Rossendale BOROUGH COUNCIL

ITEM NO. B1

Application Number:	2016/0630	**Application Type:**	Full
Proposal:	Erection of 8 dwellings including new access road, landscaping and land stabilisation and drainage works (part retrospective)	**Location:**	Land at Hurst Platt, Waingate Road, Rawtenstall
Report of:	Planning Manager	**Status:**	For Publication
Report to:	Development Control Committee	**Date:**	18/07/2017
Applicant(s):	BAK Contracts	**Determination Expiry Date:**	21/07/2017
Agent:	Mr N Anyon (Croft Goode Architects)		

Contact Officer:	**James Dalgleish**	**Telephone:**	**01706 238643**
Email:	**planning@rossendalebc.gov.uk**		

REASON FOR REPORTING	
Outside Officer Scheme of Delegation	
Member Call-In Name of Member: Reason for Call-In:	
3 or more objections received	✓
Other (please state):	

HUMAN RIGHTS
The relevant provisions of the Human Rights Act 1998 and the European Convention on Human Rights have been taken into account in the preparation of this report, particularly the implications arising from the following rights:-

Article 8
The right to respect for private and family life, home and correspondence.

Article 1 of Protocol 1
The right of peaceful enjoyment of possessions and protection of property.

1. RECOMMENDATION

Approve full planning permission subject to conditions and **SUBJECT TO MICHAEL POOLER'S ACCEPTANCE OF A SUITABLE SCHEME IN RESPECT OF LAND STABILITY AND DRAINAGE.**

2. SITE

The application relates to a substantial parcel of land located to the north of Newchurch Road in Rawtenstall, accessed via Green Street.

The land has been partially developed; two pairs of semi-detached three-storey stone dwellings have been constructed on the western portion of the site. Excavations have taken place toward the eastern end of the site, extending into the slope to the north, and a steel sheet piled retaining wall has been constructed at the foot of the slope. Foundations have been partially constructed for an additional pair of semi-detached dwellings.

The slope at the northern end of the site has undergone some movement, which appears to have resulted in damage to the gardens and outbuildings of residential properties to the north along Hurst Crescent.

The site is surrounded on its north, west and south sides by residential properties and their gardens. To the east of the site is a small area of woodland.

The site lies within the defined urban boundary.

3. RELEVANT PLANNING HISTORY

2008/0681 - Erection of 3 no. detached dwellings (Refused)

2009/0028 - Erection of 3 dwellings (Refused, than allowed on appeal, not implemented)

2012/0544 - Erection of 3 dwellings (Approved, not implemented)

2013/0470 – Outline: Construction of 8 Dwellings Comprising Four Semi Detached Pairs (Approved, not implemented)

2014/0168 - Erection of 8 houses (Approved, not implemented. The construction of the four dwellings currently on site commenced but without the discharge of several pre-commencement conditions included on planning permission 2014/0168, and as such it is not considered that planning permission 2014/0168 has been lawfully implemented)

2015/0087 - Variation of condition 6 (access road and retaining walls) pursuant to planning permission 2014/0168 (Not determined)

2015/0088 - Discharge of Conditions: 5 (road improvements) 8 (construction method statement) 10 (foul & surface water drainage) & 11(structural stability of land & properties) pursuant to planning permission 2014/0168 (Refused)

2015/0507 - Variation of Condition 11 (land stability) pursuant to Planning Permission 2014/0168 (Refused)

2015/0508 - Discharge of Conditions: 3 (design and facing materials); 5 (scheme to improve section of Green Street); 8 (Construction Method Statement); and 10 (foul/surface water drainage)

pursuant to planning permission 2014/0168 (Split Decision – Only Conditions 3 and 8 were discharged)

2016/0167 - Variation of conditions: 5 (scheme to improve section of Green Street); 10 (foul / surface water drainage); and 11 (land stability) pursuant to planning permission 2014/0168 (Not determined)

4. PROPOSAL

Planning permission was granted previously (ref: 2014/0168) for the construction of four pairs of semi-detached dwellings on the land, subject to eleven conditions. Several of those conditions required the submission and approval of details to the Council prior to the commencement of development on the site. Development was carried out by the land owner at the time to construct two pairs of semi-detached dwellings on the site, and significant excavations took place at the foot of the slope toward the north east end of the site and a steel sheet piled retaining wall was put in place. Foundations were constructed on the excavated area for another pair of semi-detached dwellings.

The above works took place without the necessary discharge of a number of the aforementioned pre-commencement conditions, and as such it is not considered that planning permission 2014/0168 has been lawfully implemented.

A Temporary Stop Notice was served on the site by the Council's Planning Enforcement Team and the developer at the time was advised to cease the unauthorised works until they had been regularised and brought within planning control.

The slope to the north of the site has undergone some movement, which has resulted in a land slip towards the top of the slope. It appears that damage to the rear gardens and outbuildings of some residential properties along Hurst Crescent was caused by the land slip.

Subsequently the land was sold to a new developer (the current applicant). Further to discussions between officers and the current developer, the current application has been submitted to regularise the development that has already occurred on the site and for the erection of a further two pairs of semi-detached three-storey dwellings (bringing the total to eight), to match those already constructed (and largely in line with the planning permission previously granted for eight dwellings under 2014/0168).

The current application also includes proposed works to drain and stabilise the site including the slope to the north of the site, including:

- The installation of land drainage within the slope
- The installation of a new sheet piled retaining wall, approximately 2m higher than the existing sheet piled wall at the foot of the slope
- Backfilling the slope behind the new sheet piled wall with single-size granular stone fill, covered with topsoil and grass
- Construction of a gabion retaining wall to the rear of the gardens of plots 1-4 at the western end of the site

The proposed dwellings themselves would match those that have been constructed on site, resulting in a line of four pairs of semi-detached properties aligned approximately in an east-west direction. The dwellings would be of stone construction to match those which have already been

built, and would have roof slates again to match those already constructed. Windows and doors on the dwellings would be grey UPVC units to match those on the existing houses.

Access to the development would be via the existing access along Green Street, and the access road to the dwellings would be surfaced in tarmac. The parking spaces in front of the dwellings would be surfaced with porous paving.

5. POLICY CONTEXT

National

National Planning Policy Framework

Section 4 Promoting Sustainable Transport
Section 6 Delivering a Wide Choice of High Quality Homes
Section 7 Requiring Good Design
Section 8 Promoting Healthy Communities
Section 11 Conserving and Enhancing the Natural Environment

Development Plan Policies

Rossendale Core Strategy DPD (2011)

Policy AVP4 Rawtenstall, Crawshawbooth, Goodshaw and Loveclough
Policy 1 General Development Locations and Principles
Policy 8 Transport
Policy 9 Accessibility
Policy 18 Biodiversity, Geodiversity and Landscape Conservation
Policy 19 Climate Change, etc
Policy 23 Promoting High Quality Designed Spaces
Policy 24 Planning Application Requirements

Other Material Considerations

National Planning Practice Guidance
RBC Alterations and Extensions to Residential Properties SPD

6. CONSULTATION RESPONSES

Environment Agency

No comments to make on the application.

RBC Building Control

No comments to make on the application.

Contaminated Land

No objection subject to conditions.

Ecology

No objection subject to condition.

LCC (Highways)
No objection subject to conditions.

Consulting Structural / Civil Engineer (Michael Pooler Associates)

Awaiting comments.

RBC Property Services

No comments have been received.

United Utilities

No objection subject to conditions.

7. REPRESENTATIONS

To accord with the General Development Procedure Order 48 neighbours were sent letters on 12/04/2017 and 4 site notices were posted on 12/04/2017.

Five letters of objection and one other representation have been received, raising the following points:

- Piled foundations may cause adverse impacts to residential properties to the north.
- Inadequate access to the site, and the development will cause highway safety issues.
- Existing land drainage issues on the site.
- Site not suitable for building.
- Facing materials need to match houses already constructed on site, including those for retaining wall to the proposed access road.
- Planting of native tree species is required to the rear of the site.
- Development would harm the privacy enjoyed by neighbouring residents.
- Inadequate landscaping is proposed.
- Concerns over land stability.

8. REPORT

The main considerations of the application are:

1) Principle; 2) Visual Amenity; 3) Neighbour Amenity; 4) Access/Parking and Highway Safety

Principle

The site is located within the defined urban boundary, and the principle of residential development (8 dwellings) has already been established on the site by previous planning approvals.

Given the history of land instability on the site, it is considered that the acceptability of the scheme in principle is partly dependent on whether or not it can be demonstrated that the proposed works will satisfactorily stabilise the slope to the north of the proposed dwellings.

Paragraph 121 of the Framework states:

"Planning policies and decisions should also ensure that:

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation"*

The applicant has appointed engineers to devise a suitable scheme of land stabilisation and a drainage solution for this site. The Council has appointed Michael Pooler Associates to assess the proposed scheme on its behalf. Discussions have been held between the case officer and Michael Pooler during which Michael has indicated that the slope stability scheme's design appears to be progressing in a favourable direction.

However, at the time of writing further technical information is still awaited from the applicant's consulting engineer relating to the design of the proposed slope stability works. The applicant has confirmed that the information will be provided by Wednesday 14th June. Until such information is received, the Council's consulting engineer (Michael Pooler Associates) is unable to provide formal confirmation that the proposed scheme is acceptable. It is anticipated that final confirmation of the acceptability of the proposed slope stability and drainage scheme will be provided in the update report.

It is considered necessary to include a condition requiring that the proposed land stabilisation and drainage works are carried out prior to any other construction works taking place to the proposed dwellings on site, in order that any risk of land instability is addressed without delay.

Subject to Michael Pooler's acceptance of a suitable scheme in respect of land stability and drainage and the above condition, the proposed scheme is considered acceptable in principle.

Visual Amenity

The design and appearance of the proposed dwellings would be similar to that previously approved under 2014/0168 and it is proposed to use facing materials to match those on the dwellings already constructed.

The design, scale and appearance of the proposed dwellings would be acceptable, and it is considered appropriate to include a condition requiring the facing materials to match those on the dwellings already constructed.

The applicant has confirmed that the proposed retaining wall on the southern edge of the site will be faced in 140mm coursed stone which would be appropriate in the context of the site, and it is considered appropriate to include a condition requiring that the wall is faced as such.

The submitted landscaping and boundary treatment details are appropriate, and it is considered necessary to include a condition requiring that the proposed planting is carried out in the first planting season following either completion of the development or first occupation of any of the dwellings (whichever is the sooner).

Subject to the above conditions, the proposed scheme is considered acceptable in terms of visual amenity.

Neighbour Amenity

The siting, orientation and fenestration of the proposed dwellings would not differ significantly from the scheme approved under 2014/0168.

Given the siting and orientation of the proposed dwellings, and the separation distances involved between the site and other residential properties, it is not considered that the scheme would result in any undue loss of daylight, outlook or privacy to any nearby residential properties.

Given the proximity to other residential properties, it is considered appropriate to include a condition restricting the hours of construction in order to prevent undue noise disturbance during construction works.

Subject to the above, the scheme is considered acceptable in terms of neighbour amenity.

Access / Parking and Highway Safety

The Local Highway Authority has no objection to the proposed scheme (subject to conditions), which in terms of access arrangements is similar to that previously approved under 2014/0168.

Concerns were initially raised by the Local Highway Authority regarding the length of the proposed driveways serving Plots 7 and 8. However, it has since been clarified that there is a 2m-wide underpass incorporated into the front elevations of the dwellings which effectively extends the length of the driveways to an acceptable standard. In any case, the applicant has now provided amended plans showing that roller shutter garage doors are to be used (rather than up-and-over garage doors) to maximise the available driveway length for cars to be parked.

The conditions requested by the Local Highway Authority include:

- None of the dwellings shall be occupied until their garages are available to use for the parking of cars and the hard standing fronting them has been provided with a hard permeable surface as shown on the submitted drawings. Notwithstanding permitted development rights, the garages and driveways shall be kept freely available for the parking of cars in perpetuity.
- Within 3 months of the grant of planning permission a scheme to improve the section of Green Street from its junction with Holmes Street in an easterly direction to the red edge shown on the plan shall be submitted to and approved by the Local Planning Authority and shall be constructed prior to the occupation of any of the houses.
- Within 3 months of the grant of planning permission full engineering, drainage, street lighting and constructional details of the access road, including the retaining wall and the pedestrian/vehicle restraint along the southerly side of the access road shall been submitted to and approved in writing by the Local Planning Authority. The development shall thereafter be constructed in accordance with the approved details.

Subject to the above conditions, the proposed scheme is considered acceptable in terms of access / parking and highway safety.

9. CONCLUSION

An unlawful commencement of a previously approved development commenced on this site and this application seeks to regularise the situation at site. At the time of writing this report the Council's consultant engineer has not formally confirmed acceptance of the proposed land stabilisation and drainage solutions for this site however it is considered that an acceptable solution can be achieved to resolve the issues at this site.

10. RECOMMENDATION

Approve full planning permission subject to conditions and **SUBJECT TO MICHAEL POOLER'S ACCEPTANCE OF A SUITABLE SCHEME IN RESPECT OF LAND STABILITY AND DRAINAGE.**

11. CONDITIONS

1. The development shall be carried out in accordance with the following:

- Application Form date stamped 12th April 2017 by the Local Planning Authority.
- Site Location Plan (Croft Goode Architects Drawing Number 16-2218-EX001 Revision B) date stamped 25th April 2017 by the Local Planning Authority.
- Site Layout (James Crosbie Associates Ltd Drawing Number 01 Revision P2) date stamped 12th April 2017 by the Local Planning Authority.
- Proposed Floor Plans (Croft Goode Architects Drawing Number 16-2218-PN101) date stamped 12th April 2017 by the Local Planning Authority.
- Sections Through Site (James Crosbie Associates Ltd Drawing Number 02 Revision P2) date stamped 12th April 2017 by the Local Planning Authority.
- Detailed Landscape Proposals (Margaret Twigg Landscape Architects Drawing Number 452.01) date stamped 2nd June 2017 by the Local Planning Authority.
- Proposed Elevations (Croft Goode Architects Drawing Number 16-2218-003) date stamped 1st June 2017 by the Local Planning Authority.
- Proposed Site Sections (Croft Goode Architects Drawing Number 16-2218-PN301) date stamped 12th April 2017 by the Local Planning Authority.
- Property Management North West Ltd arrangements for future management and maintenance of the proposed streets within the development (date stamped 12th June 2017 by the Local Planning Authority).

Reason: For the avoidance of doubt.

2. No development in respect of the construction of the dwellinghouses hereby permitted shall take place until the slope stability and drainage works as shown on approved drawing Numbers 01 (Revision P2) and 02 (Revision P2) (by James Crosbie Associates Ltd) have been completed in full.

Reason: In the interests of land stability and to ensure adequate drainage of the site.

3. Any construction works associated with the development hereby approved shall not take place except between the hours of 7:00 am and 7:00 pm Monday to Friday and 8:00 am and 1:00 pm on Saturdays. No construction shall take place on Sundays, Good Friday, Christmas Day or Bank Holidays.

Reason: To safeguard the amenities of neighbours.

4. Notwithstanding what is shown on the submitted plans and documents, the dwellings hereby permitted shall be constructed with facing materials to match those used in the construction of the elevations and roof of the dwelling on Plot 1 which has already been constructed on the site.

Reason: To ensure the development is of satisfactory appearance.

5. Notwithstanding what is shown on the submitted plans and documents, the retaining wall to the new access road along the southern boundary of the site shall be faced in coursed stone to match that used in the construction of the elevations of the dwelling on Plot 1 which has already been constructed on the site.

   Reason: To ensure the development is of satisfactory appearance.

6. None of the dwellings hereby permitted shall be occupied until their garages are available for use for the parking of cars, and until the driveways fronting them have been surfaced in a hard permeable material as shown on Margaret Twigg Landscape Architects drawing number 452.01.

   Reason: In the interests of highway safety and to ensure that sufficient parking provision is provided for the size of the dwellings hereby approved.

7. Notwithstanding the provisions of the Town & Country Planning (General Permitted Development) (England) Order 2015, or any subsequent Order amending or revoking and re-enacting it, each of the garages shall be kept freely available for the parking of cars at all times.

   Reason: In the interests of highway safety and to ensure that sufficient parking provision is provided and retained for the size of the dwellings hereby approved.

8. Within three months of the date of the planning permission hereby granted, a scheme (including proposed layout, construction details, materials, width, lighting and drainage) to improve the section of Green Street from its junction with Holmes Street in an easterly direction to the red edge shown on the submitted site location plan (Croft Goode Architects Drawing Number 16-2218-EX001 Revision B) shall be submitted to the Local Planning Authority for its approval. The development shall thereafter be fully implemented in accordance with the approved details prior to first occupation of any of the dwellings hereby permitted.

   Reason: In the interests of highway safety and to manage surface water runoff.

9. Within three months of the date of the planning permission hereby granted, full engineering, drainage, street lighting and constructional details of the access road (including the retaining wall and the pedestrian/vehicle restraint along the southerly side of the access road) shall been submitted to the Local Planning Authority for its approval. The development shall thereafter be fully implemented in accordance with the approved details prior to first occupation of any of the dwellings hereby permitted.

   Reason: In the interests of highway safety and to manage surface water runoff.

10. Foul and surface water shall be drained on separate systems.

Reason: To secure proper drainage and to manage the risk of flooding and pollution.

11. All new planting forming part of the approved scheme (as shown on Margaret Twigg Landscape Architects drawing number 452.01) shall be carried out in the first planting season either following completion of the development or following first occupation of the last dwelling to be occupied (whichever is the sooner). Any trees or plants which within a period of 5 years of first occupation of the final dwelling die, are removed or become seriously damaged or diseased shall be replaced in the next planting season with others of similar size and species. All lawns, trees, shrubs and hedges located forward of the front elevations of the dwellings hereby permitted shall be retained thereafter and any that die or become seriously damaged or diseased shall be replaced in the next planting season with others of similar size and species.

    Reason: In the interests of visual amenity and to enhance the biodiversity value of the site.

12. If, during any works on site, land contamination is suspected or found, or land contamination is caused, the Local Planning Authority shall be notified immediately. Within one month of such notification taking place a risk assessment (together with a scheme including full details of any proposed remediation measures, together with timescales for their implementation) shall be submitted to the Local Planning Authority for its approval. The development shall thereafter be carried out in accordance with the agreed details. Within one month of the completion of the development or within one month of first occupation of any of the dwellings hereby permitted (whichever is the sooner), a verification report (demonstrating that the approved remediation measures have been carried out in accordance with the approved details) shall be submitted to the Local Planning Authority for its approval.

    Reason: In the interests of preventing harm to the future occupants of the development from land contamination.

INFORMATIVES

1. The Local Planning Authority has a Core Strategy (adopted in November 2011) and a series of Supplementary Planning Documents, which can be viewed at:

   http://www.rossendale.gov.uk/downloads/download/331/core_strategy_local_plan_part_1_adopted

   The Council operates a pre-application planning advice service. All applicants are encouraged to engage with the Local Planning Authority at the pre-application stage. In this case the applicant did not engage in pre-application discussions.

   The Local Planning Authority has considered the application and where necessary considered either the imposition of planning conditions and/or sought reasonable amendments to the application in order to deliver a sustainable form of development in accordance with the National Planning Policy Framework and the local planning policy context.

OUTLINE PLANTING SPECIFICATION

PROTECTION OF EXISTING TREES
Existing trees to be retained on the Development Site, and their canopies and roots, are to protected as necessary during construction works with temporary protective fencing in accordance as far as possible with the recommendations within BS5837 : 2012
Care should also be taken during Hard and soft landscape works, construction, topsoiling etc, to minimise any disturbance to tree roots, and to retain existing levels within RPA's as much as feasible, using hand digging where necessary within Root Protection Areas.
All materials for construction purposes to be stored outside of the canopy zone of trees. All toxic materials such as oils, bitumens & residues from concrete mixing should be kept well away from the protection zone of the trees, well away from their root systems, & should be retained within effective catchment areas as far away as possible to avoid risk of tree root contamination.
Should any tree works be required during the beginning of March to end of August bird nesting season, the trees should be inspected by a suitably qualified Ecologist prior to any pruning works to ensure no nesting birds are present. All nesting birds are protected from disturbance or injury under the Wildlife and Countryside Act 1981. In addition the trees should be checked to ensure no bats are present - if cracks or holes are present in the stems or trunk.

PROPOSED EXTRA HEAVY STANDARD TREE PLANTING
To be planted in 1200 x 1200 x 1000 mm depth pits , with 100 mm backfill of clean drainage material in base. Planting medium to be 900mm depth, comprising 80% approved quality topsoil. Any imported topsoil to comply with BS 3882:2007 Multi Purpose Grade. 20% approved peat free compost and Enmag fertilizer to be incorporated at a rate of 70 grams/m2. Mycorrhizal fungus should be applied to new tree either in the form of powder, granules or spikes. Powder and granules should be applied over the exposed roots of the transplanted tree and spread over the newly dug hole. Spikes should be pushed into the rootball once the tree has been planted. An irrigation pipe -eg Green - tech Mona Relief Grande MRG 3 (3m x 60mm dia pipe) to be supplied with a Mona Relief Grande Aria Inlet; or similar approved, irrigation pipe & cover to be installed around tree root ball. Trees to be staked with two 100 mm dia. treated softwood stakes pointed at one end. Stakes to be driven into existing ground beneath tree pit 300mm min. Top of stakes to be approx 750mm above ground, and fixed to tree with a timber cross bar, spacer and rubber tie – type to be agreed Allow for watering in to field capacity upon planting and then a second watering 48 hours later.

PROPOSED HEDGE PLANTING TO FRONT DRIVEWAYS
To receive 400 mm depth x 1m wide approved quality topsoil beds, over a de-compacted and free draining formation level. All topsoil to comply to BS 3882:2015 Multi Purpose Grade ' As Dug' topsoil, made weed free, and cultivated, including incorporating a 50mm layer of peat free compost across whole of bed worked in to full depth, and incorporating Enmag fertilizer at a rate of 70 g/m2 both to be worked into the full depth of topsoil prior to planting. Hedge plants to be planted in single row to centre of bed, with proposed groundcover plants to either side All plants to be well watered in. Bark mulch to whole of finished hedge bed to be 75mm layer of approved quality coarse/medium grade bark mulch. Allow for watering in to field capacity.

ORNAMENTAL SHRUBS & GROUNDCOVER PLANTING
All proposed shrub and groundcover areas are to receive 400 mm depth approved quality topsoil beds, over a de-compacted and free draining formation level. All topsoil to comply to BS 3882:2015 Multi Purpose Grade, 'As Dug' (Not a manufactured soil) made weed free, and cultivated, including incorporating a 35mm layer of peat free compost across whole of shrub beds, and incorporating Enmag fertilizer at a rate of 70 g/m2 both to be worked into the full depth of topsoil prior to planting. Specimen plants of 25L size plus, to be planted in 800mm3 pits, and all specimens to have backfill of 80% topsoil /20% approved peat free compost. All plants to be well watered in. Bark mulch to whole of finished shrub beds to be 75mm layer of approved quality coarse/medium grade bark mulch.

PROPOSED INDIGENOUS MASS PLANTING TO SLOPE TO LAND NORTH OF DEVELOPMENT SITE
Proposed Indigenous Tree Whips/ Transplants to be notch planted into existing slope, incorporating approved peat free compost. Allow provisionally for rabbit guards - Allow for Tubex Shrub Shelters 130 - 160mm dia X 75cm ht rabbit guards, green to be fixed individually to each transplant, secured with Tubex square section treated softwood stakes 1150mm height with one third fixed into ground. Stakes treated to BS8417:2003 for long term protection against fungi & pests. Each transplant to have a circle of bark mulch 75mm depth x 40mm diameter to base. Transplants to be planted at 3m centres and in a random mix of individuals and stands of between 1-4 of a species. To be planted at least 4m from the proposed structural retaining wall.

LOW MAINTENANCE STABILISING GRASS MIX TO ANY DISTURBED AREAS TO SLOPE TO LAND TO NORTH OF DEVELOPMENT SITE
Any disturbed areas of ground , those stripped of topsoil, or re-graded next to retaining wall to receive top up of topsoil as necessary - to achieve a 150mm minimum depth, and to be cultivated and made weed free, using non residual herbicide, and seeded with Germinal Seeds A3 Embankments and Drought Mix at a rate of 35g/ m2.

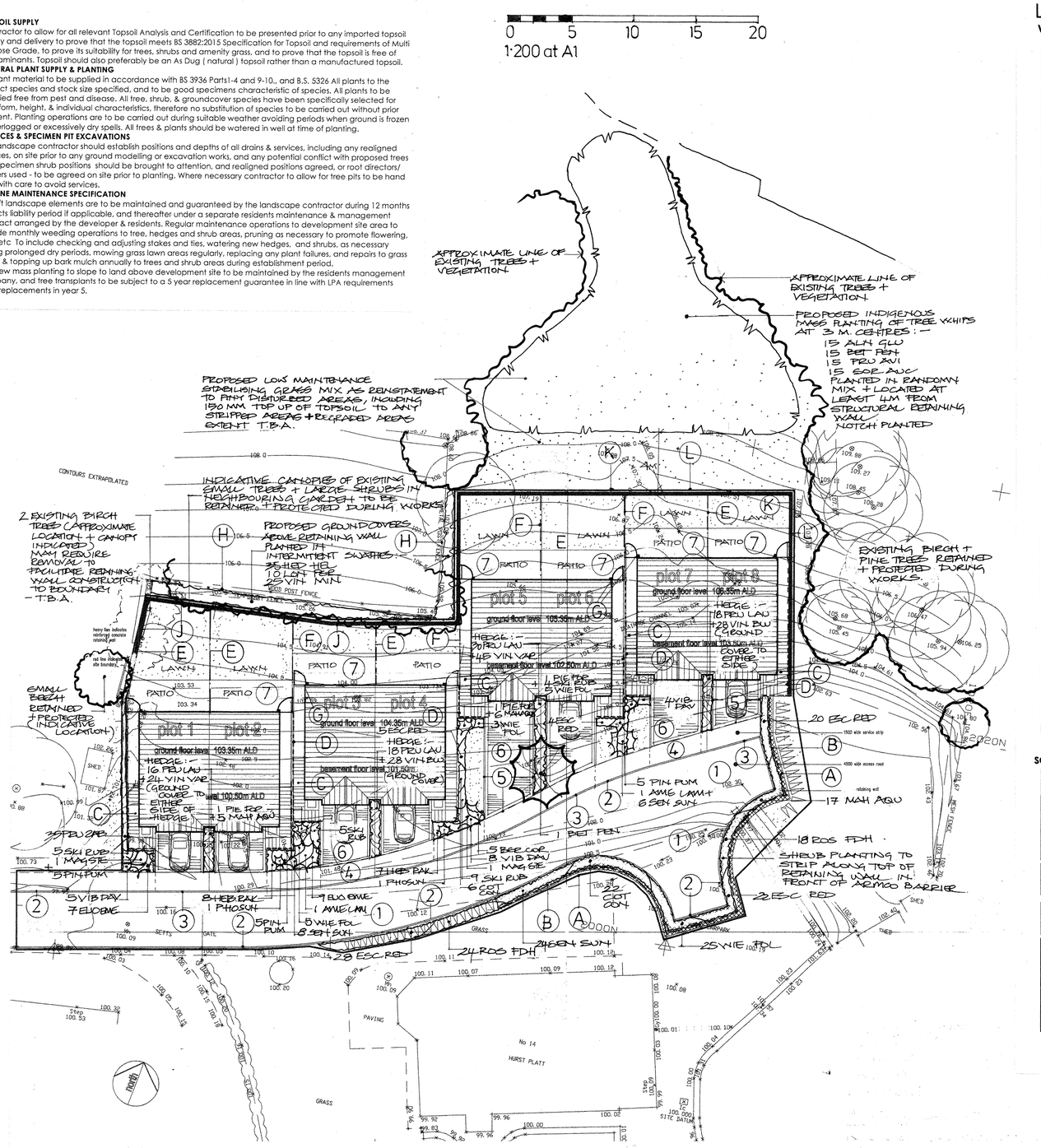
PROPOSED LAWNS TO FRONT AND REAR GARDENS
Front Lawn areas to receive topsoil to achieve a min 150mm depth of approved on site or imported topsoil, and rear gardens to recieve 400mm depth of tosoil, to BS3882: 2015, cultivated, and made weed free, and laid over a de-compacted and free draining formation level. To receive a cultivated shade tolerant turf from an approved Turf Supplier,

TOPSOIL SUPPLY
Contractor to allow for all relevant Topsoil Analysis and Certification to be presented prior to any imported topsoil supply and delivery to prove that the topsoil meets BS 3882:2015 Specification for Topsoil and requirements of Multi Purpose Grade, to prove its suitability for trees, shrubs and amenity grass, and to prove that the topsoil is free of contaminants. Topsoil should also preferably be an As Dug (natural) topsoil rather than a manufactured topsoil.

GENERAL PLANT SUPPLY & PLANTING
All plant material to be supplied in accordance with BS 3936 Parts1-4 and 9-10., and B.S. 5326 All plants to the correct species and stock size specified, and to be good specimens characteristic of species, All plants to be supplied free from pest and disease. All tree, shrub, & groundcover species have been specifically selected for their form, height, & individual characteristics, therefore no substitution of species to be carried out without prior consent. Planting operations are to be carried out during suitable weather avoiding periods when ground is frozen ,waterlogged or excessively dry spells. All trees & plants should be watered in well at time of planting.

SERVICES & SPECIMEN PIT EXCAVATIONS
The landscape contractor should establish positions and depths of all drains & services, including any realigned services, on site prior to any ground modelling or excavation works, and any potential conflict with proposed trees and specimen shrub positions should be brought to attention, and realigned positions agreed, or root directors/ barriers used - to be agreed on site prior to planting. Where necessary contractor to allow for tree pits to be hand dug with care to avoid services.

OUTLINE MAINTENANCE SPECIFICATION
All soft landscape elements are to be maintained and guaranteed by the landscape contractor during 12 months defects liability period if applicable, and thereafter under a separate residents maintenance & management contract arranged by the developer & residents. Regular maintenance operations to development site area to include monthly weeding operations to tree, hedges and shrub areas, pruning as necessary to promote flowering, form etc To include checking and adjusting stakes and ties, watering new hedges, and shrubs, as necessary during prolonged dry periods, mowing grass lawn areas regularly, replacing any plant failures, and repairs to grass areas & topping up bark mulch annually to trees and shrub areas during establishment period.
The new mass planting to slope to land above development site to be maintained by the residents management company, and tree transplants to be subject to a 5 year replacement guarantee in line with LPA requirements with replacements in year 5.



LEGEND

VERTICAL ELEMENTS & BOUNDARY TREATMENTS

- (A) Proposed Retaining Wall to New Access road - to Engineers details
- (B) Proposed Steel parapet railing with Armco Vehicular barrier attached to top of retaining wall to access road- to engineers detail
- (C) Proposed Steps to dwellings comprising rendered outer face to retaining walls, buff concrete flag treads, with risers faced with building fascia stone
- (D) Proposed 1.1m ht vertical steel railings as parapet/ handrails to outer sides of steps Dark charcoal or Black coloured finish to match windows and doors
- (E) Proposed 1800mm height feather board timber divisional garden screen fences between adjoining dwellings.
- (F) Proposed 1800mm height feather board timber divisional garden screen fences between the properties separated by 1m retaining wall to flights of steps (screen fence to be fixed to platform of upper dwellings, eg 1.8m long posts fixed to upper level path platforms using steel slotted & bolted down base plates?)
- (G) Proposed Gates -Feather board to match fencing- with gatepost fixed to rear elevation to allow access space along narrow paths
- (H) Existing post & wire fence approx 1-1.2m ht to existing garden boundary retained & New 1m ht Featherboard fence introduced to development side to tidy up the boundary
- (J) Proposed Retaining wall approx 900-1500mm ht to engineers details
- (K) Proposed Tall Structural Retaining Wall to engineers detail
- (L) Proposed Fence to top of tall Structural retaining wall -type TBA with LPA and Engineer

HARD SURFACES

- (1) 4.5m wide bitmac service road to engineers details
- (2) Proposed PC Concrete Road Kerbs set to approx 125mm height
- (3) PC concrete Drop kerbs to driveway positions to engineers details
- (4) Bitmac service strip/ path 1.5 m wide to engineers details
- (5) Flat top flush concrete pin kerb to engineers details to back of service strip and driveway edging
- (6) Proposed Tegula block paving to Driveways, in random stretcher course pattern eg Tobermore, 'Hydropave Tegula Duo' (Porous Suds paving), over infiltration sub base to engineers details, with a soldier or stretcher course around edge. Colours & pattern TBA to tie in with building vernacular eg Cedar with Slate trim around edge
- (7) 600mm x 600mm Buff coloured concrete flag paving to patio areas and access paths/ step landings

SOFT LANDSCAPE ELEMENTS

- Existing Trees & Vegetation retained and protected during works in accordance with principles in BS5837:2012 as far as feasible
- Proposed Hedges - in 400mm depth topsoil beds
- Proposed Trees planted in 1200mm x 1200mm x 1200mm pits, Double stake & cross bar tie
- Proposed Ornamental Shrubs, and Groundcover Planting, and Specimens in 400mm depth topsoil beds, with 800mm2 pits for specimens
- Proposed Mass Planting of Indigenous Whips/ Transplants to slope to land north of development site
- Proposed Low Maintenance Bank Stabilising Grass Mix to areas of reinstatement to slope to land north of development site
- Proposed Grass lawns to front of properties, 150mm topsoil and turfing.
- LAWN Proposed Rear lawns 400mm topsoil and turf (400mm depth to allow future flexibility for cultivation by resident)

PLANTING SCHEDULE

KEY	TOTAL	SPECIES	Common Name	SPECIFICATION	NO/M2
PROPOSED TREES					
BET PEN	1	Betula pendula	Silver Birch	Extra Heavy Standard	
				14-16 cm girth 4.25 -6m ht	
				1.8-m clear stem, Container grown	
				If planted April- October inclusive	
PROPOSED SPECIMEN PLANTS					
AME LAM	2	Amelanchier lamarckii	Snowy Mespilis	50-70L 150- 175cm multi stem	
MAG STE	2	Magnolia stellata	Star Magnolia	50-70L 150-175cm	
PIE FOR	3	Pieris forestii Forest Flame	Pierris variety	10L 60-80cm	
PHO SUN	2	Phormium tenax Sundowner**	New Zealand Flax	25L 100-125cm	
**Phormium Sundowner must be true to species ie green/ bronzed foliage with pink/red to margins only . No garish red substitutes will be accepted.					
PROPOSED HEDGES					
PRU LAU	82	Prunus laurocerasus Rotundifolia	Cherry Laurel	RB /or 3L CG 60-90cm	4/ lin m
Hedge Plants to be bushy/ well foliaged. If planted April to October to be container grown					
ORNAMENTAL SHRUBS, & GROUNDCOVERS & EVERGREEN HERBACEOUS PEENNIALS					
BER COR	5	Bergenia cordifolia	Elephant Ears	2L	5/m2
COT CON	28	Cotoneaster conspicuous Decor	Cotoneaster groundcover	2L 30-40cm	4/m2
HEB RAK	15	Hebe rakaiensis	White flowered Hebe	2L 20-30cm	5/m2
HED HEL	35	Hedera helix	Common Ivy	2L40-60cm (unstaked)	5/ m2
ESC RED	65	Escallonia Red Elf	Dwarf Escallonia	3L 30-40cm	3/m2
EUO EME	16	Euonymous Emerald Gaiety	Groundcover Euonymous	2L20-30cm	5/m2
LON PER	10	Lonicera periclymenum	Common Honeysuckle	3L 40-60cm (unstaked)	3/m2
MAH AQU	28	Mahonia aquifolium	Groundcover	3L 30-40cm	4/m2
PIN PUM	15	Pinus mugho Pumilo*	Dwarf Pine	5L 30-40cm	4/m2
PRU ZAB	35	Prunus Zabeliana	Dwarf Laurel	3L 30-40cm	3/m2
ROS FRA	42	Rosa Frau Dagmar Hastrup	Groundcover Rose	3L 30-40cm	4/m2
SEN SUN	38	Senecio Sunshine*	Senecio	3L 30-40cm	3/m2
SKI RUB	24	Skimmia japonica Rubella	Skimmia	3L 30-40cm	4/m2
VIB DAV	25	Viburnum davidii	Groundcover viburnum	3L 30-40cm	4/m2
VIN MIN	25	Vinca minor	Lesser periwinkle	2L 30-40cm	5/m2
VIN VAR	69	Vinca minor Variegata	Variegated Great Periwinkle	2L 30-40cm	5/m2
VIN BLU	56	Vinca minor Blue and Gold	Variegated Great Periwinkle	2L 20-30cm	5/m2
WIE FOL	38	Wiegela foliis Purpureus	Purple foliaged Wiegela	3L 30-40cm	4/m2
Pinus Pumilo and Senecio must be bushy/ compact - not 'leggy' plants					
INDIGENOUS MASS TREE PLANTING TO SLOPE NORTH OF DEVELOPMENT SITE					
ALN GLU	15	Alnus glutinosa	Common Alder	90-120cm 1+1 Transplants	
BET PEN	15	Betula Pendula	Silver Birch	90-120cm 1+1 Transplants	
PRU AVI	15	Prunus avium	Wild Cherry	90-120cm 1+1 Transplants	3m centres
SOR AUC	15	Sorbus aucuparia	Rowan	90-120cm 1+1 Transplants	
PROPOSED LOW MAINTENANCE STABILISING GRASS MIX TO SLOPE TO NORTH OF DEVELOPMENT SITE					
Any disturbed areas of ground and those effected by retaining wall construction to slope to north of development site, once regraded, to receive top up as necessary with topsoil to 150mm depth, cultivation, and seeding with Germinal Seeds(formerly British Seed Houses) A3 Embankments and Drought Mix at a rate of 35g/m2, inc pre seed fertilizer.					
PROPOSED FRONT AND REAR GARDEN LAWNS					
Proposed Lawns to front gardens to receive 150mm topsoil, and rear lawns 400mm topsoil and cultivated and to receive an approved quality shade tolerant cultivated turf.					

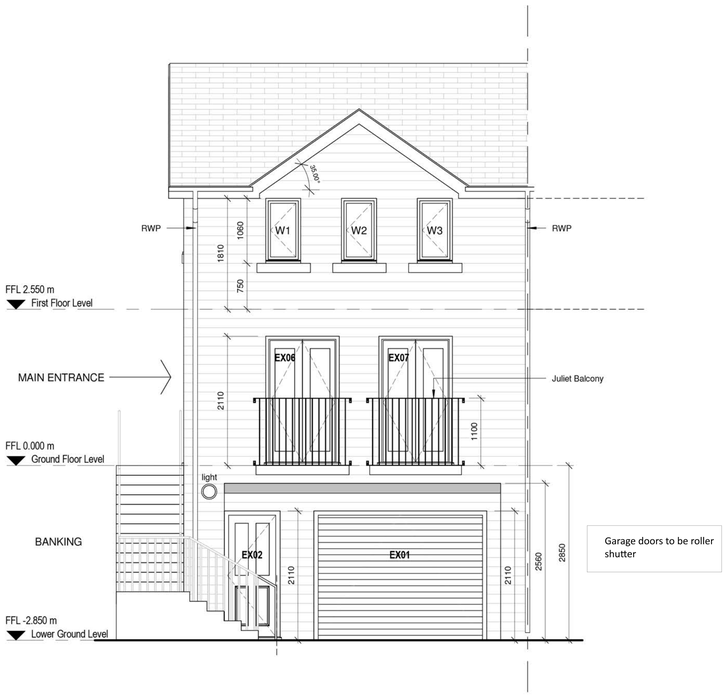
NOTES

1.This drawing to be read in conjunction with Architects Site Layout, and Structural Engineers road and retaining wall drawings, also any drainage and M& E drawings etc
2.. Contractor to establish positions of all drains and services prior to excavation works. Any conflict with proposed tree positions or larger specimen plants to be brought to attention and new positions agreed or root barriers used.

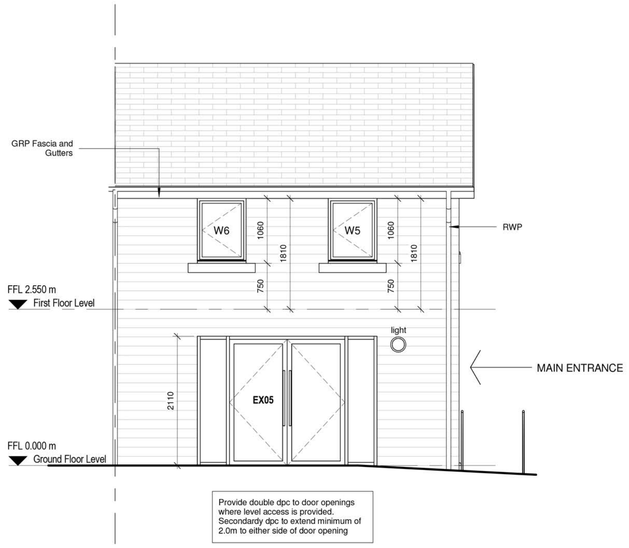
DETAILED LANDSCAPE PROPOSALS
PROPOSED RESIDENTIAL DEVELOPMENT
HURST PLATT, WAINGATE RD, RAWTENSTALL

Date : June 2017 Scale : 1.200 at A1 Drawn : MT Drwg No. 452. 01

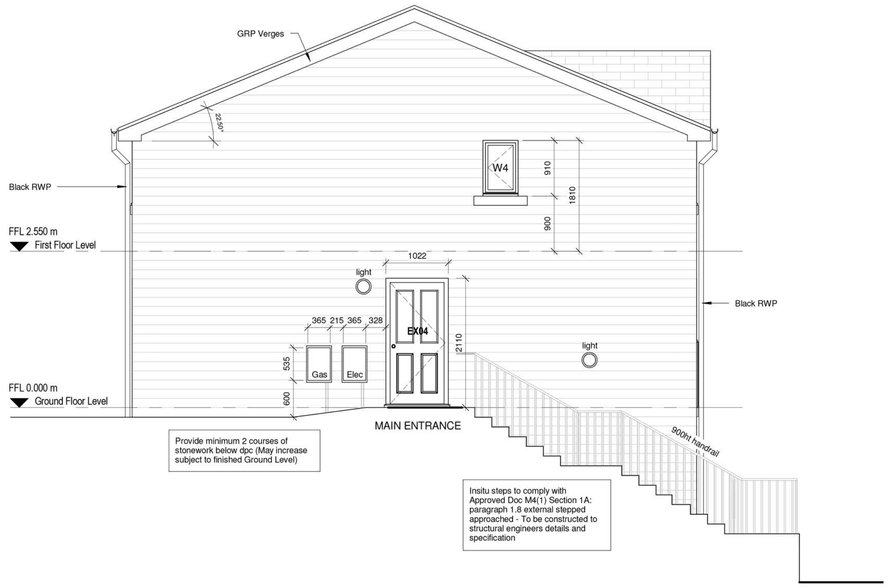
Margaret Twigg Dip LA CMLI
Chartered Landscape Architect
18 Brayton Avenue ▪ Didsbury ▪ Manchester ▪ M20 5LP
Telephone and Facsimile: 0161 445 8369
E-Mail: margaret@margarettwigg.co.uk



1 Front Elevation
1 : 50



2 Rear Elevation
1 : 50



3 Side Elevation
1 : 50

MATERIAL KEY

Facing Stone - Standard Coursed Artificial Stonework - Planning Sampled Approved

Roofing Tile - Standard Slate Tile to be laid in accordance with the Manufacturers Specification and Min Angle - Planning Sampled Approved

GRP/UPVc Detailing - Door, Window Frames, Fascia & Soffit Boards, Gutters and Downpipes to be GRP/UPVc and colour to be agreed by Planning Officer.

rev	description	date	drawn	check
Revision Schedule				

0m 0.7m 1.4m 2.1m 2.8m
VISUAL SCALE 1:50

client:
Berkshire Homes

project:
Proposed Residential Development comprising 4 no 3 Bed Semi-Detachedhouses with Basement Garages at Union Street

drawing:
Proposed Elevations

drawing no: 16-2218 -003
project - originator - volume - level - type - role - drawing number

drawn:	rev:	scale:
11/04/16		1 : 50 @A1

issue status:	original by:	checked by:
Preliminary	NM/DC	DJC

croft goode
architects

Croft Goode Chartered Architects, 4 The Crossroads, Freckleton Street, Kirkham, Preston, Lancashire PR4 2SH
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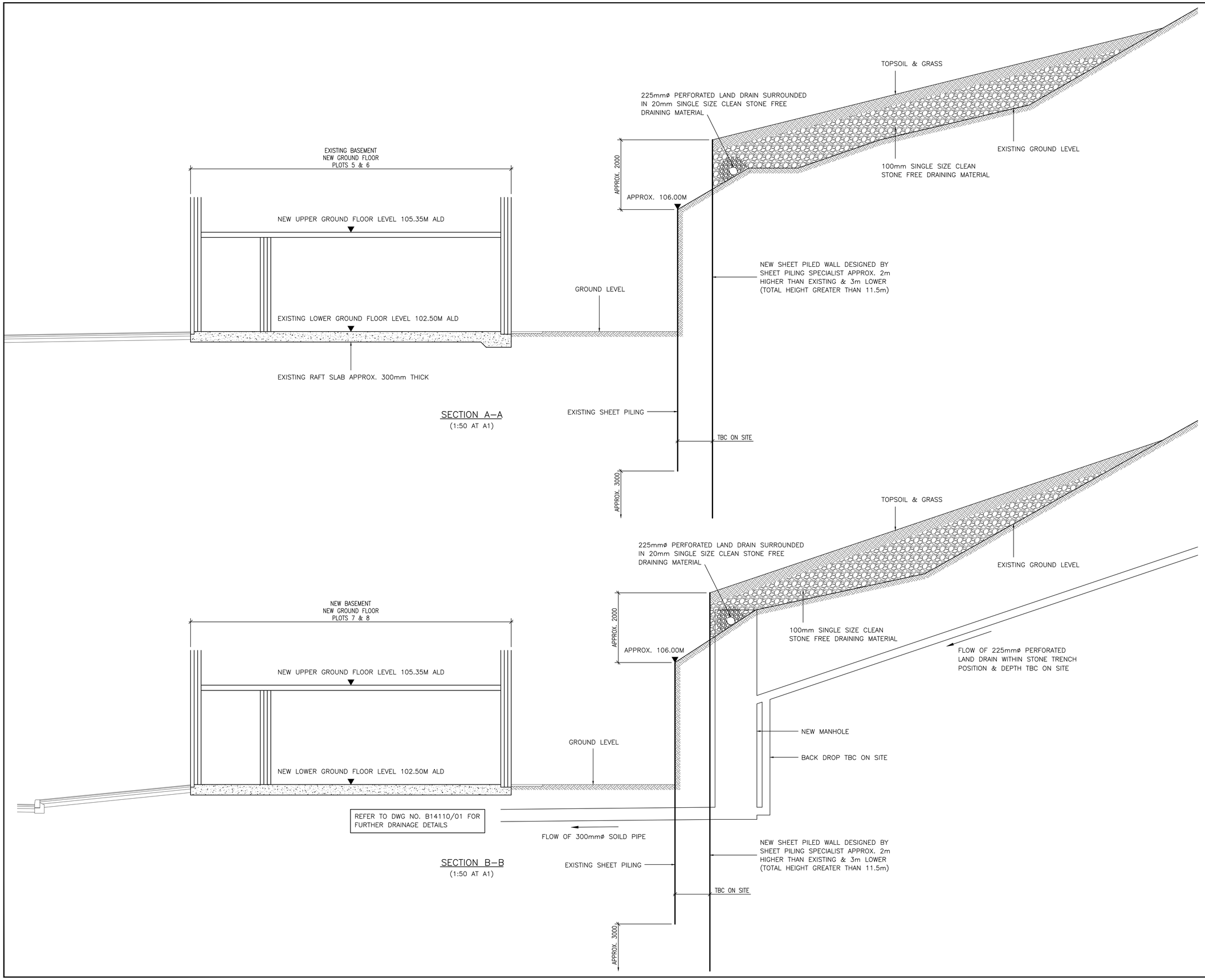
F: 01772 686050
email@croftgoode.co.uk
www.croftgoode.co.uk

NOTES:

1. REFER TO DRAWING NUMBER B14110/01 FOR LOCATION OF SECTIONS



SECTION A–A
(1:50 AT A1)

SECTION B–B
(1:50 AT A1)

rev	date	revisions	initials
P2	03.04.17	REVISED DRAINAGE & ADDED NEW SHEET PILING TO SECTIONS B & C	S.P.M.
P1	05.12.16	ADDED DRAINAGE TO REAR OF SITE	S.P.M.

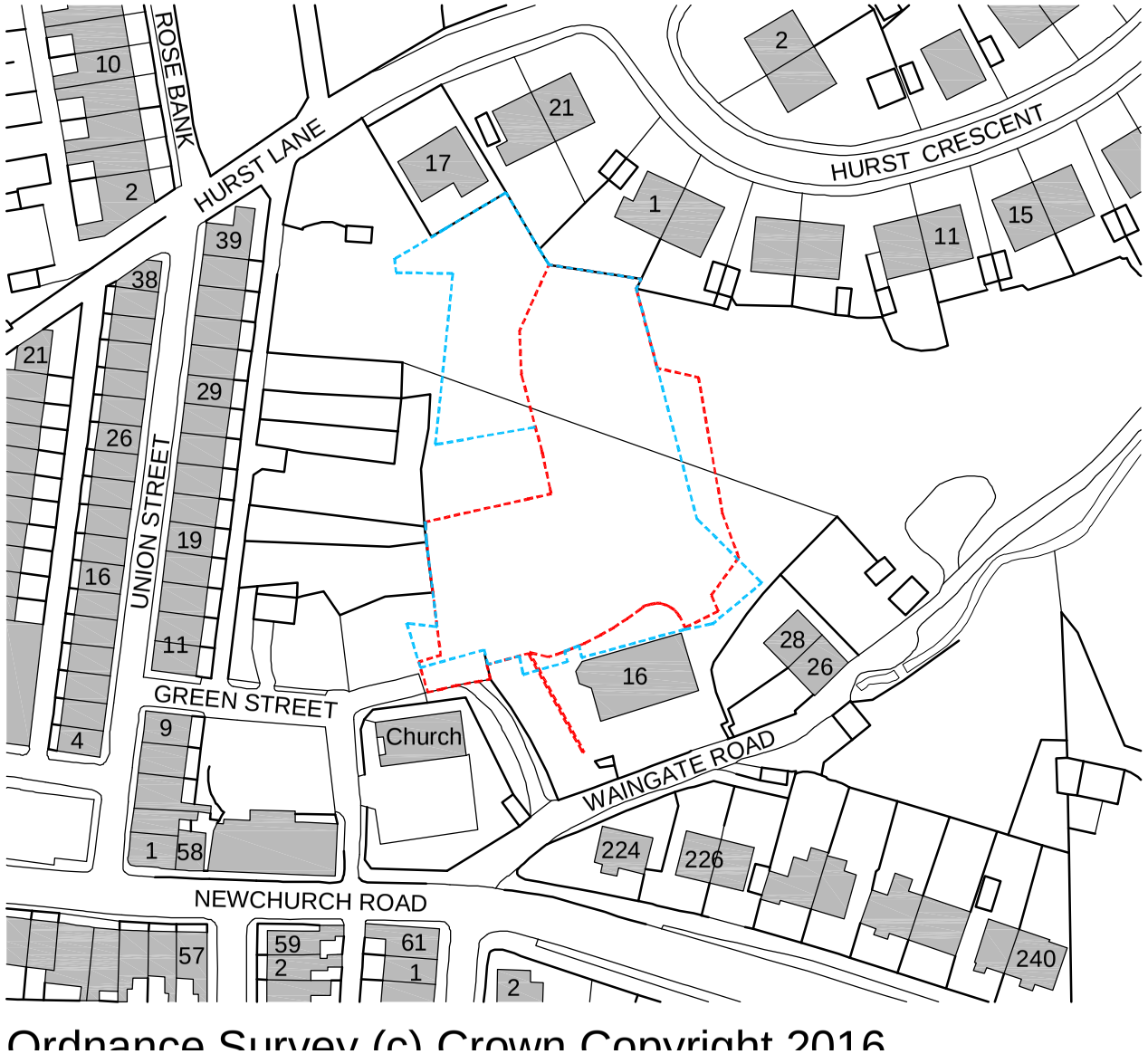
client
BERKSHIRE HOMES

project
UNION STREET
RAWTENSTALL
ROSSENDALE

drawing
SECTIONS THROUGH SITE

James Crosbie Associates Ltd
Consulting Civil □ Structural Engineers
37 Chorley New Road, Bolton, BL1 4□R
Telephone 01204 384585
Facsimile 01204 363358
Email jca@james-crosbie.co.uk

drawn	S.P.M.	date	29.11.16
scale	1:50	checked	
contract no.	B14110	drawing no.	02 P2



Ordnance Survey (c) Crown Copyright 2016

0 10 20 50 93.75m

Please Note

Drawings are based on those submitted as part of previously approved application (Application Number 2014/0168). We are acting as agents on behalf of the applicant and do not assume copyright or ownership of any design or intellectual property.

Site area = 2,547m^2 (0.25 hectares, 0.63 acres)

Site boundary

Client ownership

rev	description	date	drawn	check
B	Blue edge amended following email from Planning on 19.04.2015	25-Apr-17	NJA	RJE
A	Application red edge amended to incorporate works to slope north of site.	06-Apr-17	RJE	NJA

client
Berkshire Homes

project
New Housing Development
Hurst Platt
Rawtenstall

drawing
Existing Site Location Plan

file name		drawn
16-2218-EX001 Existing Site Location Plan Rev B		25-Apr-17

drawing reference	rev	scale
16-2218-EX001	B	1:1250 @ A3

issue status		
Planning	original by	RJE
	checked by	NJM

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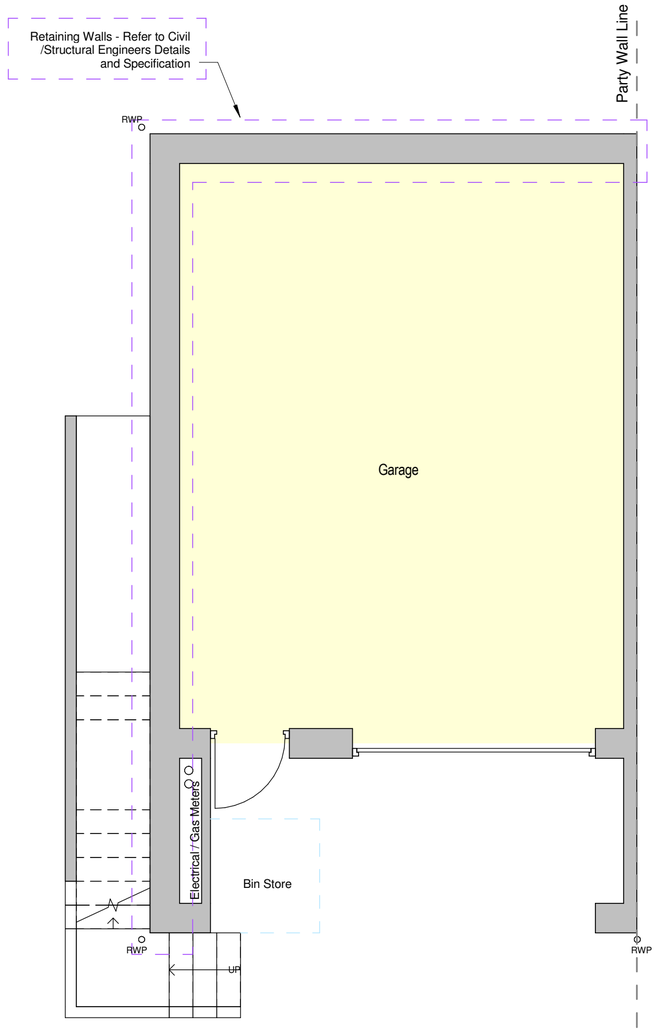
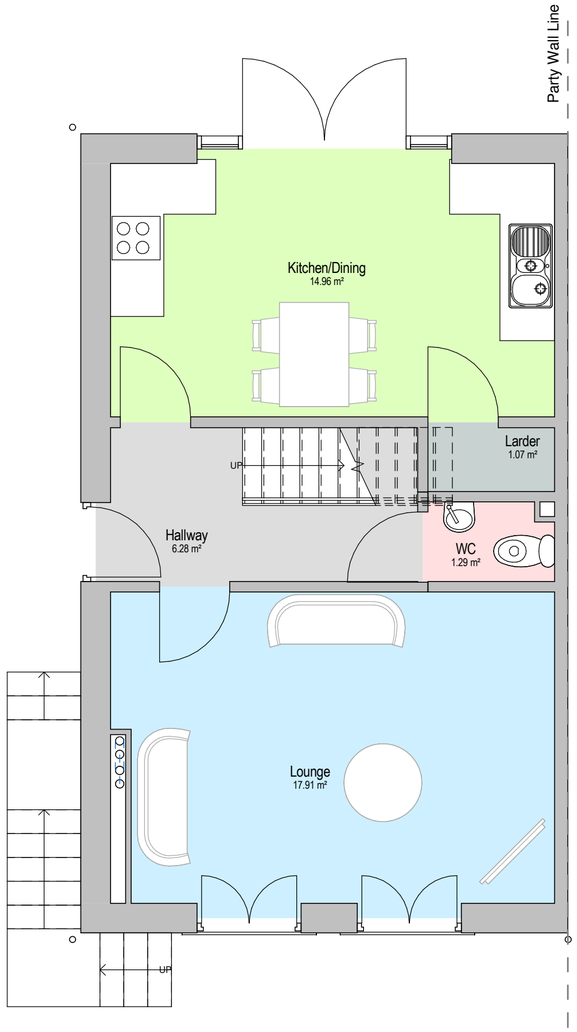
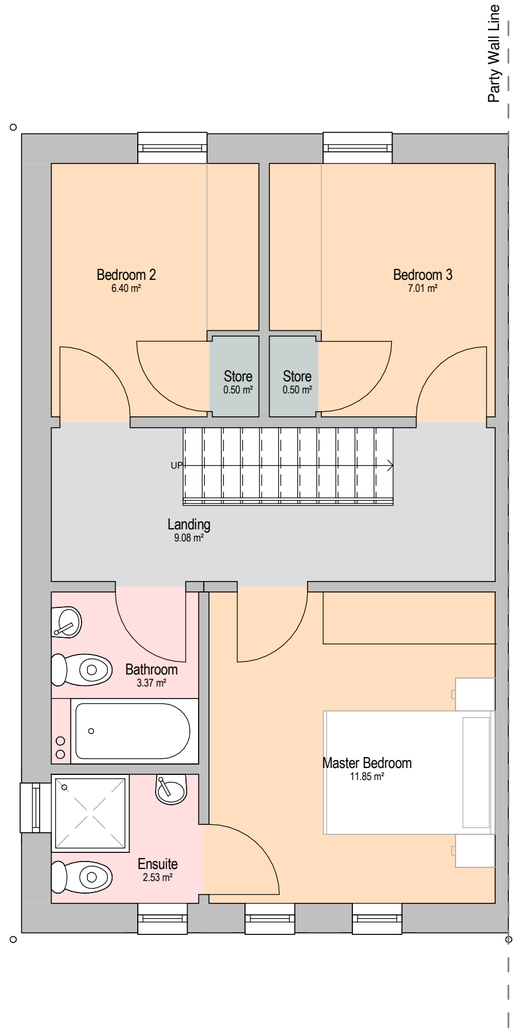


1 Basement Level
1 : 50



2 Ground Floor Level
1 : 50



3 First Floor Level
1 : 50

By Department Legend

- Bedroom
- Circulation
- Kitchen/Dining
- Lounge
- Parking
- Sanitary
- Storage
- Store

Please Note:

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Site Area = 1,630m² (0.16 Hectres, 0.4 Acres)

rev	description	date	drawn	check
Revision Schedule				

0m 0.7m 1.4m 2.1m 2.8m

VISUAL SCALE 1:50

client:
Berkshire Homes

project:
New Housing Development, Hurst Platt
Rawtenstall

drawing:
Proposed Floor Plans

drawing no: project - originator - volume - level - type - role - drawing number
16-22018 -PN101

drawn:	rev:	scale:
20/12/16		1 : 50 @A2

issue status:	original by:	DKC
PLANNING	checked by:	RJE

croft goode architects

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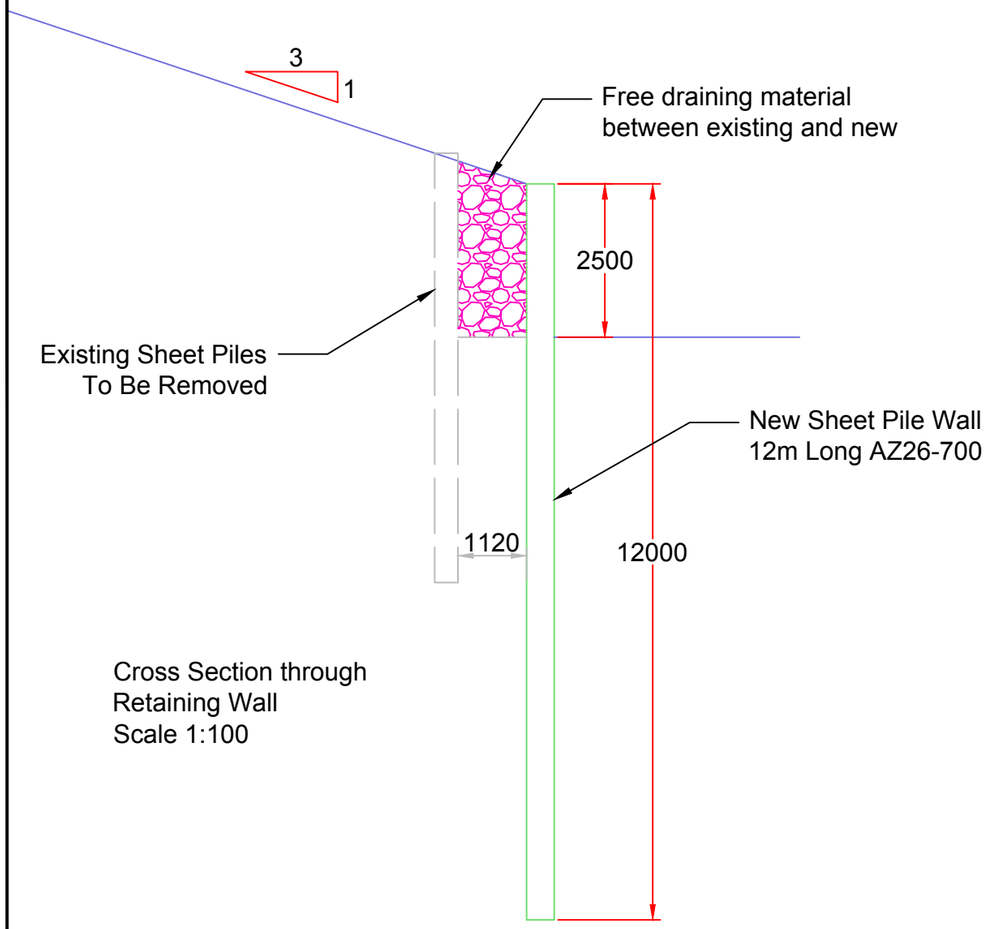
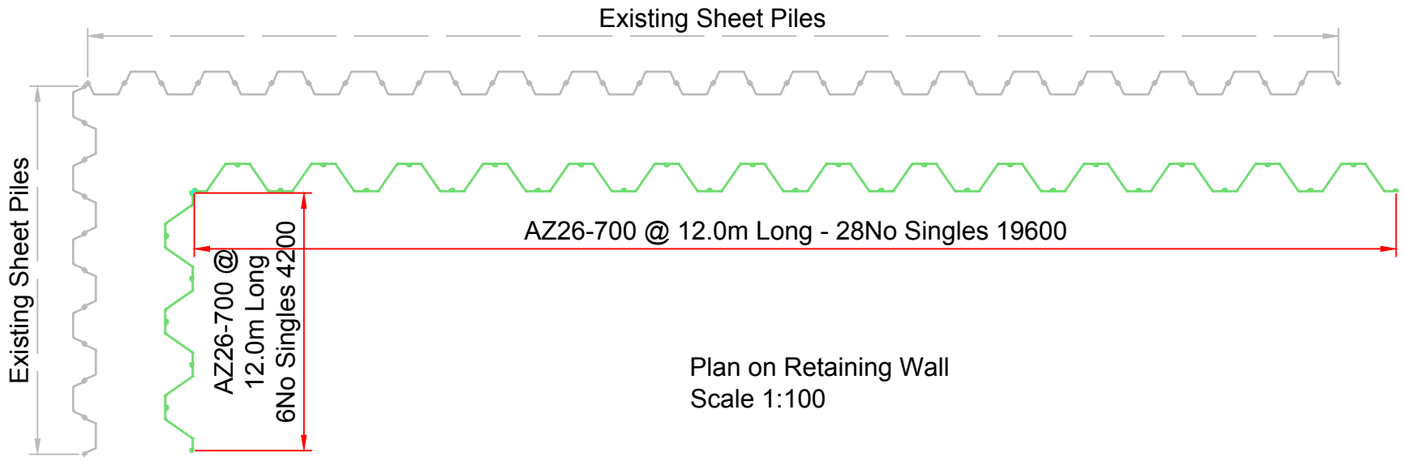


Cross Section through
Retaining Wall
Scale 1:100



Plan on Retaining Wall
Scale 1:100

NOTES

GENERAL

1. DO NOT SCALE FROM THIS DRAWING
2. All dimensions are in mm and levels are in mOD unless otherwise stated.
3. This drawing is currently on PRELIMINARY.
4. The installation of Sheet Piles is a "best-fit" using modules that are pre-fabricated to within a tolerance. Therefore the as-built layout is likely to vary from the idealised layout shown on this drawing.

RISK ASSESSMENT

1. The designer is to be notified if the ground conditions and water levels stated within this document are not encountered on Site during the execution of the works.
2. The designer is to be notified if piles do not reach the design length stated in the schedule due to obstructing on cobbles or boulders.
3. No spoil is to be stored to the rear of the Sheet Piles
4. Slope to the rear of the wall is to be graded no steeper than 1 in 3

DESIGN CONSTRUCTION SEQUENCE

1. Sheet Piles installed with Top at 2.5m above EGL
2. Free draining material installed between existing and new piles
3. Installation of Jet Filter or similar weep holes at 0.5m and 1.0m above formation level
4. Remove existing sheet piles.

Rev	Date	Description	By	Chk
		Revision		

Drawing Status: PRELIMINARY

VolkerGround Engineering
A VolkerWessels company
VolkerGround Engineering Ltd.
The Lancashire Hub
Preston City Park
Bluebell Way
Preston, PR2 5PE
Telephone: 01772 708 690
Registered in England No. 981398

CLIENT: B.A.K Building Contracts

PROJECT: Waingate Mews

TITLE: Permanent Sheet Pile Wall

Designed	DC	07.07.2017	Scales: 1:100	
Drawn	DC	07.07.2017	Drawing No. C12538-PW01-101	Rev. 0
Checked				

Master Size A3

VOLKERSTEVIN LTD | Sheet No.
Program: WALLAP Version 6.06 Revision A51.B69.R54 | Job No.
Licensed from GEOSOLVE | Made by :
Data filename/Run ID: Waingate_Mews_SLS |
New data set - contains default parameters | Date: 7-07-2017
Please modify / add | Checked :

Units: kN,m

INPUT DATA

SOIL PROFILE

Stratum no.	Elevation of top of stratum	Soil types Left side	Right side
1	2.00	1 Silt	1 Silt
2	-6.00	2 Glacial	2 Glacial

SOIL PROPERTIES

-- Soil type -- No.	Description (Datum elev.)	Bulk density kN/m3	Young's Modulus Eh,kN/m2 (dEh/dy)	At rest coeff. Ko (dKo/dy)	Consol state. NC/OC Nu)	Active limit Ka (Kac)	Passive limit Kp (Kpc)	Cohesion kN/m2 (dc/dy)
1	Silt	18.00	10000	1.000	OC (0.250)	0.311 (0.000)	4.085 (0.000)	
2	Glacial	19.00a 21.00b	25000	1.000	OC (0.200)	0.285 (0.000)	4.633 (0.000)	

Note: (a) and (b) are Bulk Densities above and below the water table

Additional soil parameters associated with Ka and Kp

	--- parameters for Ka ---			--- parameters for Kp ---		
------- Soil type ------- No. Description	Soil friction angle	Wall adhesion coeff.	Back-fill angle	Soil friction angle	Wall adhesion coeff.	Back-fill angle
1 Silt	28.00	0.635	0.00	28.00	0.635	0.00
2 Glacial	30.00	0.630	0.00	30.00	0.630	0.00

GROUND WATER CONDITIONS

Density of water = 10.00 kN/m3

	Left side	Right side
Initial water table elevation	-1.00	-1.00

Automatic water pressure balancing at toe of wall : No

Water press. profile no.	Left side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	Right side Point no.	Elev. m	Piezo elev. m	Water press. kN/m2	
1	1	0.00	0.00	0.0	1	-1.00	-1.00	0.0	MC+WC

WALL PROPERTIES

Type of structure = Fully Embedded Wall
Elevation of toe of wall = -10.00
Maximum finite element length = 1.00 m
Youngs modulus of wall E = 2.0000E+08 kN/m2
Moment of inertia of wall I = 5.2250E-04 m4/m run
(Arcelor AZ25) E.I = 104500 kN.m2/m run
Yield Moment of wall = Not defined

SURCHARGE LOADS

Surch -arge no.	Elev.	Distance from wall	Length parallel to wall	Width perpend. to wall	Surcharge ----- kN/m2 ----- Near edge	Far edge	Equiv. soil type	Partial factor/ Category
1	2.00	0.00(L)	100.00	30.00	0.00	180.00	1	N/A

Note: L = Left side, R = Right side
A trapezoidal surcharge is defined by two values:
N = at edge near to wall, F = at edge far from wall

CONSTRUCTION STAGES

Construction stage no.	Stage description
1	Apply surcharge no.1 at elevation 2.00
2	Excavate to elevation -0.50 on RIGHT side
3	Apply water pressure profile no.1 (Mod. Conserv.)

FACTORS OF SAFETY and ANALYSIS OPTIONS

Limit State options: Serviceability Limit State
All loads and soil strengths are unfactored

Stability analysis:
Method of analysis - Strength Factor method
Factor on soil strength for calculating wall depth = 1.00
Active limit pressures calculated by Wedge Stability

Parameters for undrained strata:
Minimum equivalent fluid density = 5.00 kN/m3
Maximum depth of water filled tension crack = 0.00 m

Bending moment and displacement calculation:
Method - Subgrade reaction model using Influence Coefficients
Open Tension Crack analysis? - No
Non-linear Modulus Parameter (L) = 0 m

Boundary conditions:
Length of wall (normal to plane of analysis) = 1000.00 m

Width of excavation on Left side of wall = 20.00 m
Width of excavation on Right side of wall = 20.00 m

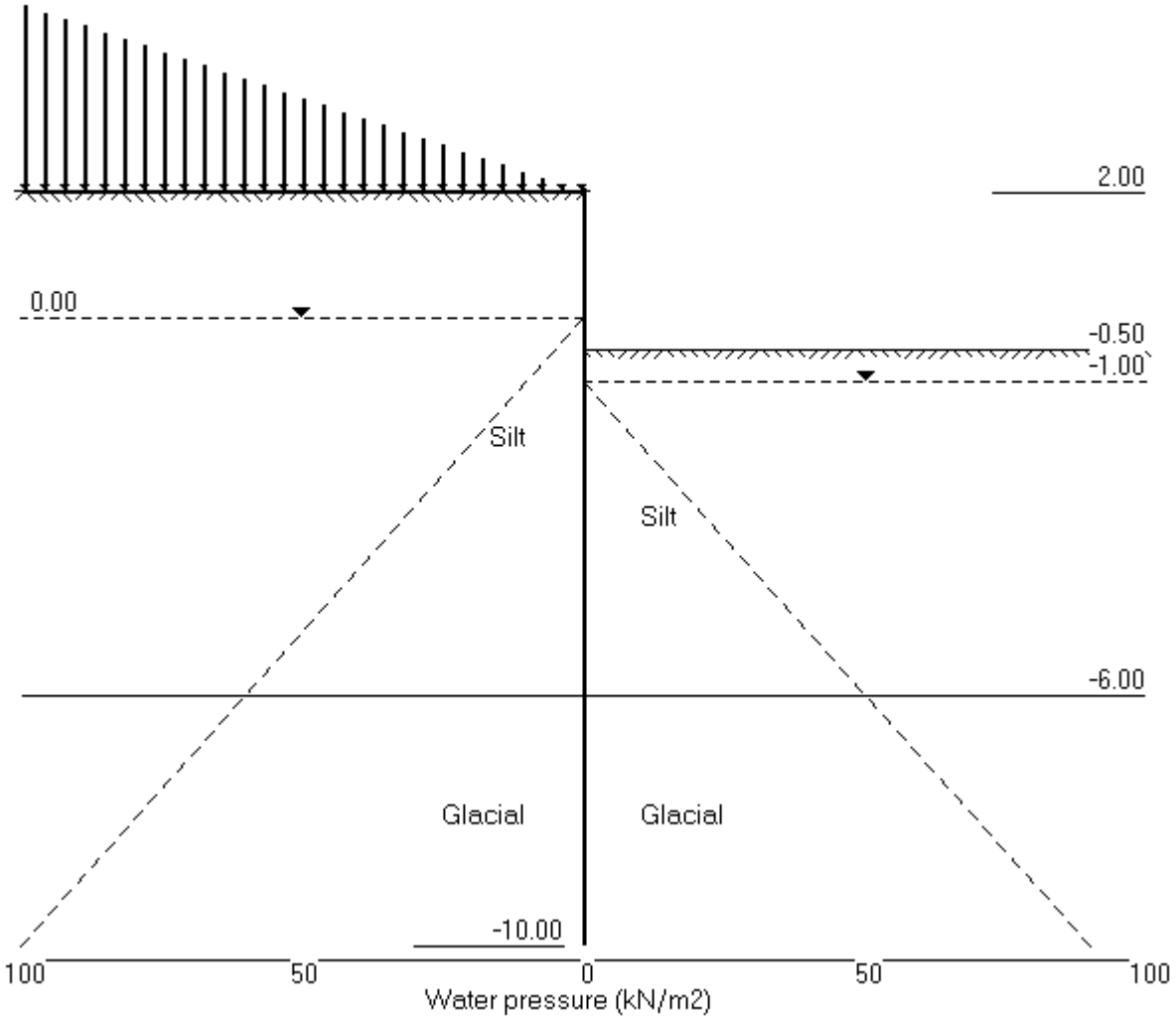
Distance to rigid boundary on Left side = 20.00 m
Distance to rigid boundary on Right side = 20.00 m

OUTPUT OPTIONS

Stage no.	Stage description	Output options: Displacement, Bending mom., Shear force	Active, Passive pressures	Graph. output
1	Apply surcharge no.1 at elev. 2.00	Yes	Yes	Yes
2	Excav. to elev. -0.50 on RIGHT side	Yes	Yes	Yes
3	Apply water pressure profile no.1	Yes	Yes	Yes
*	Summary output	Yes	-	Yes

Units: kN,m

Stage No.3 Apply water pressure profile no.1 (Mod. Conserv.)



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Program: WALLAP Version 6.06 Revision A51.B69.R54 | Job No.
Licensed from GEOSOLVE | Made by :
Data filename/Run ID: Waingate_Mews_SLS |
New data set - contains default parameters | Date: 7-07-2017
Please modify / add | Checked :

Units: kN,m

Stage No. 1 Apply surcharge no.1 at elevation 2.00

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength
Active limit pressures calculated by Wedge Stability

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = -10.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
1	2.00	2.00	Cant.	Conditions not suitable for FoS calc.				

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall
Analysis options
Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Active limit pressures calculated by Wedge Stability
Open Tension Crack analysis - No

Rigid boundaries: Left side 20.00 from wall
Right side 20.00 from wall
Limit State: Serviceability Limit State
Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	2.00	0.00	0.001	-3.03E-04	0.0	0.0	
2	1.00	-1.80	0.002	-3.04E-04	-0.9	0.2	
3	0.00	-1.07	0.002	-2.98E-04	-2.3	-1.4	
4	-0.50	-0.71	0.002	-2.88E-04	-2.8	-2.6	
5	-1.00	-0.34	0.002	-2.72E-04	-3.0	-4.1	
6	-2.00	0.44	0.003	-2.19E-04	-3.0	-7.1	
7	-3.00	1.31	0.003	-1.38E-04	-2.1	-9.7	
8	-4.00	2.30	0.003	-4.02E-05	-0.3	-10.9	
9	-5.00	3.42	0.003	5.94E-05	2.6	-9.9	
10	-6.00	4.65	0.003	1.32E-04	6.6	-5.5	
		-4.41	0.003	1.32E-04	6.6	-5.5	
11	-7.00	-3.02	0.003	1.63E-04	2.9	-0.9	
12	-8.00	-1.61	0.002	1.65E-04	0.6	0.5	
13	-9.00	-0.27	0.002	1.60E-04	-0.4	0.4	
14	-10.00	1.02	0.002	1.59E-04	-0.0	0.0	

Node no.	Y coord	LEFT side Water press. kN/m2	Effective stresses Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	889
2	1.00	0.00	21.82	7.31	89.11	17.74	17.74	889
3	0.00	0.00	43.61	14.98	178.11	36.73	36.73	889
4	-0.50	0.00	54.48	18.71	222.55	46.23	46.23	889
5	-1.00	0.00	65.35	22.44	266.91	55.72	55.72	889
6	-2.00	10.00	77.01	27.50	314.56	64.72	74.72	889

(continued)

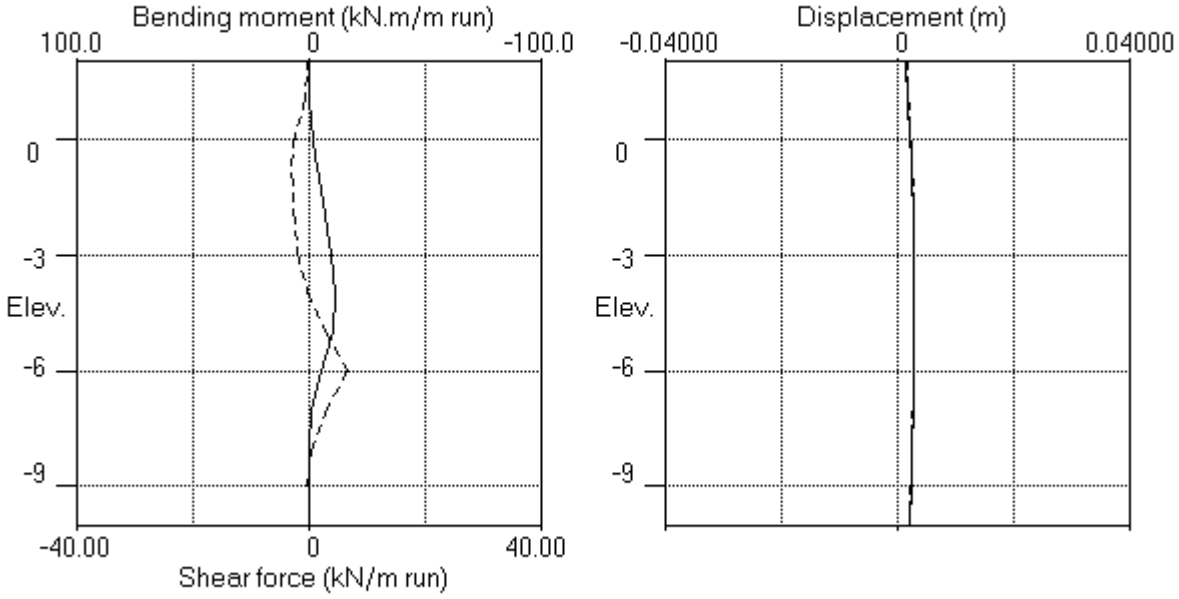
Stage No.1 Apply surcharge no.1 at elevation 2.00

Node no.	Y coord	LEFT side: Water press. kN/m2	Vertic -al kN/m2	Effective stresses: Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
7	-3.00	20.00	88.58	32.52	361.81	73.75	93.75	889
8	-4.00	30.00	100.03	37.51	408.58	82.82	112.82	889
9	-5.00	40.00	111.34	42.45	454.79	91.93	131.93	889
10	-6.00	50.00	122.50	47.33	500.38	101.08	151.08	889
		50.00	122.50	44.14	567.55	95.36	145.36	2115
11	-7.00	60.00	136.50	49.65	632.39	107.43	167.43	2115
12	-8.00	70.00	150.31	55.10	696.40	119.48	189.48	2115
13	-9.00	80.00	163.95	60.27	759.57	131.49	211.49	2115
14	-10.00	90.00	177.39	65.32	821.85	143.43	233.43	2115

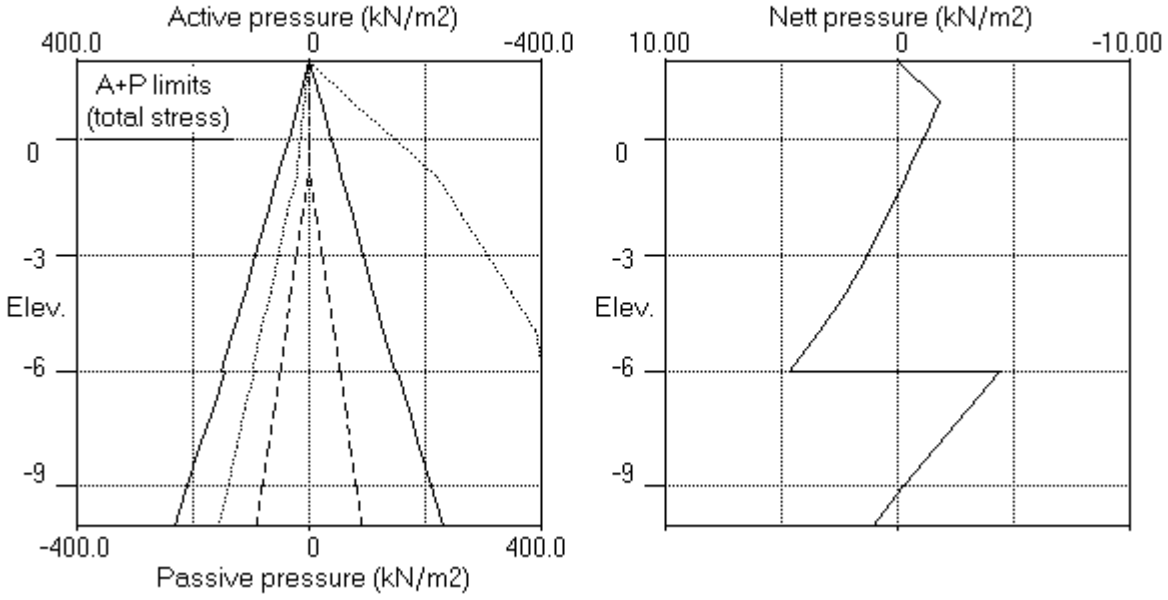
Node no.	Y coord	RIGHT side: Water press. kN/m2	Vertic -al kN/m2	Effective stresses: Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	889
2	1.00	0.00	18.00	5.53	73.52	19.53	19.53	889
3	0.00	0.00	36.00	11.05	147.05	37.80	37.80	889
4	-0.50	0.00	45.00	13.82	183.81	46.93	46.93	889
5	-1.00	0.00	54.00	16.58	220.57	56.06	56.06	889
6	-2.00	10.00	62.00	18.92	253.25	64.28	74.28	889
7	-3.00	20.00	70.00	21.26	285.93	72.44	92.44	889
8	-4.00	30.00	78.00	23.60	318.60	80.52	110.52	889
9	-5.00	40.00	86.00	25.94	351.28	88.51	128.51	889
10	-6.00	50.00	94.00	28.28	383.96	96.42	146.42	889
		50.00	94.00	26.55	435.50	99.77	149.77	2115
11	-7.00	60.00	105.00	29.64	486.47	110.45	170.45	2115
12	-8.00	70.00	116.00	32.73	537.43	121.10	191.10	2115
13	-9.00	80.00	127.00	35.83	588.39	131.75	211.75	2115
14	-10.00	90.00	138.00	38.92	639.35	142.41	232.41	2115

Units: kN,m

Stage No.1 Apply surcharge no.1 at elev. 2.00



Stage No.1 Apply surcharge no.1 at elev. 2.00



Units: kN,m

Stage No. 2 Excavate to elevation -0.50 on RIGHT side

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength
Active limit pressures calculated by Wedge Stability

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = -10.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
2	2.00	-0.50	Cant.	1.478	-9.35	-3.34	2.84	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Active limit pressures calculated by Wedge Stability
Open Tension Crack analysis - No

Rigid boundaries: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	2.00	0.00	0.026	3.59E-03	0.0	0.0	
2	1.00	7.31	0.022	3.58E-03	3.7	1.7	
3	0.00	14.98	0.019	3.52E-03	14.8	10.4	
4	-0.50	19.18	0.017	3.45E-03	23.3	21.0	
5	-1.00	-4.75	0.015	3.32E-03	26.9	33.9	
6	-2.00	-22.32	0.012	2.89E-03	13.4	54.6	
7	-3.00	-11.86	0.010	2.34E-03	-3.7	60.4	
8	-4.00	-2.01	0.008	1.81E-03	-10.6	51.0	
9	-5.00	5.55	0.006	1.37E-03	-8.8	39.6	
10	-6.00	11.24	0.005	1.02E-03	-0.4	33.7	
		-13.21	0.005	1.02E-03	-0.4	33.7	
11	-7.00	-4.68	0.004	7.40E-04	-9.4	26.7	
12	-8.00	1.26	0.003	5.40E-04	-11.1	15.1	
13	-9.00	5.70	0.003	4.45E-04	-7.6	4.7	
14	-10.00	9.57	0.002	4.23E-04	-0.0	0.0	

Node no.	Y coord	LEFT side ------- Effective stresses ------- Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	1818
2	1.00	0.00	21.82	7.31	89.11	7.31	7.31a	1818
3	0.00	0.00	43.61	14.98	178.11	14.98	14.98a	1818
4	-0.50	0.00	54.48	18.71	222.55	19.18	19.18	1818
5	-1.00	0.00	65.35	22.44	266.91	32.01	32.01	1818
6	-2.00	10.00	77.01	27.50	314.56	47.15	57.15	1818

(continued)

Stage No.2 Excavate to elevation -0.50 on RIGHT side

LEFT side

Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
7	-3.00	20.00	88.58	32.52	361.81	61.28	81.28	1818
8	-4.00	30.00	100.03	37.51	408.58	74.28	104.28	1818
9	-5.00	40.00	111.34	42.45	454.79	86.26	126.26	1818
10	-6.00	50.00	122.50	47.33	500.38	97.41	147.41	1818
		50.00	122.50	44.14	567.55	86.52	136.52	4376
11	-7.00	60.00	136.50	49.65	632.39	101.78	161.78	4376
12	-8.00	70.00	150.31	55.10	696.40	115.87	185.87	4376
13	-9.00	80.00	163.95	60.27	759.57	129.28	209.28	4376
14	-10.00	90.00	177.39	65.32	821.85	142.41	232.41	4376

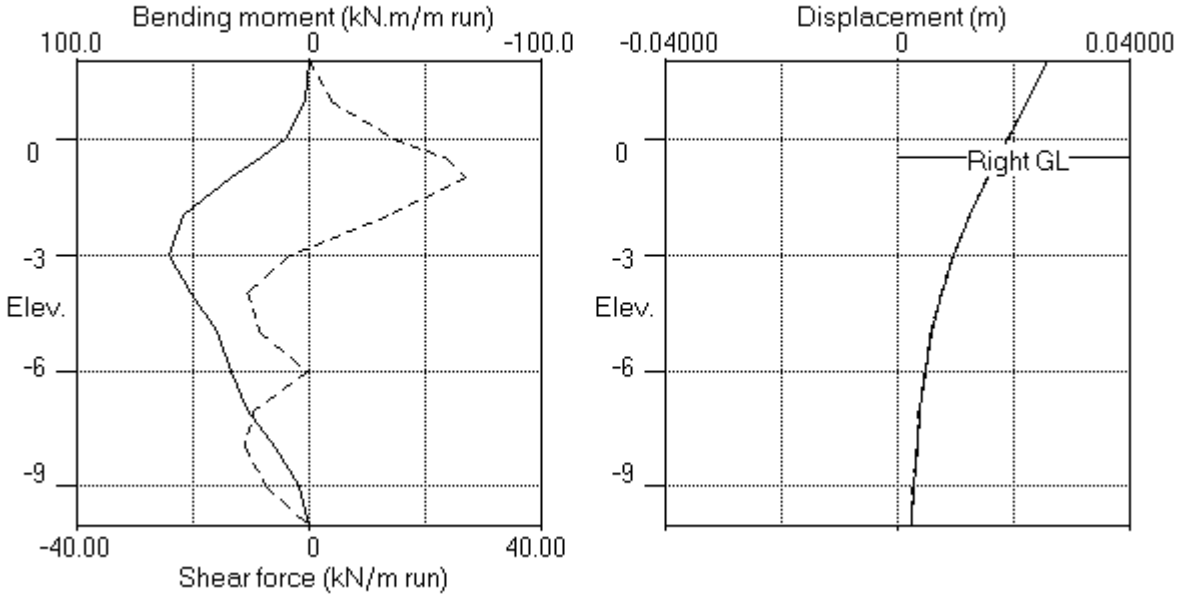
RIGHT side

Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	2287
5	-1.00	0.00	9.00	2.78	36.76	36.76	36.76p	2287
6	-2.00	10.00	17.01	5.17	69.47	69.47	79.47p	2287
7	-3.00	20.00	25.04	7.58	102.27	73.14	93.14	2287
8	-4.00	30.00	33.10	9.99	135.20	76.29	106.29	2287
9	-5.00	40.00	41.21	12.42	168.31	80.71	120.71	2287
10	-6.00	50.00	49.36	14.86	201.63	86.16	136.16	2287
		50.00	49.36	13.83	228.70	99.74	149.74	5512
11	-7.00	60.00	60.58	16.97	280.67	106.46	166.46	5512
12	-8.00	70.00	71.86	20.14	332.93	114.61	184.61	5512
13	-9.00	80.00	83.20	23.32	385.47	123.58	203.58	5512
14	-10.00	90.00	94.60	26.52	438.29	132.85	222.85	5512

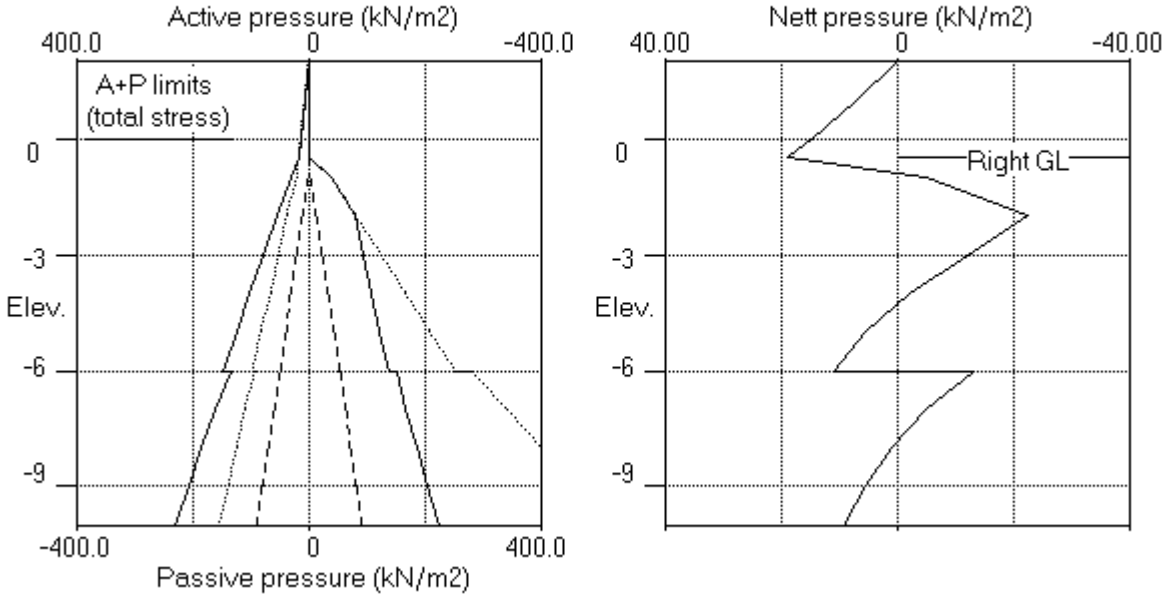
Note: 14.98a Soil pressure at active limit
79.47p Soil pressure at passive limit

Units: kN,m

Stage No.2 Excav. to elev. -0.50 on RIGHT side



Stage No.2 Excav. to elev. -0.50 on RIGHT side



Units: kN,m

Stage No. 3 Apply water pressure profile no.1 (Mod. Conserv.)

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method

Factor of safety on soil strength

Active limit pressures calculated by Wedge Stability

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = -10.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
3	2.00	-0.50	Cant.	1.420	-9.31	-3.72	3.22	L to R

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m

Subgrade reaction model - Boussinesq Influence coefficients

Soil deformations are elastic until the active or passive limit is reached

Active limit pressures calculated by Wedge Stability

Open Tension Crack analysis - No

Rigid boundaries: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces are to be multiplied by a factor of 1.35 to obtain values for structural design. See summary for factored values.

Node no.	Y coord	Nett pressure kN/m2	Wall disp. m	Wall rotation rad.	Shear force kN/m	Bending moment kN.m/m	Strut forces kN/m
1	2.00	0.00	0.032	4.24E-03	0.0	0.0	
2	1.00	7.30	0.028	4.23E-03	3.7	1.7	
3	0.00	14.93	0.024	4.17E-03	14.8	10.4	
4	-0.50	22.45	0.022	4.10E-03	24.1	21.1	
5	-1.00	-4.15	0.020	3.96E-03	28.7	35.0	
6	-2.00	-20.82	0.016	3.52E-03	16.2	57.7	
7	-3.00	-14.44	0.013	2.92E-03	-1.4	67.0	
8	-4.00	-2.95	0.010	2.32E-03	-10.1	58.6	
9	-5.00	6.05	0.008	1.82E-03	-8.6	47.1	
10	-6.00	12.96	0.006	1.39E-03	0.9	41.8	
		-17.61	0.006	1.39E-03	0.9	41.8	
11	-7.00	-6.70	0.005	1.03E-03	-11.2	34.0	
12	-8.00	1.14	0.004	7.77E-04	-14.0	19.5	
13	-9.00	7.18	0.004	6.54E-04	-9.8	6.2	
14	-10.00	12.52	0.003	6.25E-04	-0.0	0.0	

Node no.	Y coord	LEFT side ------- Effective stresses ------- Water press. kN/m2	Vertic -al kN/m2	Active limit kN/m2	Passive limit kN/m2	Earth pressure kN/m2	Total earth pressure kN/m2	Coeff. of subgrade reaction kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	1401
2	1.00	0.00	21.82	7.30	89.11	7.30	7.30a	1401
3	0.00	0.00	43.61	14.93	178.11	14.93	14.93a	1401
4	-0.50	5.00	49.48	17.45	202.12	17.45	22.45a	1401
5	-1.00	10.00	55.35	19.96	226.07	22.62	32.62	1401
6	-2.00	20.00	67.01	24.97	273.71	38.65	58.65	1401

(continued)

Stage No.3 Apply water pressure profile no.1 (Mod. Conserv.)

LEFT side

Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
7	-3.00	30.00	78.58	29.95	320.96	53.63	83.63	1401
8	-4.00	40.00	90.03	34.88	367.73	67.40	107.40	1401
9	-5.00	50.00	101.34	39.77	413.94	80.05	130.05	1401
10	-6.00	60.00	112.50	44.61	459.53	91.76	151.76	1401
		60.00	112.50	41.61	521.22	78.48	138.48	3363
11	-7.00	70.00	126.50	47.05	586.06	94.84	164.84	3363
12	-8.00	80.00	140.31	52.44	650.07	109.82	189.82	3363
13	-9.00	90.00	153.95	57.60	713.24	123.97	213.97	3363
14	-10.00	100.00	167.39	62.67	775.52	137.80	237.80	3363

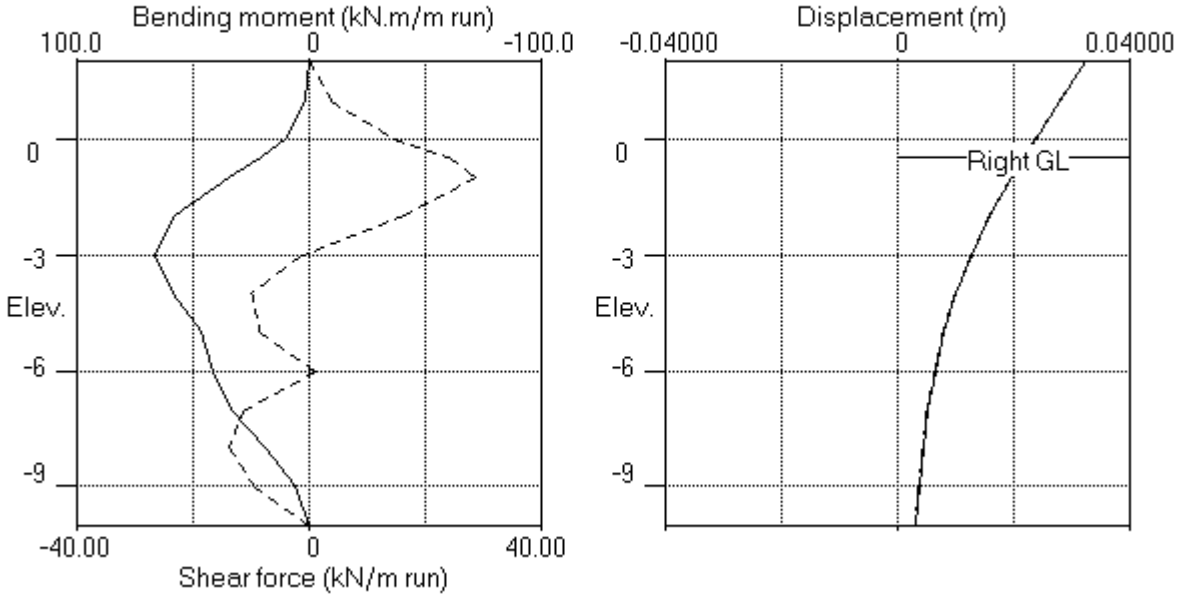
RIGHT side

Node no.	Y coord	Water press.	Vertic -al	Active limit	Passive limit	Earth pressure	Total earth pressure	Coeff. of subgrade reaction
		kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m2	kN/m3
1	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
4	-0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.0
		0.00	0.00	0.00	0.00	0.00	0.00	1603
5	-1.00	0.00	9.00	2.78	36.76	36.76	36.76p	1603
6	-2.00	10.00	17.01	5.17	69.47	69.47	79.47p	1603
7	-3.00	20.00	25.04	7.58	102.27	78.08	98.08	1603
8	-4.00	30.00	33.10	9.99	135.20	80.35	110.35	1603
9	-5.00	40.00	41.21	12.42	168.31	84.00	124.00	1603
10	-6.00	50.00	49.36	14.86	201.63	88.80	138.80	1603
		50.00	49.36	13.83	228.70	106.09	156.09	3854
11	-7.00	60.00	60.58	16.97	280.67	111.54	171.54	3854
12	-8.00	70.00	71.86	20.14	332.93	118.68	188.68	3854
13	-9.00	80.00	83.20	23.32	385.47	126.80	206.80	3854
14	-10.00	90.00	94.60	26.52	438.29	135.28	225.28	3854

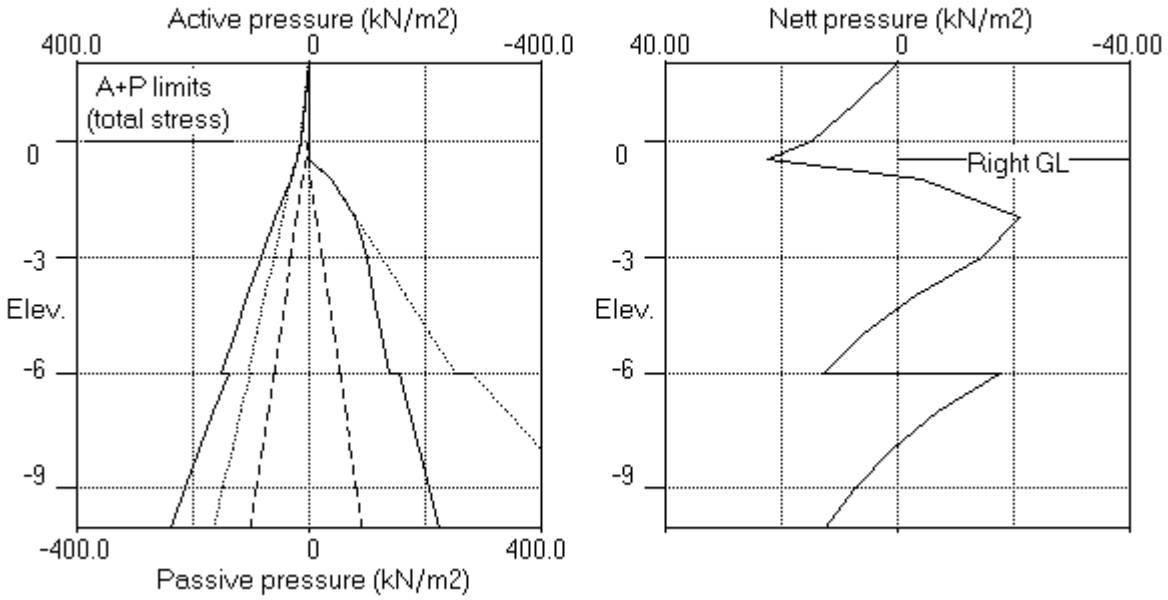
Note: 22.45a Soil pressure at active limit
79.47p Soil pressure at passive limit

Units: kN,m

Stage No.3 Apply water pressure profile no.1 (Mod. Conserv.)



Stage No.3 Apply water pressure profile no.1 (Mod. Conserv.)



Units: kN,m

Summary of results

LIMIT STATE PARAMETERS
Limit State: Serviceability Limit State
All loads and soil strengths are unfactored

STABILITY ANALYSIS of Fully Embedded Wall according to Strength Factor method
Factor of safety on soil strength
Active limit pressures calculated by Wedge Stability

Stage No.	--- G.L. --- Act.	Pass.	Strut Elev.	FoS for toe elev. = -10.00 Factor of Safety	Moment equilib. at elev.	Toe elev. for FoS = 1.000 Toe elev.	Wall Penetr -ation	Direction of failure
1	2.00	2.00	Cant.	Conditions not suitable for FoS calc.				
2	2.00	-0.50	Cant.	1.478	-9.35	-3.34	2.84	L to R
3	2.00	-0.50	Cant.	1.420	-9.31	-3.72	3.22	L to R

Units: kN,m

Summary of results

BENDING MOMENT and DISPLACEMENT ANALYSIS of Fully Embedded Wall

Analysis options

Length of wall perpendicular to section = 1000.00m
Subgrade reaction model - Boussinesq Influence coefficients
Soil deformations are elastic until the active or passive limit is reached
Active limit pressures calculated by Wedge Stability
Open Tension Crack analysis - No

Rigid boundaries: Left side 20.00 from wall
Right side 20.00 from wall

Limit State: Serviceability Limit State

Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force and displacement envelopes

Node no.	Y coord	Displacement max. m	Displacement min. m	Bending moment Calculated max. kN.m/m	Bending moment Calculated min. kN.m/m	Bending moment Factored max. kN.m/m	Bending moment Factored min. kN.m/m	Shear force Calculated max. kN/m	Shear force Calculated min. kN/m	Shear force Factored max. kN/m	Shear force Factored min. kN/m
1	2.00	0.032	0.000	0	0	0	0	0	0	0	0
2	1.00	0.028	0.000	2	0	2	0	4	-1	5	-1
3	0.00	0.024	0.000	10	-1	14	-2	15	-2	20	-3
4	-0.50	0.022	0.000	21	-3	28	-4	24	-3	33	-4
5	-1.00	0.020	0.000	35	-4	47	-6	29	-3	39	-4
6	-2.00	0.016	0.000	58	-7	78	-10	16	-3	22	-4
7	-3.00	0.013	0.000	67	-10	91	-13	0	-4	0	-5
8	-4.00	0.010	0.000	59	-11	79	-15	0	-11	0	-14
9	-5.00	0.008	0.000	47	-10	64	-13	3	-9	3	-12
10	-6.00	0.006	0.000	42	-5	56	-7	7	-0	9	-1
11	-7.00	0.005	0.000	34	-1	46	-1	3	-11	4	-15
12	-8.00	0.004	0.000	20	0	26	0	1	-14	1	-19
13	-9.00	0.004	0.000	6	0	8	0	0	-10	0	-13
14	-10.00	0.003	0.000	0	0	0	0	0	-0	0	-0

Maximum and minimum bending moment and shear force at each stage

Stage no.	Bending moment Calculated max. kN.m/m	Bending moment Calculated max. elev.	Bending moment Calculated min. kN.m/m	Bending moment Calculated min. elev.	Bending moment Factored max. kN.m/m	Bending moment Factored min. kN.m/m	Shear force Calculated max. kN/m	Shear force Calculated max. elev.	Shear force Calculated min. kN/m	Shear force Calculated min. elev.	Shear force Factored max. kN/m	Shear force Factored min. kN/m
1	1	-8.00	-11	-4.00	1	-15	7	-6.00	-3	-1.00	9	-4
2	60	-3.00	0	2.00	82	0	27	-1.00	-11	-8.00	36	-15
3	67	-3.00	0	2.00	91	0	29	-1.00	-14	-8.00	39	-19

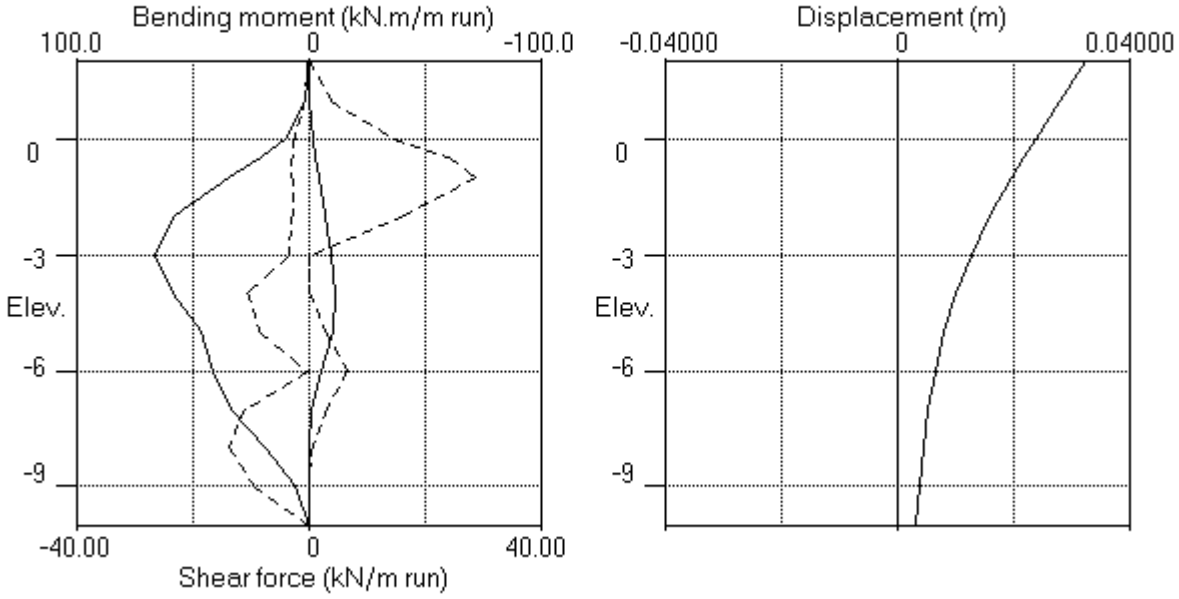
Maximum and minimum displacement at each stage

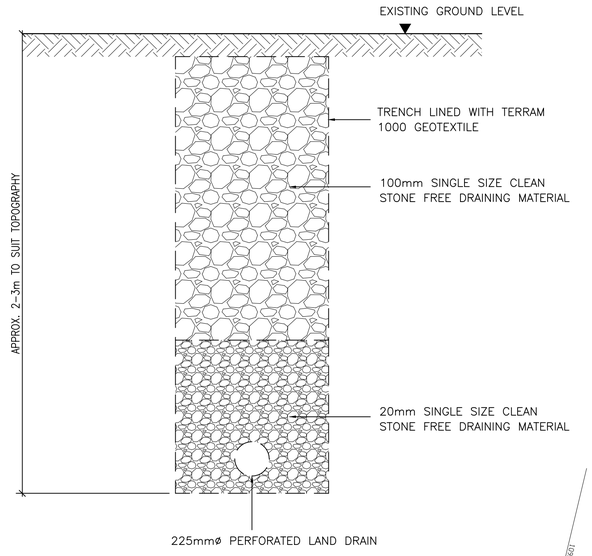
Stage no.	Displacement maximum m	Displacement maximum elev.	Displacement minimum m	Displacement minimum elev.	Stage description
1	0.003	-4.00	0.000	2.00	Apply surcharge no.1 at elev. 2.00
2	0.026	2.00	0.000	2.00	Excav. to elev. -0.50 on RIGHT side
3	0.032	2.00	0.000	2.00	Apply water pressure profile no.1

Summary of results (continued)

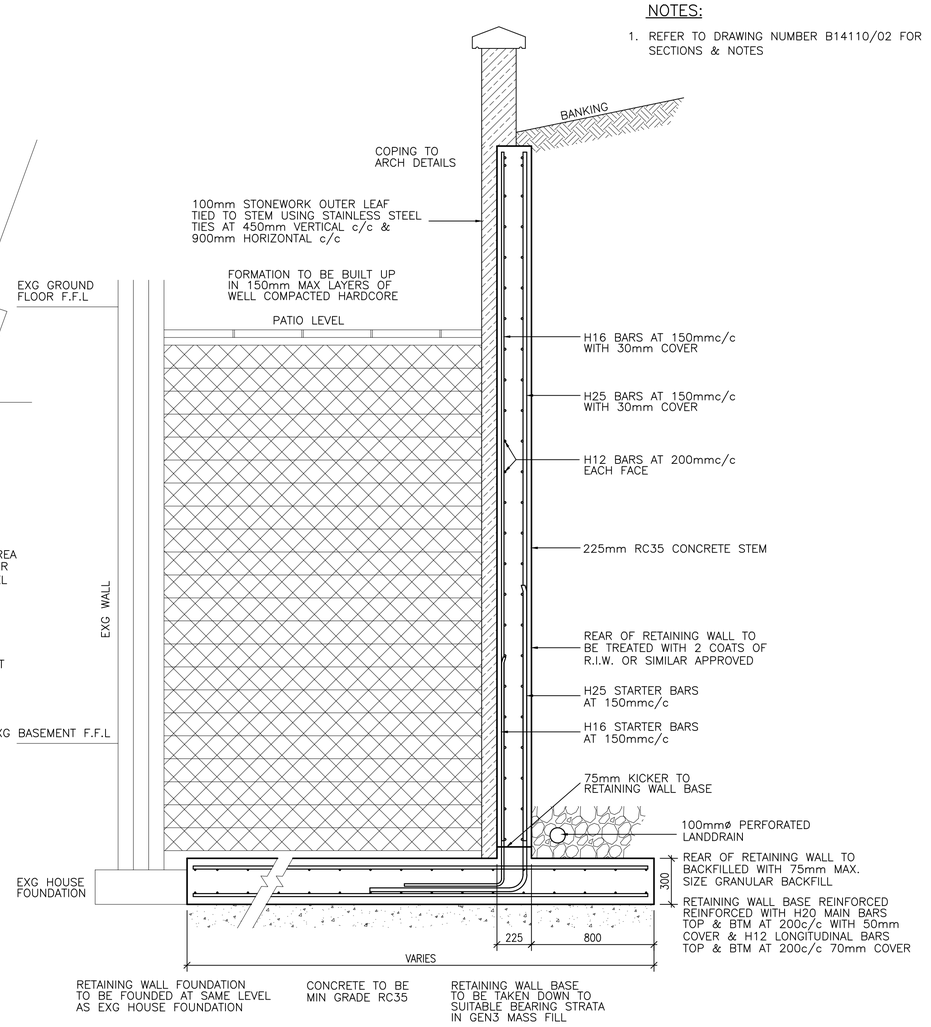
Calculated Bending Moments and Strut Forces have been multiplied by a factor of 1.35 to obtain values for structural design.

Bending moment, shear force, displacement envelopes





SECTION X–X
(1:20 AT A1)



TYPICAL RETAINING WALL SECTION
(1:20 AT A1)

NOTES:

1. REFER TO DRAWING NUMBER B14110/02 FOR SECTIONS & NOTES

rev	date	revisions	initials
P5	25.07.17	RETAINING WALL LAYOUT & SECTION REVISED.	D.J.W
P4	03.07.17	LAND DRAIN LOCATIONS REVISED, 1-1 ADDED	D.J.W
P3	02.06.17	GABION RET WALL REVISED TO CONCRETE CORE	D.J.W
P2	03.04.17	REVISED DRAINAGE. ADDED NEW SHEET PILING	S.P.M.
P1	25.12.16	ADDED DRAINAGE TO REAR OF SITE	S.P.M.

client
BERKSHIRE HOMES

project
UNION STREET
RAWTENSTALL
ROSSENDALE

drawing
SITE LAYOUT

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drawn	S.P.M.	date	29.11.16
scale	1:200	checked	
contract no.	B14110	drawing no.	01 P5