description: 100mm thick wall. 1.95m high on site side and 3.375m high on the neighbouring side.

Assigned To: No Assignment

Comments: 23 Nov 2021
100mm thick wall. 1.95m high on site side and 3.375m high on the neighbouring side.

Boundary Wall



Created: 23 Nov 2021

Priority: No Priority

Status: New

Tags: No Tags

Description: 100mm thick solid masonry wall. Circa 1m high on both neighbouring and site side

Assigned To: No Assignment

Comments: 23 Nov 2021
100mm thick solid masonry wall. Circa 1m high on both neighbouring and site side