

Cyfartha Retail Park – Costa

TECHNICAL NOTE

Retaining Wall Philosophy

DOCUMENT CONTROL SHEET

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Client: British Land

Project: Cyfartha Retail Park – Costa

Document No: 30106-BGL-XX-XX-TN-X-00004

Title: Retaining Wall Philosophy

Status: V01

Date: 13/05/2026

Prepared By: Sam Pattison

Checked By: RH

Document Revision Record

Version Number	Date	Revision Details
V01	03/05/2026	First Issue

Burrows Graham Limited has prepared this report in accordance with the instructions of the above-named Client for their sole and specific use. Any third parties who may use the information contained herein do so at their own risk.

Introduction

This technical note outlines the design philosophy and responsibility split for the proposed retaining wall solution. The retaining wall system comprises:

- A reinforced concrete base/foundation designed by BGL (refer to Appendix A); and
- A proprietary precast retaining wall unit supplied and structurally designed by FP McCann in accordance with their issued Design Output/Design Package documentation (refer to Appendix B).

The intent of this note is to clarify the interaction between the two design elements and define the overall engineering approach adopted for the retaining wall system.

Design Philosophy

The retaining wall solution has been developed as a combined system consisting of a cast in-situ reinforced concrete foundation/base slab and a proprietary precast retaining wall unit.

The philosophy of the design is that:

- The precast retaining wall element supplied by FP McCann acts as the primary retaining structure and is designed by the specialist manufacturer to resist retained earth pressures, surcharge loadings and all associated structural actions acting on the wall unit itself.
- The reinforced concrete base designed by BGL has been developed to provide a suitable founding platform and structural support to the proprietary wall system, transferring vertical and horizontal actions safely into the underlying ground.
- The design has been undertaken on the basis that the loading assumptions, wall geometry, imposed surcharges and retained heights adopted within the specialist supplier's design documentation are compatible with those used in the foundation/base design.

Conclusion

The proposed retaining wall arrangement has been developed as a coordinated design between the in-situ reinforced concrete base designed by BGL and the proprietary precast retaining wall system designed and supplied by FP McCann.

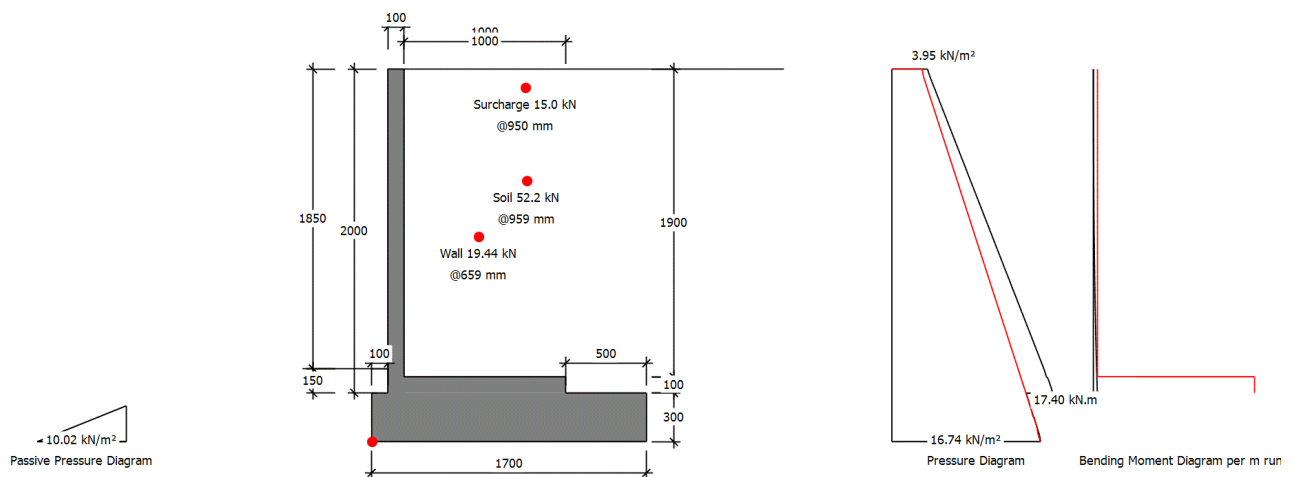
The design intent is that the specialist retaining wall system and supporting foundation act together as an integrated solution, with each party retaining responsibility for their respective design elements as identified within this note and the appended documentation.

Appendix A

P:\30000 PROJECTS NORTH\30106 CYFARTHA RETAIL PARK\04 WIP\CALCS\30106 - 2M HIGH WALL.MRW

MASTERKEY : RETAINING WALL DESIGN TO BS 8002 : 1994 AND BS 8110 : 1997

Basic RC Retaining Wall Reinforced Concrete Retaining Wall with Reinforced Base



Summary of Design Data

Notes	All dimensions are in mm and all forces are per metre run
Material Densities (kN/m³)	Soil 18.00, Concrete 24.00
Concrete grade	fcu 30 N/mm², Permissible tensile stress 0.250 N/mm²
Concrete covers (mm)	Wall inner cover 30 mm, Wall outer cover 30 mm, Base cover 50 mm
Reinforcement design	fy 500 N/mm² designed to BS 8110: 1997
Surcharge and Water Table	Surcharge 10.00 kN/m², Fully drained
Unplanned excavation depth	Front of wall 230 mm
† The Engineer must satisfy him/herself to the reinforcement detailing requirements of the relevant codes of practice	

Soil Properties

Bearing pressure	Premissible service pressure @ front 150.00 kN/m², @ back 150.00 kN/m²
Back Soil Friction and Cohesion	$\phi = \text{Atn}(\text{Tan}(30)/1.2) = 25.69^\circ$
Base Friction and Cohesion	$\delta = \text{Atn}(0.75 \times \text{Tan}(\text{Atn}(\text{Tan}(26)/1.2))) = 16.95^\circ$
Front Soil Friction and Cohesion	$\phi = \text{Atn}(\text{Tan}(30)/1.2) = 25.69^\circ$

Loading Cases

G_{Soil} Soil Self Weight, G_{Wall} Wall & Base Self Weight, F_{VHeel} Vertical Loads over Heel,	
P_a Active Earth Pressure, $P_{\text{surcharge}}$ Earth pressure from surcharge, P_p Passive Earth Pressure	
Case 1: Geotechnical Design	1.00 G_{Soil} + 1.00 G_{Wall} + 1.00 F_{VHeel} + 1.00 P_a + 1.00 $P_{\text{surcharge}}$ + 1.00 P_p
Case 2: Structural Ultimate Design	1.40 G_{Soil} + 1.40 G_{Wall} + 1.60 F_{VHeel} + 1.00 P_a + 1.00 $P_{\text{surcharge}}$ + 1.00 P_p

Geotechnical Design

Wall Stability - Virtual Back Pressure

Case 1 Overturning/Stabilising	20.678/70.094	0.295	OK
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Wall Sliding - Virtual Back Pressure

$F_x / (R_{\text{Friction}} + R_{\text{XPassive}})$	23.152 / (23.362 + 1.107)	0.946	OK
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Soil Pressure

Virtual Back (No uplift)	Max(77.735/150, 12.429/150) kN/m²	0.518	OK
Wall Back (No uplift)	Max(85.986/150, 4.179/150) kN/m²	0.573	OK



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Job ref : 30106
Sheet
Made By : CA
Date : 09/08/2024
Checked :
Approved :

Structural Design

Wall Design (Inner Steel)

Critical Section	Critical @ 101 mm from base, Case 2		
Steel Provided (Cover)	Main H16@125 (30 mm) Dist. H16@125 (46 mm)	1608 mm ²	OK
Compression Steel Provided (Cover)	Main H12@250 (30 mm) Dist. H16@150 (42 mm)	452 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	62 mm, 1000 mm, 1608 mm ² , 500 N/mm ² , 30.0 N/mm ²	48 mm	
$M_r = \text{fn}(\text{above}, A_s, d', x, x/d)$	452 mm ² , 36 mm, 31 mm, 0.50	18.0 kN.m	
Moment Capacity Check (M/M_r)	M 15.3 kN.m, Mr 18.0 kN.m	0.848	OK
Shear Capacity Check	F 20.3 kN, vc 1.471 N/mm ² , Fvr 91.2 kN	0.22	OK

Base Top Steel Design

Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@200 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@200 (60 mm)	393 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 500 N/mm ² , 30 N/mm ²	233 mm	
$M_r = \text{fn}(\text{above}, A_s, d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.8 kN.m	
Moment Capacity Check (M/M_r)	M 5.2 kN.m, Mr 39.8 kN.m	0.130	OK
Shear Capacity Check	F 18.9 kN, vc 0.412 N/mm ² , Fvr 101.0 kN	0.19	OK

Base Bottom Steel Design

Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@200 (60 mm)	393 mm ²	OK
Compression Steel Provided (Cover)	Main H10@200 (50 mm) Dist. H10@200 (60 mm)	393 mm ²	
Leverarm $z = \text{fn}(d, b, A_s, f_y, F_{cu})$	245 mm, 1000 mm, 393 mm ² , 500 N/mm ² , 30 N/mm ²	233 mm	
$M_r = \text{fn}(\text{above}, A_s, d', x, x/d)$	393 mm ² , 55 mm, 14 mm, 0.06	39.8 kN.m	
Moment Capacity Check (M/M_r)	M 0.4 kN.m, Mr 39.8 kN.m	0.011	OK
Shear Capacity Check	F 8.7 kN, vc 0.412 N/mm ² , Fvr 101.0 kN	0.09	OK

Appendix B



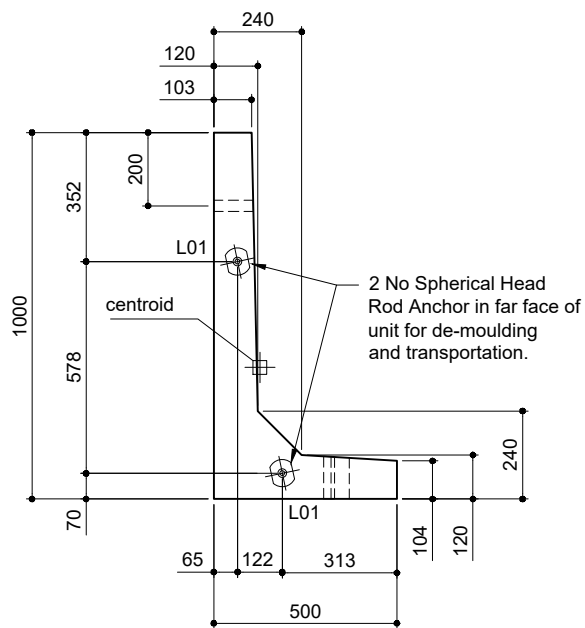
DECLARATION OF PERFORMANCE

No. 001- LRW2014-01-09

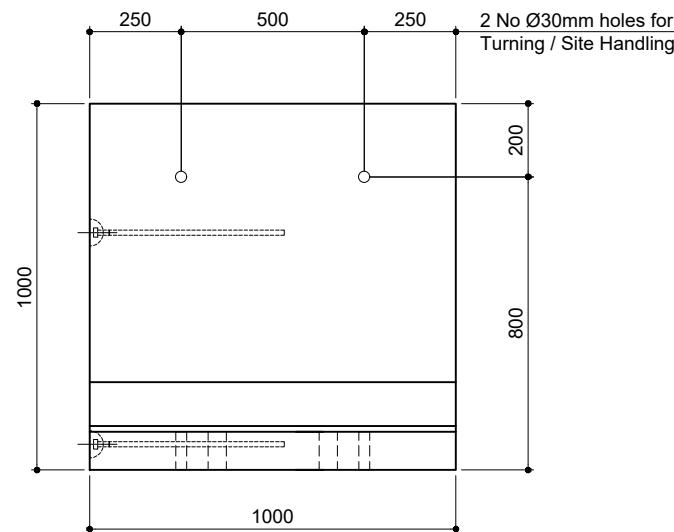
RETAINING WALLS Cat No. 1101

1. Retaining Walls regular in shape (L or Rocket), in lengths, heights and wall thicknesses to suit design criteria, as specified in BS EN 15258 and BS 13369.	2. Retaining Walls are wet-cast and reinforced . The concrete is designed to give a Chemical Class DC2 in accordance with the requirements of Part D, BRE Special Digest 1.						
3. The main intended use of this product is to retain natural ground, earth fills and several kinds of loose materials such as sand, gravel, etc. in structures of buildings and other civil engineering works, but not to retain liquids in tanks or reservoirs.	4. Retaining Walls are manufactured at the Lydney Production Facility – Harbour Road, Lydney, Gloucestershire GL15 4EJ. The manufacturing plant has a Factory Process Control Certificate 0086-CPR-614632 issued by BSI Assurance UK Limited.						
5. Declared Performance <table><tr><td>Mechanical Resistance</td><td>Strength Class C28/35</td></tr><tr><td>Steel Tensile Yield Stress</td><td>Grade 500B</td></tr><tr><td>Durability</td><td>DC2 chemical class (BRE Special Digest SD1)</td></tr></table>	Mechanical Resistance	Strength Class C28/35	Steel Tensile Yield Stress	Grade 500B	Durability	DC2 chemical class (BRE Special Digest SD1)	6. The performance of the product as identified in sections 1 and 2 is in conformity with the declared performance of section 5. Signed for and on behalf of FP McCann  Don Mulholland (Managing Director)
Mechanical Resistance	Strength Class C28/35						
Steel Tensile Yield Stress	Grade 500B						
Durability	DC2 chemical class (BRE Special Digest SD1)						

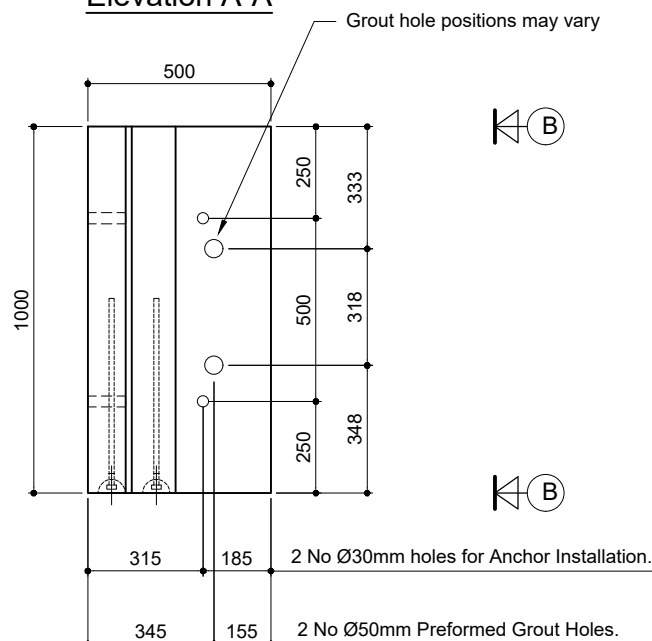
Issue Status 1.0



Elevation A-A

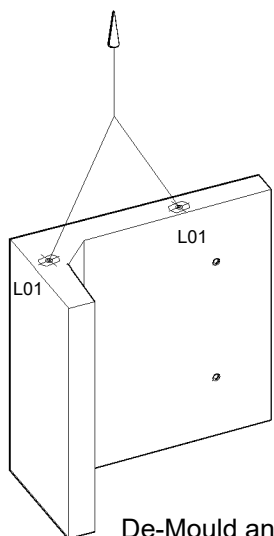
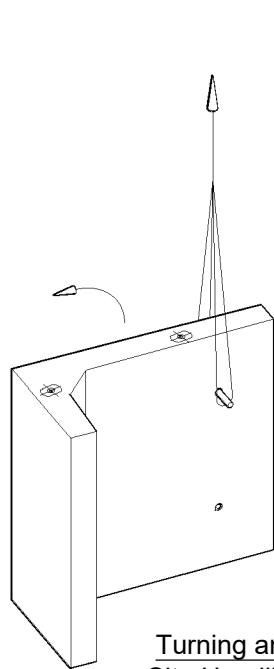


Elevation B-B

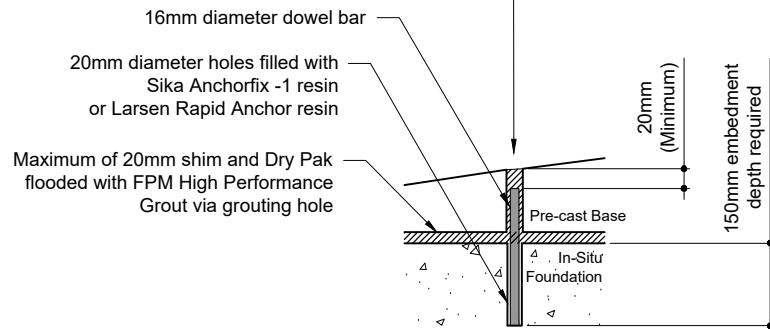


Plan View

Manufacture Tolerances		
Allowable dimensional variations shall not exceed the following:		
Length/Height	Cross section (each direction)	
Length	± 6mm	± 6mm
Height	± 6mm	± 6mm
Edge straightness (deviation from intended line)		
± 6mm		
Holes		
Size of hole or opening:	+ 5/-0	
Location of holes:	± 25mm	

De-Mould and
Transportation
Diagram (nts)Turning and
Site Handling
Diagram (nts)

Unit supplied with 2 No. 250mm B16 deformed rebar dowel bars. (All dowel bars must be installed).

Anchor Detail
Scale 1:10**Installation steps:**

- Position the units on to the shimmed concrete foundation.
- Dry Pak to the edge of the base of the units to create a seal to the perimeter.
- Through the 30mm preformed holes drill a 150mm, 20mm diameter hole into the foundation.
- Fill holes with the resin to a level so that when the dowels are inserted the resin becomes level with the top of the foundation (as a minimum).
- Insert the B16 dowel bar into the resin. Ensure that the bar is pushed to the base of the drilled hole.
- Ensure the units are uniformly supported by using the grouting hole to completely flood the shimmed void (and grouting hole) with grout.
- Grout around the dowel so that the dowel is completely encapsulated.
- Do not disturb dowel bar or unit until grout has achieved full strength in accordance with resin and grout manufacture guidelines.

The Construction (Design and Management) Regulations 2015

- a) If you are unsure of your responsibilities please refer to the HSE website.

- b) These notes should be read by all CDM duty holders. Whilst we do not go into specifics such as working at heights, working over excavations, slips and trips etc, where Δ is shown in the notes and on the drawing some potential hazard / risks are identified and should be assessed accordingly by the main contractor and the design team prior to any site works commencing.

- c) Particular attention should be made to the notes identified by Δ which have the potential for significant risk where not adhered to. This F.P. McCann unit drawing should be read in conjunction with all other relevant drawings available from the design team e.g Architect, Engineer, Steelwork sub-contractor etc.

- d) **Lifting** - The lifting equipment referred to in note 1 is the only lifting equipment which should be used on F.P. McCann supplied units. All elements must be lifted in accordance with F.P. McCann's lifting plan/method statement.

- e) **Installation** - Where it is necessary to work at height i.e. removal of shackles, procedures for working at heights must be followed. The manufactures guidelines and safety recommendation for the application of the grout and resin must be followed.

Notes:**1. Δ Handling**

Unit Ref	Volume (m³)	Weight (T)	Weight + 5% (T)
1000 Wall Unit	0.16	0.42	0.44

Weight is based on 2.5 T/m³.

+5% is recommended for sizing lifting equipment.

- b) All lifting points shall be used as specified below:

As-Cast Lift	Qty	Simply Reference	SWL (T)
Sph. Head Rod Anchors	2	STRA025520	2.5
Upright Lift	Qty	Reference	
Wire Rope Lifters	2	Rope Assemblies - A18 Master Link	

Anchor recesses to be filled by others on site.

- c) The site lifting / installation equipment may be purchased from Simply Precast (Tel: 0800 678 5178).

Site Lifting: Pin Anchor Lifting Shackle Ref: SPARC025.

Concrete

- a) Lifting strength based on 2 cubes = 15 N/mm².
b) Characteristic 28 day cube strength = 55 N/mm².
c) Concrete provides Design Chemical Class 2 (DC2) to Special Digest 1, Table D2.

Reinforcement

- a) Reinforcement (500B or C) to BS4449.
b) Scheduling, dimensioning, bending and cutting to BS8666.
c) Cage to be tack welded and/or tied with 17 gauge annealed tying wire.

Manufacture

- a) Manufactured to BS EN 13369:2013.
b) Tolerances based on BS EN 13369:2013 & BS EN 13670:2009.
c) Finishes: As below unless indicated otherwise on drawing

Class	Cast Edge	All Other Faces
	Steel Float	A

- d) Marking: Units shall be indelibly marked to show:

- Unit reference and date of manufacture
- Unit weight + 5%

5. Δ Design

- a) Design to BS EN 1992-1-1:2004 & BS EN 1997-1:2004.
b) Application of the wall to conform to standard loading conditions(8) or to be verified (by Others) to be suitable based on noted wall capacities (7). Loading of the wall during construction must be considered.
c) F.P. McCann have designed the concrete units only, the stability of the support conditions should be checked by overall scheme designer.
d) Design Life: >100 years to BS8500.
e) Cover to Reinforcement & Exposure:

Min Cover	Cover Block Size (mm)	Min Cover (mm)	Max Cover (mm)
All Faces	45	40	50

Exposure			
All Faces	XC3/4	XD2	XF4

6 Δ Foundation

- a) Concrete base to be designed and installed (by others).
b) To ensure good bond and satisfy cover requirements in the anchors the slab should have minimum strength of C20 / C25 and a minimum depth of 250mm.

7 Δ Retaining Wall Capacity

- a)1. Sectional moment capacity at analysis position (top of haunch) = 4kNm/m run (in both directions).
2. Sectional moment capacity above 2nd analysis position = 4kNm/m run (in both directions).
b) 1. Analysis position 1 (top of haunch) 240mm.
2. Analysis position 2 500mm
c)Stabilizing action from backfill material to be assessed on the unit weight of backfill (where applicable).
d)Resistance to overturning from fixing when loaded to the rear (over the heel) about the leading edge = 6kNm/m run.
e)Resistance to overturning from fixing when loaded to the front about the leading edge = 3kNm/m run.
f)Shear resistance at foundation = 110kN/m run.

8 Δ Standard Loading Conditions

- a) Four Loading conditions considered: -
• Loaded to rear with level fill and live load surcharge.
• Loaded to front with level fill and live load surcharge.
• Loaded to rear with 20° sloped fill.
• Loaded to front with 20° sloped fill.
Construction loading must not be more onerous than the permanent condition.
b) The backfill material should be free draining granular material such as a class 6N or 6P, fill as define in the manual of Contract Documents for Highway Works Volume 1 Specification Series 600 Clause 610 & table 6/1.
Characteristic effective shearing resistance $\phi = 35^\circ$.
Unit weight of fill = 19kN/m³
c) Live Load 10.0kN/m²

Rev	Date	Revision detail	By	Chk'd
H	Dec/23	Grout notes updated	AS	SH
G	April/23	Grout notes updated	AS	SH
F	Feb/22	Notes updated	AS	SH

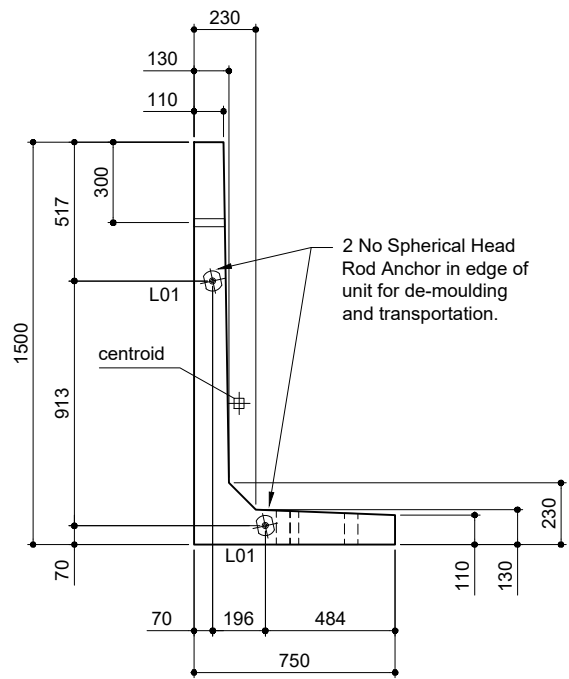


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Tel: 01594 847500
Fax: 01594 847501
www.fpmccann.co.uk

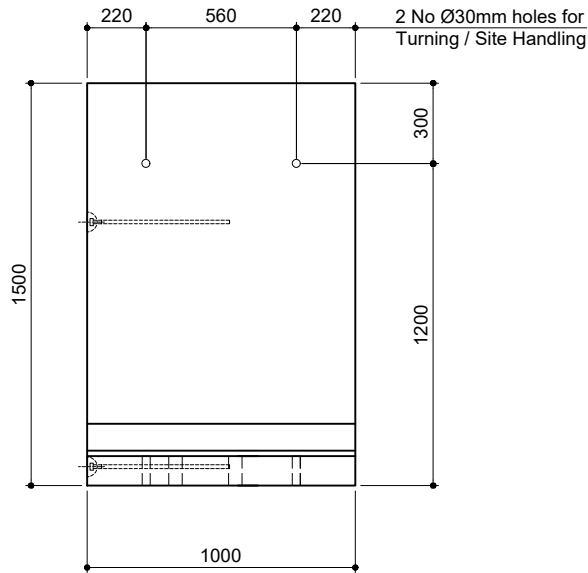
Contract / Title:

F. P McCann
Standard Retaining Wall
Straight L Wall 1.0m High
General Arrangement

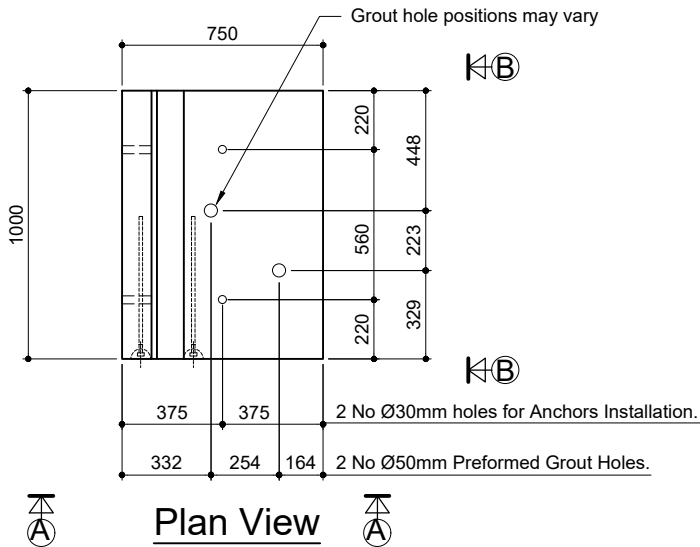
Drawn:	Scale:	Status:
LK	1:25, 1:10	Manufacture
Date:	Chk'd:	Rev:
14/12/16	SH	H
Drawing no:		
FPM-SLW-1.0-GA		



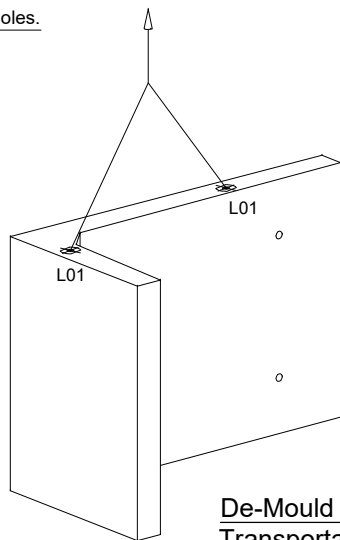
Elevation A-A



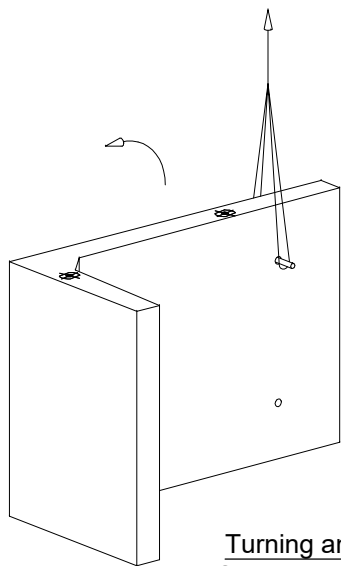
Elevation B-B



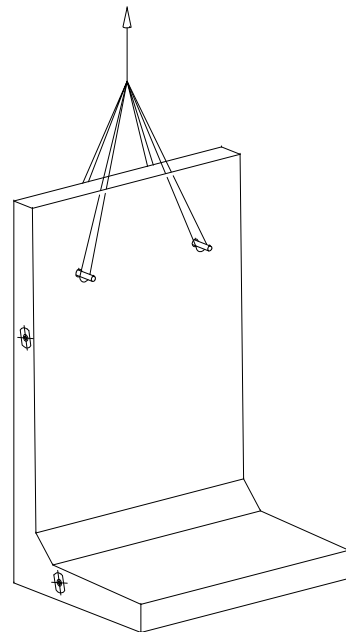
Plan View



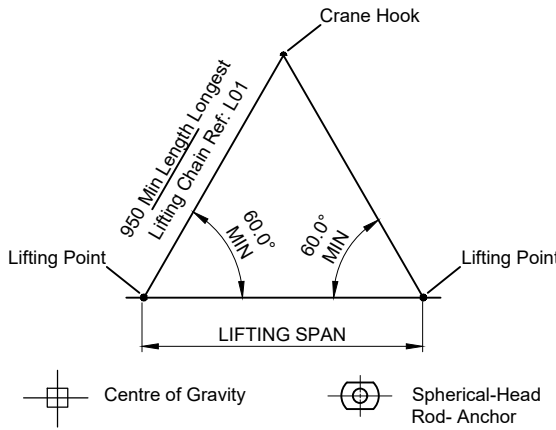
De-Mould and Transportation Diagram (nts)



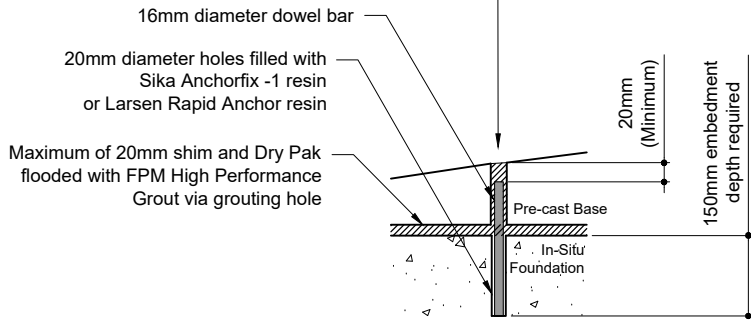
Turning and Site Handling Diagram (nts)



Lifting Instructions



Anchor Detail
Scale 1:10



Unit supplied with 2 No. 250mm B16 deformed rebar dowel bars. (All dowel bars must be installed).

Installation steps:

- Position the units on to the shimmed concrete foundation.
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- Grout around the dowel so that the dowel is completely encapsulated.
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- d) **Lifting** - The lifting equipment referred to in note 1 is the only lifting equipment which should be used on F.P. McCann supplied units. All elements must be lifted in accordance with F.P. McCann's lifting plan/method statement.
- e) **Installation** - Where it is necessary to work at height i.e. removal of shackles, procedures for working at heights must be followed. The manufactures guidelines and safety recommendation for the application of the grout and resin must be followed.

Notes:

1. Δ Handling

a) Unit Volume / Weight

Unit Ref	Volume (m³)	Weight (T)	Weight + 5% (T)
1500 Wall Unit	0.26	0.68	0.71

Weight is based on 2.5 T/m³.

+5% is recommended for sizing lifting equipment.

b) All lifting points shall be used as specified below:

As-Cast Lift	Qty	Simply Reference	SWL (T)
Sph. Head Rod Anchors	2	STRA025520	2.5

Upright Lift	Qty	Reference
Wire Rope Lifters	2	Rope Assemblies - A18 Master Link

Anchor recesses to be filled by others on site.

c) The site lifting / installation equipment may be purchased from Simply Precast

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- a) Lifting strength based on 2 cubes = 15 N/mm².
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Reinforcement

- a) Reinforcement (500B or C) to BS4449.
- b) Scheduling, dimensioning, bending and cutting to BS8666.
- c) Cage to be tack welded and/or tied with 17 gauge annealed tying wire.

Manufacture

- a) Manufactured to BS EN 13369:2013.
- b) Tolerances based on BS EN 13369:2013 & BS EN 13670:2009.
- c) Finishes: As below unless indicated otherwise on drawing

Class	Cast Edge	All Other Faces
	Steel Float	A

d) Marking: Units shall be indelibly marked to show:

- Unit reference and date of manufacture
- Unit weight + 5%

5. Δ Design

- a) Design to BS EN 1992-1-1:2004 & BS EN 1997-1:2004.
- b) Application of the wall to conform to standard loading conditions(8) or to be verified (by Others) to be suitable based on noted wall capacities (7). Loading of the wall during construction must be considered.
- c) F.P. McCann have designed the concrete units only, the stability of the support conditions should be checked by overall scheme designer.
- d) Design Life: >100 years to BS8500.
- e) Cover to Reinforcement & Exposure:

Min Cover	Cover Block Size (mm)	Min Cover (mm)	Max Cover (mm)
All Faces	45	40	50

Exposure			
All Faces	XC3/4	XD2	XF4

6. Δ Foundation

- a) Concrete base to be designed and installed (by others).
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- a) 1. Sectional moment capacity at analysis position (top of haunch) = 6kNm/m run (in both directions).
2. Sectional moment capacity above 2nd analysis position = 6kNm/m run (in both directions)
- b) 1. Analysis position 1 (top of haunch) 230mm.
2. Analysis position 2 750mm
- c) Stabilizing action from backfill material to be assessed on the unit weight of backfill (where applicable).
- d) Resistance to overturning from fixing when loaded to the rear (over the heel) about the leading edge = 7kNm/m run.
- e) Resistance to overturning from fixing when loaded to the front about the leading edge = 7kNm/m run.
- f) Shear resistance at foundation = 110kN/m run.
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 - Loaded to rear with 20° sloped fill.
 - Loaded to front with 20° sloped fill.
- Construction loading must not be more onerous than the permanent condition.
- b) The backfill material should be free draining granular material such as a class 6N or 6P, fill as define in the manual of Contract Documents for Highway Works Volume 1 Specification Series 600 Clause 610 & table 6/1.
- Characteristic effective shearing resistance $\phi = 35^\circ$.
- Unit weight of fill = 19kN/m³
- c) Live Load 10.0kN/m²

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H	Dec/23	Grout notes updated	AS	SH
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F	Feb/22	Notes updated	AS	SH

Manufacture Tolerances		
Allowable dimensional variations shall not exceed the following:		
Length/Height	Cross section (each direction)	
Length	± 6mm	± 6mm
Height	± 6mm	± 6mm
Edge straightness (deviation from intended line)		
± 6mm		
Holes		
Size of hole or opening:	+ 5/-0	
Location of holes:	± 25mm	

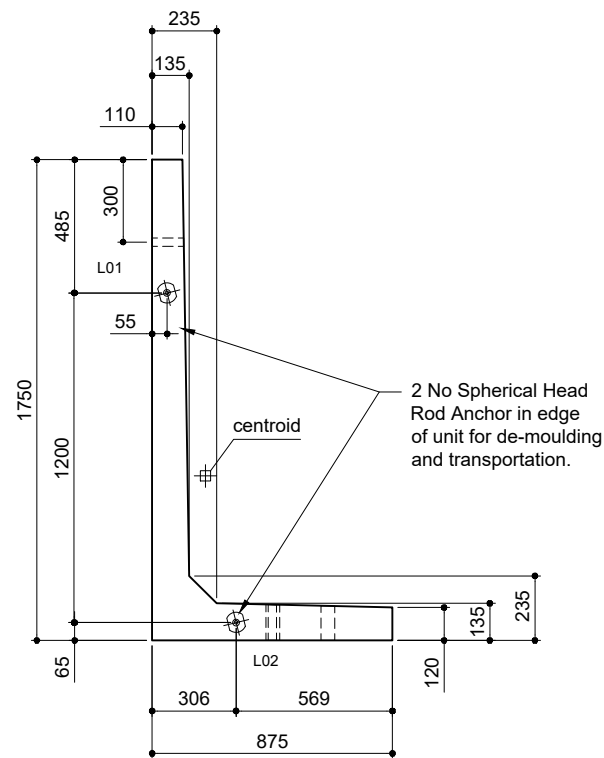


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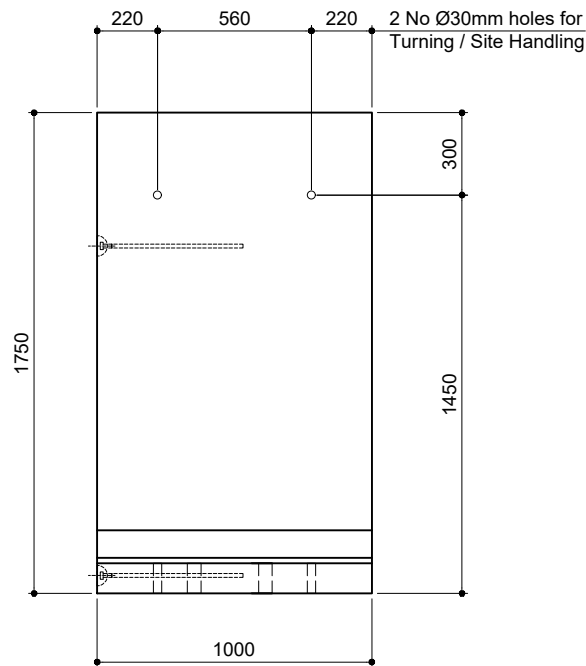
Contract / Title:

F. P McCann
Standard Retaining Wall
Straight L Wall 1.5m High
General Arrangement

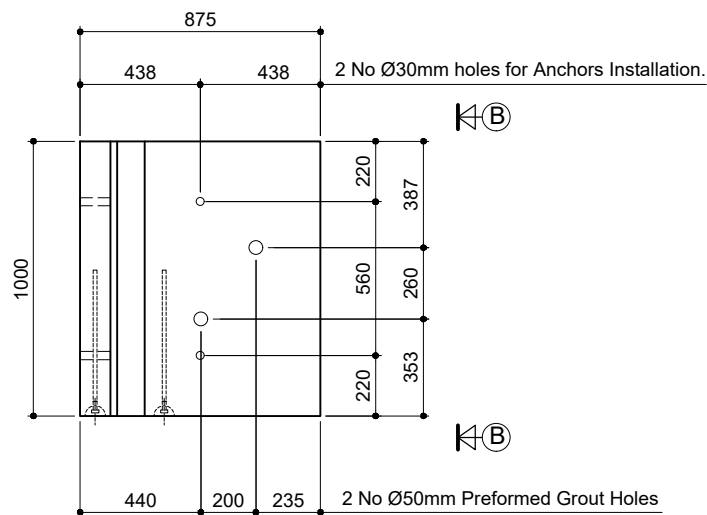
Drawn:	Scale:	Status:
LK	1:20, 1:10	Manufacture
Date:	Chk'd:	Rev:
14/12/16	SH	H
Drawing no:		
FPM-SLW-1.5-GA		



Elevation A-A

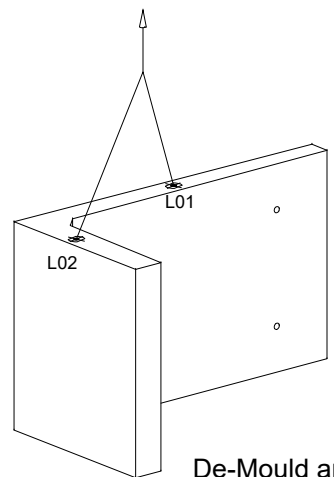


Elevation B-B

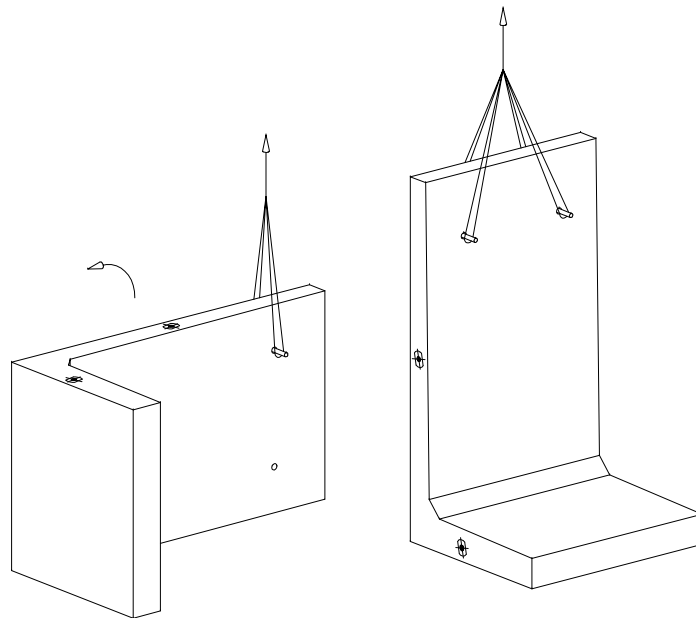


Plan View

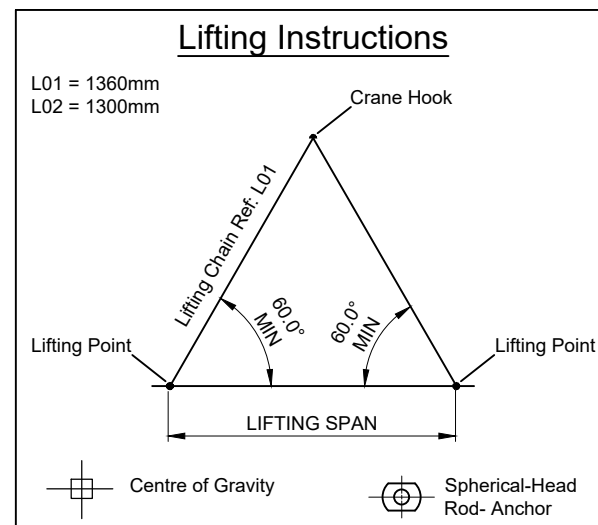
Manufacture Tolerances			
Allowable dimensional variations shall not exceed the following:			
Length/Height		Cross section (each direction)	
Length	± 6mm	± 6mm	
Height	± 6mm		
Edge straightness (deviation from intended line)			
± 6mm			
Holes			
Size of hole or opening:		+ 5/-0	
Location of holes:		± 25mm	



De-Mould and Transportation Diagram (nts)



Turning and Site Handling Diagram (nts)

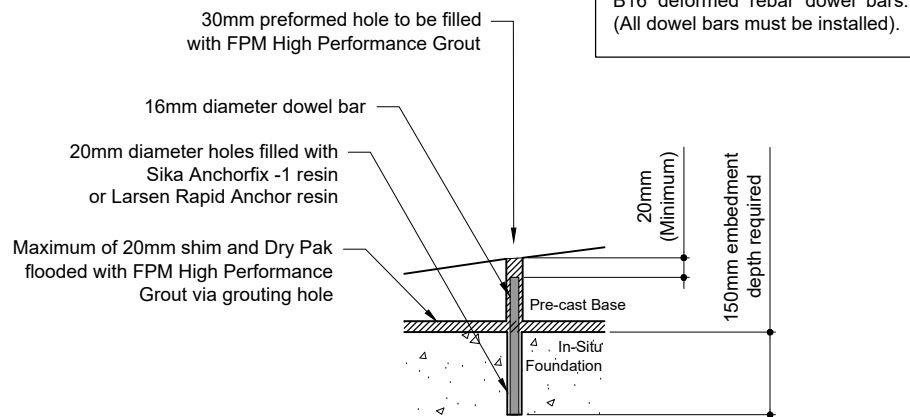


Lifting Instructions

L01 = 1360mm
L02 = 1300mm

Centre of Gravity

Spherical-Head Rod- Anchor

Anchor Detail
Scale 1:10

Installation steps:

- Position the units on to the shimmed concrete foundation.
- Dry Pak to the edge of the base of the units to create a seal to the perimeter.
- Through the 30mm preformed holes drill a 150mm, 20mm diameter hole into the foundation.
- Fill holes with the resin to a level so that when the dowels are inserted the resin becomes level with the top of the foundation (as a minimum).
- Insert the B16 dowel bar into the resin. Ensure that the bar is pushed to the base of the drilled hole.
- Ensure the units are uniformly supported by using the grouting hole to completely flood the shimmed void (and grouting hole) with grout.
- Grout around the dowel so that the dowel is completely encapsulated.
- Do not disturb dowel bar or unit until grout has achieved full strength in accordance with resin and grout manufacture guidelines.

The Construction (Design and Management) Regulations 2015

- a) If you are unsure of your responsibilities please refer to the HSE website.

- b) These notes should be read by all CDM duty holders. Whilst we do not go into specifics such as working at heights, working over excavations, slips and trips etc, where Δ is shown in the notes and on the drawing some potential hazard / risks are identified and should be assessed accordingly by the main contractor and the design team prior to any site works commencing.

- c) Particular attention should be made to the notes identified by Δ which have the potential for significant risk where not adhered to. This F.P McCann unit drawing should be read in conjunction with all other relevant drawings available from the design team e.g Architect, Engineer, Steelwork sub-contractor etc.

- d) **Lifting** - The lifting equipment referred to in note 1 is the only lifting equipment which should be used on F.P. McCann supplied units. All elements must be lifted in accordance with F.P. McCann's lifting plan/method statement.

- e) **Installation** - Where it is necessary to work at height i.e. removal of shackles, procedures for working at heights must be followed. The manufactures guidelines and safety recommendation for the application of the grout and resin must be followed.

Notes:

1. Δ Handling

Unit Ref	Volume (m³)	Weight (T)	Weight + 5% (T)
1750 Wall Unit	0.32	0.83	0.87

Weight is based on 2.5 T/m³.

+5% is recommended for sizing lifting equipment.

- b) All lifting points shall be used as specified below:

As-Cast Lift	Qty	Simply Reference	SWL (T)
Sph. Head Rod Anchors	2	STRA025520	2.5
Upright Lift	Qty	Reference	
Wire Rope Lifters	2	Rope Assemblies - A18 Master Link	

Anchor recesses to be filled by others on site.

- c) The site lifting / installation equipment may be purchased from Simply Precast (Tel: 0800 678 5178).

Site Lifting: Pin Anchor Lifting Shackle Ref: SPARC025.

Concrete

- a) Lifting strength based on 2 cubes = 15 N/mm².
b) Characteristic 28 day cube strength = 55 N/mm².
c) Concrete provides Design Chemical Class 2 (DC2) to Special Digest 1, Table D2.

Reinforcement

- a) Reinforcement (500B or C) to BS4449.
b) Scheduling, dimensioning, bending and cutting to BS8666.
c) Cage to be tack welded and/or tied with 17 gauge annealed tying wire.

Manufacture

- a) Manufactured to BS EN 13369:2013.
b) Tolerances based on BS EN 13369:2013 & BS EN 13670:2009.
c) Finishes: As below unless indicated otherwise on drawing

	Cast Edge	All Other Faces
Class	Steel Float	A

- d) Marking: Units shall be indelibly marked to show:

- Unit reference and date of manufacture
- Unit weight + 5%

5. Δ Design

- a) Design to BS EN 1992-1-1:2004 & BS EN 1997-1:2004.
b) Application of the wall to conform to standard loading conditions(8) or to be verified (by Others) to be suitable based on noted wall capacities (7). Loading of the wall during construction must be considered.
c) F.P. McCann have designed the concrete units only, the stability of the support conditions should be checked by overall scheme designer.
d) Design Life: >100 years to BS8500.
e) Cover to Reinforcement & Exposure:

Min Cover	Cover Block Size (mm)	Min Cover (mm)	Max Cover (mm)
All Faces	45	40	50

Exposure			
All Faces	XC3/4	XD2	XF4

6 Δ Foundation

- a) Concrete base to be designed and installed (by others).
b) To ensure good bond and satisfy cover requirements in the anchors the slab should have minimum strength of C20 / C25 and a minimum depth of 250mm.

7 Δ Retaining Wall Capacity

- a) 1. Sectional moment capacity at analysis position (top of haunch) = 14kNm/m run (in both directions).
2. Sectional moment capacity above 2nd analysis position = 12kNm/m run (in both directions)
b) 1. Analysis position 1 (top of haunch) 235mm.
2. Analysis position 2 875mm
c) Stabilizing action from backfill material to be assessed on the unit weight of backfill (where applicable).
d) Resistance to overturning from fixing when loaded to the rear (over the heel) about the leading edge = 8kNm/m run.
e) Resistance to overturning from fixing when loaded to the front about the leading edge = 8kNm/m run.
f) Shear resistance at foundation = 110kN/m run.

8 Δ Standard Loading Conditions

- a) Four Loading conditions considered: -
• Loaded to rear with level fill and live load surcharge.
• Loaded to front with level fill and live load surcharge.
• Loaded to rear with 20° sloped fill.
• Loaded to front with 20° sloped fill.

Construction loading must not be more onerous than the permanent condition.

- b) The backfill material should be free draining granular material such as a class 6N or 6P, fill as define in the manual of Contract Documents for Highway Works Volume 1 Specification Series 600 Clause 610 & table 6/1.
Characteristic effective shearing resistance $\phi = 35^\circ$,
Unit weight of fill = 19kN/m³
c) Live Load 10.0kN/m²

Rev	Date	Revision detail	By	Chk'd
H	Dec/23	Grout notes updated	AS	SH
G	April/23	Grout notes updated	AS	SH
F	Feb/22	Notes updated	AS	SH

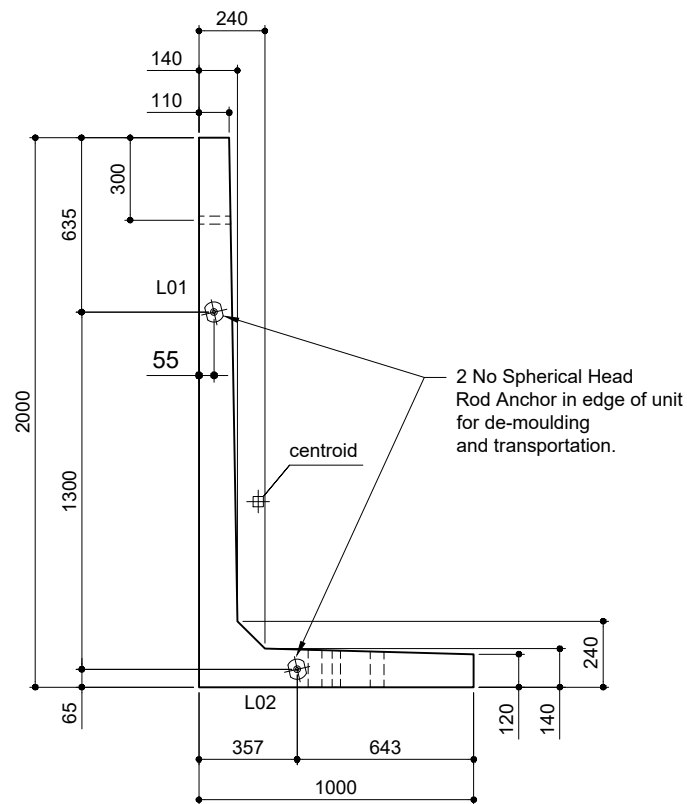


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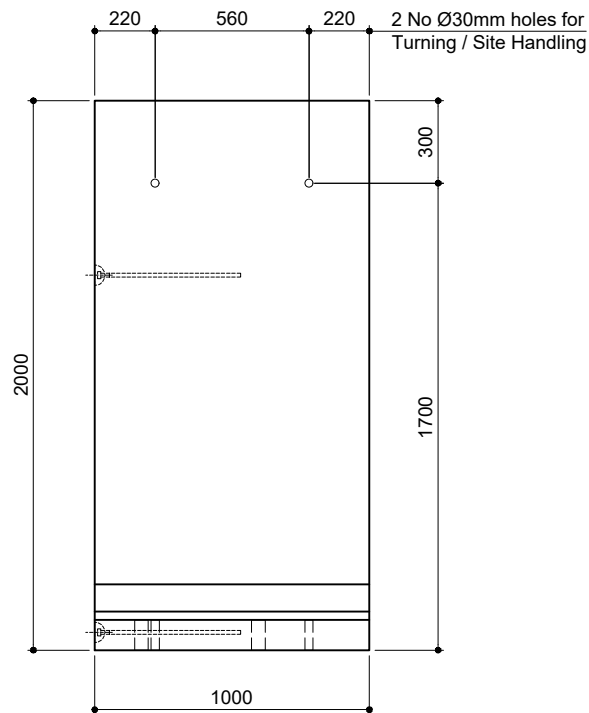
Contract / Title:

F. P McCann
Standard Retaining Wall
Straight L Wall 1.75m High
General Arrangement

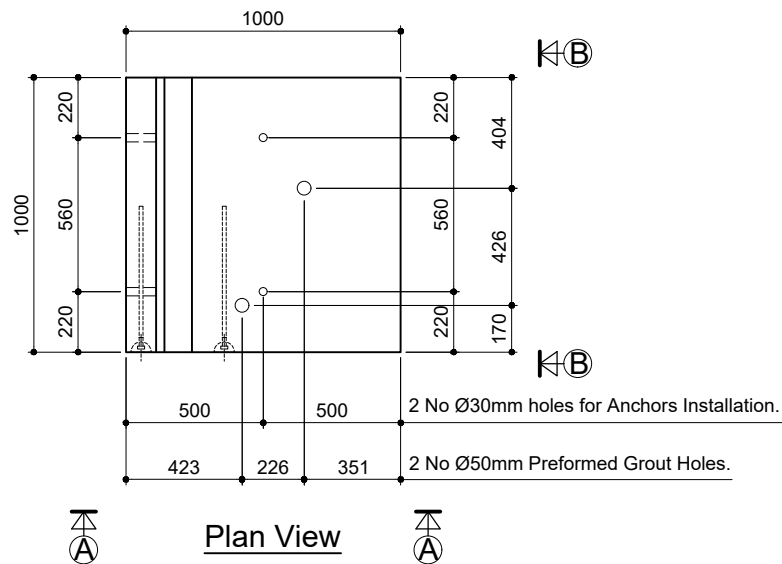
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Date	Chk'd	Rev
23.11.15	SH	H
Drawing no:		FPM-SLW-1.75-GA



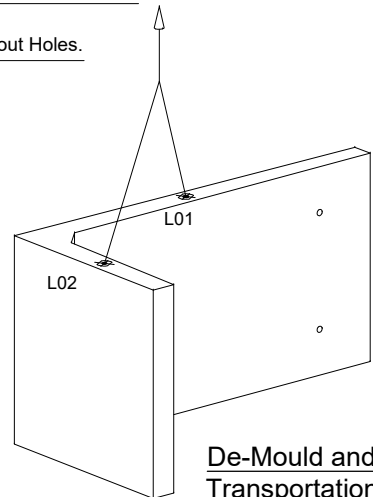
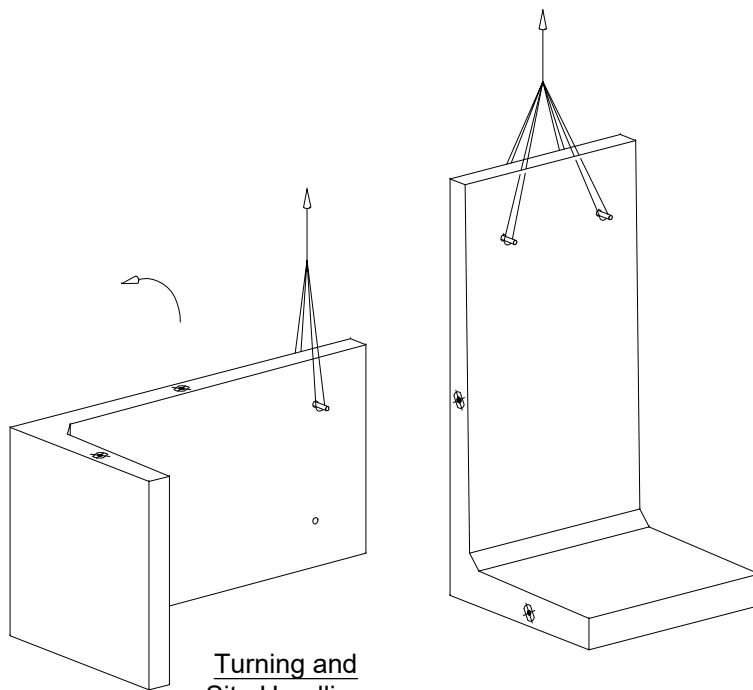
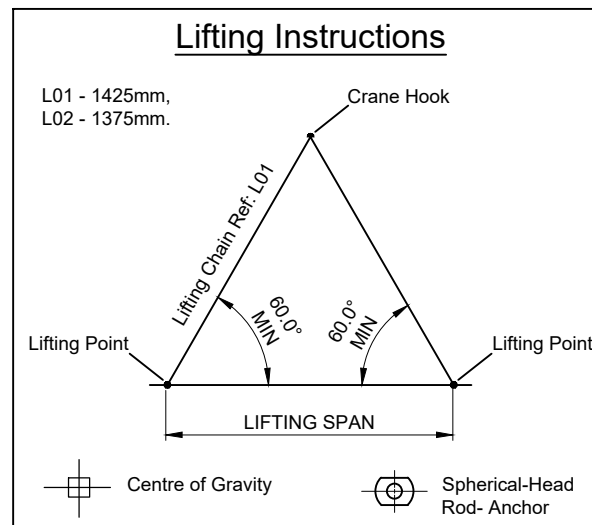
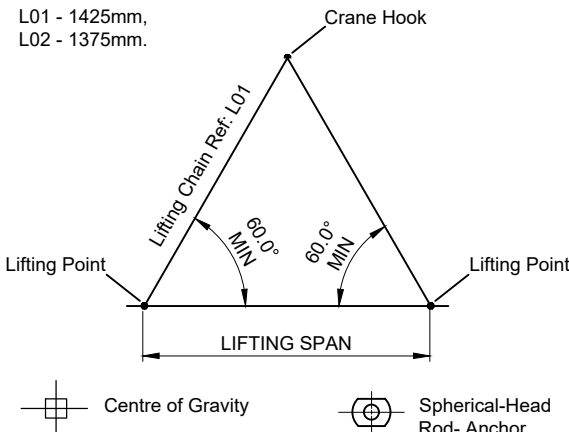
Elevation A-A



Elevation B-B



Plan View

De-Mould and
Transportation
Diagram (nts)Turning and
Site Handling
Diagram (nts)**Lifting Instructions**L01 - 1425mm,
L02 - 1375mm.Centre of Gravity Spherical-Head
Rod- Anchor30mm preformed hole to be filled
with FPM High Performance Grout

16mm diameter dowel bar

20mm diameter holes filled with
Sika Anchorfix -1 resin
or Larsen Rapid Anchor resinMaximum of 20mm shim and Dry Pak
flooded with FPM High Performance
Grout via grouting holeUnit supplied with 2 No. 275mm
B16 deformed rebar dowel bars.
(All dowel bars must be installed).**Anchor Detail**

Scale 1:10

Installation steps:

1. Position the units on to the shimmed concrete foundation.
2. Dry Pak to the edge of the base of the units to create a seal to the perimeter.
3. Through the 30mm preformed holes drill a 150mm, 20mm diameter hole into the foundation.
4. Fill holes with the resin to a level so that when the dowels are inserted the resin becomes level with the top of the foundation (as a minimum).
5. Insert the B16 dowel bar into the resin. Ensure that the bar is pushed to the base of the drilled hole.
6. Ensure the units are uniformly supported by using the grouting hole to completely flood the shimmed void (and grouting hole) with grout.
7. Grout around the dowel so that the dowel is completely encapsulated.
8. Do not disturb dowel bar or unit until grout has achieved full strength in accordance with resin and grout manufacture guidelines.

The Construction (Design and Management) Regulations 2015

- a) If you are unsure of your responsibilities please refer to the HSE website.
- b) These notes should be read by all CDM duty holders. Whilst we do not go into specifics such as working at heights, working over excavations, slips and trips etc, where Δ is shown in the notes and on the drawing some potential hazard / risks are identified and should be assessed accordingly by the main contractor and the design team prior to any site works commencing.
- c) Particular attention should be made to the notes identified by Δ which have the potential for significant risk where not adhered to. This F.P. McCann unit drawing should be read in conjunction with all other relevant drawings available from the design team e.g Architect, Engineer, Steelwork sub-contractor etc.
- d) **Lifting** - The lifting equipment referred to in note 1 is the only lifting equipment which should be used on F.P. McCann supplied units. All elements must be lifted in accordance with F.P. McCann's lifting plan/method statement.
- e) **Installation** - Where it is necessary to work at height i.e. removal of shackles, procedures for working at heights must be followed. The manufactures guidelines and safety recommendation for the application of the grout and resin must be followed.

Notes:**1. Δ Handling**

Unit Ref	Volume (m³)	Weight (T)	Weight + 5% (T)
2000 Wall Unit	0.37	0.96	1.01

Weight is based on 2.5 T/m³.

+5% is recommended for sizing lifting equipment.

b) All lifting points shall be used as specified below:

As-Cast Lift	Qty	Simply Reference	SWL (T)
Sph. Head Rod Anchors	2	STRA025520	2.5

Upright Lift	Qty	Reference
Wire Rope Lifters	2	Rope Assemblies - A18 Master Link

Anchor recesses to be filled by others on site.

c) The site lifting / installation equipment may be purchased from Simply Precast (Tel: 0800 678 5178).

Site Lifting: Pin Anchor Lifting Shackle Ref: SPARC025.

Concrete

- a) Lifting strength based on 2 cubes = 15 N/mm².
- b) Characteristic 28 day cube strength = 55 N/mm².
- c) Concrete provides Design Chemical Class 2 (DC2) to Special Digest 1, Table D2.

Reinforcement

- a) Reinforcement (500B or C) to BS4449.
- b) Scheduling, dimensioning, bending and cutting to BS8666.
- c) Cage to be tack welded and/or tied with 17 gauge annealed tying wire.

Manufacture

- a) Manufactured to BS EN 13369:2013.
- b) Tolerances based on BS EN 13369:2013 & BS EN 13670:2009.
- c) Finishes: As below unless indicated otherwise on drawing

	Cast Edge	All Other Faces
Class	Steel Float	A

d) Marking: Units shall be indelibly marked to show:

- Unit reference and date of manufacture
- Unit weight + 5%

5. Δ Design

- a) Design to BS EN 1992-1-1:2004 & BS EN 1997-1:2004.
- b) Application of the wall to conform to standard loading conditions(8) or to be verified (by Others) to be suitable based on noted wall capacities (7). Loading of the wall during construction must be considered.
- c) F.P. McCann have designed the concrete units only, the stability of the support conditions should be checked by overall scheme designer.
- d) Design Life: >100 years to BS8500.
- e) Cover to Reinforcement & Exposure:

Min Cover	Cover Block Size (mm)	Min Cover (mm)	Max Cover (mm)
All Faces	45	40	50

Exposure			
All Faces	XC3/4	XD2	XF4

6 Δ Foundation

- a) Concrete base to be designed and installed (by others).
- b) To ensure good bond and satisfy cover requirements in the anchors the slab should have minimum strength of C20 / C25 and a minimum depth of 250mm.

7 Δ Retaining Wall Capacity

- a)1. Sectional moment capacity at analysis position (top of haunch) = 18kNm/m run (in both directions).
2. Sectional moment capacity above 2nd analysis position = 15kNm/m run(in both directions)
- b) 1. Analysis position 1 (top of haunch) 240mm.
2. Analysis position 2 1000mm
- c)Stabilizing action from backfill material to be assessed on the unit weight of backfill (where applicable).
- d)Resistance to overturning from fixing when loaded to the rear (over the heel) about the leading edge = 10kNm/m run.
- e)Resistance to overturning from fixing when loaded to the front about the leading edge = 10kNm/m run.
- f)Shear resistance at foundation = 110kN/m run.

8 Δ Standard Loading Conditions

- a) Four Loading conditions considered: -
 - Loaded to rear with level fill and live load surcharge.
 - Loaded to front with level fill and live load surcharge.
 - Loaded to rear with 20° sloped fill.
 - Loaded to front with 20° sloped fill.
- Construction loading must not be more onerous than the permanent condition.
- b) The backfill material should be free draining granular material such as a class 6N or 6P, fill as define in the manual of Contract Documents for Highway Works Volume 1 Specification Series 600 Clause 610 & table 6/1.
Characteristic effective shearing resistance $\phi = 35^\circ$,
Unit weight of fill = 19kN/m³
- c) Live Load 10.0kN/m²

Rev	Date	Revision detail	By	Chk'd
H	Dec/23	Grout notes updated	AS	SH
G	April/23	Grout notes updated	AS	SH
F	Feb/22	Note updated	AS	SH

Manufacture Tolerances		
Allowable dimensional variations shall not exceed the following:		
Length/Height		Cross section (each direction)
Length	± 6mm	± 6mm
Height	± 6mm	
Edge straightness (deviation from intended line)		
± 6mm		
Holes		
Size of hole or opening:		+ 5/-0
Location of holes:		± 25mm

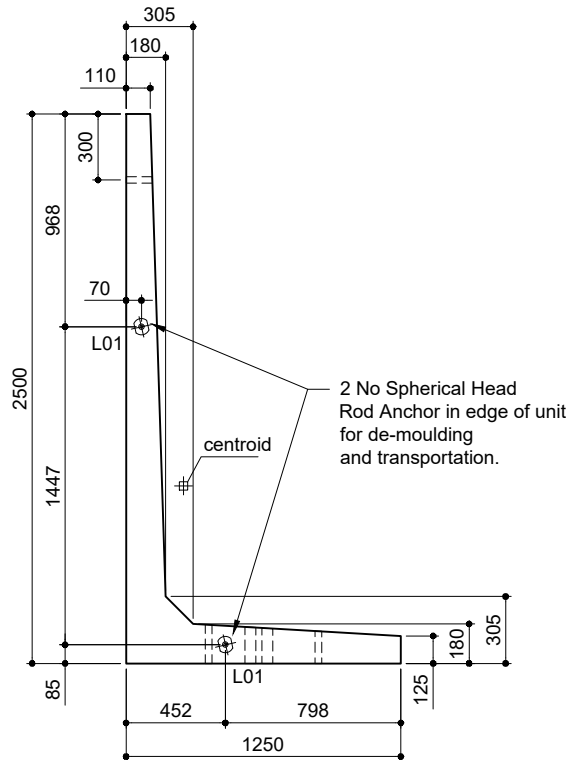


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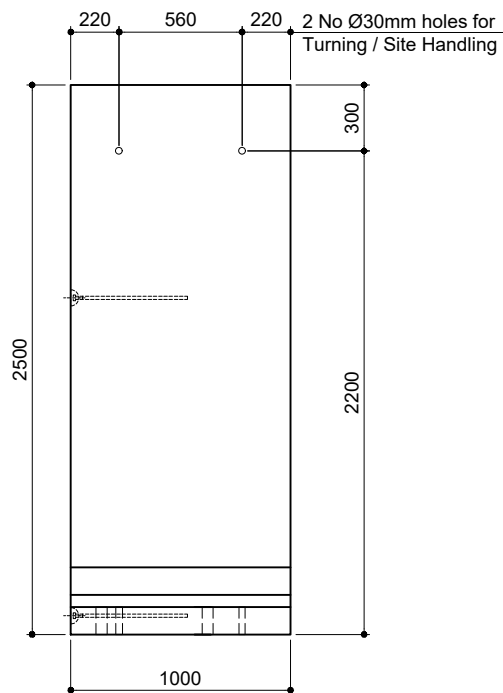
Contract / Title:

F. P McCann
Standard Retaining Wall
Straight L Wall 2.0m High
General Arrangement

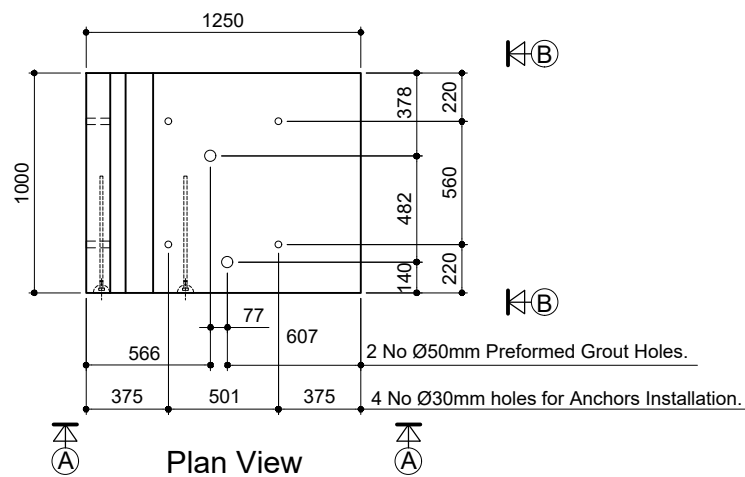
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LK	1:25, 1:10	Manufacture
Date:	Chk'd:	Rev:
14/12/16	SH	H
Drawing no:		FPM-SLW-2.0-GA



Elevation A-A

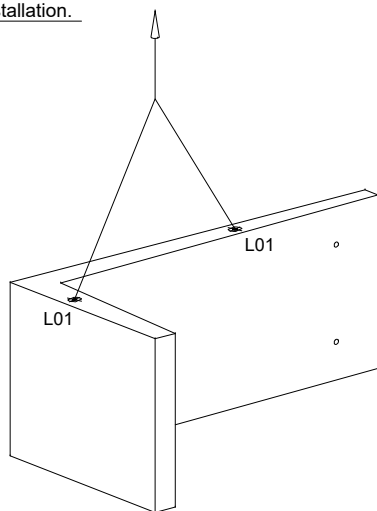
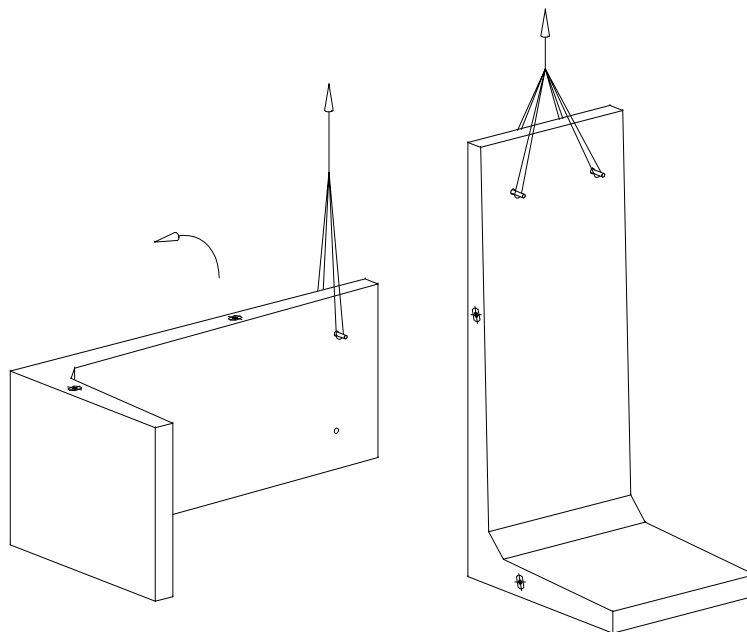
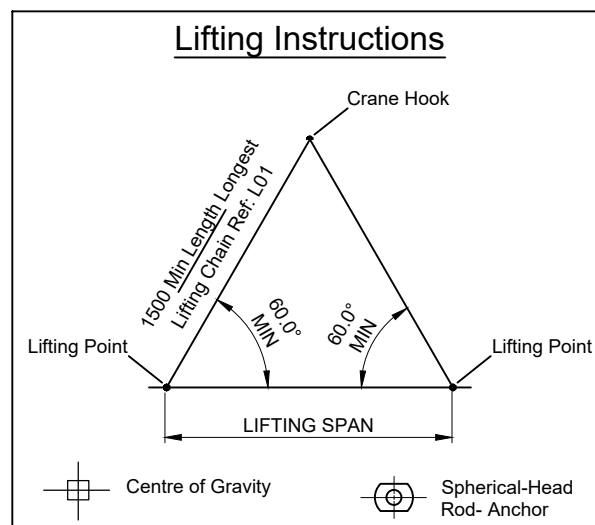


Elevation B-B



Plan View

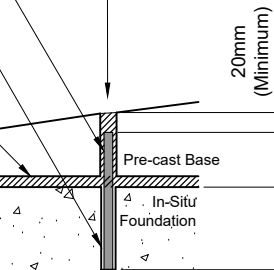
Manufacture Tolerances		
Allowable dimensional variations shall not exceed the following:		
Length/Height		Cross section (each direction)
Length ± 6mm		± 6mm
Height ± 6mm		
Edge straightness (deviation from intended line)		
± 6mm		
Holes		
Size of hole or opening:	+ 5/-0	
Location of holes:	± 25mm	

De-Mould and
Transportation
Diagram (nts)Turning and
Site Handling
Diagram (nts)

30mm preformed hole to be filled with FPM High Performance Grout

16mm diameter dowel bar
20mm diameter holes filled with Sika Anchorfix -1 resin or Larsen Rapid Anchor resin

Maximum of 20mm shim and Dry Pak flooded with FPM High Performance Grout via grouting hole

Anchor Detail
Scale 1:10

Unit supplied with 4 No. 275mm B16 deformed rebar dowel bars. (All dowel bars must be installed).

Installation steps:

- Position the units on to the shimmed concrete foundation.
- Dry Pak to the edge of the base of the units to create a seal to the perimeter.
- Through the 30mm preformed holes drill a 150mm, 20mm diameter hole into the foundation.
- Fill holes with the resin to a level so that when the dowels are inserted the resin becomes level with the top of the foundation (as a minimum).
- Insert the B16 dowel bar into the resin. Ensure that the bar is pushed to the base of the drilled hole.
- Ensure the units are uniformly supported by using the grouting hole to completely flood the shimmed void (and grouting hole) with grout.
- Grout around the dowel so that the dowel is completely encapsulated.
- Do not disturb dowel bar or unit until grout has achieved full strength in accordance with resin and grout manufacture guidelines.

The Construction (Design and Management) Regulations 2015

- a) If you are unsure of your responsibilities please refer to the HSE website.

- b) These notes should be read by all CDM duty holders. Whilst we do not go into specifics such as working at heights, working over excavations, slips and trips etc, where Δ is shown in the notes and on the drawing some potential hazard / risks are identified and should be assessed accordingly by the main contractor and the design team prior to any site works commencing.

- c) Particular attention should be made to the notes identified by Δ which have the potential for significant risk where not adhered to. This F.P McCann unit drawing should be read in conjunction with all other relevant drawings available from the design team e.g Architect, Engineer, Steelwork sub-contractor etc.

- d) **Lifting** - The lifting equipment referred to in note 1 is the only lifting equipment which should be used on F.P. McCann supplied units. All elements must be lifted in accordance with F.P. McCann's lifting plan/method statement.

- e) **Installation** - Where it is necessary to work at height i.e. removal of shackles, procedures for working at heights must be followed. The manufactures guidelines and safety recommendation for the application of the grout and resin must be followed.

Notes:**1. Δ Handling**

Unit Ref	Volume (m³)	Weight (T)	Weight + 5% (T)
2500 Wall Unit	0.55	1.43	1.50

Weight is based on 2.5 T/m³.

+5% is recommended for sizing lifting equipment.

- b) All lifting points shall be used as specified below:

As-Cast Lift	Qty	Simply Reference	SWL (T)
Sph. Head Rod Anchors	2	STRA025520	2.5

Upright Lift	Qty	Reference
Wire Rope Lifters	2	Rope Assemblies - A18 Master Link

Anchor recesses to be filled by others on site.

- c) The site lifting / installation equipment may be purchased from Simply Precast (Tel: 0800 678 5178).

Site Lifting: Pin Anchor Lifting Shackle Ref: SPARC025.

Concrete

- a) Lifting strength based on 2 cubes = 15 N/mm².
b) Characteristic 28 day cube strength = 55 N/mm².
c) Concrete provides Design Chemical Class 2 (DC2) to Special Digest 1, Table D2.

Reinforcement

- a) Reinforcement (500B or C) to BS4449.
b) Scheduling, dimensioning, bending and cutting to BS8666.
c) Cage to be tack welded and/or tied with 17 gauge annealed tying wire.

Manufacture

- a) Manufactured to BS EN 13369:2013.
b) Tolerances based on BS EN 13369:2013 & BS EN 13670:2009.
c) Finishes: As below unless indicated otherwise on drawing

	Cast Edge	All Other Faces
Class	Steel Float	A

- d) Marking: Units shall be indelibly marked to show:

- Unit reference and date of manufacture
- Unit weight + 5%

5. Δ Design

- a. Design to BS EN 1992-1-1:2004 & BS EN 1997-1:2004.
b. Application of the wall to conform to standard loading conditions(8) or to be verified (by Others) to be suitable based on noted wall capacities (7). Loading of the wall during construction must be considered.
c. F.P. McCann have designed the concrete units only, the stability of the support conditions should be checked by overall scheme designer.
d. Design Life: >100 years to BS8500.
e. Cover to Reinforcement & Exposure:

Min Cover	Cover Block Size (mm)	Min Cover (mm)	Max Cover (mm)
All Faces	45	40	50
Exposure			
All Faces	XC3/4	XD2	XF4

6 Δ Foundation

- a) Concrete base to be designed and installed (by others).
b) To ensure good bond and satisfy cover requirements in the anchors the slab should have minimum strength of C20 / C25 and a minimum depth of 250mm.

7 Δ Retaining Wall Capacity

- a)1. Sectional moment capacity at analysis position (top of haunch) = 35kNm/m run (in both directions).
2. Sectional moment capacity above 2nd analysis position = 25kNm/m run (in both directions)
b) 1. Analysis position 1 (top of haunch)305mm.
2. Analysis position 2 1250mm
b) Stabilizing action from backfill material to be assessed on the unit weight of backfill (where applicable).
c) Resistance to overturning from fixing when loaded to the rear (over the heel) about the leading edge = 25kNm/m run.
d) Resistance to overturning from fixing when loaded to the front about the leading edge = 25kNm/m run.
e) Shear resistance at foundation = 220kN/m run.

8 Δ Standard Loading Conditions

- a) Four Loading conditions considered: -
• Loaded to rear with level fill and live load surcharge.
• Loaded to front with level fill and live load surcharge.
• Loaded to rear with 20° sloped fill.
• Loaded to front with 20° sloped fill.
Construction loading must not be more onerous than the permanent condition.
b) The backfill material should be free draining granular material such as a class 6N or 6P, fill as define in the manual of Contract Documents for Highway Works Volume 1 Specification Series 600 Clause 610 & table 6/1.
Characteristic effective shearing resistance $\phi = 35^\circ$.
Unit weight of fill = 19kN/m³
c) Live Load 10.0kN/m²

Rev	Date	Revision detail	By	Chk'd
H	Dec/23	Grout notes updated	AS	SH
G	April/23	Grout notes updated	AS	SH
F	Feb/22	Note updated	AS	SH

Contract / Title:

F. P McCann
Standard Retaining Wall
Straight L Wall 2.5m High
General Arrangement

Drawn: LK	Scale: 1:25, 1:10	Status: Manufacture
Date: 14/12/16	Chk'd: SH	Feb,2022

Drawing no: FPM-SLW-2.5-GA	Rev: H
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