

Appendix H

Arboricultural Impact Assessment Report - Arbtech

Site investigations

Site investigations are to be undertaken within the RPAs of retained trees to determine the size, depth and location of any roots that may be present for the purpose of informing foundation design.

All excavation within the RPAs will be initially undertaken to a minimum depth of 800mm deep for any excavation or to the full depth of the proposed foundations, hard surfacing or underground services. The soil is to be loosened with the use of a fork or pick and then cleared with the aid of an air-spade and air-vac using a specialist arboricultural contractor; If an air-spade is not used and all excavations are to be undertaken using hand tools (forks, shovel, trowel, brush).

Soil will be loosened with the aid of a fork or trowel and the spoil removed from with the aid of a shovel. Where an air spade or specialist arboricultural contractor is not employed, all excavations are to be undertaken under direct arboricultural supervision. All roots are to be retained in situ and the project arborist will visit the site to record and photograph the depth, location, and size of any roots present; during this visit the project arborist may be able to cut specific roots with the use of a hand saw or secateurs. The edge of the excavation closest to the retained trees and all uncovered roots will be covered over with a minimum of two layers of damp hessian to prevent drying out, and where necessary be shuttered to prevent soil collapse or contamination. If appropriate soil beneath the depth of 800mm may be sheet piled with any deeper excavations being undertaken by a machine with an appropriate bucket under direct arboricultural supervision. If a decision is made for a machine to be used it must work form outside of the RPA or have appropriate ground protection in place to move and work upon.

Upon the completion of the site investigations all trial excavations are to be back filled with the original material or inert fill. It may be suitable to insert a root barrier in locations where the proposed roots are not present or are beginning to enter to prevent root activity within areas deemed to be root free.

Utility apparatus

Underground utility apparatus

Mechanical trenching for the installation of underground apparatus and drainage serves any roots present and can change the local hydrology in a way that adversely affects the health of the tree. For this reason, particular care should be taken in the route and methods of installation of all underground apparatus. Wherever possible, apparatus should be routed outside of RPAs. Where this is not possible, it is preferable to keep apparatus together in common ducts, all inspection chambers should be sited outside of the RPAs.

Where underground apparatus is to pass within the RPAs, detailed plans showing the proposed route should be drawn up in conjunction with the project arboriculturalist. In such cases trenchless insertion methods should be used with entry and retrieval pits being located outside of the RPAs. If this option is not feasible and providing roots can be retained and protected excavations should be undertaken using hand held tools (air-spade, forks, shovels) or a combination of trenchless and manual excavation (broken trench).

Any design and installation should be undertaken in accordance with the National Joint Utilities Guidelines (NJUG).

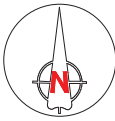
Above-ground utility apparatus

Above-ground apparatus (including CCTV cameras and lighting) should be sited to avoid the need for detrimental tree pruning, as such the current and future crown size of the tree should be assessed. Tree branches can be pruned back with care to provide space, though it is not appropriate for repetitive and significant tree work to bean initial design solution unless this is a suitable management outcome for the tree. Any pruning should be undertaken in accordance with BS3998:2010



0m 1m 3m 5m 10m 15m 20m

Cartographical errors exist



Arboricultural Impacts

Impacts	Nos. of trees
Trees to be removed	5
Groups (partial groups) to be removed	0 (1)
Trees with proposed incursions into RPAs	2
Groups with proposed incursions into RPAs	0
Trees that will require pruning	1
Groups that will require pruning	0

Arboricultural Impacts

No.	Species	Proposed structure	Incursion
3	Common yew	Lower ground floor structure	RPA
6	Common lime	Lower ground floor structure	RPA & crown

Arboricultural Impacts

No.	Species	RPA	Incursion
3	Common yew	83.4m²	6.1m² 7.3%
6	Common lime	162.9m²	13.0m² 8.0%

Tree Work Schedule

No.	Species	Work	Category
1	Common yew	Pruning	A
2	Common yew	Pruning	A
3	Common yew	Pruning	A
4	Common yew	Pruning	A
5	Common yew	Pruning	A
6	Common lime	Pruning	B
7	Common lime	Pruning	B
8	Common lime	Pruning	B
9	Common lime	Pruning	B
10	Common lime	Pruning	B
11	Common lime	Pruning	B
12	Common lime	Pruning	B
13	Common lime	Pruning	B
14	Common lime	Pruning	B
15	Common lime	Pruning	B
16	Common lime	Pruning	B
17	Common lime	Pruning	B
18	Common lime	Pruning	B
19	Common lime	Pruning	B
20	Common lime	Pruning	B
21	Common lime	Pruning	B
22	Common lime	Pruning	B
23	Common lime	Pruning	B
24	Common lime	Pruning	B
25	Common lime	Pruning	B
26	Common lime	Pruning	B
27	Common lime	Pruning	B
28	Common lime	Pruning	B
29	Common lime	Pruning	B
30	Common lime	Pruning	B

No. of individual trees to be removed

U	A	B	C
0	0	3	2

No. of groups (partial groups) to be removed

U	A	B	C
0	0	0	0 (1)

Arboricultural Method Statement

All tree work is to be undertaken in accordance with British Standard BS 3998:2010 Tree work - Recommendations. All arising's are to be removed and the site is to be left as found. Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of tree surgery operations. No equipment or vehicles such as timber lorries, tractors, excavators or cranes shall be parked or driven beneath the crowns of any retained trees, to prevent subsequent compaction and root death.

Rev: Date: Notes:

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ARBTECH

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Project:

Channing Junior School,
Fairseat,
Highgate Hill,
N6 5JR

Client:

Channing School

Drawing:

Arboricultural Impact Assessment

Based on:

343.36/PL001; 343.36/PL01/A;
343.36/PL05; 343.36/PL.6

Drawing No:

Arbtech AIA 01

Rev:

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Date:

OCT 2017

Scale:

1:250 @ A1

Drawn:

JCH

Key:

Tree Nos.:	2	Tree Canopies:	Trunks:
RPAs:	Category 'A' trees:	Category 'B' trees:	
Category 'C' trees:	Trees to be removed:	Incursion - Dwelling:	
Topo. survey:	Existing site plan:	Proposed LGF:	
Proposed GF:	Site investm.:		

All dimensions should be checked on site. No dimensions are to be scaled from this drawing. Please verify use of any dimensions based. Arbtech Consulting Ltd. cannot be held responsible for inaccuracies in the above drawing or which this plan is based. This drawing is designed to reflect the principles of the layout or design only, and relates only to the protection of retained trees. This drawing is not to be used as a definitive part of the engineering or construction design or method statement, an architect or structural engineer should be consulted over any matters of construction, detailing or specifications and for any standards or regulatory requirements relating to proposed structures, hard surfacing or underground services. This drawing was produced in colour - a monochrome copy should not be relied upon.

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BS5837:2012

**Trees in relation to design, demolition and construction –
Recommendations**

Arboricultural Method Statement

Channing Junior School

**Fairseat,
Highgate Hill,
N6 5JR**

2 November 2017

Author: Jon Hartley DipHortArb FdSc MArborA

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Introduction

Arbtech Consulting Limited (Arbtech) received written instruction on 27th September 2017 from Channing School to attend Channing Junior School, Fairseat, Highgate Hill, N6 5JR (site) to undertake an arboricultural survey to BS5837:2012 guidance to assess trees, hedges and major shrub groups growing on and within influencing distance of the site and to produce a schedule of trees, tree constraints plan, arboricultural impact assessment, arboricultural method statement and tree protection plan.

Executive Summary

This report describes the extent and effect of the proposed development at Site on individual trees and groups of trees within and adjacent to the site.

Figure 1: Site location in the context of its immediate setting



Trees within the site were surveyed; using a methodology guided by British Standard 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' ("BS5837").

Subsequently, this report has been produced, balancing the layout of the proposed development against the competing needs of trees. This report comprises all of the requisite elements of an arboricultural implications assessment, method statement and supporting plans.

Checklist for Submission to Local Planning Authority

Tree survey	<input checked="" type="checkbox"/>
Tree constraints plan	<input checked="" type="checkbox"/>
Arboricultural impact assessment	<input checked="" type="checkbox"/>
Arboricultural method statement	<input checked="" type="checkbox"/>
Tree protection plan	<input checked="" type="checkbox"/>

This report and its appendices follow precisely the strategy for arboricultural appraisal intended to provide local planning authorities with evidence that trees have been properly considered throughout the development process.

It is the conclusion of this report that the overall quality and longevity of the amenity contribution provided for by the trees and groups of trees within and adjacent to the site will not be adversely affected as a result of the local planning authority consenting to the proposed development. It is considered that any issues raised in this report, or beyond the scope of it can be dealt with by planning conditions.

General Information

Client: Channing School

Site: Channing Junior School, Fairseat, Highgate Hill, N6 5JR.

Brief proposal description: Proposed rear ground floor extension to the main building, alteration to the southern wing to provide additional teaching space and a subterranean extension for recreation changing facilities adjacent to existing tennis courts.

Planning application reference: N/A

Table 1: Documents referred to.

Document	Reference No.
Levels survey	343.36/PL001
Existing plans	343.36/PL01/A
Proposed plans - lower ground floor	343.36/PL06
Proposed plans - ground floor	343.36/PL056
Landscape master plan drawing	N/A
LPA pre-app comments	N/A
British Standard 5837:2012	"BS5837"
Arboricultural Impact Assessment	Arbtech AIA 01
Tree Protection Plan	Arbtech TPP 01

Tree Survey

Survey: An arboricultural survey to BS5837 of all trees within impacting distance of the site was undertaken by Aran Nearn on 12th October 2017.

A total of 26no individual trees and 3no groups of trees were surveyed. Details for each of the trees surveyed are provided in the Schedule of Trees (see Appendix 1)

Table 2: Documents upon which this tree survey has been based

Document	Originator	Reference Number	Title
Levels survey	Prime Meridian Architect and structural engineers	343.36/PL01/A	Levels Survey

Limitations: The survey was made at ground level using visual observation only. Detailed examinations, such as climbing inspections and decay detection equipment were not employed, though may form part of the survey's management recommendations. Measurements were taken using specialist tapes, laser and GPS devices. Where this was not possible, measurements are estimated.

Scope: Pre-development tree surveys make arboricultural management recommendations based exclusively upon the individual tree or group of trees condition relative to their present context (*i.e. not in relation to the proposed development*).

Legal Status: No statutory protection check has been performed. BS5837 does not draw any distinction between trees subject to statutory protection, such as a Tree Preservation Order ("TPO"), and those trees without. This is principally because a detailed planning consent overrides any TPO protection. Consequently, we do not seek to offer any comparison between or infer any difference in the quality or importance of TPO trees and other trees.

* For more information on the surveyed trees please see Arbtech Consulting Ltd, Tree Survey Schedule (Appendix 1), Tree Survey Report and Tree Constraints Plan.

Arboricultural Impact Assessment

Table 3: Documents upon which this assessment has been based

Document	Originator	Reference Number	Title
Levels survey	Prime Meridian Architect and structural engineers	343.36/PL01/A	Levels Survey
Existing plans	Prime Meridian Architect and structural engineers	343.36/PL01/A	Existing plans
Proposed plans - lower ground floor	Prime Meridian Architect and structural engineers	343.36/PL06	Proposed plans - lower ground floor
Proposed plans - ground floor	Prime Meridian Architect and structural engineers	343.36/PL056	Proposed plans - ground floor

There are a number of issues that may need to be addressed in an arboricultural impact assessment between the trees and the proposed development, these are as follows:

- The effect and extent of the proposed development within the root protection areas (RPAs) of retained trees;
- The potential conflicts of the proposed development with canopies of retained trees; and
- The likelihood of any future remedial works to retained trees beyond which would have been scheduled as a part of usual management.

Table 4: Impacts upon the RPAs of retained trees

Tree Number	Species	Structure	RPA (m ²)	Incursion	
				(m ²)	(%)
3	Common yew	Lower ground floor structure	83.4	6.1	7.3
6	Common lime	Lower ground floor structure	162.9	13	8.0

These impacts can be seen on the Arboricultural Impact Assessment drawing number Arbtech AIA 01.

Trees to be removed

The implementation of this development requires the removal of 5 no individual trees and the partial removal of 1 no group of understory trees.

A breakdown of all tree removals and pruning works can be seen in **Table 8: Summary of Tree Works**

Table 5: Number of individual trees to be removed.

U	A	B	C
0	0	2	3

Table 6: Number of groups (partial groups) to be removed.

U	A	B	C
0	0	0	0 (1)

Canopy cover is ecologically important and the loss of canopy cover by these trees will be mitigated with planting within the development.

Conclusion

The proposed construction works of the new development should have no substantial adverse impact on the amenity value of the local tree stock. As such I see no arboricultural or landscape reasons why this scheme should not proceed subject to the appropriate conditions

Arboricultural Method Statement

The purpose of this method statement is to demonstrate how any aspect of the development that has potential to result in loss or damage to a tree may be implemented and provide an adequate level of protection for those trees that are to be retained during the proposed works.

Details of key site personnel, including site / project manager will be submitted to the Council's Tree Officer prior to the commencement of site works.

This method statement is to be approved and agreed to in writing by all key personnel prior to the commencement of site works.

No site personnel are to be present and no demolition, site clearance, building work or delivery of materials is to occur until the protective measures are in accordance with this method statement and the Tree Protection Plan drawing number Arbtech TPP 01.

Protective measures should be in accordance with this method statement and the Tree Protection Plan; drawing number Arbtech TPP 01 will remain unaltered and in situ, unless otherwise specified, for the entire duration of the construction.

Table 7: Documents upon which this assessment has been based

Document	Originator	Reference Number	Title
Levels survey	Prime Meridian Architect and structural engineers	343.36/PL01/A	Levels Survey
Existing plans	Prime Meridian Architect and structural engineers	343.36/PL01/A	Existing plans
Proposed plans - lower ground floor	Prime Meridian Architect and structural engineers	343.36/PL06	Proposed plans - lower ground floor
Proposed plans - ground floor	Prime Meridian Architect and structural engineers	343.36/PL056	Proposed plans - ground floor

Tree Works

For reasons of public safety, all tree works referred to herein must be carried out prior to any site personnel commencing works or any building materials being delivered.

Table 8: Summary of Tree Works

No.	Species	Works	Category
G3	Various	Partial removal of group: fell trees to ground level; grind out stumps.	C12
1	Pittosporum	Fell tree to ground level; grind out stump.	B1
4	Common yew	Fell tree to ground level; grind out stump.	B1
5	Common yew	Fell tree to ground level; grind out stump.	B1
6	Common lime	Crown lift to achieve 2m clearance over proposed structure.	B1
25	Mountain ash	Fell tree to ground level; grind out stump.	C1
26	Whitebeam	Fell tree to ground level; grind out stump.	C1

Notes

All tree work is to be undertaken in accordance with British Standard BS 3998:2010, Recommendations for tree work. All arising's are to be removed and the site is to be left as found. Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of tree surgery operations. No equipment or vehicles such as timber lorries, tractors, excavators or cranes shall be parked or driven beneath the crowns of any retained trees, to prevent subsequent compaction and root death.

Tree removal

A tree should be felled in one piece only when there is no significant risk of damage to people, property or protected species (see Annex A).

Where restrictions (e.g. lack of space, buildings, other features, land ownership or use, or other trees which are to be retained) cannot be overcome, trees should be dismantled in sections.

This also applies where a tall stump is being retained but where branches are to be removed/pruned.

Extensively decayed trees can be unpredictable when they are being felled, and special precautions should therefore be taken, such as the use of a winch to guide the direction of fall.

Stump removal – stump grinding

Stump grinding should be to a minimum of 300mm deep or to extend through the base of the stump leaving the major roots disconnected if the intention is to reduce the potential for the spread of Honey fungus.

The grinding residue should be treated as arising's and removed from site.

NOTE Mechanical destruction of a stump by stump grinding is less disruptive to the site than digging out.

The hole left by stump removal, should be filled with soil or other material. The filling should be appropriate for future site usage, and for any surface treatment that is to be installed.

Where future plant growth is desired, the backfill material should be firmed in 150 mm layers by treading, avoiding excessive compaction and destruction of the soil structure.

Stump removal - digging

Stump removal by digging out should include disposal/utilisation of woody material (see Clause 13).

NOTE Whether done by hand or machine, digging out can cause severe disturbance of the site.

Where possible, when winching out a stump, a ground or other type of anchor should be used rather than a tree to be retained. If there is no alternative to using such a tree as an anchor, appropriate protective measures should be adopted.

After stump removal

The hole left by stump removal, whether by digging out or grinding, should be filled with soil or other material. The filling should be appropriate for future site usage and for any surface treatment that is to be installed.

Where future plant growth is desired, the back-fill material should be firmed in 150mm layers by treading, avoiding excessive compaction and destruction of the soil structure.

Protected Species (general informative for tree works)

British fauna enjoys a level of statutory protection. Undertaking tree work can impact upon some species directly. Bats and nesting birds should be considered when undertaking tree works. The below information is not intended to be exhaustive but gives a brief overview of the protection afforded to these two groups of animals.

Conservation Status of British Bats

The general consensus in Britain and Europe is that virtually all bat species are declining and vulnerable. Our understanding of population status is poor as there is very little historical data for most bat species. Certain species, such as the horseshoe bats, are better understood and have well documented contractions in range and population size.

Given this general picture of decline in UK Government within the UK Biodiversity Action Plan has designated five species of bats as priority species (greater and lesser horseshoe bats, barbastelle, Bechstein's and pipistrelle). These plans provide an action pathway whereby the maintenance and restoration of the former populations levels are investigated.

Legal Status of British Bats

Given the above position all British bats as well as their breeding sites and resting places enjoy national and international protection.

All bat species in the UK are fully protected under the Wildlife and Countryside Act 1981 (as amended) through inclusion in Schedule 5. All bats are also listed on Annex IV (and some on Annex II) of the EC Habitats Directive giving further, European protection. Taken together the act and Conservation of Habitats and Species Regulations 2012 (as amended)* make it an offence to; intentionally or deliberately kill, injure or capture (take) bats;

- Deliberately disturb bats (whether in a roost or not);
- Damage, destroy or obstruct access to bat roosts;
- Possess or transport a bat or any part of a bat, unless acquired legally;
- Sell, barter or exchange bats, or parts of bats

The legislation although not strictly affording protection to foraging grounds does protect roost sites. Bat roosts are protected at all times of the year whether or not bats are present. Any disturbance of a roost due to development must be licenced.

**the regulations that delivered by the UK's commitments to the Habitats Directive.*

Breeding birds

All nesting birds are protected under the Wildlife and Countryside Act (as amended) 1981, which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. Furthermore, a number of birds enjoy further protection under that Act and are listed on Schedule 1 of the Act. These further protected birds are also protected from disturbance and it may be necessary to operate “no-go” buffer zones around such nests – typically out to 100m.

Planning policy guidance on the treatment of species identified as priorities under the biodiversity action programme suggests that local authorities should take measures to protect the habitats of these species from further decline through policies in local development documents and should ensure that they are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. The conservation of these species should be promoted through the incorporation of beneficial biodiversity designs within developments.

Site Management

The site manager will be responsible for briefing and inducting all personnel who will be working on any stage of this development and especially those who will be working within or adjacent to the canopies or RPAs of retained trees; and will make them aware of, and provide a copy of this method statement and tree protection plan drawing number Arbtech TPP 01; this is to include but not exclusively the movement and or operation of plant, excavations, unloading deliveries, mixing and or pouring of cement and concrete.

The site manager will be responsible for the day to day running and protection of all retained trees and for liaising with the project arborist about any tree related matters and prior to any works that may or will affect the RPAs or canopies of retained trees; this is to include but not exclusively the movement and or operation of plant, excavations, unloading deliveries, mixing, pouring and storage of all caustic materials that may cause harm to retained trees.

Any incidents of damage to retained trees or of tree protection measures will be documented by the site manager who will then report these incidents to the project arboriculturist immediately and make sure that works within this area cease until the project arborist has had an opportunity to inspect the damage and where appropriate, agree a mitigation plan with the local planning authority tree officer.

The site manager may designate another person to take charge of briefing and inducting process of new site personnel or visitors in his absence.

If the site manager is replaced or is absent from site for more than three consecutive working days the project arborist will be informed and a pre-start meeting will be held with the new or acting site manager.

It is the responsibility of the site manager to ensure that the planning conditions attached to the planning consent are adhered to at all times and that a monitoring regime and supervision of any works within or adjacent to the RPAs are adopted.

If at any time pruning works are required other than those previously approved, permission must be sought from the LPA tree officer and once permission is granted they are to be carried out by a suitably qualified person in accordance with BS3998:2010 Tree work – Recommendations.

Prohibition

- Mechanical digging or scraping is not permitted within a defined root protection area or within areas cordoned off by protective barrier fencing.
- No access will be permitted within the protected areas;
- No materials, equipment or debris will be stored within any of the fenced areas, or against the fencing;
- Fires are not permitted within 10m of any vegetation.
- Leaning objects against or attaching of objects to a tree is not permitted.
- Machinery, plant and vehicles are not permitted to be washed down within 10m of vegetation.
- Chemicals and materials are not to be transported, stored, used or mixed within a root protection area or within areas cordoned off by protective barrier fencing.
- Cement silos, mixing site to be situated within a bunded area to prevent pillage/leaking of chemicals harmful to trees. These areas are to be sited well clear of protected trees.
- Refuelling of plant or machinery is prohibited within 10m of the construction exclusion zones.
- It is essential that allowance should be made for the slope of the ground so that damaging materials such as concrete washings, mortar or diesel oil cannot run towards trees.
- Where machinery is to be used within 5m of retained tree canopies a banks man will be required at all times whilst setting up, moving or operating within this distance of retained trees canopies.
- Storage of all caustic material and chemicals are to be situated well clear of protected areas and preferably on lower ground if slopes are present, or to be situated within a bonded area to prevent any spills or leaks entering the ground.

Sequencing of works

A logical sequence of events is to be observed and shall be phased as follows.

Table 9: Sequence of Events

Stage	Event
Stage 1	Pre-commencement site meeting
Stage 2	Carry out tree works as specified within the summary of tree works
Stage 3	Installation of protective measures in accordance with the approved tree protection plan/s
Stage 4	Site set up
Stage 5	Undertake and complete construction works
Stage 6	Undertake external landscaping works outside of the construction exclusion zones
Stage 7	Removal of all machinery and materials from site
Stage 8	Dismantle and removal of protective measures
Stage 9	Undertake external landscaping works within the construction exclusion zones
Stage 10	Sign off from project arboriculturist

Protective Measures

Protective measures are to be installed immediately following the completion of the tree works, and are to be sited and aligned in accordance with the tree protection plan (Arbtech TPP 01) prior to the commencement of any works or the introduction of any machinery or material to site.

Upon installation of the protective measures around the retained trees the project arboriculturist will visit the site to inspect and document the position and specifications of the protective measures.

In the event that the protective measures and their positions do not comply with this arboricultural method statement document number Arbtech AMS 01 (2 November 2017) and tree protection plan drawing number Arbtech TPP 01, the project arboriculturist shall inform the client and fencing contractor so adjustments can be made.

When the protective measures comply with document number Arbtech AMS 01 (2 November 2017) and tree protection plan drawing number Arbtech TPP 01, the project arboriculturist will sign off the protective measures in writing to the client and will send a copy to the fencing contractor, site agent and local authority tree officer.

If the protective measures become damaged or there is any accident or emergencies involving trees, these areas are to be cordoned off immediately with high visibility plastic mesh fencing. The site agent is to photograph and document the damage and inform the project arboriculturist immediately after the incident and all work within in this area is to cease until the project arboriculturist has made a visit to the site. Any and all damaged sections of protective measures shall be replaced within 48 hours of the initial incident.

The protected area is sacrosanct and will not be invaded by the storage of materials, mixing of concrete or other products, accessed by machinery, equipment or pedestrians or in any other way disturbed by construction activity.

The protective measures will remain in place until the completion of stage 8 (see **Sequencing of Works**), there after they will be carefully dismantled only with the agreement of the project arboriculturist and or the local authority tree officer.

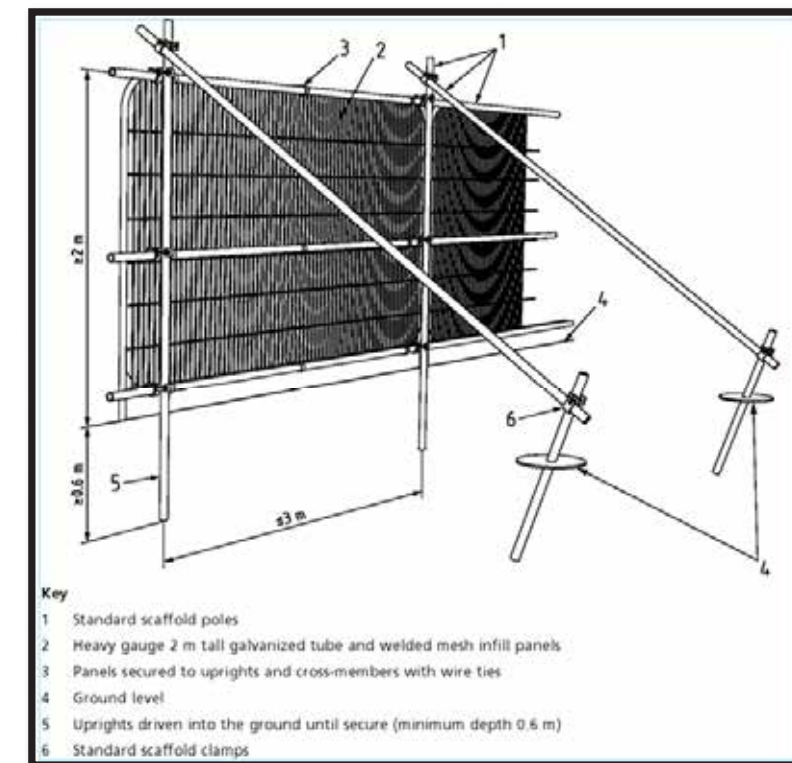
The existing site boundary measures are to be retained for the duration of the development. If for any reason the existing boundary measures are not to be used protective barrier fencing is to be installed along the line of the boundaries and is only to be removed upon the written permission of the project arboriculturist or LPA tree officer upon the completion of the development or immediately prior to the installation of the permanent boundary measures.

No equipment, vehicles or plant shall operate beyond the tree protection fencing. Booms, hoists and rigs should be kept as far away from the canopies of retained trees at all times. Where it is necessary to operate within 5m of a tree canopy, it will be done with the utmost caution and under the control of a banks man. Damage to trees will be considered a breach of this tree protection plan, which in turn could be a breach of planning permission.

Protective Barrier Fencing

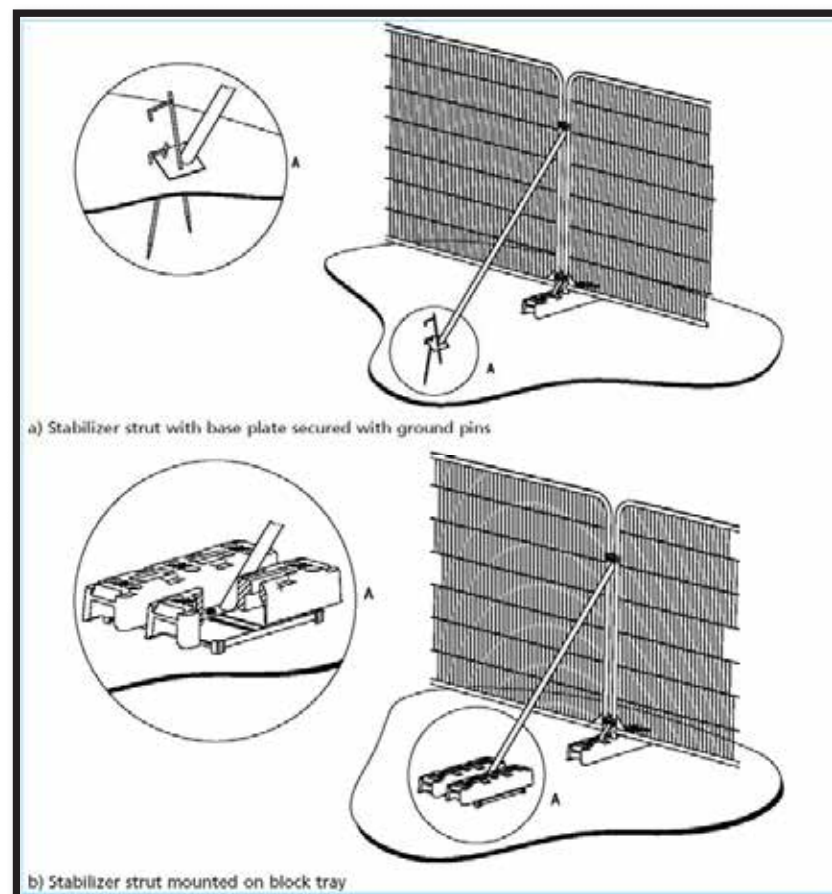
Protective barrier fencing should be appropriate for the intensity and proximity of the development to protect trees where development activity is in close proximity.

Default specification: To comprise either 2.4m wooden site hoarding; or a 2.3m high scaffold framework, well braced to resist impacts, with uprights to be spaced at a maximum of 3.0m intervals and driven into the ground by a minimum of 600mm. On to this, standard anti-climb welded mesh panels are to be securely fixed to each other with at least two scaffold clamps and to the scaffold frame work with wire.



Secondary specification: To comprise of 2m tall welded mesh panels on rubber or concrete feet. Panels are to be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels

should be supported on the inner side by stabiliser struts, which should be attached to a base plate and secured with ground pins.



Signage denoting the words “*tree protection area*” at 5.0m intervals should be fixed to the protective barrier fencing (**See Appendix 2**).

Protective fencing is to be removed **ONLY** with the written permission of the arboricultural consultant and approval of the local planning authority (LPA).

Ground boarding

Where it is determined by the project engineer that the any hard surfacing is not adequate protection from any expected loading, ground boarding is to be installed to the engineer’s specification on top of the hard surfacing within the root protection areas of retained trees.

New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

Where machinery will be stored or used from the ground boarding within the RPAs of the retained trees an impervious barrier and or bunding to prevent oils, fuel or chemicals is to be installed to prevent leaching into the soil within or adjacent to the RPAs.

Note The ground protection might comprise of one of the following:

- for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane;
- for pedestrian-operated plant up to a gross weight of 2t, proprietary inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150mm depth of woodchip), laid onto a geotextile membrane;
- for wheeled or tracked construction traffic exceeding 2t gross weight, an alternative system (e.g. proprietary system or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

For any situations other than those described in a) or b) (as above), the ground boarding is to be designed by a suitably qualified person to an engineering specification in conjunction with arboricultural advice, to be suitable of supporting the expected loading to be placed upon it.

In all cases, the objective of the ground boarding is to avoid compaction of the soil beneath, so that tree root functions remain unimpaired.

Demolition

Prior to the demolition of the existing site features, all tree works are to have been completed, tree protection measures are to be in place as per Arbtech Consulting Ltd. tree protection plan document number Arbtech TPP 01 and have been signed off and a copy of the demolition method statement has been submitted and approved by the project arboriculturist and LPA tree officer, to ensure that there is no conflict with this method statement.

All demolition work within or immediately adjacent to RPAs or canopies of retained trees is to be undertaken under the direct on-site supervision of an arboriculturist.

Construction

Prior to the construction of the proposed development scheme, a copy of the construction method statement should have been submitted and approved by the project arboriculturist and LPA tree officer, to ensure that there is no conflict with this method statement.

All excavations and construction work within or immediately adjacent to RPAs or canopies of retained trees is to be undertaken under the direct on-site supervision of an arboriculturist.

Foundations design

New foundations for buildings, structures and hard surfacing situated within the RPAs of retained trees are to be designed in conjunction with site investigations and arboricultural advice to accommodate the likely loading of the structure. The foundations will be designed to limit the amount of excavation required within RPAs to retain roots that are important to the trees stability as identified during the site investigations.

The use of strip foundations within RPAs of retained trees can cause extensive root loss and as such are to be avoided.

Design of foundations for the new court equipment store within the RPAs of tree no. 6 are to be designed to minimise the adverse impact upon trees and should pay particular attention to the existing ground levels and proposed finished floor level. Foundation design should be undertaken using site specific information in conjunction with the project arboriculturist and engineer.

Root damage can be minimised using:

- Piles, with a site investigation it is possible to determine their optimal location whilst avoiding damage to roots important for the stability of the tree.

Investigative excavations are to be undertaken with the use of hand tools or compressed air displacement to a minimum depth of 600mm;

- Beams laid at or above ground level and or cantilevered as necessary to avoid tree roots identified by the site investigation
- Multi-dimensional confinement systems.

These are just an example of a few types of foundations that can be used to minimise root damage. In order to arrive at a suitable solution, site specific and specialist advice regarding foundation design should be sought from the project arboriculturist and engineer.

Large structures

Slabs for structures with an incursion into the RPAs of retained trees in excess of 20% should be designed and constructed with a ventilated air space between the underside of the slab and the existing soil surface. A specialist irrigation system is to be installed underneath the slab e.g. rain water runoff from the roof.

Small structures

Slabs for structures less than 20% of the total area of the RPA may be formed / constructed directly onto the existing soil surface. It may be possible to use a multi-dimensional confinement system such as CellWeb TM or similar as the foundation for these structures (specialist advice should be sought from the manufacturer).

Where piling is to be installed near to trees, the smallest practical pile diameter should be used, as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. If a piling mat is required, this should conform to the specification for ground boarding.

All and any excavations that may be required for foundations within the RPAs of retained trees will initially be undertaken manually under arboricultural supervision (see Manual excavation).

Lower ground floor

The proposed basement has been designed to be situated almost entirely outside of the RPAs of all retained trees with the exception for a minor incursion within the RPA of tree no.3.

Table 10: Impacts upon RPAs of retained trees – Subterranean construction

Tree No.	Species	RPA (m ²)	Incursion (%)
3	Common yew	83.4	7.3

Prior to the excavation/installation of the lower ground floor, a temporary retaining system (TRS) will be installed along the outside line of the footprint to retain the surrounding soil and to remove the need for any over dig.

Within the RPA of tree no.3 excavations will be undertaken along the line of the TRS, these excavations will be undertaken manually under arboricultural supervision (see Manual excavation).

Temporary Retaining System (TRS)

Prior to the excavations for the lower ground floor a TRS (sheet piling or similar) is to be installed along the blue hatched line (see drawing No. Arbtech TPP 01) to retain the surrounding rooting environment and remove the need for any over dig.

The type of TRS and its nature of being temporary or permanent are to be confirmed by the project engineer but the TRS is to be capable of retaining the retained rooting environment during the excavation and construction phases.

The installation of the TRS is to be undertaken prior to the removal of the driveway. A strip of the concrete driveway along the line of the TRS will be removed wide enough to be able to undertake manual excavation down to a depth of 1000mm, during this excavation the roots exposed during the trial excavations will be severed cleanly by the project arboriculturist.

The excavation of the lower ground floor in this area is to be undertaken using the methodology of supervised excavation, under direct on-site arboricultural supervision to a minimum depth of 1000mm or to a depth that will be determined by the project arboriculturist whilst on site.

Concrete within RPAs

Prior to concrete being poured within or immediately adjacent to the RPAs of retained trees the excavation is to be lined and sealed to prevent any leaching of the concrete into the soil and causing desiccation of retained roots by concrete run off.

Manual excavation

Excavation within RPAs will be undertaken by hand under direct on-site arboricultural supervision of the required depth of the foundation; Or to a minimum of 600mm deep of any excavation, whether for proposed foundations, hard surfacing or underground services. The total depth of the manual excavation will be determined by the arboriculturist whilst on site.

The soil is to be loosened with the aid of a fork or pick axe and then cleared with the aid of an Air-spade, Air-vac and or shovel. Any roots found will be cleanly severed by the arboricultural consultant with either a hand saw or secateurs.

Any roots found with a diameter of less than 25mm shall be cleanly severed by the arboricultural consultant. Any roots of 25mm and above shall be excavated around without damaging them; the arboricultural consultant shall decide if it's feasible or necessary to retain the root, if not it shall be severed.

The edge of the excavation closest to the trees will be covered with damp hessian to prevent soil collapse or contamination by concrete.

Soil beneath the depth may be sheet piled, regular piled or excavated deeper. Machinery may be used for this providing that it is situated outside of the RPA or has appropriate ground protection in place to move around on and work upon.

Services

Detailed drawings of proposed underground services are not available at this time; hence it is not possible to identify any specific potential impacts associated with the scheme at this stage.

Existing services within the site should be retained where ever possible. Where existing services within RPAs require upgrading, the upmost care must be taken to minimise disturbance, and where feasible trenchless techniques are to be employed, and only where necessary should open excavations be considered.

Where new services are to be introduced into the site they should be located outside of RPAs, where they will not interfere with tree roots. If any excavations are required within the RPAs all trenches are to be excavated by hand and radially to the tree trunks under direct on-site arboricultural supervision and are to be carried out under NJUG guidelines.

Final positions of any proposed services should be verified and approved by the arboricultural consultant and local authority tree officer before implementation.

New Underground services

Trenching for installation of underground services and drainage routes could sever any roots that may be present and as such adversely affects the health of the tree. For this reason, particular care should be taken in routing and methods of installation of all underground services. All underground services and drainage routes should be located so that no excavations are required within RPAs.

Where it has been impossible to keep underground services from passing through RPAs or within close proximity to trees, these sections are to be installed in one of three ways in accordance with the guidance set out in National Joint Utilities Group guidelines (NJUG 4), under on site arboricultural supervision.

Trenchless Techniques

There are three main types of trenchless techniques, these include, guided and unguided boring and pipe replacement by lining or bursting. These allow for the installation, maintenance or renewal of underground services, without the disturbance of soil in which roots are likely to be growing. Starting and receiving pits for the boring machinery are to be located outside of the RPAs of any retained trees, with the bore depth being maintained at a minimum depth of 600mm below the existing ground level. Techniques involving external lubrication of the equipment shall use no material other than water as other lubricants could contaminate the soil (e.g. oil, bentonite, etc.).

Manual Excavation

Excavation within RPAs will be undertaken by hand under direct on-site arboricultural supervision of the required depth of the foundation; Or to a minimum of 600mm deep of any excavation, whether for proposed foundations, hard surfacing or underground services. The total depth of the manual excavation will be determined by the arboriculturist whilst on site.

The soil is to be loosened with the aid of a fork or pick axe and then cleared with the aid of an Air-spade, Air-vac and or shovel. Any roots found will be cleanly severed by the arboricultural consultant with either a hand saw or secateurs.

Any roots found with a diameter of less than 25mm shall be cleanly severed by the arboricultural consultant. Any roots of 25mm and above shall be excavated around without damaging them; the arboricultural consultant shall decide if it's feasible or necessary to retain the root, if not it shall be severed.

The edge of the excavation closest to the trees will be covered with damp hessian to prevent soil collapse or contamination by concrete.

Soil beneath the depth may be sheet piled, regular piled or excavated deeper. Machinery may be used for this providing that it is situated outside of the RPA or has appropriate ground protection in place to move around on and work upon.

Broken Trench – Hand Dug

This technique combines both trenchless techniques and manual excavation where excavation is unavoidable. Excavations should be limited to where there is clear access around and below the roots. All trenches shall be excavated by hand with the same precautions taken as for manual excavation. Open section of trench should only be large enough to allow access for linking to the next section.

Landscaping

Landscaping around retained trees may only be carried out once all tree protection measures have been removed (planting, turfing, fencing etc.).

All excavations within the Root Protection Areas shall be undertaken by hand and without reducing current ground levels unless it is agreed in writing with the LPA. At no time is the use of a rotavator permitted within the RPAs of retained tree.

Any tree roots discovered will be left in-situ and shall not be cut or otherwise damaged. Where possible, the soil structure within the Root Protection area shall be preserved.

No works will be carried out within the RPAs of any trees if the soil moisture is of such a level that soil compaction may be likely. Should the soil become compacted or has poor structure which would hinder the development of the existing trees and plants or any new plantings the arboriculturist should be consulted about soil decompaction techniques.

Monitoring and Supervision

Where trees have been identified within this method statement and tree protection plan drawing number Arbtech TPP 01 for retention, there should be an auditable system of arboricultural monitoring. This is to extend to arboricultural supervision whenever demolition or construction activity is to take place within or adjacent to any canopy or RPA.

The development's tree protection measures are to be monitored and all demolition and construction works to be undertaken within or adjacent to the RPAs of retained trees are to be supervised by project arboriculturist, who should be retained to record and report observations to the council at appropriate intervals.

Pre-commencement site meeting

Prior to the commencement of any works or machinery and materials arriving on site a pre-commencement site meeting involving the project arborist, land owner or agent, site manager, contractors and engineer (as appropriate) and the relevant LPA officers will be held to ensure that all aspects of the arboricultural method statement and tree protection are understood and for all parties to swap contact details (see **Appendix 3**).

Monitoring and supervision schedule

The initial monitoring visit will be to check that the tree protective measures are in the correct location and as specified within the approved method statement; if so to sign off their installation.

There after monitoring visits are to take place at regular intervals, to ensure that tree protection measures are in place and are functioning as designed or whenever necessary to undertake works to be carried out under arboricultural supervision. The frequency of the monitoring visits is to be determined with the LPA tree officer at the pre-commencement site meeting.

A record of all arboricultural monitoring and supervision visits will be kept and any faults will be logged, this will then be copied to the site agent, developer and local planning authority in a digital format.

If during the course of the development it is necessary for areas to be re-designed so that they would require changes to the approved arboricultural method statement or tree protection plan and so affecting retained trees the project arborist and LPA tree officer will be invited to attend a site meeting with all relevant parties. Prior to any changes being implemented these must have been approved in writing by the LPA tree officer.

Supervision


The arboricultural consultant will be required to attend site to directly supervise all demolition and construction works that are to be undertaken within or adjacent to the RPAs of all retained trees and will be advised a minimum of 72 hours prior to the commencement of any works that require his attendance, these will include:

1. Pre-commencement site meeting.
2. Location of protective measures.
3. Manual excavation for site investigations and any subsequent root pruning within RPAs of tree nos. 3 & 6.
4. Any excavations within or adjacent to RPAs, including foundations, hard surfacing or underground services.
5. Removal of protective measures and sign off

Completion meeting

Once all construction works have been completed all materials and machinery has been removed from site the project arborist shall be informed and will invite the LPA tree officer to meet on site to discuss the process and discuss any final remedial works that may be required and to sign the development off so that the protective measures may be removed.

Appendix 1: Tree Survey Schedule

BS5837:2012 Tree Survey										Arbtech Consulting Limited		
Client: Channing School										Unit 3 Well House Barns Chester Cheshire CH4 0DH Phone: 01244661170		
Project: Channing Junior School												
Survey Date: 12/10/2017												
Surveyor: Aran Nearn												
												
Tree and Tag No	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC	
Species	No	Ø (mm)	Spread (m)	Clear (m)								
G1												
A Group	5	1	90	N	1.5	1	SM	A: 3.7 R: 1.08	Good	C: Fair S: Fair B: Fair	Estimated Measurements Rockery group; species include sumach, elder and aucuba; stem and crown dimensions recorded are the largest represented within the group.	C.1.2 10 to 20 yrs
See comments for details				E	1.5	1						
				S	1.5	1						
				W	1.5	1						
G2												
A Group	4	1	100	N	1.5	0	SM	A: 4.5 R: 1.19	Fair	C: Fair S: Fair B: Fair	Estimated Measurements Linear boundary group; grows from; car park edge; potential compaction from vehicle access over root plates; species include elder, lilac, holly, cherry laurel, ash and beech; stem and crown dimensions recorded are the largest represented within the group.	C.1.2 10 to 20 yrs
See comments for details				E	2	0						
				S	2	0						
				W	2	0						
G3												
A Group	5	1	130	N	2	0	SM	A: 7.6 R: 1.55	Good	C: Fair S: Fair B: Fair	Estimated Measurements Understorey shrub group, species include holly, yew, buddleia and elder; stem and crown dimensions recorded are the largest represented within the group.	C.1.2 20 to 40 yrs
See comments for details				E	2	0						
				S	2	0						
				W	2	0						
1												
Pittosporum	8	5	200 (Eq)	N	4	3	M	A: 18.1 R: 2.4	Good	C: Good S: Fair B: Fair	Estimated Measurements Grows from planted bed; multi-stemmed from base; up to 200mm of included bark at several tight compression forks throughout crown; previously crown lifted to 3m, wound diameter up to 100mm.	B.1 20 to 40 yrs
Pittosporum tenuifolium				E	4	3						
				S	4	3						
				W	4	3						
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter												
Y Young M Mature S Stem (Eq) Diameter												
SM Semi-mature OM Over Mature B Basal area Equivalent stem diameter using BS5837:2012 definition												

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment		Cat ERC		
No	Ø (mm)	Spread (m)	Clear (m)											
2														
Common Horse Chestnut <i>Aesculus hippocastanum</i>	18	1	710	N	6	7	M	A: 228.1 R: 8.52	Good	C: Good S: Good B: Fair	Grows from fenced off area; potential compaction from vehicle access over root plate; previously crown reduced away from neighbouring building, wound diameter up to 100mm.	B.1 20 to 40 yrs		
3														
Common Yew <i>Taxus baccata</i>	15	2	429 (Eq)	N	4	3	M	A: 83.4 R: 5.15	Good	C: Fair S: Good B: Good	Grows from fenced off area; two co-dominant stems from 1m; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs		
4														
Common Yew <i>Taxus baccata</i>	12	2	419 (Eq)	N	2	3	M	A: 79.3 R: 5.02	Good	C: Fair S: Good B: Good	Grows from fenced off area; two co-dominant stems from 1m; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs		
5														
Common Yew <i>Taxus baccata</i>	8	2	419 (Eq)	N	3	1	M	A: 79.3 R: 5.02	Good	C: Fair S: Fair B: Good	Grows from fenced off area; two co-dominant stems from 1m; stem leans at 20 from vertical to northeast; asymmetrical crown distribution due to suppression from neighbouring trees; climber throughout crown.	B.1 20 to 40 yrs		
6														
Common Lime <i>Tilia europaea</i>	20	1	600	N	5	4	M	A: 162.9 R: 7.2	Good	C: Fair S: Good B: Not Visible	Off-site tree; grows from neighbouring land; base not visible over boundary fence; stem diameter estimated from site.	B.1 20 to 40 yrs		
7														
Common Lime <i>Tilia europaea</i>	18	1	600	N	5	4	M	A: 162.9 R: 7.2	Good	C: Fair S: Good B: Not Visible	Off-site tree; grows from neighbouring land; base not visible over boundary fence; stem diameter estimated from site.	B.1 20 to 40 yrs		
Age Classifications:														
N	Newly planted	EM	Early Mature	Condition:				C	Crown	Stems:			Ø	Diameter
Y	Young	M	Mature					S	Stem				(Eq)	Equivalent stem diameter using BS5837:2012 definition
SM	Semi-mature	OM	Over Mature					B	Basal area					

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)						
8											
Holm Oak <i>Quercus ilex</i>	16	1	600	N E S W	8 9 4 3	4 4 4 4	M A: 162.9 R: 7.2	Good	C: Fair S: Good B: Good	Grows from fenced off area; two co-dominant stems from 2m; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs
9											
Norway Maple <i>Acer platanoides</i>	7	1	340	N E S W	3.5 4 4 4	2.5 3 3 3	SM A: 52.3 R: 4.08	Good	C: Good S: Fair B: Fair	Grows from verge on edge of track; potential compaction from vehicle access over root plate; previously crown lifted to 3m, wound diameter up to 100mm.	B.1 20 to 40 yrs
10											
Common Ash <i>Fraxinus excelsior</i>	6	1	180	N E S W	3 3 4 4	3 3 3 3	SM A: 14.7 R: 2.16	Fair	C: Good S: Good B: Fair	Grows from hedge block, in close proximity to boundary wall; dieback in lower crown.	B.1.2 20 to 40 yrs
11											
Common Ash <i>Fraxinus excelsior</i>	8	1	270	N E S W	4.5 5 5 5	3 3 3 3	SM A: 33 R: 3.24	Good	C: Fair S: Good B: Fair	Grows in close proximity to track; potential compaction from vehicle access over root plate; visible from road.	B.1.2 20 to 40 yrs
12											
Common Holly <i>Ilex aquifolium</i>	5	2	224 (Eq)	N E S W	1.5 3 2 1	0 0 0 0	SM A: 22.6 R: 2.68	Fair	C: Fair S: Good B: Fair	Grows in close proximity to track; potential compaction from vehicle access over root plate twin-stemmed from base.	C.1 10 to 20 yrs
13											
Common Holly <i>Ilex aquifolium</i>	6	2	262 (Eq)	N E S W	3 3 3 3	2 2 2 2	SM A: 31 R: 3.14	Good	C: Fair S: Fair B: Fair	Grows in close proximity to track; potential compaction from vehicle access over root plate; two co-dominant stems from base; vertical suppression from neighbouring tree.	B.1 20 to 40 yrs
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter Y Young M Mature S Stem (Eq) Equivalent stem diameter using BS5837:2012 definition SM Semi-mature OM Over Mature B Basal area											

Tree and Tag No Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations Survey Comment	Cat ERC
		No	Ø (mm)	Spread (m)	Clear (m)						
14											
Sycamore <i>Acer pseudoplatanus</i>	20	2	700 (Eq)	N E S W	7 5 9 7	5 5 5 5	M A: 221.7 R: 8.4	Good	C: Fair S: Good B: Fair	Grows in close proximity to track; potential compaction from vehicle access over root plate; two co-dominant stems from 1m, with up to 1m of included bark at union; cable bracing of the two co-dominant stems at 15m.	B.1.2 20 to 40 yrs
15											
Irish Yew <i>Taxus baccata 'Fastigiata'</i>	6	3	191 (Eq)	N E S W	1.5 2 2 2	1 1 1 1	SM A: 16.5 R: 2.29	Good	C: Fair S: Fair B: Fair	Grows in close proximity to car park; potential compaction from vehicle access over root plate.	C.1 >40 yrs
16											
Common Holly <i>Ilex aquifolium</i>	7	1	230	N E S W	2.5 1.5 3 3.5	2 2 2 2	SM A: 23.9 R: 2.75	Fair	C: Fair S: Good B: Fair	Grows in close proximity to car park edge; potential compaction from vehicle access over root plate; lower than average foliage density; asymmetrical crown distribution due to suppression from neighbouring tree.	C.1 10 to 20 yrs
17											
Common Holly <i>Ilex aquifolium</i>	5	2	347 (Eq)	N E S W	3 2 1 2	4 4 4 4	M A: 54.3 R: 4.15	Good	C: Fair S: Good B: Fair	Grows from car park edge; potential compaction from vehicle access over root plate; two co-dominant stems from base; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs
18										Estimated Measurements	
Sycamore <i>Acer pseudoplatanus</i>	18	1	300	N E S W	2 3 3 3	5 5 5 5	M A: 40.7 R: 3.59	Good	C: Fair S: Ivy B: Not Visible	Off-site tree grows from neighbouring land; base not visible over boundary fence; 60% ivy coverage of stem; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs
19										Estimated Measurements	
Sycamore <i>Acer pseudoplatanus</i>	18	3	374 (Eq)	N E S W	2 3 3 3	5 5 5 5	M A: 63.3 R: 4.48	Good	C: Fair S: Ivy B: Not Visible	Off-site tree grows from neighbouring land; base not visible over boundary fence; 60% ivy coverage of stem; asymmetrical crown distribution due to suppression from neighbouring trees.	B.1 20 to 40 yrs
Age Classifications: N Newly planted EM Early Mature Condition: C Crown Stems: Ø Diameter Y Young M Mature S Stem (Eq) Equivalent stem diameter using BS5837:2012 definition SM Semi-mature OM Over Mature B Basal area											

Tree and Tag No	Species	Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations		Cat ERC
			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment		
20		Estimated Measurements											
Common Lime <i>Tilia europaea</i>		18	1	500	N E S W	4 4 4 4	3 3 3 3	M A: 113.1 R: 6	Fair	C: Good S: Ivy B: Not Visible	Off-site tree; grows from neighbouring land; base not visible over boundary fence; 60% ivy coverage of stem; tip dieback throughout crown.		B.1.2 20 to 40 yrs
21		Estimated Measurements											
Sycamore <i>Acer pseudoplatanus</i>		18	1	400	N E S W	1 3 4 2	5 5 5 5	M A: 72.4 R: 4.8	Good	C: Fair S: Ivy B: Not Visible	Off-site tree; grows from neighbouring land; base not visible over boundary fence; 80% ivy coverage of stem; asymmetrical crown distribution due to suppression from neighbouring tree.		B.1.2 20 to 40 yrs
22		Estimated Measurements											
Sycamore <i>Acer pseudoplatanus</i>		18	1	400	N E S W	2 3 2 2	5 5 5 5	M A: 72.4 R: 4.8	Good	C: Fair S: Ivy B: Not Visible	Off-site tree; grows from neighbouring land; base not visible over boundary fence; 80% ivy coverage of stem; asymmetrical crown distribution due to suppression from neighbouring tree.		B.1.2 20 to 40 yrs
23		Estimated Measurements											
Cedar of Lebanon <i>Cedrus libani</i>		20	1	1370	N E S W	14 11 15 17	0 0 0 0	M A: 707 R: 15	Good	C: Good S: Good B: Good	Grows from lawn; focal tree of site; dense low hanging canopy.		A.1.2.3 >40 yrs
24		Estimated Measurements											
Holm Oak <i>Quercus ilex</i>		10	1	850	N E S W	7 8 8 8	0 0 0 0	M A: 326.9 R: 10.2	Good	C: Good S: Good B: Good	Grows from lawn; surface roots visible to south, no apparent damage; several cavities in stem up to 100mm diameter, previously occluded or surrounded by strong wood wound growth.		A.1.2.3 >40 yrs
25		Estimated Measurements											
Mountain Ash <i>Sorbus aucuparia</i>		4	3	179 (Eq)	N E S W	1.5 2 2 2	2 2 2 2	SM A: 14.5 R: 2.14	Fair	C: Good S: Good B: Fair	Grows from playground edge; three co-dominant stems from 1m; lower than average foliage density.		C.1 10 to 20 yrs
Age Classifications:		N Y SM	Newly planted Young Semi-mature	EM M OM	Early Mature Mature Over Mature	Condition:		C S B	Crown Stem Basal area	Stems:		Ø (Eq)	Diameter Equivalent stem diameter using BS5837:2012 definition

Tree and Tag No		Hght (m)	Stems		Crown		Age	RP A (m²) R (m)	Phys Condition	Structural Condition	Preliminary Recommendations	Cat ERC
Species			No	Ø (mm)	Spread (m)	Clear (m)					Survey Comment	
26												
Whitebeam <i>Sorbus aria</i>		4	1	120	N	1.5	2	Y	A: 6.5 R: 1.43	Good	C: Fair S: Fair B: Good	C.1 20 to 40 yrs
					E	2	2				Grows from top of bank; future crown conflict with neighbouring tree.	
					S	2	2					
					W	2	2					

Appendix 2: Tree Protection Notice

(To be printed at A3 or larger)

Tree Protection Area
KEEP OUT
Do not move this fence


(TOWN & COUNTRY PLANNING ACT 1990)
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS
AND/OR ARE THE SUBJECT OF A TREE PRESERVATION ORDER.
CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL
PROSECUTION

ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN
PERMISSION OF THE LOCAL PLANNING AUTHORITY

Appendix 3: Contact Details

Name	Position	Company	Contact
	Client		
	Tree Officer		
	Arboricultural Consultant	Arbtech Consulting Ltd.	01244 661170 https://arbtech.co.uk
	Site Manager		
	Main contractor		

Document Production Record

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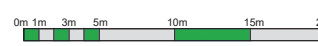
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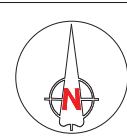
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<h2 style="text-align: center;">Protective Fencing</h2>	
To be erected prior to the commencement of all works on site, and retained in place throughout construction.	
Default Specification: To comprise either 2.4m wooden stile hoarding; or 2.3m high scaffolding framework comprising of vertical and horizontal rails, well braced to resist impacts, with uprights to be spaced at a maximum of 3.0m intervals and driven into the ground by a minimum of 600mm. On top, standard anti-climb welded mesh panels are to be securely fixed to each other with at least two scaffold clamps and to the scaffold framework with wire.	
Secondary Specification: To comprise of 2m tall welded mesh panels on rubber or concrete feet. Panels are to be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should also be supported on the inner side by stabilizer studs, which should should be attached to a base plate and secured with ground pins.	
All weather notices should be erected at regular intervals on the weld mesh panels with words such as "Construction exclusion zone - Keep out".	
<div><div><h2 style="text-align: center;">Tree Protection Area</h2><h1 style="text-align: center;">KEEP OUT</h1><h3 style="text-align: center;">Do not move this fence</h3></div><div><p>TREES CROWNED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECT OF A TREE PRESERVATION ORDER. CONTRAVENTION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION.</p><p>ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY</p></div></div>	
<div><div><div>ARBTECH</div><div><small>Arboricultural Consulting Limited Unit 5, Red Bull House, Church Road, Chesham, Bucks HP8 4DA Tel: 01494 433000 Fax: 01494 433001 Email: info@arbtech.co.uk www.arbtech.co.uk</small></div></div><div><small>Arboriculture & Landscaping Ltd 100, High Street, Lutterworth, Leics LE15 1JG Tel: 01530 212345 Fax: 01530 212346 Email: info@arboricultureandlandscaping.co.uk www.arboricultureandlandscaping.co.uk</small></div></div>	
<h2 style="text-align: center;">Ground boarding</h2>	
New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.	
Note: The ground protection might comprise one of the following: <ul style="list-style-type: none">a) for pedestrian movements only, a single thickness of scaffold boards placed edge on top of a gravel or silt proof frame, as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100mm depth of woodchip), laid onto a geotextile membrane;b) for pedestrian-operated plant up to a gross weight of 2t, proprietary inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150mm depth of woodchip), laid onto a geotextile membrane;c) for wheeled or tracked construction traffic exceeding 2 t gross weight for rigid systems (e.g. proprietary systems made of reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.	
<h2 style="text-align: center;">Manual Excavation</h2>	
Excavation within the RPAs will be initially undertaken by hand under on-site arboricultural supervision to a minimum of 600mm depth of any excavation, whether for proposed foundations, hard surfacing or underground services. The soil is to be loosened with the use of a fork or pick and then cleared with the aid of an air-spade and air-vac. All roots to be cut with a chainsaw (or equivalent system). Hand saw or secateurs. The edge of the excavation closest to the retained trees will be covered over with damp hessian to prevent drying out, and where necessary be shuttered to prevent soil collapse or contamination by any excavation. Design for proposed foundations, hard surfacing or underground services shall be agreed with the client. Where necessary, piled, regular pile or individual piles. Any deeper excavations may be undertaken by a machine provided it works from outside of the RPA or has appropriate ground protection in place to move and work upon.	
<h2 style="text-align: center;">Foundations within RPAs</h2>	
The use of traditional strip foundations can result in excessive root loss and as such should be avoided. Designs for foundations should minimize the adverse impact upon trees soil include particular attention to the existing levels, proposed finished levels and cross sectional details. Site specific and specialist advice should be sought from the project engineers and arboriculturist.	
Root damage can be minimized by using: <ul style="list-style-type: none">Piles with site investigation used to be determined their optimal location whilst avoiding damage to roots important for the stability of the tree, by means of hand tools or compressed air soil displacement, to a minimum depth of 600mm;Beams, laid at or above ground level, and cantilevered as necessary to avoid tree roots identified by site investigation.	
Where a slab for minor structures (e.g. shed base) is to be formed within the RPA, it should bear on the existing ground level, and should not exceed an area greater than 20% of the existing unsurfaiced ground.	
Slabs for larger structures (e.g. dwellings) should be constructed with a ventilated air space between the underside of the slab and the existing soil surface (to enable gas exchange and venting through the soil surface. In such cases, a specialist irrigation system should be employed (e.g. roof run-off redirected under the slab). The design of the foundation should take into account of the effect on the load bearing properties of the underlying soil from the redirected roof-run-off.	
Approval in principle for a foundation that relies on topsoil retention and roof run-off under the slab should be sought from building control authority prior to this approach being relied upon.	
When piling is to be installed near trees, the smallest practical pile diameter should be used, as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. If a piling mat is required, this should conform to the parameters for ground boarding. Use of the smallest practical piling rig is also important whenever piling within the branch spread is proposed, as this can reduce the need for access facilitation pruning. The pile type should be selected bearing in mind the need to protect the soil and adjacent roots from the potentially toxic effects of uncured concrete, e.g. sleeved bored piles or screw piles.	
<small>This information is compiled with British Standard BS5957:2012. This is a revision to design demolition and construction. Recommendations, section 7.5 Special engineering for foundations within the RPA.</small>	
<h2 style="text-align: center;">Arboricultural Supervision</h2>	
The arboricultural consultant will be required to attend site to directly supervise all demolition and construction works that have to be undertaken within the root protection areas. This will include: <ol style="list-style-type: none">Pre-commencement site meetingLocation of protective measuresManual excavation for site investigations and any subsequent root for ground boarding. Use of the smallest practical piling rig is also importantAny excavations within or adjacent to RPAs, including foundations, hard surfacing or underground servicesRemoval of protective measures and sign off.	
<h2 style="text-align: center;">Arboricultural Method Statement</h2>	
Please refer to Arbtech Consulting Ltd. Tree Schedule and Arboricultural Method Statement, for full details on all surveyed trees and how all aspects of the development may be implemented without detriment to retained trees.	



Tree Work Schedule				
No	Species	Work	Category	
<p>All tree work is to be undertaken in accordance with British Standard BS 3998:2010 Tree work - Recommendations.</p> <p>All arising's are to be removed and the site is to be left as found.</p> <p>Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of tree surgery operations. No equipment or vehicles such as timber lorries, tractors, excavators or cranes shall be parked or driven beneath the crowns of any retained trees, to prevent subsequent compaction and root death.</p>				
<div style="display: flex; justify-content: space-between;"> <div>Rev: Date:</div> <div>Notes:</div> </div>				
<p style="margin-top: 10px;">Unit 3, Well House Bams, Chester, CH4 0DH https://arbtech.co.uk, 01244 661170</p>				
Project: Channing Junior School, Fairseat, Highgate Hill, N6 5JR				
Client: Channing School				
Drawing: Tree Protection Plan				
Based on: 343.36/PL001; 343.36/PL01/A; 343.36/PL05; 343.36/PL.6				
Drawing No: Arbtech TPP 01			Rev: --	
Date: OCT 2017		Scale: 1:250 @ A1		Drawn: JCH
Key:				
Tree No.: 2	Tree Canopies:	Trunks:		
RPA's:	Category 'A' trees:	Category 'B' trees:		
Category 'C' trees:	Trees to be removed: 1	Incursion - Dwelling:		
Topo. survey:	Proposed LGF:	Proposed GF:		
Protective fencing:	Ground boarding:	Manual / Supervised excavation:		
Temp. retaining system:				
<small>All dimensions should be checked on site. No dimensions are to be scaled from this drawing. Please verify as if any discrepancies found, Arbtech Consulting Ltd. cannot be held responsible for inaccuracies in the final drawing in which this plan is based. This drawing is designed to reflect the principles of the layout or design only, and relates only to the protection of this drawing is not to be used as a substitute part of the engineering or construction design or method statement. No architect or structural engineer should be contacted over any matters of construction, detailing or specification and for any standards or regulatory requirements relating to proposed structures, hard surfacing or underground services. This drawing was produced in colour - a monochrome copy should not be relied upon.</small>				
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Appendix I

Structural Calculations

Pavilion - Buoyancy / Floatation Check

$$\Sigma D > \Sigma (U \times 1.1)$$

where $U = 10 \text{ kN/m}^3 \times h$

From borehole logs \rightarrow water table encountered at :-

$$+ 110.30 \text{ m AOD}$$

$$+ 109.43 \text{ m AOD}$$

$$+ 109.60 \text{ m AOD}$$

$$+ 109.44 \text{ m AOD}$$

\therefore Assume water table at $+ 109.69 \text{ m AOD}$

Design for water table 1m above known level - $+ 110.69 \text{ m AOD}$

Pavilion \rightarrow

Proposed SSL $+ 110.95 \text{ m AOD}$

Assuming 350mm thick raft foundation

\therefore Founding level $+ 110.60 \text{ m AOD}$

Dead Loads :-

Ground Floor / Roof Slab - 250 mm thick RC slab

$$DL = 6.25 + 2.0 = 8.25 \text{ kN/m}^2$$

Lower Ground Floor Slab - 350 mm thick RC raft

$$DL = 8.75 + 1.0 = 9.75 \text{ kN/m}^2$$

$$\text{Total DL} = 8.25 + 9.75 = 18.0 \text{ kN/m}^2 \text{ (excl. RC wall/s)}$$

$$110.69 - 110.60 = 0.09 \text{ m} \therefore \text{negligible}$$

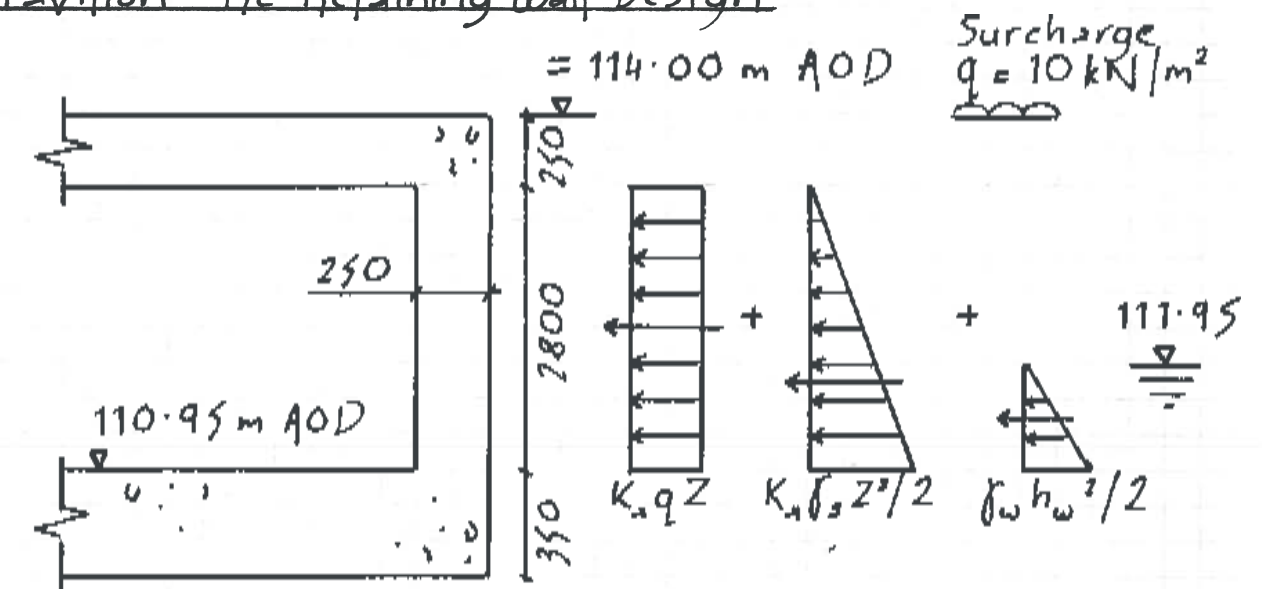
Conservatively design for 1m water \rightarrow

$$18.0 \text{ kN/m}^2 > (10 \times 1 \times 1.1)$$

$$> 11.0 \text{ kN/m}^2$$

\therefore Buoyancy / floatation is not an issue

Pavilion - RC Retaining Wall Design



Assume :- 250 mm thick propped retaining wall

350 mm thick raft foundation

No heel beam (subject to sliding)

No toe (subject to overturning moment)

From buoyancy check \rightarrow

Water table at $+ 109.69 \text{ m AOD}$

In granular soils, typically design for water 1m above known water table = $+ 110.69 \text{ m AOD}$

But this is lower than proposed SSL

\therefore Conservatively design for 1m water above SSL

$$K_a = \frac{1 - \sin \phi}{1 + \sin \phi}$$

$$\text{Assuming } \phi = 30^\circ \therefore K_a = 0.33$$

$$q_s = 18 \text{ kN/m}^2$$

Vertical Forces on Wall \rightarrow

$$\text{RC Wall - Stem} = 25 \times 2.8 \times 0.25 = 17.5 \text{ kN/m}$$

$$\text{Base} = 25 \times 7.70 \times 0.35 = 67.4 \text{ kN/m}$$

(where ground is highest)

Job	11111
Title	1 m
Job No.	Sheet 3 Rev



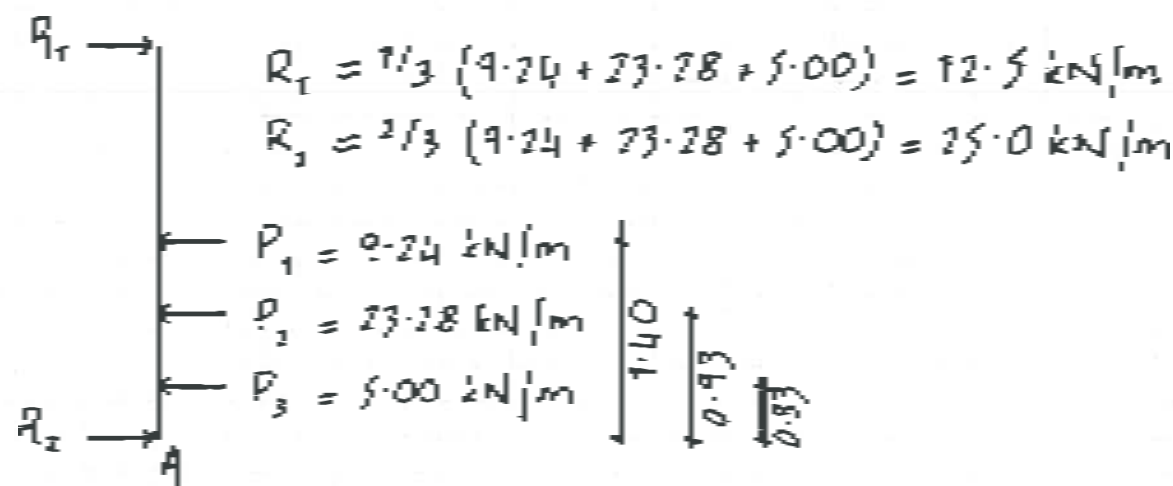
Horizontal Forces on Wall \rightarrow

$$\text{Surcharge} = 0.33 \times 10 \times 1.8 = 9.24 \text{ kN/m}$$

$$\text{Active} = 0.33 \times 18 \times 1.8^2 / 2 = 23.28 \text{ kN/m}$$

$$\text{Water} = 10 \times 1^2 / 2 = 5.00 \text{ kN/m}$$

$$\text{Total load, } H = 37.52 \text{ kN/m}$$



$$R_1 = 1/3 (9.24 + 23.28 + 5.00) = 12.5 \text{ kN/m}$$

$$R_2 = 2/3 (9.24 + 23.28 + 5.00) = 25.0 \text{ kN/m}$$

$$P_1 = 9.24 \text{ kN/m}$$

$$P_2 = 23.28 \text{ kN/m}$$

$$P_3 = 5.00 \text{ kN/m}$$

$$M_A = (1.6 \times 9.24 \times 1.40) + (1.4 \times 23.28 \times 0.93) + (1.6 \times 5.00 \times 0.33)$$

$$M_A = 20.7 + 30.3 + 2.6 = 53.6 \text{ kNm/m ULS}$$

$$M_A = 53.6 - R_1 \text{ but conservatively design for } 53.6 \text{ kNm/m}$$

Reinforcement Design \rightarrow

$$d = 250 - 40 - 16/2 = 202 \text{ mm}$$

$$K = \frac{M}{bd^2 f_{cu}} = \frac{53.6 \times 10^6}{1000 \times 202^2 \times 40} = 0.033 < 0.156$$

$$z = 0.96d \therefore \text{use } 0.95d$$

$$A_{s, \text{req.}} = \frac{M}{0.87 f_y z} = \frac{53.6 \times 10^6}{0.87 \times 500 \times 0.95 \times 202} = 642 \text{ mm}^2/\text{m}$$

$$\rightarrow \text{Provide H16s at } 250 \text{ mm c/c, } A_s = 804 \text{ mm}^2/\text{m}$$

Each face (or reduce in compression face)

$$A_{s, \text{min.}} = 0.13\% = 0.13 \times 250 \times 1000 = 325 \text{ mm}^2/\text{m}$$

$$325 \text{ mm}^2/\text{m} < 642 \text{ mm}^2/\text{m} \therefore \text{OK}$$

Job	11111
Title	1 m
Job No.	Sheet 4 Rev



Sliding \rightarrow

$$\mu = \tan \phi = \tan 30 = 0.58$$

$$\text{Total load, } V = 17.5 + 67.4 = 84.9 \text{ kN/m SLS}$$

$$\gamma_f = 1.6$$

$$H_k = R_2 = 25.0 \text{ kN/m SLS}$$

$$\mu V = 0.58 \times 84.9 = 49.2 \text{ kN/m}$$

$$\gamma_f H_k = 1.60 \times 25.0 = 40.0 \text{ kN/m}$$

$$49.2 \text{ kN/m} > 40.0 \text{ kN/m} \therefore \text{OK, heel beam not required}$$

Overturning \rightarrow

By inspection, overturning is not an issue due to propped retaining wall

