



ARBORICULTURAL PLANNING CONSULTANTS

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ARBORICULTURAL METHOD STATEMENT

For Protection of Trees

at

2 Grove Cottages, Sandford Lane

Hurst



February 2025

SJA ams 25075-01

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1. Statement of purpose

1.1. The purpose of this method statement is to detail what actions need to be taken to ensure the proposed erection of a ground and first floor side extension and a new porch with associated internal and external alteration including changes to fenestration and addition of roof lights at No. 2 Grove Cottages does not cause any unacceptable damage to the trees to be retained within this site and in the adjacent properties.

1.2. This method statement has been drawn up to comply with Condition no. 3 of the planning permission ref. 242978 granted by Wokingham Borough Council, which states: **“3. Protection of trees etc**

a) No development or other operation shall commence on site until an Arboricultural Method Statement and Scheme of Works which provides for the retention and protection of trees, shrubs and hedges growing on or adjacent to the site in accordance with BS5837:2012 has been submitted to and approved in writing by the local planning authority. No development or other operations shall take place except in complete accordance with the details as so-approved (hereinafter referred to as the Approved Scheme).

b) No operations shall commence on site in connection with development hereby approved (including any tree felling, tree pruning, demolition works, soil moving, temporary access construction and or widening or any other operation involving use of motorised vehicles or construction machinery) until the tree protection works required by the Approved Scheme are in place on site.

c) No excavations for services, storage of materials or machinery, parking of vehicles, deposit or excavation of soil or rubble, lighting of fires or disposal of liquids shall take place within an area designated as being fenced off or otherwise protected in the Approved Scheme.

d) The fencing or other works which are part of the Approved Scheme shall not be moved or removed, temporarily or otherwise, until all works including external works have been completed and all equipment, machinery and surplus materials removed from the site, unless the prior approval in writing of the local planning authority has first been sought and obtained.”

1.3. This method statement has been drawn up to comply with the recommendations of British Standard BS 5837: 2012, *Trees in relation to design, demolition and construction – Recommendations*.

1.4. Details of the trees can be found in the tree survey schedule at **Appendix 1**. Their locations are shown on the tree protection plan (SJA TPP 25075-041) at **Appendix 2**. This plan is based on the approved site layout drawing, no. 24-2GC-SK 24.10.24 (ext issue) and the Engineering designs provided by JRG Consultant Engineers Ltd. ref JRG25006-601.

1.5. The key words and phrases used in this statement are defined in **Table 1** below.

Arboricultural consultant	Arboricultural expert instructed by the developer to oversee the retention and protection of trees adjacent to the development site.
Arboricultural monitoring	Regular inspections of retained trees by the arboricultural consultant, to monitor their health and condition; and to inspect the effectiveness of the tree protection measures implemented.
Arboricultural supervision	Pre-arranged attendance on site of appointed arboricultural consultant for the duration of specific construction activities that could otherwise result in unacceptable damage to retained trees. Whilst on site the consultant will control, supervise and where appropriate assist in the undertaking of these activities.
Construction Exclusion Zone ('CEZ')	Area based on the root protection area (RPA), normally surrounded with protective fencing, from which access is prohibited during development works.
Ground boarding	Temporary ground covering, designed to prevent compaction of soil in which significant roots of retained trees are growing.
Protective fencing	Temporary fencing, erected for the duration of demolition and construction activities; designed to prevent access and disturbance to the trunks and root protection areas of trees.
Pruning	The removal of living or dead parts of a tree, especially branches, to reduce size, to maintain shape, health, safety, or to regulate growth.
Root Protection Area ('RPA')	The minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority.
Tree Protection Plan ('TPP')	Drawing based upon the finalised proposals; showing trees for retention and illustrating the tree and landscape protection measures.

Table 1: Key words & phrases

1.6. This statement is designed to reflect the principles of the proposed layout as far as these relate to the protection of trees to be retained and should **not** be read as a definitive engineering or construction method statement for this development.¹

¹ Reference should be made to the architect or structural engineer over any matters of construction detail, specification, engineering performance standards or regulatory requirements, relating to structures, surfaces or underground services to be constructed. As arboricultural consultants, Simon Jones Associates Ltd. can accept no liability for any matters relating to the structural integrity or engineering performance of structures, surfaces or underground services described, proposed or eventually constructed. The responsibility for satisfying any Health & Safety requirements relating to any operations described in this method statement remains with those commissioning or undertaking the operations concerned.

2. Planning and communication

2.1. Unless otherwise agreed with the Local Planning Authority (LPA), the following actions are to be taken, in the order specified in the Sequence of Works at **Table 2**.

2.2. The developer will appoint an arboricultural consultant to oversee all aspects of tree care and protection for the duration of construction works.

2.3. Prior to the commencement of works, the project manager will send copies of any construction method statements that might have implications for existing trees to the arboricultural consultant for his comments. The arboricultural consultant will liaise with the project manager to ensure that there are no conflicts between the construction method statements and this arboricultural method statement.

2.4. Prior to the start of any site clearance, ground preparation or construction works the developer will convene a pre-commencement site meeting. This shall be attended by the developer's contract manager or site manager, the fencing/boarding contractor, the groundwork contractor(s) and the arboricultural consultant. The LPA tree officer will be invited to attend. If appropriate, the tree surgery contractor should also attend. At that meeting contact numbers will be exchanged, and the methods of tree protection outlined in this statement shall be fully discussed, so that all aspects of their implementation and sequencing are made clear to all parties. Any clarifications or modifications to this statement required as a result of the meeting shall be circulated to all parties in writing.

2.5. On the same occasion, the arboricultural consultant will make a brief re-inspection of the trees to be retained, to identify any risks of tree, stem or branch failure that could cause harm to contractors working on the site. Any such risks will be recorded and passed to the client and to the LPA, to enable appropriate remedial works to be undertaken in a timely manner.

2.6. The developer will immediately inform the arboricultural consultant if at any time during site clearance or construction the site manager or agent is replaced or transferred. The arboricultural consultant will convene a site meeting with the incoming/replacement site manager, to be held within five working days, to explain all outstanding tree protection measures detailed in this method statement.

2.7. A copy of this method statement shall be supplied to all site personnel who have control over works of any nature within the Root Protection Areas (RPAs) of trees to be retained, or within the footprints of their canopies. The contractor will provide adequate instruction on its implementation for all relevant staff. This instruction will be carried out by, or to the approval of, the arboricultural consultant.

Order	Works	Details at Section:	Arb. supervision required:
1	Pre-commencement site meeting	2	Yes
2	Site clearance and pruning of trees nos. 3 & 4	3	-
3	Erection of tree protection fencing	5	-
4	Placement of temporary ground protection over existing compacted gravel access drive and areas between trees 1, 3 & 4	6	-
5	Excavation for foundation piles within RPAs of trees nos. 3 & 4	8	Yes
6	Installation of proposed 200mm thick RC slab within RPAs of trees nos. 3 & 4	9	Yes
7	Clearance of machinery/materials from site, reinstatement and landscaping	10	-
8	Removal of tree protection fencing	5	-

Table 2: Sequence of works (relevant to tree protection)

3. Site clearance, pruning and security

3.1. No clearance of trees or other vegetation and no erection of site security fencing or hoarding shall be undertaken until after the pre-start meeting and after the erection of the tree protection fencing (see below).

3.2. If any vegetation clearance is required behind the line of the protection fencing this will be made clear at the pre-start meeting and arrangements will be made to undertake this prior to the fencing's erection, under the supervision of the arboricultural consultant, who will ensure it does not cause any soil compaction or damage to the roots of trees to be retained.

3.3. No trees are to be removed to facilitate the proposed extension.

3.4. Two off-site horse chestnut trees (nos. 3 & 4) to be retained shall be pruned as specified on the TPP.

3.5. All tree works are to be done in accordance with British Standard BS 3998: 2010, *Tree work - Recommendations*. Climbing irons or spikes are not to be used whilst pruning trees; they may only be used for the sectional removal of trees.

3.6. Except where within the RPAs of trees to be retained, all other vegetation (if present) to be removed may be cut down or grubbed out as appropriate; but within the RPAs of trees to be retained, vegetation will be cut by hand to ground level and stumps will be either left in place or ground out with a lightweight self-powered stump grinding machine. No excavators, tractors or other vehicles will enter the RPAs.

3.7. The erection of site security fencing or hoarding, where applicable, will be undertaken in a way that causes no harm to trees to be retained and no compaction of the soil in which they are growing. This encompasses:

- no fence panels or any other part of the fencing or hoarding shall be nailed, screwed or otherwise attached to any part of any of the trees to be retained.
- no vehicles shall access the RPAs; unless otherwise upon ground protection to the correct specifications – see section 6.

4. Ground preparation

4.1. No ground preparation or excavation of any kind, including topsoil stripping and levelling or re-profiling of soil, shall be undertaken prior to the pre-start meeting and after the erection of the tree protection fencing (see below).

4.2. Where underground structures that are or will become redundant are present within RPAs, these will be sealed off where possible so that the need for excavation is avoided.

5. Protective fencing

5.1. No site clearance, ground preparation or construction shall commence on site, and no demolition or construction vehicles or plant will enter the site until the RPAs of the trees to be retained have been safeguarded by the erection of protective fencing

to the specification recommended in BS 5837: 2012, Section 6.2.2, as shown in Figure 3 of that document (see *Figure 1* below).

5.2. The protective fencing will be located in the positions shown by the **continuous bold blue lines** on the TPP.

5.3. The protective fencing shall be at least 2.1m in height, comprising "Heras" welded mesh panels; every other one braced with a 45 degree strut that is pinned to the ground; and seated in concrete or plastic bases pinned to the ground by scaffold uprights sunk to a minimum depth of 600mm. Individual panels will be fixed to each other with at least two clamps, one of which will be a security clamp. "TREE PROTECTION ZONE - KEEP OUT" or similar notices will be attached to every third panel with cable ties.

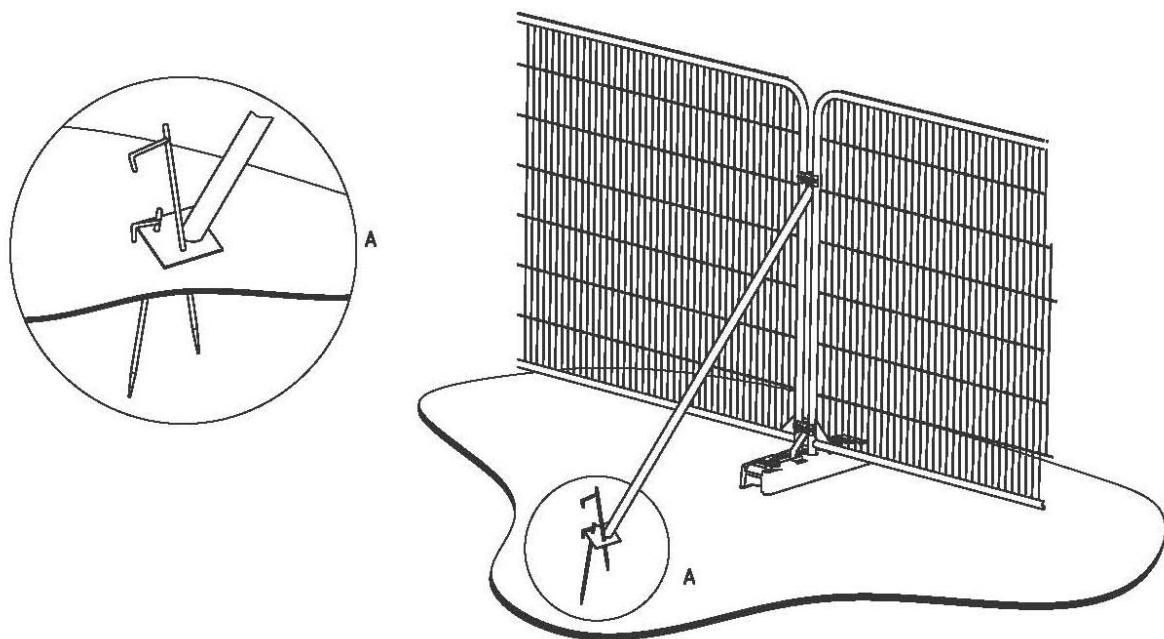


Figure 1 Protective fencing

(Based on Figure 3, BS 5837:2012)

5.4. No activity will take place within the Construction Exclusion Zones ("CEZs") behind the fencing: no equipment or materials will be stored, and no vehicles, plant or personnel shall enter these areas. Ground levels will not be changed within them, and existing vegetation and topsoil will be left undisturbed.

5.5. Areas for the storage of materials shall be outside the CEZs. Oil, bitumen, diesel, and cement shall not be stored, mixed or discharged onto the ground within 10m of the trunks of any trees. Areas for the storage or mixing of such materials shall be agreed at the pre-commencement meeting and are indicatively shown on the TPP by transparent **cyan hatch** on the south side of the detached garage.

5.6. No notice boards, or power or telephone cables, shall be attached to any of the trees. No fires shall be lit where their flames could extend to within 5m of any parts of trees.

5.7. If the protective fencing or ground boarding is accidentally damaged or knocked over, those sections will immediately be cordoned off with high visibility plastic mesh fencing. The damaged sections then will be repaired or replaced within 48 hours (2 working days). All instances of damage and re-instatement shall be recorded and immediately reported to the arboricultural consultant.

5.8. Once the protective fencing and ground protection has been installed, the arboricultural consultant will visit the site and inspect these protection features. He will record the position of the fencing and ground protection and the condition of the retained trees. If it complies with this statement, the arboricultural consultant will 'sign off' the fencing to the contractor and copy this (in writing) to the developer. (See also 'Supervision and Monitoring' below.)

5.9. The protective fencing or ground protection will not be moved or re-located without the prior approval of the arboricultural consultant. It will only be removed once all construction works are completed: the arboricultural consultant will be informed in advance of when it is intended to remove the fencing.

6. Ground protection

6.1. To avoid soil compaction and the resulting impairment of tree root function, the ground between the protective fencing adjacent to the horse chestnut trees (nos. 3 & 4) and the footprint of the adjacent proposed extension shall be covered by appropriate ground protection, in accordance with the recommendations at Section 6.2.3 of BS 5837: 2012. The place where this is to be done is **hatched pink** on the TPP.

6.2. For pedestrian-operated plant up to a gross weight of 2t, proprietary inter-linked ground protection boards (temporary aluminium roadway such as 'Trakway' or similar, or interlocking plastic tread boards such as "Ground-Guards" or similar) will be placed above a compressible material (a 100mm depth of woodchip might be appropriate), laid onto an appropriate geotextile membrane (such as 'Terram').

6.3. Where the areas of existing compacted gravel access surfacing are present within the RPAs of trees nos. 1, 2 & 3, as these are actively used by the current residents and are protecting the soil and roots below, these areas will be left in place throughout construction, and will not be removed.

6.4. The ground protection will only be removed once all construction works are completed. The arboricultural consultant will be informed in advance of when this is intended to be done.

7. Installation of underground services

7.1. All underground service and drainage routes shall be located so that no excavation is required within RPAs.

7.2. If their location within RPAs is unavoidable, underground services shall be installed in one of the following way, in accordance with NJUG guidelines².

7.3. **Manual excavation.** This involves hand digging of a continuous trench to a depth of at least 750mm, under arboricultural supervision; with the careful retention and protection of all roots of a diameter greater than 25mm, as detailed elsewhere in this method statement. If soil conditions and/or root distribution render it appropriate, the arboricultural consultant may require hand excavation to extend to a greater depth than this.

7.4. Such an excavation will be undertaken using a pick or a hand fork to loosen the soil, which will then be cleared from roots using a compressed air soil pick and removed using shovels or trowels. All roots encountered of less than 25mm diameter will be cut cleanly with secateurs or a sharp pruning saw.

² National Joint Utilities Group. Volume 4, GUIDELINES FOR THE PLANNING, INSTALLATION AND MAINTENANCE OF UTILITY APPARATUS IN PROXIMITY TO TREES", Issue 2: 16th November 2007.

7.5. The faces of all excavations that contain exposed roots will be covered with hessian sacking and be kept moist at all times; they will not be left exposed to frost, wind or direct sunlight.

7.6. Protection of retained roots shall be conducted in the following way. A 50:50 mix of sharp sand and composted organic matter shall be prepared and packed around the root within a wrapping of Hessian (builders' sand will not be used as it has a high salt content and may be toxic to trees). The layer of sharp sand and compost shall be not less than 50mm in thickness around the full circumference of the root section. If concrete is to be poured or placed around these roots, they shall also be wrapped with an impermeable polythene membrane. Both the hessian wrapping and the polythene membrane shall be secured by degradable ties, in a manner that will not constrict future growth of the root.

7.7. Excavation beneath 750mm depth (or greater if the arboricultural consultant has deemed it appropriate) may be undertaken by an excavator working from outside the RPAs, provided this is supervised to prevent any retained roots being damaged.

8. Construction of piles

8.1. The foundation of the proposed extension shall be of a reinforced concrete slab atop piles type design rather than of typical trench-fill. Digging for piles shall be done by hand under direct arboricultural supervision.

8.2. Excavation will be undertaken manually, using hand tools under the direct control and supervision of an arboricultural consultant, to excavate a minimum 500mm deep pile pilot hole. If roots larger than 25mm diameter are encountered they shall be retained and protected, and the 250mm diameter pile will be relocated by up to 75mm from its centre point.

8.3. The arboricultural consultant shall cut cleanly any smaller roots. If roots larger than 25mm diameter are accidentally damaged, the arboricultural consultant will assess the damage and undertake any necessary remedial works. He will report to the client the extent of the damage and any long-term effect to the effected tree's stability or health.

8.4. Exposed roots will be covered with sand or hessian sacking and be kept moist at all times while exposed; they will not be left exposed to frost, wind or direct sunlight.

8.5. Once dug, the holes for the piles shall be lined with appropriate materials to prevent the leaching of wet concrete into the soil. For piles, precast concrete pipes or heavy-duty PVC tubing may be appropriate.

8.6. If back filling is needed around piles, a sharp sand and topsoil mix will be used (builders' sand will not be used as it has a high salt content and may be toxic to trees). This will be firmed and consolidated in layers, by hand; no mechanical plant will be used.

8.7. The reinforced concrete slab will be constructed as detailed in section 9 below and will be founded no deeper than 100mm below the existing compacted access drive level; if any hollows need to be filled, this will be done with sharp sand.

9. Construction of reinforced concrete slab

9.1. To prevent unacceptable root damage, the proposed extension is to be formed by a 200mm thick reinforced concrete (RC) slab located atop piles within the RPAs of off-site horse chestnuts nos. 3 & 4. The RC slab shall be constructed to the specification given below and as detailed within the JRG Engineering report, appendix C as shown at **Appendix 3**.

9.2. Within the RPAs of trees nos. 3 & 4, the existing compacted gravel access drive within the footprint of the proposed extension shall be excavated and lowered by no more than 100mm under the direct control and supervision an arboricultural consultant. Any roots of less than 25mm diameter that are encountered will be cut cleanly by the arboricultural consultant.

9.3. Any roots of 25mm diameter and above within the upper 100mm of the compacted gravel access drive shall be excavated and exposed using hand tools under direct supervision to minimise the impact by the use of spade and shovels. The arboricultural consultant supervising this exercise will then decide whether it is necessary and/or feasible to retain these roots and cut them cleanly if not. If such roots can be retained, they shall be protected by localised thinning of the proposed RC slab.

9.4. The likelihood of this occurrence is low, but a contingency of approximately 50mm thinning of the slab may need to be considered to allow retention of any significant shallow roots, if discovered. In the event such roots are discovered the Engineer, Architect and Arboricultural consultant will arrange an onsite meeting to discuss potential retention solutions of such roots.

9.5. If such roots are identified and retained they will be protected by reintroducing a minimum 50mm layer of topsoil above the root and then covered in a non-permeable membrane prior to the pouring of the RC slab to prevent the leaching and direct contact of concrete with any shallow retained roots.

9.6. Following the level reduction of 100mm of the existing gravel access drive, any hollows shall be filled with sharp sand to provide a level surface; a heavy-duty non-permeable polythene sheet or sheets will be laid over the footprint of the RC slab to prevent the leaching of wet concrete into the sub-soil beneath, and will be secured with pegs or pins driven through it into the ground.

9.7. Edge supports of an appropriate size and strength should be laid above ground level, on top of the non-permeable membrane to provide the 'form' for the RC slab. Reinforcement can then be installed above the polythene membrane, prior to the pouring of the concrete for the RC slab of the proposed extension.

9.8. Construction should be undertaken in dry weather; ideally this should be between May and October when the soil is at its driest and least prone to compaction.

10. Fencing, landscaping and reinstatement

10.1. Care will be taken to ensure that landscaping and reinstatement do not cause any damage to the existing trees. Prior to the commencement of any landscaping works within RPAs the developer will convene a site meeting to be attended by the site manager or agent, the landscape contractor, and the arboricultural consultant. The methods of tree protection outlined in this section of the arboricultural method statement shall be fully discussed, so that all aspects of their implementation and sequencing are made clear to all parties. Any clarifications or modifications to this statement shall be recorded and circulated to all parties in writing.

10.2. Within RPAs the following points shall be observed:

- Other than the proposed 100mm reduction, ground levels will not be changed.
- Only lightweight plant or vehicles shall enter the RPAs.
- No fuels or chemicals shall be brought into or stored within these areas.
- No parts of any fencing shall be nailed or otherwise attached to any parts of the retained trees.
- No irrigation or drainage pipes shall be installed within RPAs.

11. Supervision and monitoring

11.1. Once the protective fencing and ground boarding have been installed, the arboricultural consultant will visit the site and inspect these tree protection measures. If the specification or location of these items does not comply with this method statement, the arboricultural consultant will inform the fencing contractor, and adjustments will be made. Once compliance is achieved, the arboricultural consultant will 'sign off' the tree protection measures to the contractor and copy this (in writing) to the client.

11.2. Throughout the construction process the arboricultural consultant will monitor the condition of the trees, and the integrity and effectiveness of the protective fencing. He will visit the site at appropriate intervals, as agreed with the LPA Tree Officer at the pre-commencement meeting, to ensure that the protection measures outlined in this document are adhered to; and will contact the site manager or agent on a weekly basis whilst ground works are being undertaken, and on a fortnightly basis thereafter, to ascertain what works are planned for the coming week and whether any of these require arboricultural input or supervision. Records of all monitoring and supervisory visits will be made and will be forwarded to the client and copied to the LPA.

11.3. The arboricultural consultant shall directly supervise all works that have to be undertaken within RPAs. These include:

- location of protective fencing
- location of ground boarding
- construction of hard surfacing
- (if necessary) installation of underground services

- excavation for foundations & piles

11.4. The project or site manager will give the arboricultural consultant at least 48 hours written notice of the date of any intended construction that are within the RPAs of any of the trees, so that he/she can attend.

11.5. All drawings or revised drawings issued to the site agent or to sub-contractors, that show details of any works within or abutting RPAs or beneath the crowns of trees are to be referred in advance to the arboricultural consultant to enable him to advise on any changes to the impact on trees that these drawings may cause, and to be able to provide solutions to avoid or minimise any further tree damage. All such drawings will be approved in writing by the arboricultural consultant before works within or abutting RPAs are proceeded with.

11.6. The arboricultural consultant will issue variation orders to the client in the case of any agreed changes to this method statement, and non-compliance notices in any cases of substantial deviation from the statement. These will be recorded in a final completion statement suitable for submission to the LPA if required.

SJAtrees

February 2025

APPENDIX 1

Tree Survey Schedule



ARBORICULTURAL PLANNING CONSULTANTS

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(Operations)

Tree Survey Schedule

2 Grove Cottages, Sandford Lane, Hurst

SJA tss 24189-01

May 2024

Tree Survey Schedule: Explanatory Notes

2 Grove Cottages, Sandford Lane, Hurst

This schedule is based on a tree inspection undertaken by Tom Southgate of SJA Trees (the trading name of Simon Jones Associates Ltd.), on Wednesday the 8th of May 2024. Weather conditions at the time were clear, dry and bright. Deciduous trees were in partial leaf.

The information contained in this schedule covers only those trees that were examined, and reflects the condition of these specimens at the time of inspection. We did not have access to the trees from any adjacent properties; observations are thus confined to what was visible from within the site and from surrounding public areas.

The trees were inspected from the ground only and were not climbed, and no samples of wood, roots or fungi were taken. A full hazard or risk assessment of the trees was not undertaken, and therefore no guarantee, either expressed or implied, of their safety or stability can be given.

Trees are dynamic organisms and are subject to continual growth and change; therefore the dimensions and assessments presented in this schedule should not be relied upon in relation to any development of the site for more than twelve months from the survey date.

1. Tree no.

Given in sequential order, commencing at "1".

2. TPO no.

Number assigned to tree in the Wokingham Borough Council Tree Preservation Order no. 0824 - 1996, as shown in the TPO schedule and plan.

3. Species.

'Common names' are given, taken from MITCHELL, A. (1978) A Field Guide to the Trees of Britain and Northern Europe.

4. Height.

Estimated with the aid of a hypsometer, given in metres.

5. Trunk diameter.

Trunk diameter measured at approx. 1.5m above ground level; or where the trunk forks into separate stems between ground level and 1.5m, measured at the narrowest point beneath the fork. Given in millimetres.

6. Radial crown spread.

The linear extent of branches from the base of the trunk to the main cardinal points, rounded up to the closest half metre, unless shown otherwise. For small trees with reasonably symmetrical crowns, a single averaged figure is quoted.

7. Crown break.

Height above ground and direction of growth of first significant live branch.

8. Crown clearance.

Distance from adjacent ground level to lowest part of lowest branch, in metres.

9. Age class.

Young: Seedling, sapling or recently planted tree; not yet producing flowers or seeds; strong apical dominance.

Semi-mature: Trunk often still smooth-barked; producing flowers and/or seeds; strong apical dominance, not yet achieved ultimate height.

Mature: Apical dominance lost, tree close to ultimate height.

Over-mature: Mature, but in decline, no crown retrenchment

Veteran: Mature, with a large trunk diameter for species; but showing signs of veteranisation, irrespective of actual age, with decay or hollowing, a crown showing retrenchment and a structure characteristic of the latter stages of life.

Ancient: Beyond typical age range and with a very large trunk diameter for species; with extensive decay or hollowing, a crown that has undergone retrenchment and a structure characteristic of the latter stages of life.

10. Physiology.

Health, condition and function of the tree, in comparison to a normal specimen of its species and age.

11. Structure.

Structural condition of the tree – based on both the structure of its roots, trunk and major stems and branches, and on the presence of any structural defects or decay.

Good: No significant morphological or structural defects, and an upright and reasonably symmetrical structure.

Moderate: No significant pathological defects, but a slightly impaired morphological structure; however, not to the extent that the tree is at immediate or early risk of collapse.

Indifferent: Significant morphological or pathological defects; but these are either remediable or do not put the tree at immediate or early risk of collapse.

Poor: Significant and irreparable morphological or pathological defects, such that there may be a risk of failure or collapse.

Hazardous: Significant and irreparable morphological or pathological defects, with a risk of imminent collapse.

12. Comments.

Where appropriate comments have been made relating to:

- Health and condition
- Safety, particularly close to areas of public access
- Structure and form
- Estimated life expectancy or potential
- Visibility and impact in the local landscape

13. Category.

Based on the British Standard "Trees in relation to design, demolition and construction - Recommendations", BS 5837: 2012; adjusted to give a greater weighting to trees that contribute to the character and appearance of the local landscape, to amenity, or to arboricultural biodiversity.

Category U: Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

- (1) Trees that have a serious, irreparable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category 'U' trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning).
- (2) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline.
- (3) Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality.

Category A: Trees of high quality with an estimated remaining life expectancy of at least 40 years.

- (1) Trees that are particularly good examples of their species, especially if rare or unusual.
- (2) Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features.
- (3) Trees, groups or woodlands of significant conservation, historical, commemorative or other value.

Category B: Trees of moderate quality with an estimated remaining life expectancy of at least 20 years.

- (1) Trees that might be included in category 'A', but are downgraded because of impaired condition (e.g. presence of significant though remediable defects including unsympathetic past management and minor storm damage) such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category 'A' designation.
- (2) Trees present in numbers, usually growing as groups or woodlands, such that they form distinct landscape features, thereby attracting a higher collective rating than they might as individuals; or trees present in numbers but situated so as to make little visual contribution to the wider locality.
- (3) Trees with material conservation or other cultural value.

Category C: Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm.

- (1) Unremarkable trees of very limited merit or of such impaired condition that they do not qualify in higher categories.
- (2) Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value, and/or trees offering low or only temporary landscape benefits.
- (3) Trees with no material limited conservation or other cultural value.

TREE SURVEY SCHEDULE

2 Grove Cottages, Sandford Lane, Hurst

No.	TPO no.	Species	Height	Trunk diameter	Radial crown spread	Crown break	Crown clearance	Age class	Physio -logy	Structure	Comments	Category
1	T1 - 0824 - 1996	Scots pine	19m	610mm	N 4.2m E 3.4m SE 5.5m S 4.7m W 4.5m	3.5m	SE 2.5m	Mature	Average	Moderate	Base surrounded by gravel; pruning wounds on lower-trunk consistent with crown raising, up to 90mm dia. est., most are occluding; decayed fungal fruiting body at base, consistent with <i>Phaeolus schweinitzii</i> ; significant differences in tone when lower-trunk tapped with acoustic hammer on E and N sides at 1m, suggesting internal defects; tensile unions throughout crown; readily visible from a short distance of 45m to the E, otherwise screened and hidden in all long direct views by off-site trees and dwellings; Sandford Lane; significant component of group in which it stands.	C (12)
2		Leyland cypress	21m	750mm est.	N 5m E 6.1m SE 6.1m S 6.3m W 6m	0.5m	E 2m	Mature	Average	Indifferent	Off-site tree; tensile main unions; rubbing limbs at 10m; readily visible from Sandford Lane.	C (1)
3		Horse chestnut	16m	180mm est. 700mm est.	N 7.2m E 2.5m S 3.5m W 7m	1m	E 1.4m	Mature	Below average	Indifferent	Off-site tree; full basal inspection prevented by boundary fence; slightly leaning trunk to SW; partially ivy covered trunk and main scaffolds; tensile unions throughout crown, where visible; crown reduced back to boundary on E side within last two years, leaving wounds up to 90mm dia. est.; readily visible in short view from Sandford Lane.	B (2)
4		Horse chestnut	16m	620mm ivy est.	N 3.3m E 1.7m S 4.8m W 6m	3m	E 1.6m	Mature	Below average	Indifferent	Off-site tree; basal inspection prevented by boundary fence; heavily ivy-covered; inspection of main unions impeded by dense ivy cover; asymmetrical crown; crown reduced back to boundary on E side within last two years, leaving wounds up to 90mm dia. est.; readily visible in short view from Sandford Lane.	C (1)
5		Horse chestnut	18m	700mm est.	N 7.5m E 5.3m S 5m W 6.5m	2.5m	E 3.5m	Mature	Below average	Indifferent	Off-site tree; full basal inspection prevented by boundary fence; slightly curved and leaning trunk to SE; acute main union with no bark to bark contact at 3m; tensile unions throughout rest of crown, where visible; obscured from public view.	B (2)
6		English oak	14m	780mm ivy	N 2.8m E 4.1m S 8.6m W 7.5m	3m	E 4m	Mature	Average	Indifferent	Prominent buttress roots to E; slightly swept and leaning trunk to W that fully corrects by 1.5m; dead ivy covered; tensile unions throughout crown, where visible; section of canopy over garden has been heavily "topped" leaving wounds up to 90mm est.; contributes to boundary screening; obscured from public view; significant component of group in which it stands.	B (2)
7		Yew	12m	700mm est.	4.8m	2m	E 1m	Semi-mature	Average	Indifferent	Off-site tree; estimated trunk diameter at 1.5m exaggerated, as at this point the trunk trifurcates, forming acute unions with bark to bark contact; contributes to boundary screening.	B (1)

No.	TPO no.	Species	Height	Trunk diameter	Radial crown spread	Crown break	Crown clearance	Age class	Physio -logy	Structure	Comments	Category
G1		Cherry Laurel	5m	Max 150mm est.	2m	0m	0m	Semi-mature	Average	Indifferent	Row of closely growing specimens, forming a hedge or screen; approx. 25 individuals; of only low level screening value.	C (2)
G2		Cherry Laurel	3m	Max 100mm est.	1.2m	0m	0m	Semi-mature	Average	Indifferent	Row of closely growing specimens, forming a hedge or screen; approx. 15 individuals; of only low level screening value.	C (2)
G3		Dogwood	3m	Max 60mm est.	2m	0m	0m	Semi-mature	Average	Indifferent	Off-site group of shrubs contributing to screening from adjacent property; approx. three individuals.	C (2)

Root Protection Areas (RPAs)

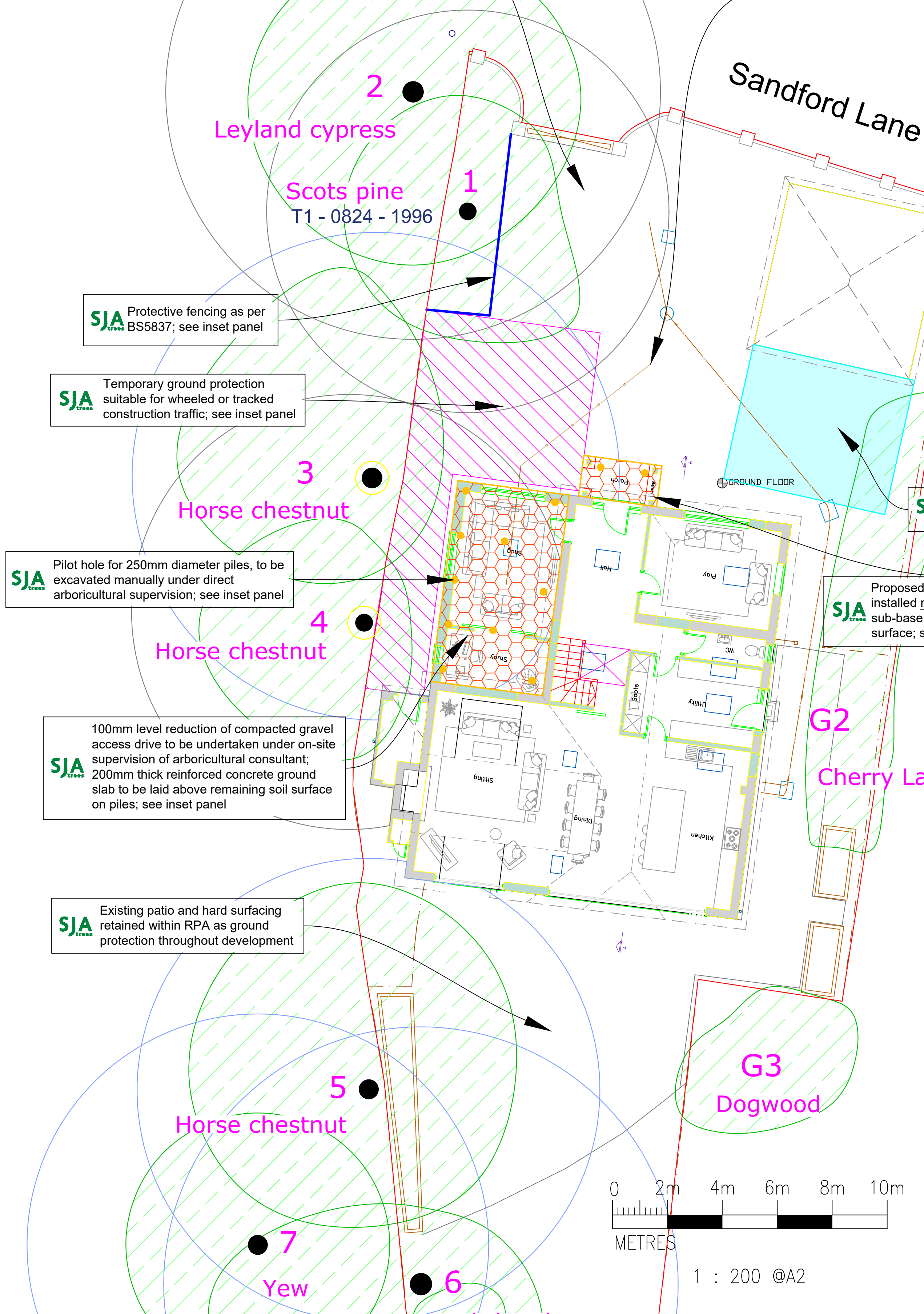
Root Protection Areas have been calculated in accordance with paragraph 4.6.1 of the British Standard 'Trees in relation to design, demolition and construction – Recommendations', BS 5837:2012. This is the minimum area which should be left undisturbed around each retained tree. RPAs are portrayed initially as a circle of a fixed radius from the centre of the trunk; but where there appear to be restrictions to root growth the circle is modified to reflect more accurately the likely distribution of roots.

<i>Tree No.</i>	<i>Species</i>	<i>RPA</i>	<i>RPA Radius</i>
1	Scots pine	7.3m	168.3m ²
2	Leyland cypress	9.0m	254.5m ²
3	Horse chestnut	8.7m	236.3m ²
4	Horse chestnut	7.4m	173.9m ²
5	Horse chestnut	8.4m	221.7m ²
6	English oak	9.4m	275.2m ²
7	Yew	8.4m	221.7m ²
G1	Cherry Laurel	1.8m	10.2m ²
G2	Cherry Laurel	2m	7.1m ²
G3	Dogwood	2m	7.1m ²

APPENDIX 2

Tree Protection Plan

Arboricultural Impacts: Summary (For details, see below)		
Impact	No. of Trees	
Trees to be removed	0	
Groups of trees to be removed	0	
TPO trees to be removed	0	
Trees to be pruned	2	
Trees where supervised demolition needed within RPAs	0	
Trees where manual excavation needed within RPAs	2	
Trees where above soil surfacing needed within RPAs	1	
Trees with proposed underground services within RPAs	0	
Trees to be pruned		
		
No.	Species	Works (Outline only)*
3	Horse chestnut	Crown reduce E lateral extent by removal of small dia. lateral shoots only from historic pruning wounds, retaining vertical shoots.
4	Horse chestnut	
Pruning is to be undertaken in accordance with the British Standard Recommendations for Tree work, BS3998: 2010. Climbing irons or spikes are not to be used whilst pruning trees.		
Trees that require manual excavation within RPAs		
		
No.	Species	Type of structure
3	Horse chestnut	Proposed 100mm level reduction of existing compacted gravel access drive for partially sunk 200mm thick RC ground slab located atop piles; 500mm deep pile pilot holes; proposed access porch to front door
4	Horse chestnut	



Protective Fencing

To be erected prior to the commencement of all works on site, and retained in place throughout construction. To comprise 2m tall 'Heras' welded mesh panels on rubber or concrete feet. The panels shall be joined together with two anti-tamper couplers, installed so that they can only be removed from inside the fence. Distance between the couplers should be at least 1m and should be uniform throughout the fence. Panels should be supported (where possible) on the inner side by stabilizer struts, which should normally be attached to a base plate secured with ground pins (see Figure 3a below). Where the fencing is to be erected on retained hard surfacing or it is otherwise unfeasible to use ground pins, e.g. due to the presence of underground services, the stabilizer struts shall be mounted on a block tray (see Figure 3b). "TREE PROTECTION ZONE - KEEP OUT" or similar notices to be attached to every fifth panel.

Figure 3 Examples of above-ground stabilizing systems

a) Stabilizer strut with baseplate secured with ground pins
b) Stabilizer strut mounted on block tray

TREE PROTECTIVE FENCING as shown in BS 5837: 2012, Section 6.2.2 & Figure 3.

Ground Protection

To be installed prior to commencement of construction works, at same time as erection of protective fencing. Temporary aluminium roadway ("Trakway" or similar), interlocking polyethylene tread boards ("Ground-Guards" or similar), laid on an appropriate compressible layer (a 75mm deep layer of woodchips may be appropriate) above a biaxial geotextile grid ("geogrid" - "Tensar" or similar) and pinned to the ground with steel pins to prevent movement.

Manual Excavation

Within root protection areas of horse chestnuts nos. 3 & 4 for:
Proposed piles: up to the first 500mm depth for piles shall be undertaken and excavated by hand under arboricultural supervision. The soil will be loosened with a pick or fork, and then will be cleared from roots and pile pilot hole with hand tools.
Proposed ground slab: The first 100mm of the upper compacted gravel access drive will be excavated and reduced using a 'toothless' grading bucket under the direct control and supervision of an arboricultural consultant.
Following reduction of the upper 100mm, a non-permeable membrane to prevent concrete leaching into the soil beneath will then be laid prior to the setting out and pouring of the 200mm RC slab.
All roots <25mm dia. within top 100mm of the soil horizon, or within the 500mm deep pile pilot holes will be cut cleanly with a hand saw or secateurs. The edge of the excavation closest to the trees will be covered with hessian sacking to prevent drying out, or lined with an impermeable membrane to prevent wet concrete leaching into the soil. If roots larger than >25mm dia. are discovered within the 500mm depth of any proposed pile, the centre point of the pile will be relocated by up to 75mm to allow root retention, subject to engineering design.

Arboricultural Supervision

The arboricultural consultant will directly supervise all construction works that have to be undertaken within root protection areas. These include:

1. Location of protective fencing and ground protection.
2. Lifting/excavation of existing hard surfaces.
3. Construction of above-ground hard surfacing.
4. All excavations, whether for proposed foundations, hard surfacing, or underground services.

SJA

ARBORICULTURAL PLANNING CONSULTANTS

Project:

2 Grove Cottages, Sandford Lane

Client:

Mr A. McQuade

Drawing:

TREE PROTECTION PLAN

Drawing no:

SJA TPP 25075-041

Based on:

24-2GC-SK 24.10.24(ext issue)
and JRG Foundation Plan appendix C JRG25006-601

Drawn by:

NHK

Date of Issue:

Feb 2025

Scale:

1: 100 @ A2

Checked by:

NHK

Tel:

(01737) 813058

sj@sjatrees.co.uk

Tree nos.:

6

Indicative pruning line:

Canopies of trees to be retained:

Category 'A' RPA:

Category 'B' RPA:

Category 'C' RPA:

Protective fencing:

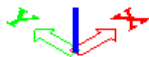
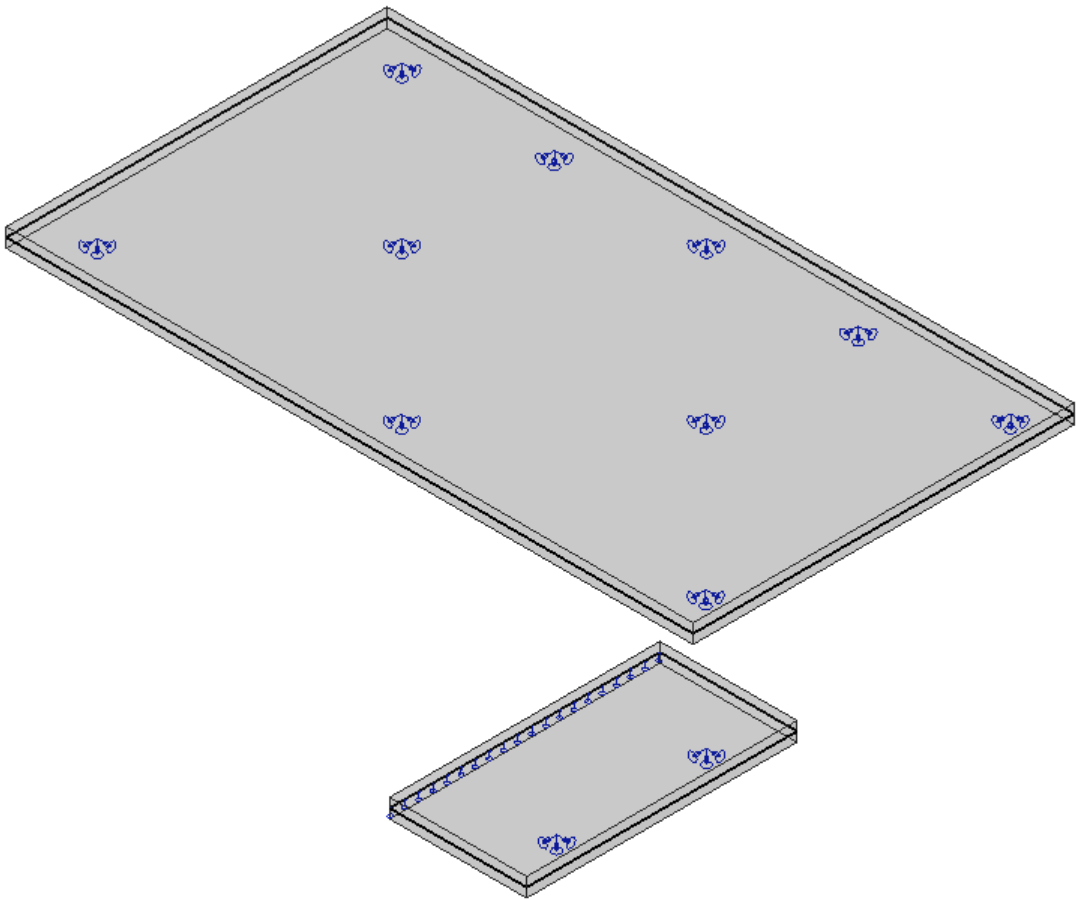
Manual excavation:

Ground protection:

For further information refer to the SJATrees Tree Survey Schedule. Do not scale from this drawing: please check all dimensions on site, and notify us of any discrepancies. SJATrees (the trading name of Simon Jones Associates Ltd.) cannot be held responsible for inaccuracies in the topographical plan on which this drawing is based. © Simon Jones Associates Ltd. 2025. This drawing is copyright and may not be used or changed without the written consent of SJATrees. This drawing is based on the proposed layout plan shown and referred to above. SJATrees authorizes its reproduction, without amendment, by the Local Planning Authority (LPA), and to its posting on the LPA website, to assist in consideration of this application only. This drawing is designed to reflect only the principles of layout and/or design insofar as these relate to the protection of trees to be retained, and should NOT be read as a definitive engineering or construction method statement. Reference should be made to the architect or structural engineer, as appropriate, over any matters of construction detail or specification, or any engineering standards or regulatory requirements relating to proposed structures, hard surfaces or underground services.

APPENDIX 3

DESIGN REPORT



04-02-2025	0	Analysis and Design of piled RC slab	GIF	RRJ	VM/ MC
Date	Revision	Description of Revision	Prepared by	Checked by	Approved by
Ref:	CADS-DSN-QR-03	Issue Date: 04-09-2014	Rev:	00	

	2 GROVE COTTAGES	
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C	DESIGN OF RC SLAB	17

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1.0 INTRODUCTION

The scope of work is to design the newly extended piled RC slab. The site is located in 2 grove Cottages, Sandford Lane, Hurst RG10 0SX. The building is designed to Eurocodes with UK Annexes.



2.0 DESIGN

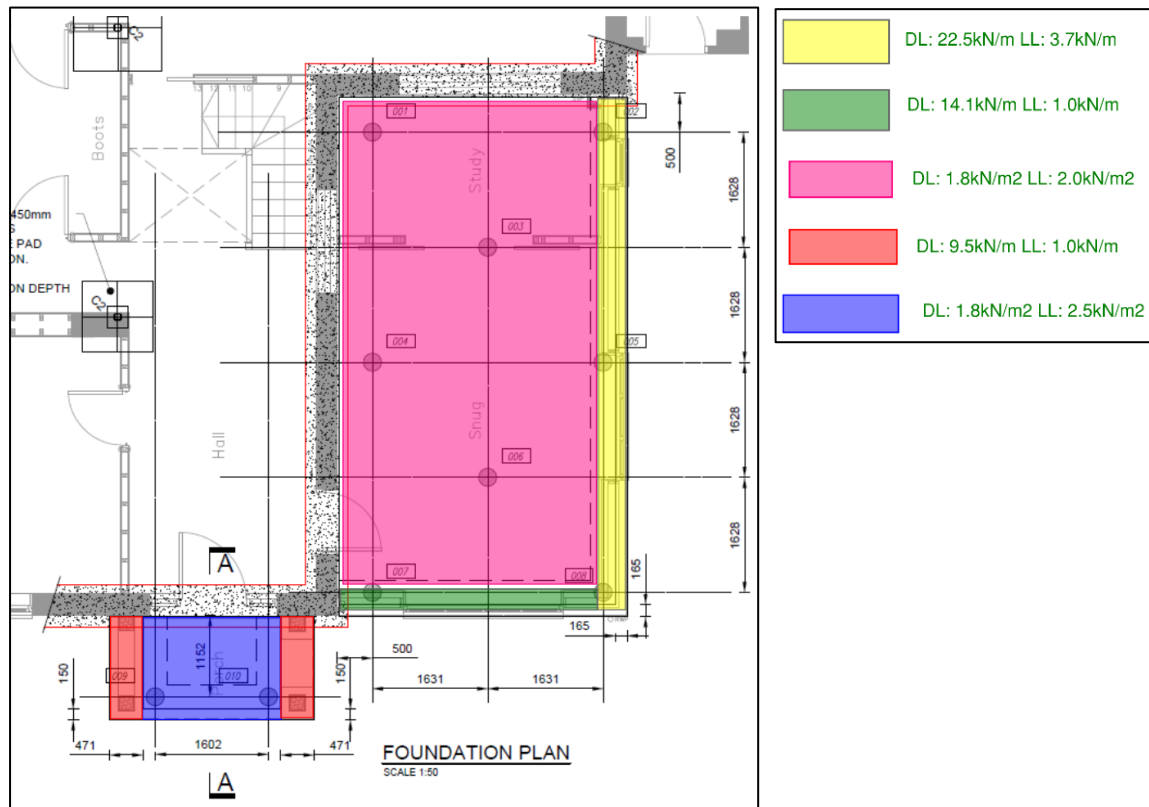
2.1 FOUNDATION

The foundation system consists of the 200mm thick piled RC slab. Concrete grade C32/40 is used throughout. RC slab is designed using SCIA. Spring stiffness of 130MN/m is used for 250mm dia piles.

3.0 DATA SHEET

3.1 LOADING DATA

Piled Slab:



3.2 CODES

The following codes have been utilized

- A. BS EN 1990 Eurocode 0: Basis of design
- B. BS EN 1991 Eurocode 1: Actions on structures
- C. BS EN 1992 Eurocode 2: Design of concrete structures
- D. BS 8666:2020 – Scheduling, dimensioning, bending and cutting of steel reinforcement for concrete - Specification
- E. Standard method of detailing structural concrete. By Institution of Structural Engineers (4th edition)

LOAD COMBINATION:

The structure is designed for both ultimate and serviceability limit states as per EC1 & EC2.

Load Combination	Load Type (Partial Safety factors)	
	Dead	Imposed
Serviceability	1	1
Ultimate	1.35	1.5

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3.3 SPECIFICATIONS AND COVER

Concrete Grade C32/40

Reinforcement Type H Grade 500MPa

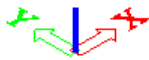
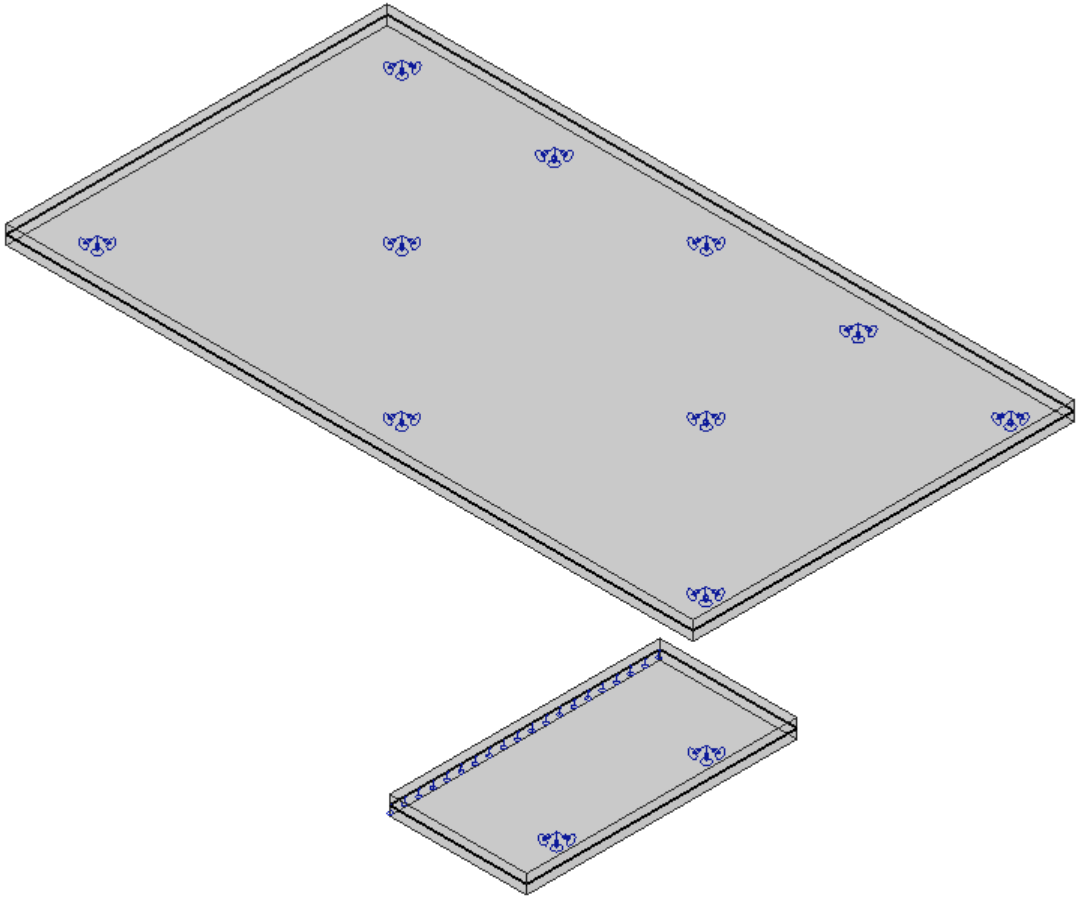
Fire resistance 30 minutes.

Reinforcement cover requirements:

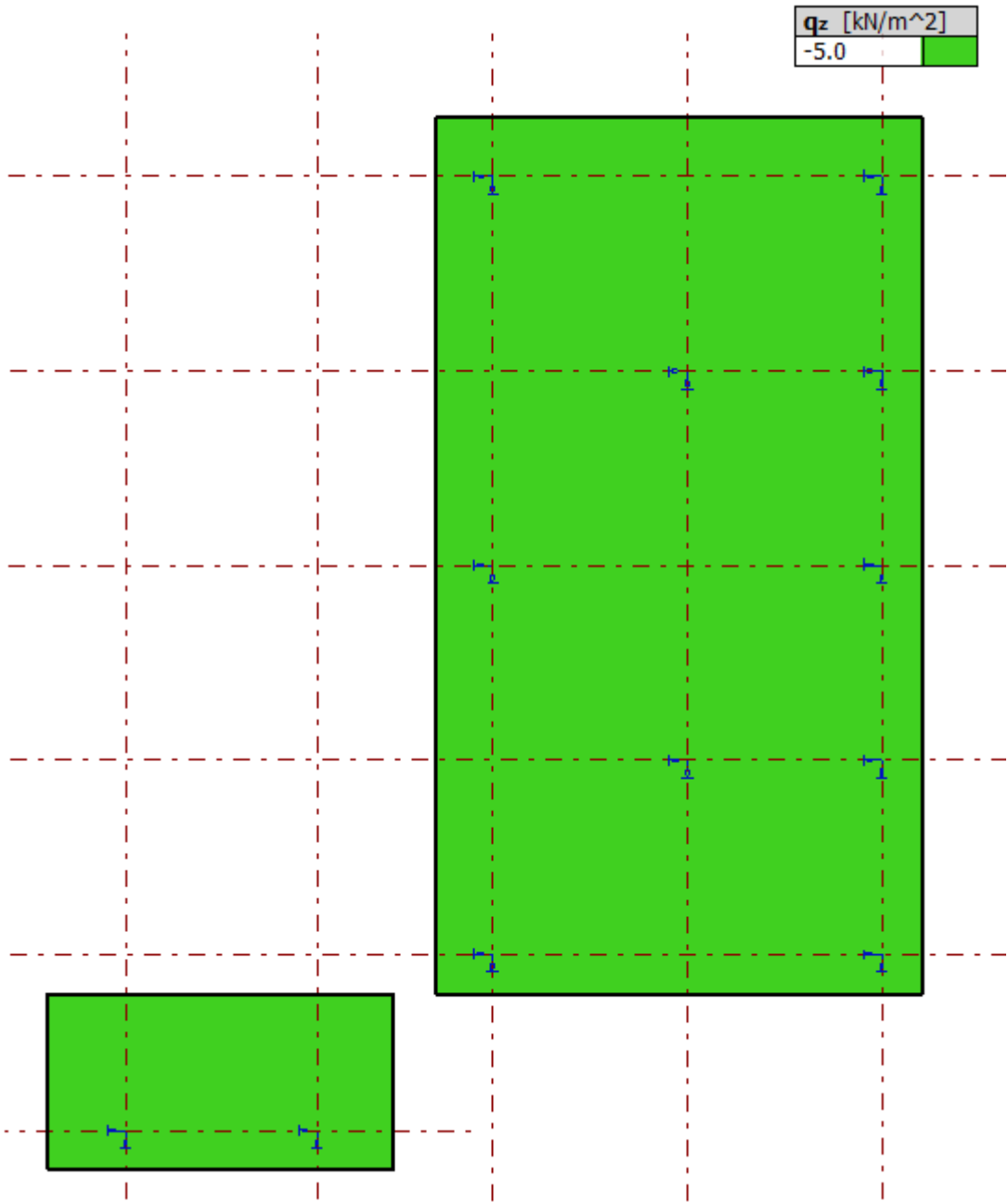
COVER	Top	Bottom
Piled Slab	30mm	75mm

APPENDIX A – SCIA INPUT DATA

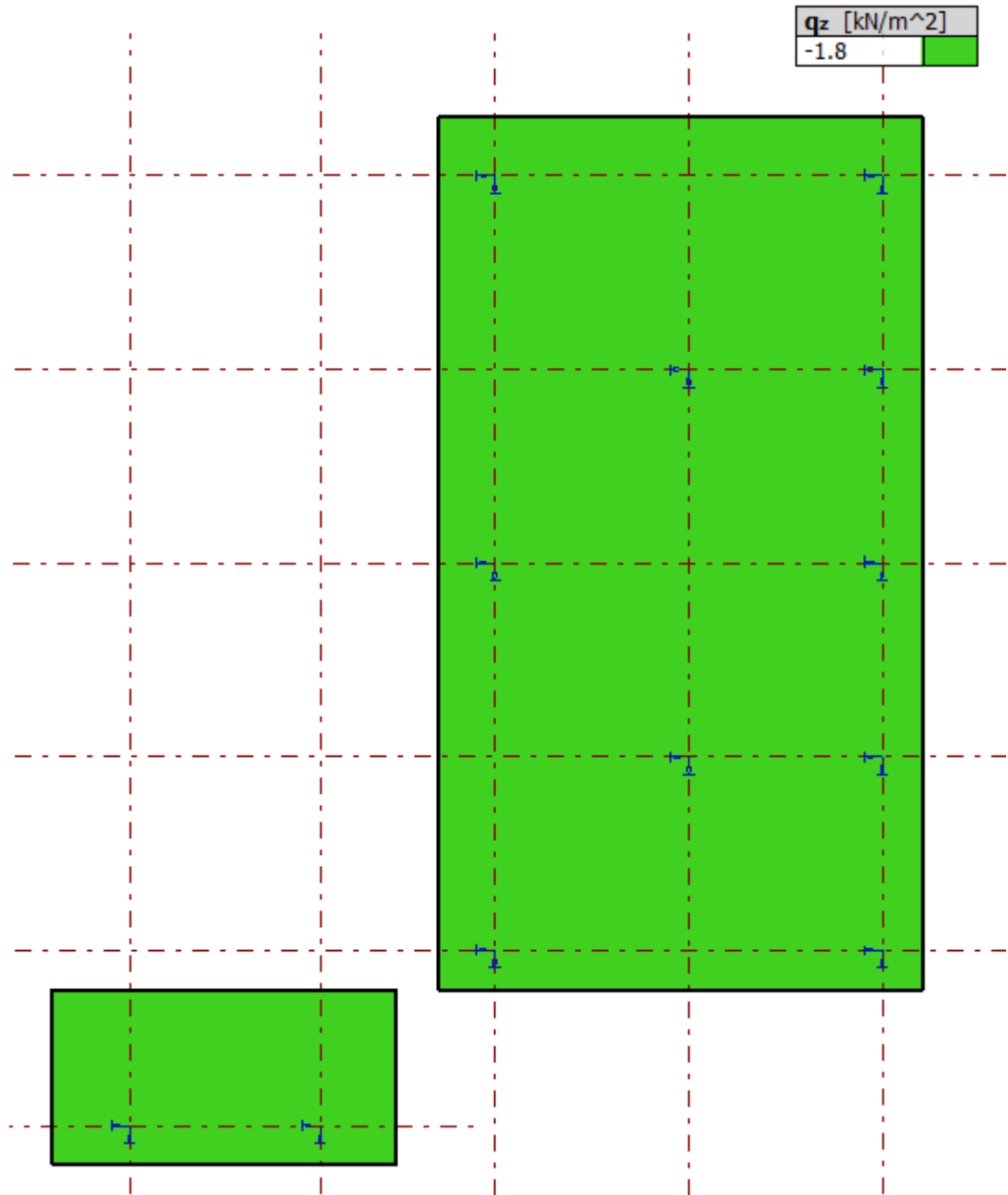
3d Model:



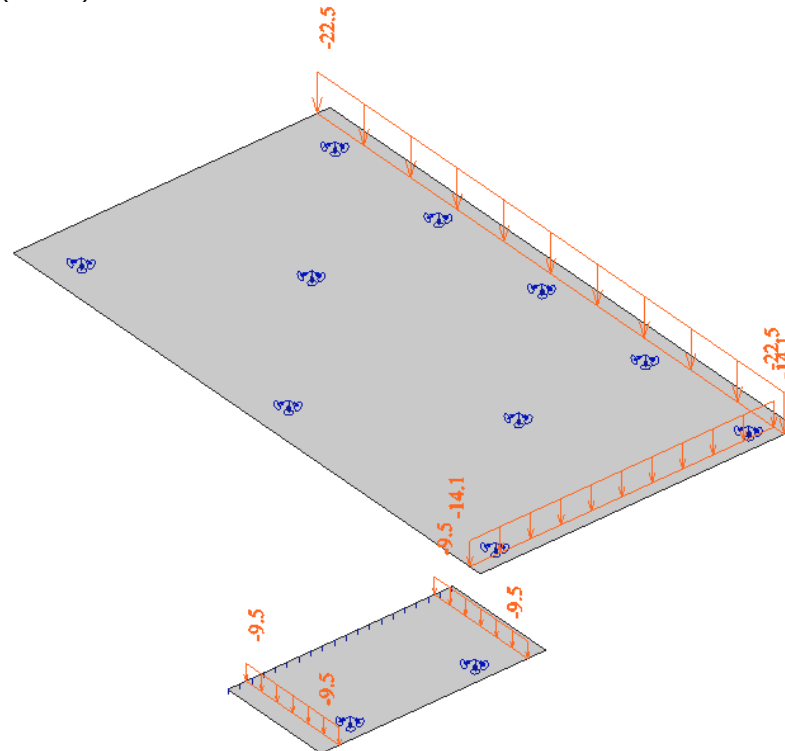
SELF-WEIGHT:



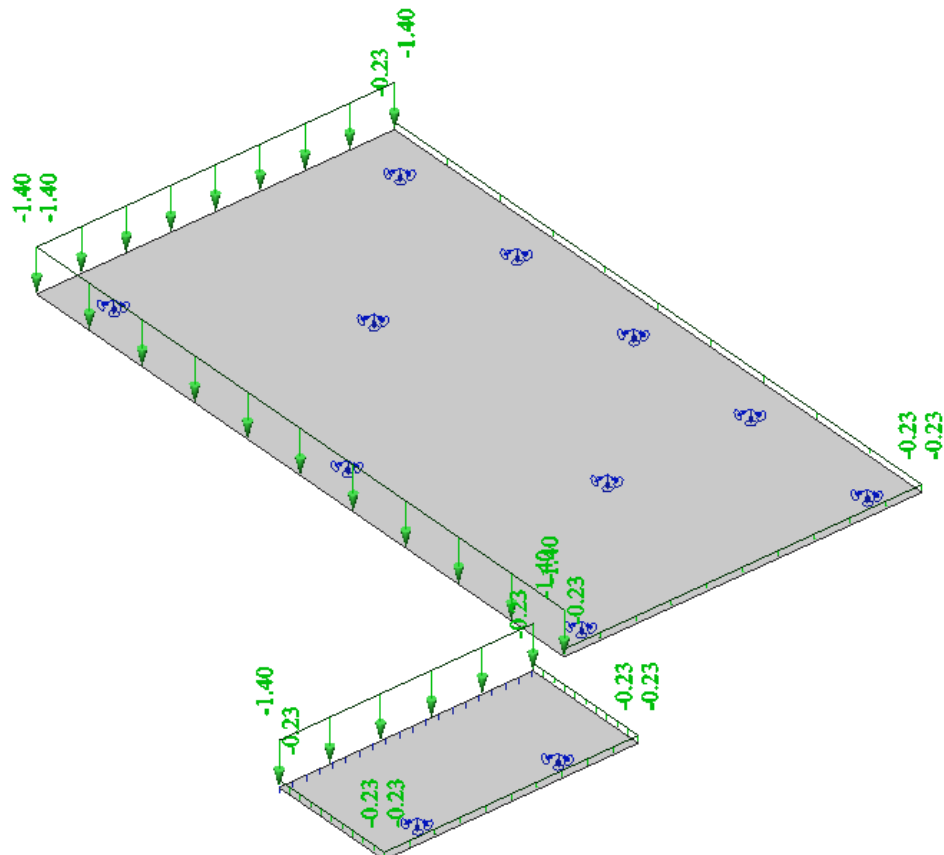
SUPER IMPOSED DEAD LOAD:



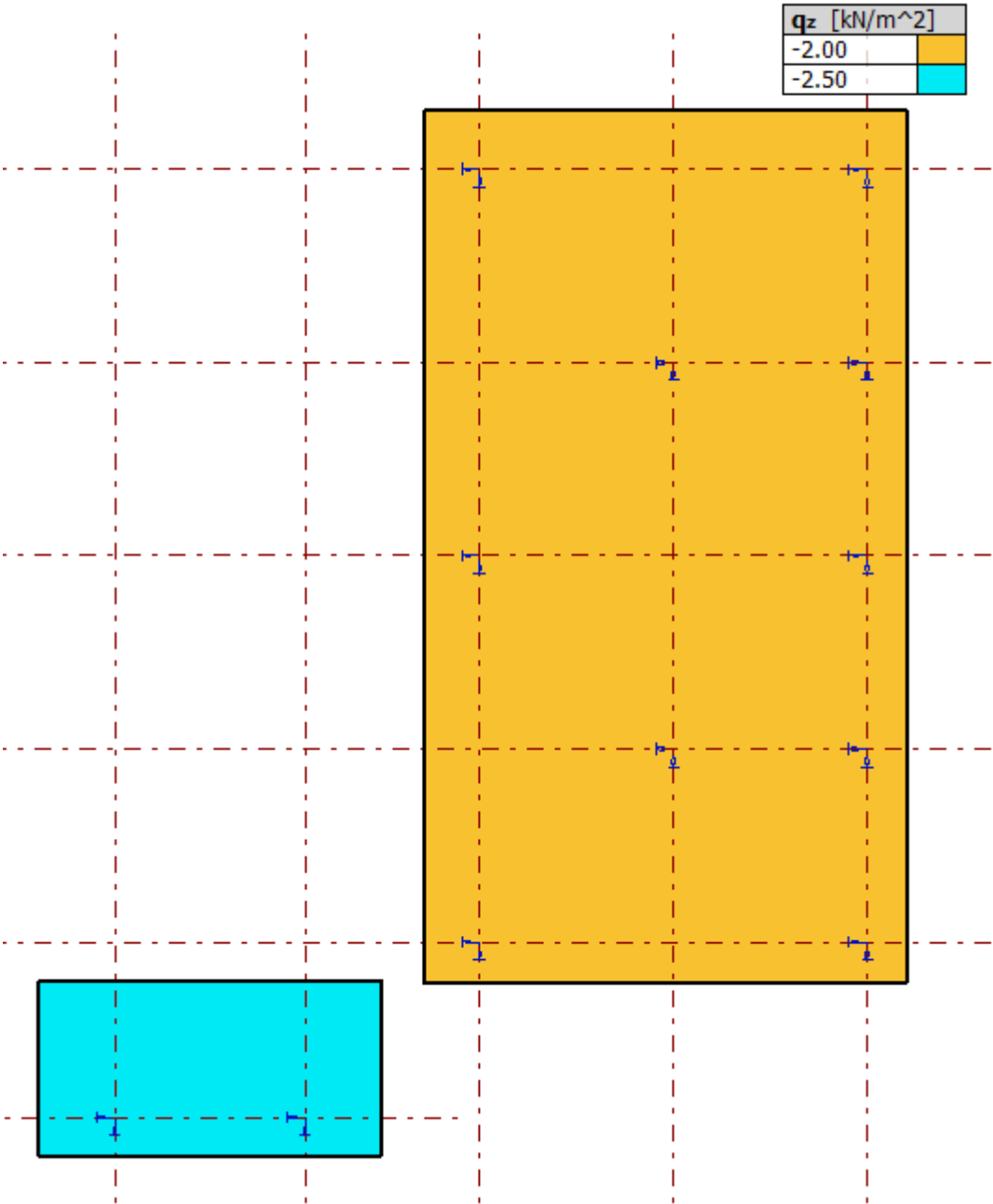
LINE LOAD in kN/m (DEAD)



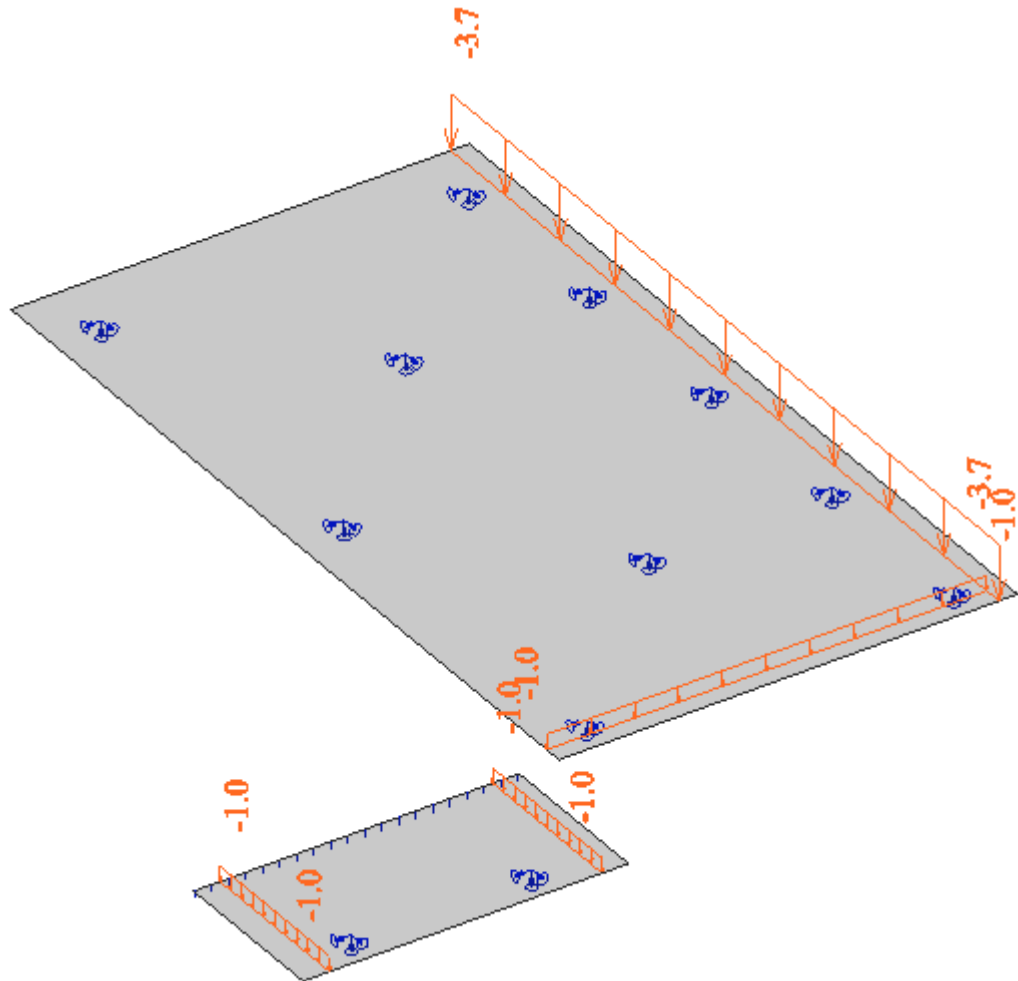
RC TOE & RC THICKENING LINE LOAD in kN/m (DEAD)



LIVE LOAD:



LINE LOAD in kN/m (LIVE)



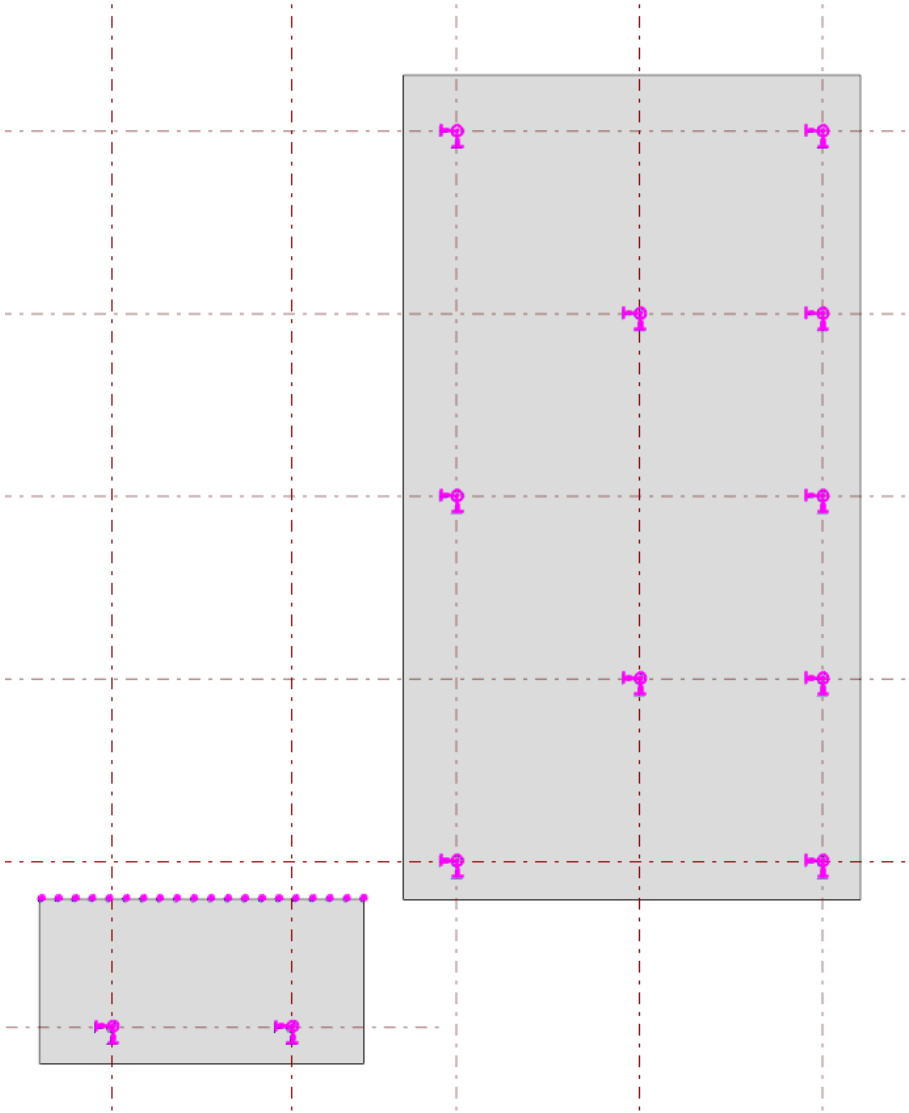
APPENDIX B – PILE LOADS

Pile Spring Stiffness: (250mm dia piles)

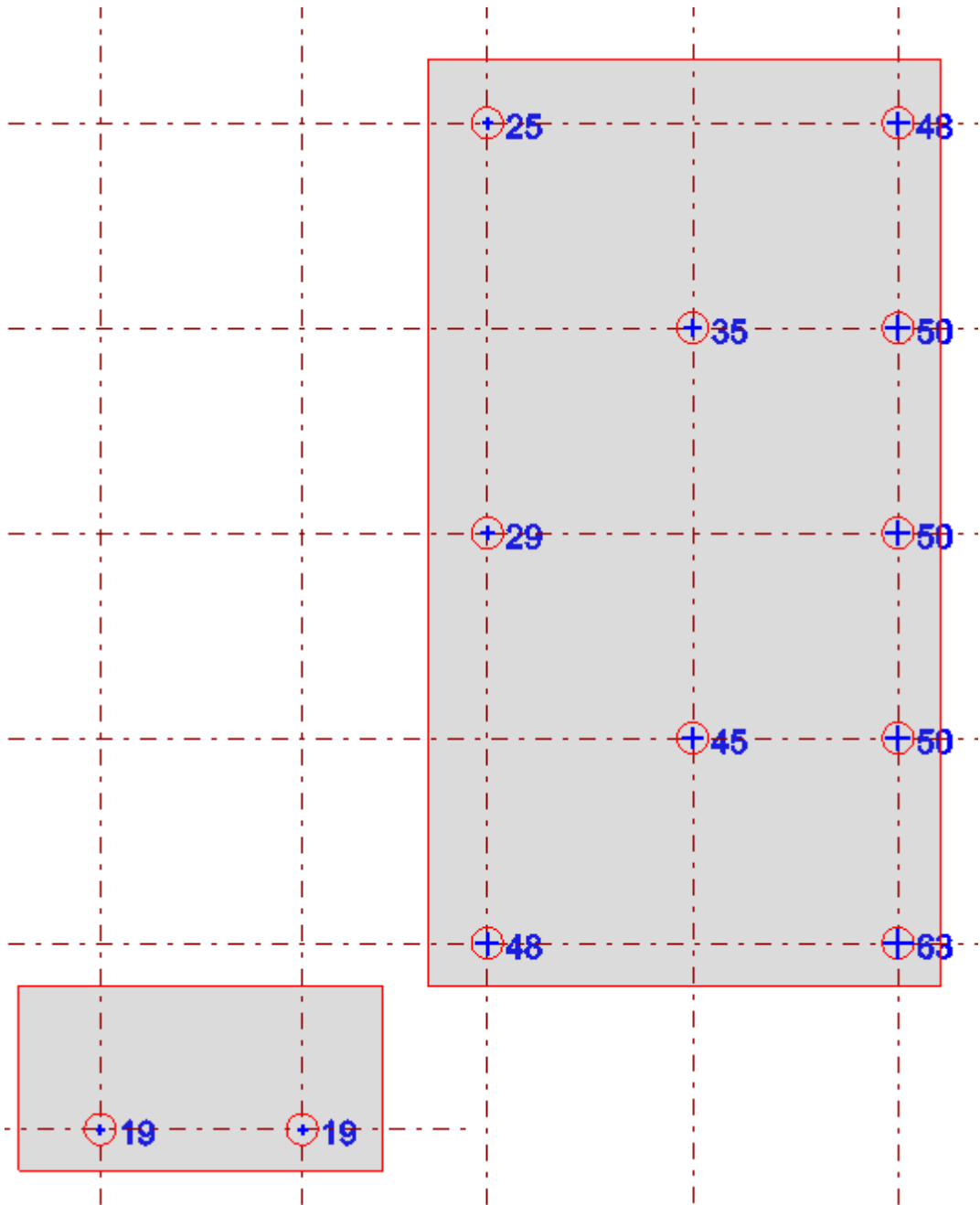
Vertical Spring stiffness: 130 MN/m per pile.

Horizontal Spring stiffness: 13.0 MN/m per pile. [10% of Vertical]

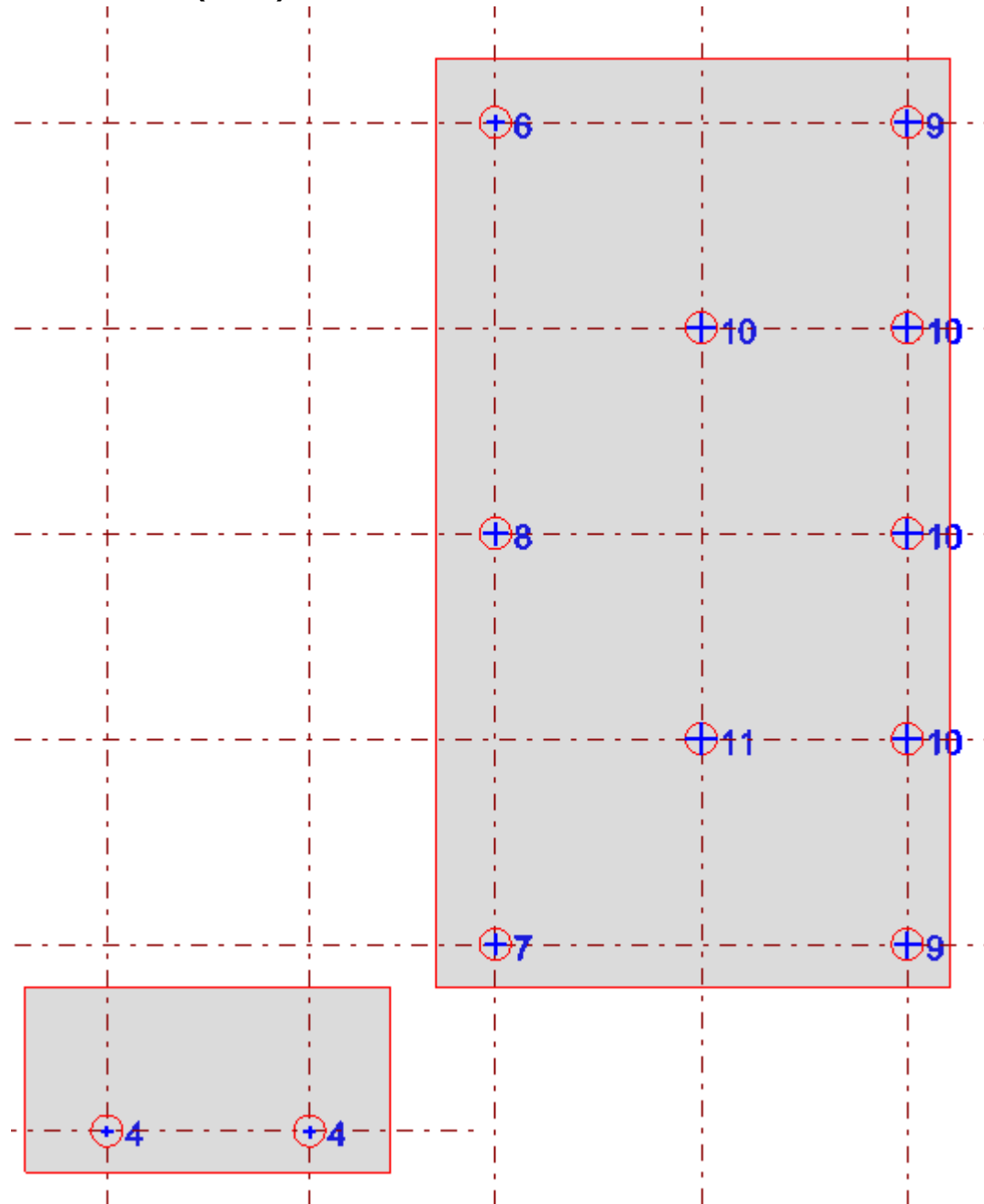
PILE SUPPORT ARRANGEMENT:



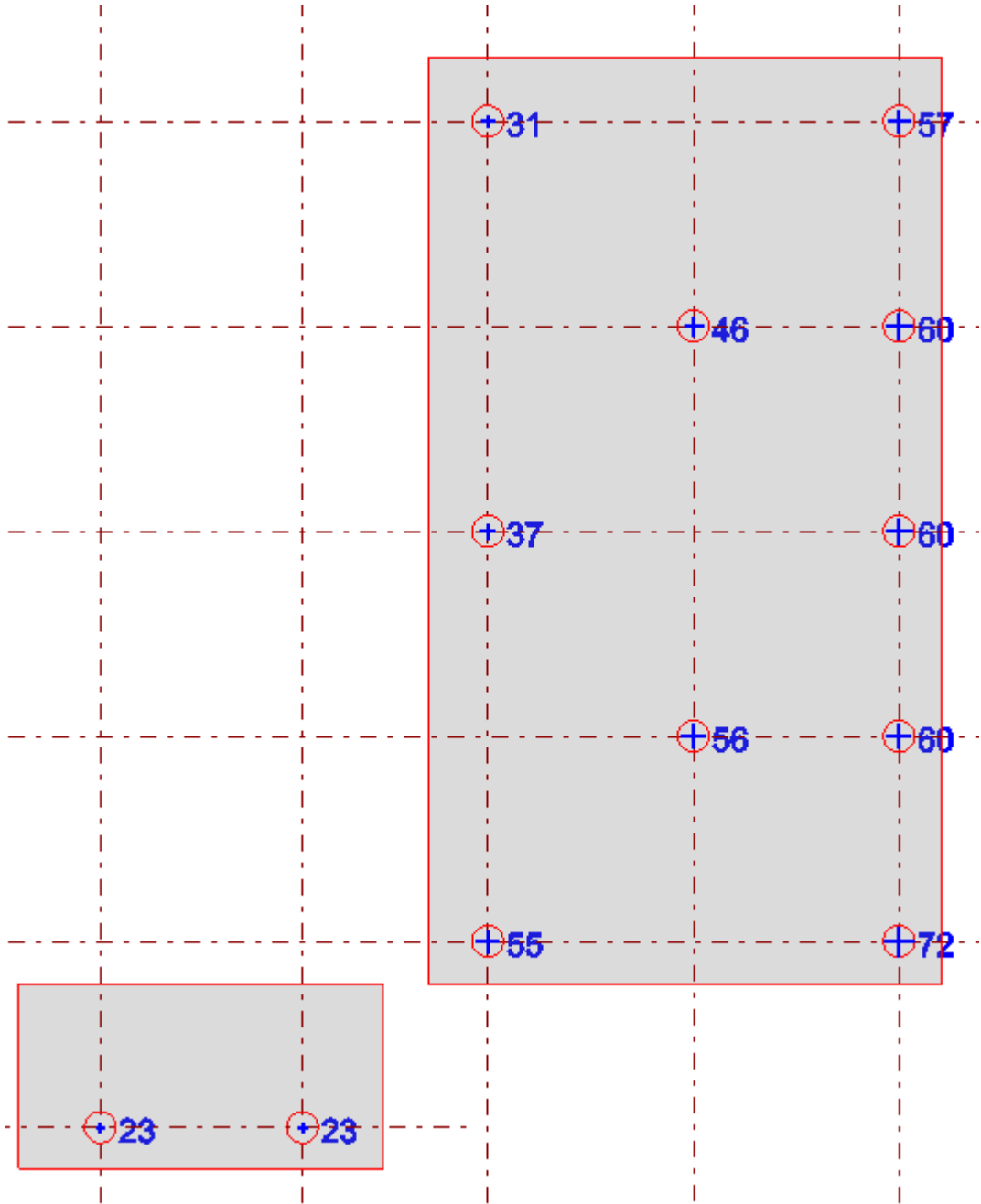
DEAD LOADS (Self weight + SDL) (in kN)



LIVE LOADS (in kN)

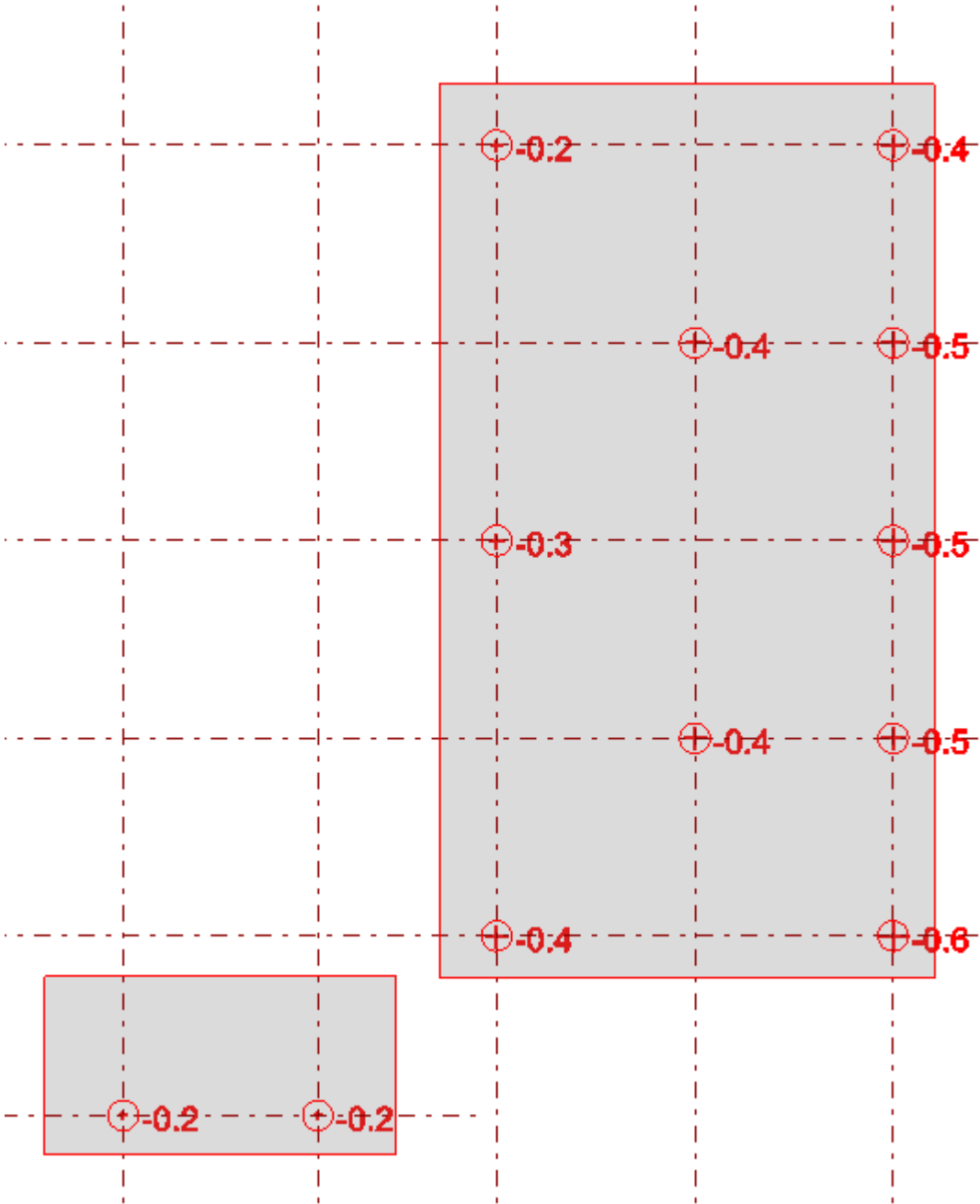


DEAD LOADS + LIVE LOADS (in kN)



Maximum Pile Load is 72 KN.

PILE SETTLEMENT: (SLS)



Maximum settlement is 0.6mm

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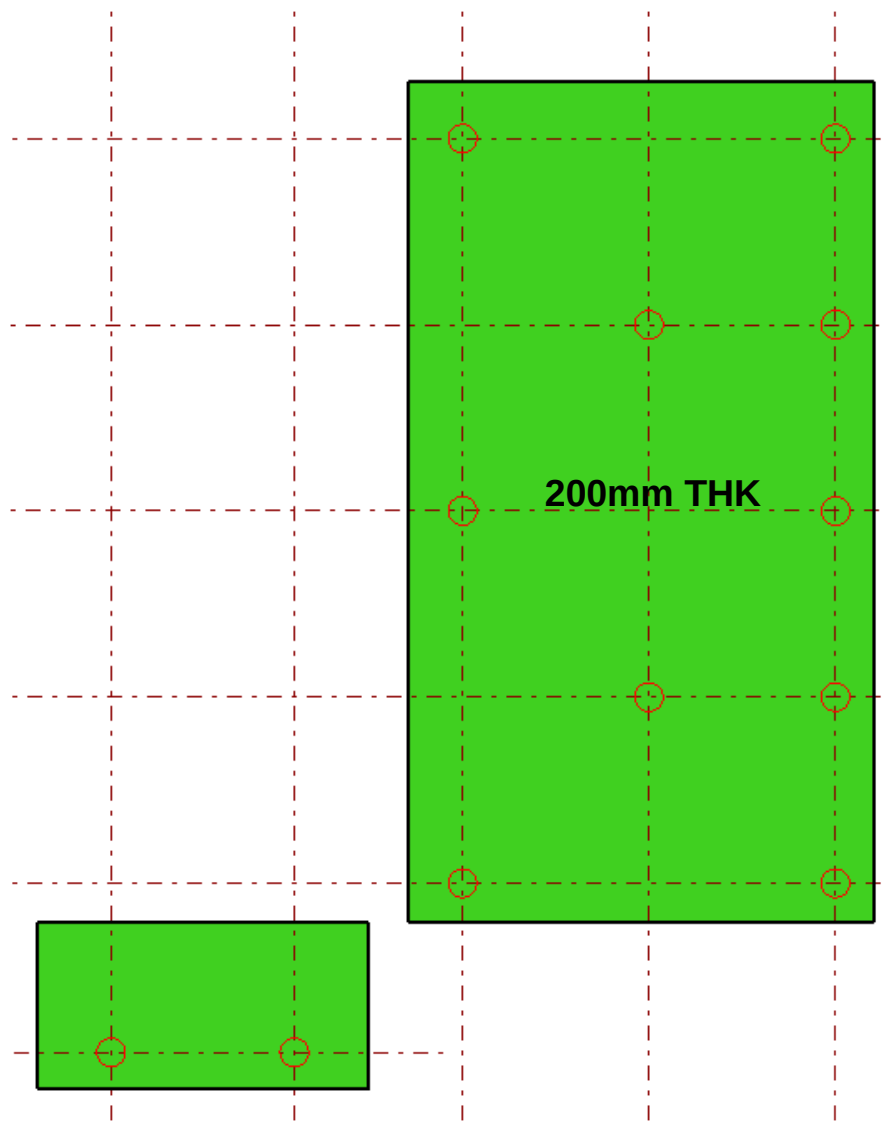
APPENDIX C – DESIGN OF RC SLAB

DESIGN OF RC SLAB

Design Data:

Concrete Grade : C32/40
Reinforcement Grade : 500 N/mm²
Cover : Top – 30mm
Bottom – 75mm

Slab Thickness:

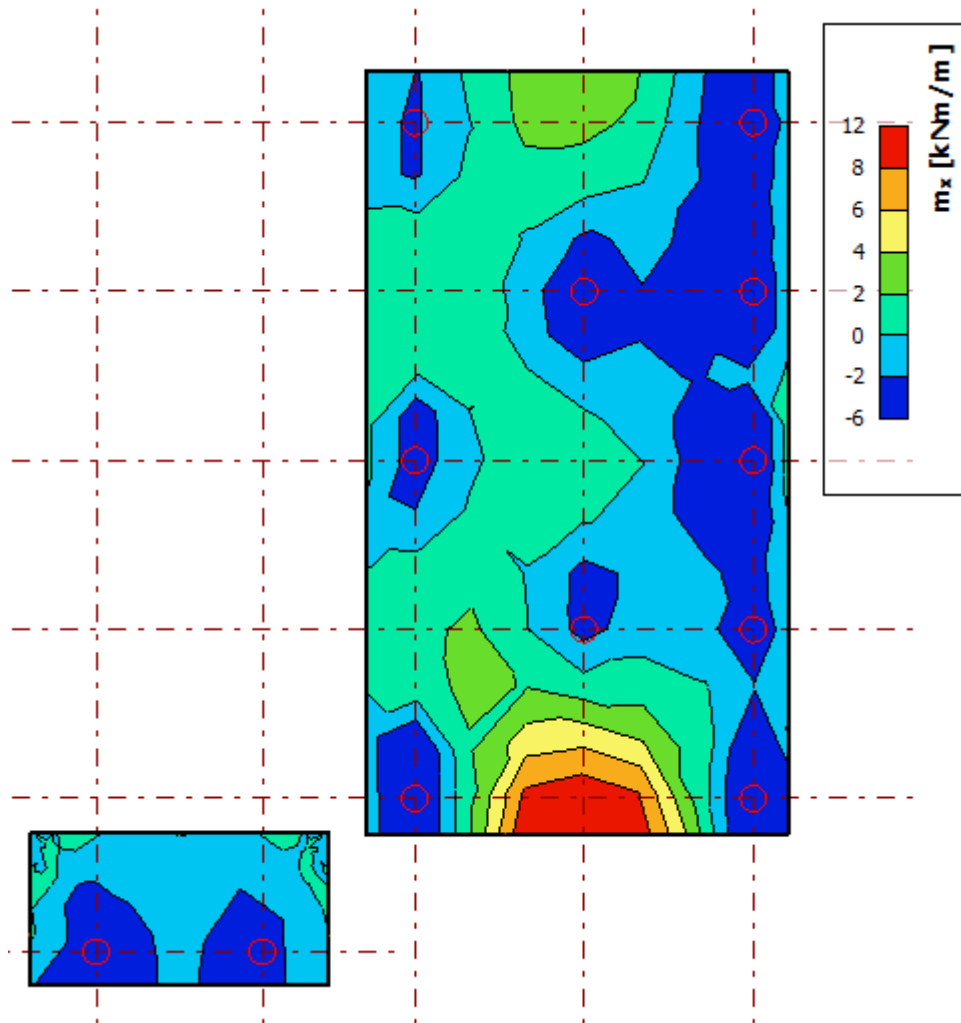


Note:

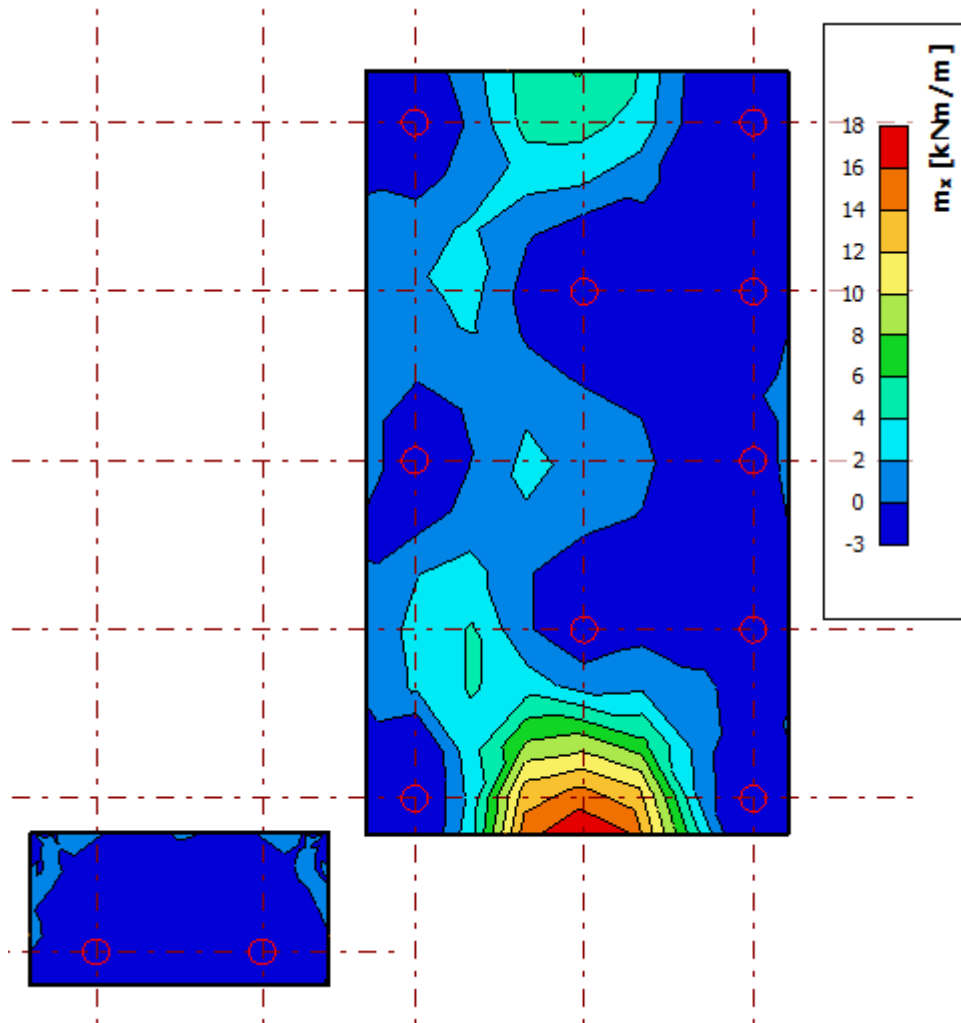
Slab bending stiffness of 50% is considered in design.

MOMENT CONTOURS (ULS)

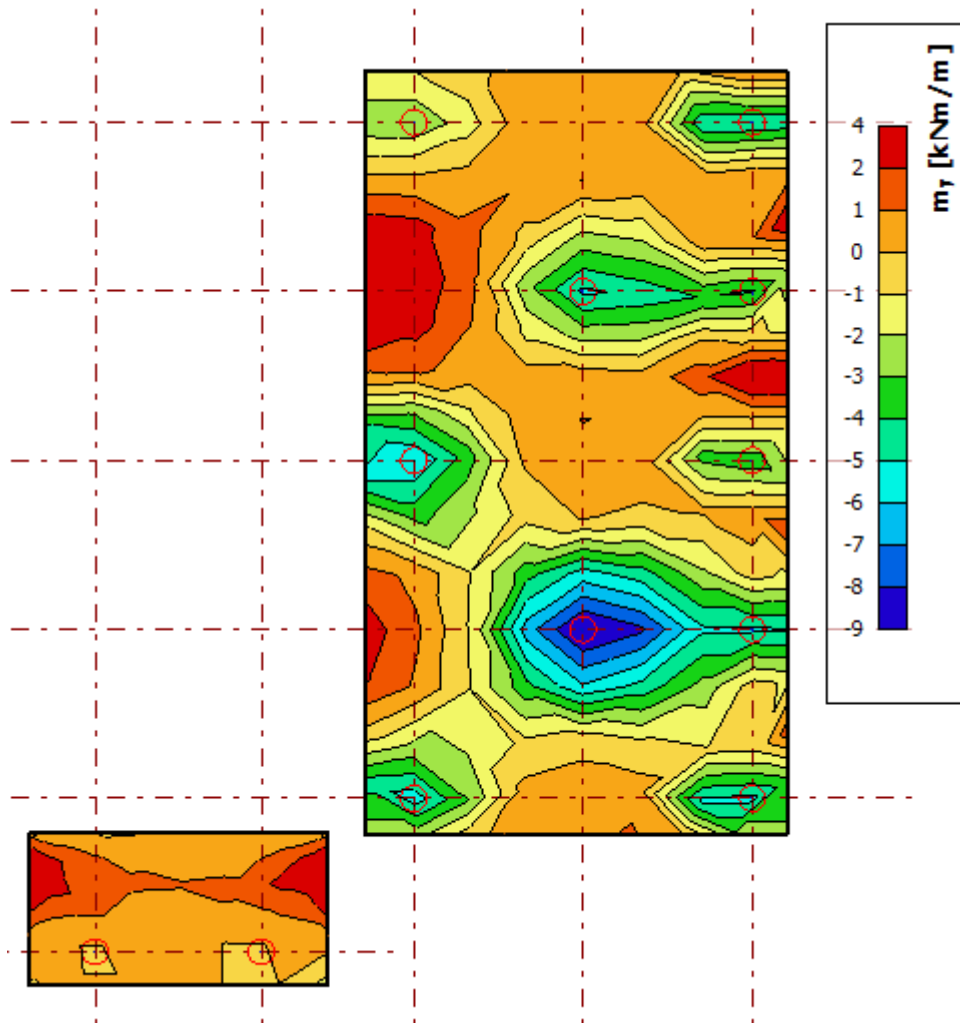
Mx minimum



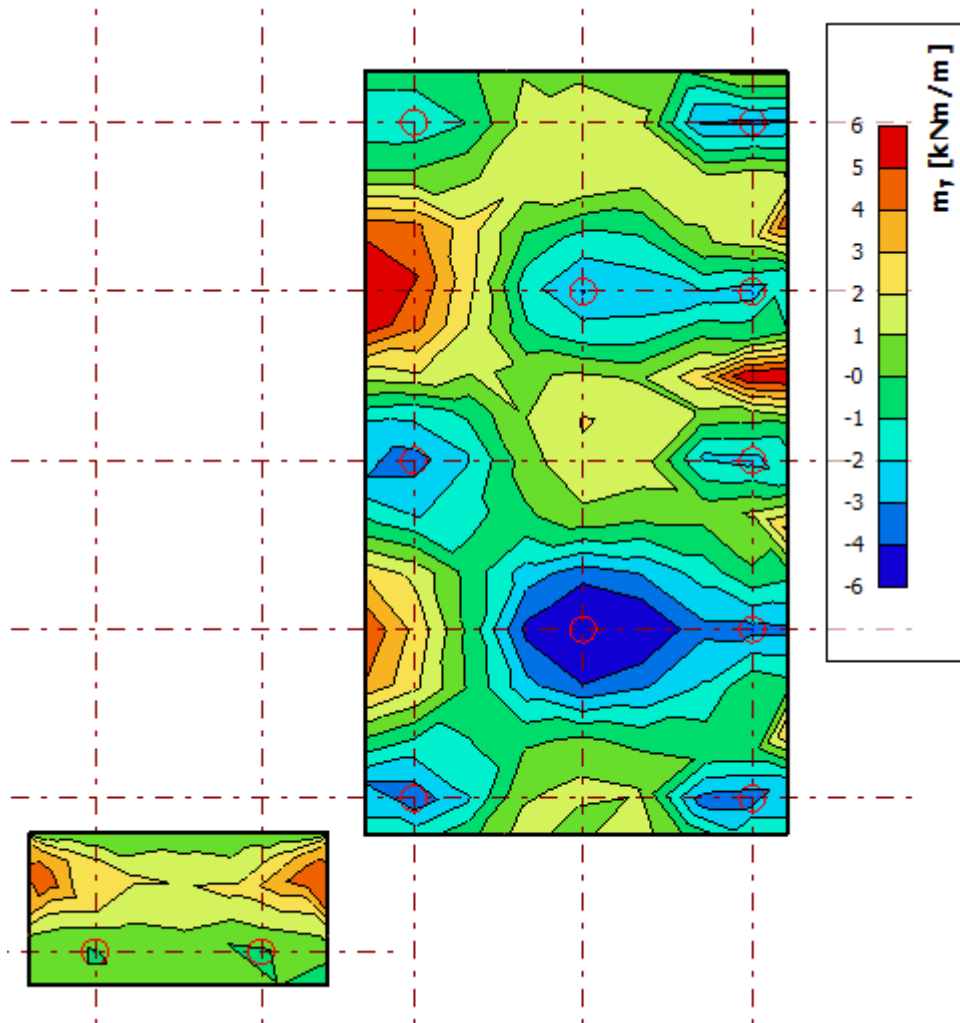
Mx Maximum



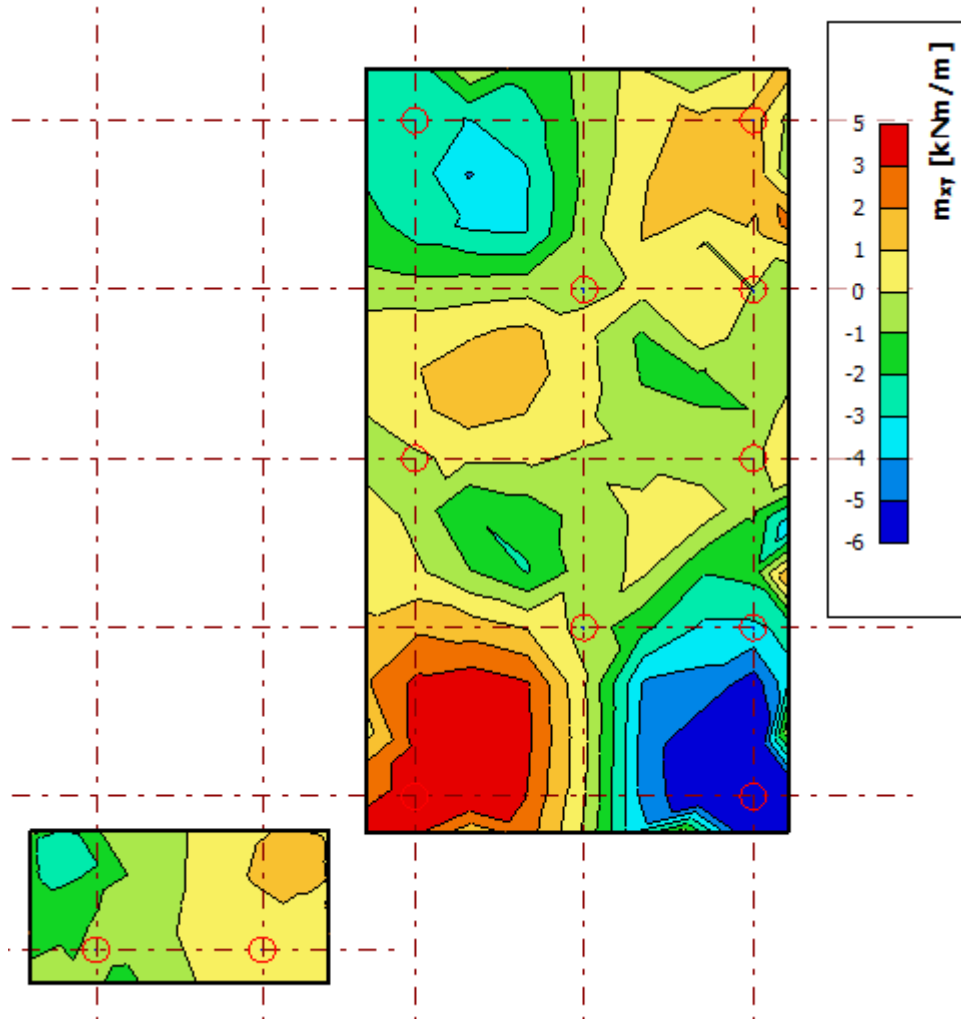
My minimum



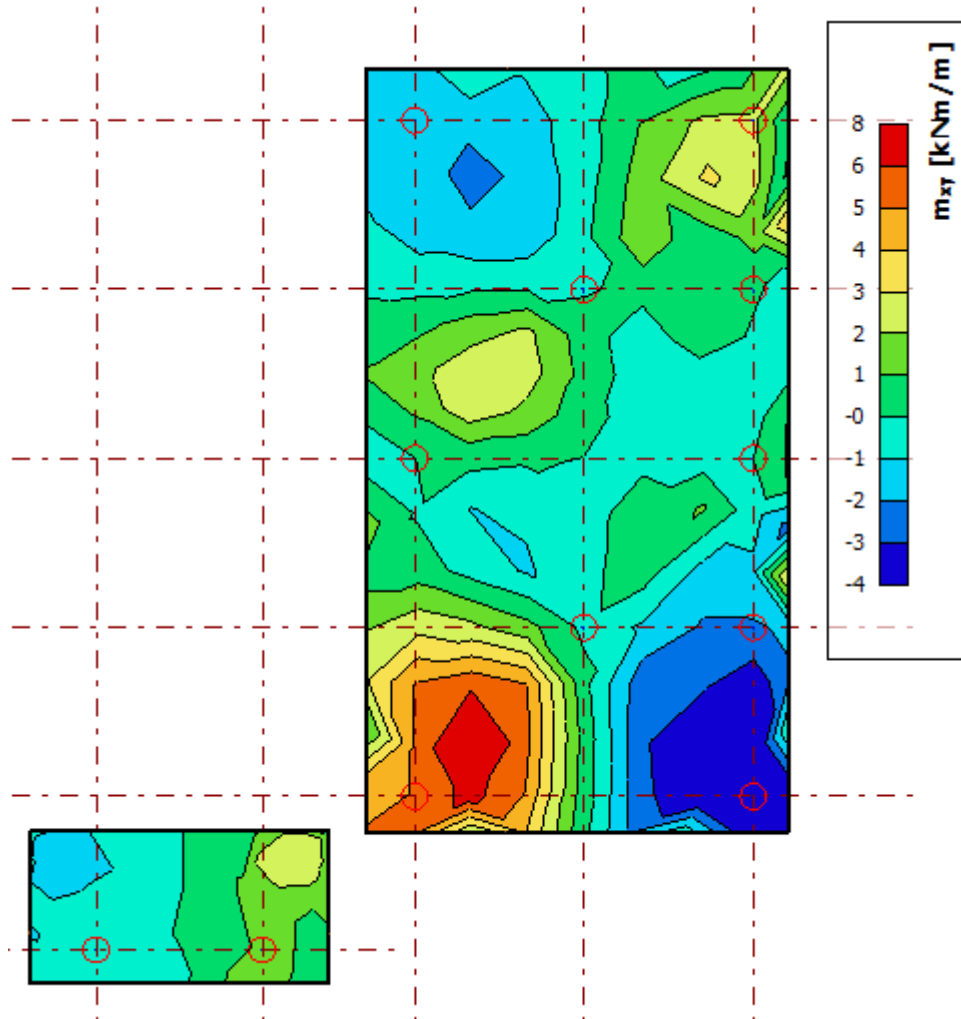
My maximum



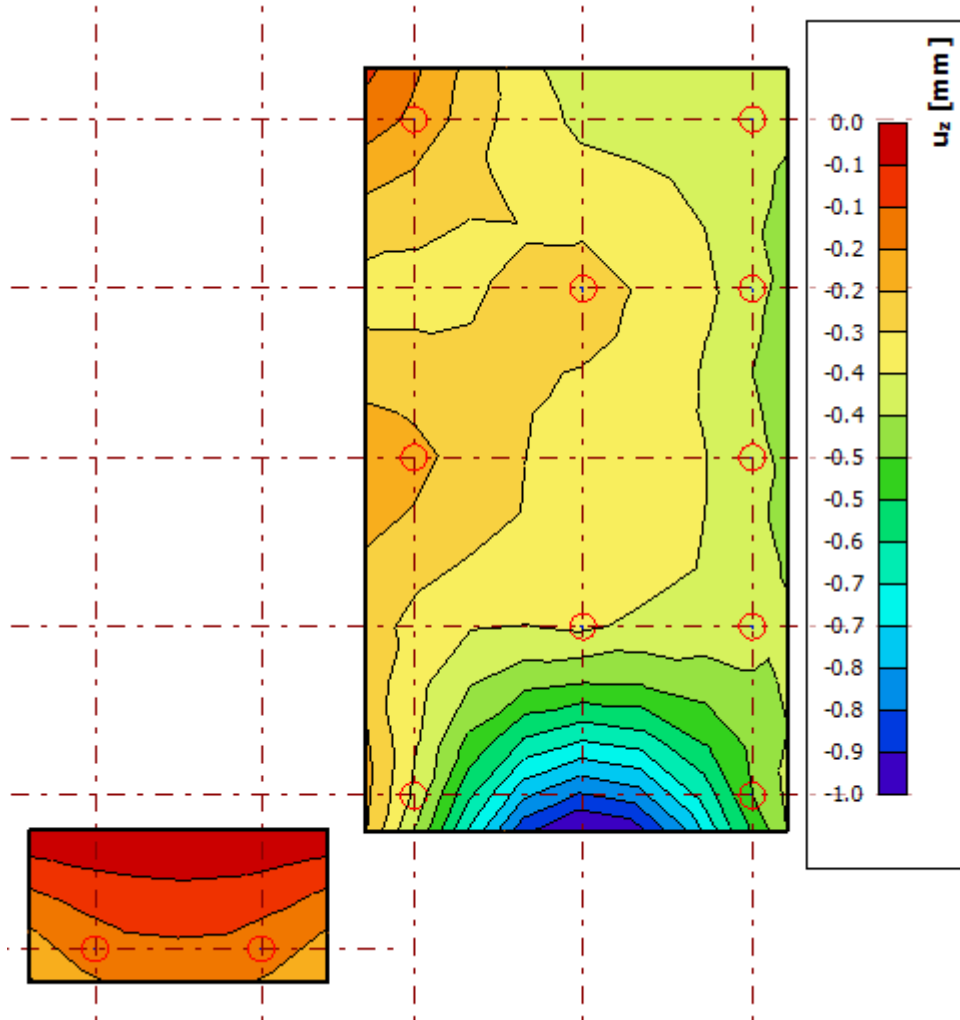
Mxy minimum:



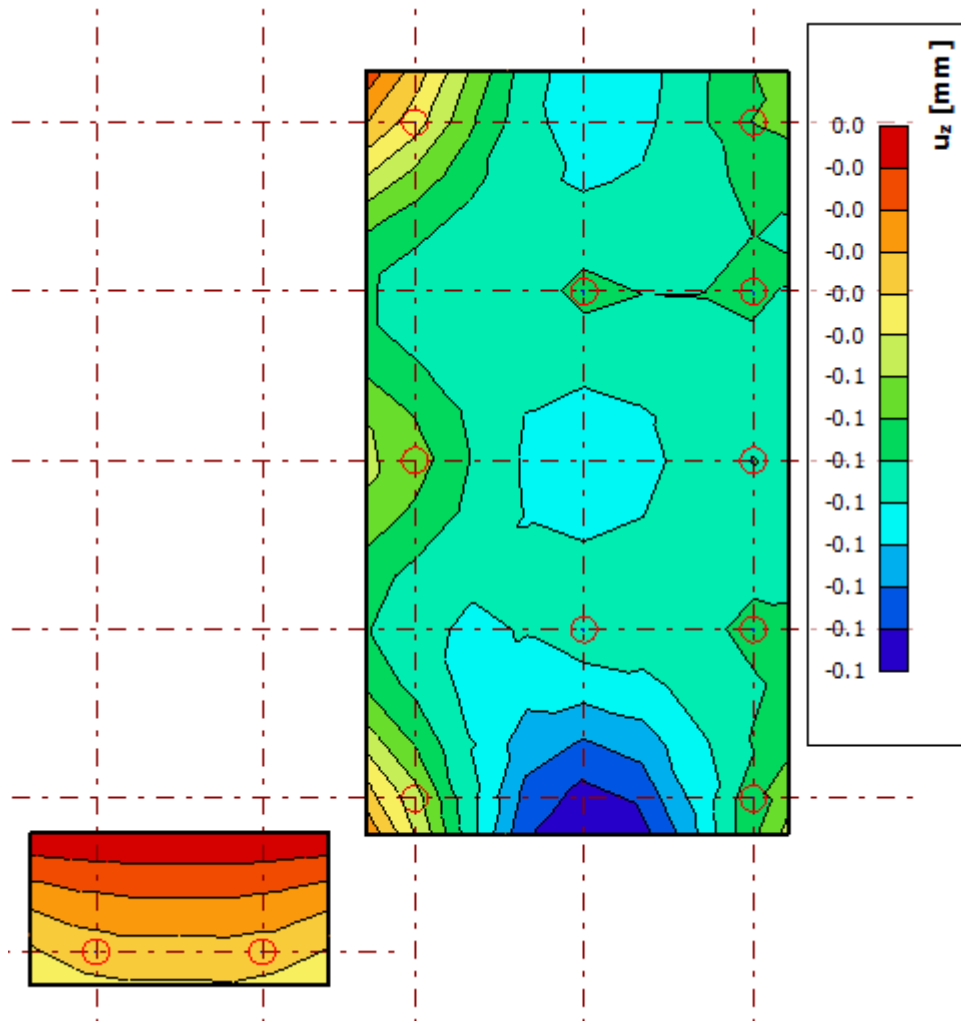
Mxy maximum:



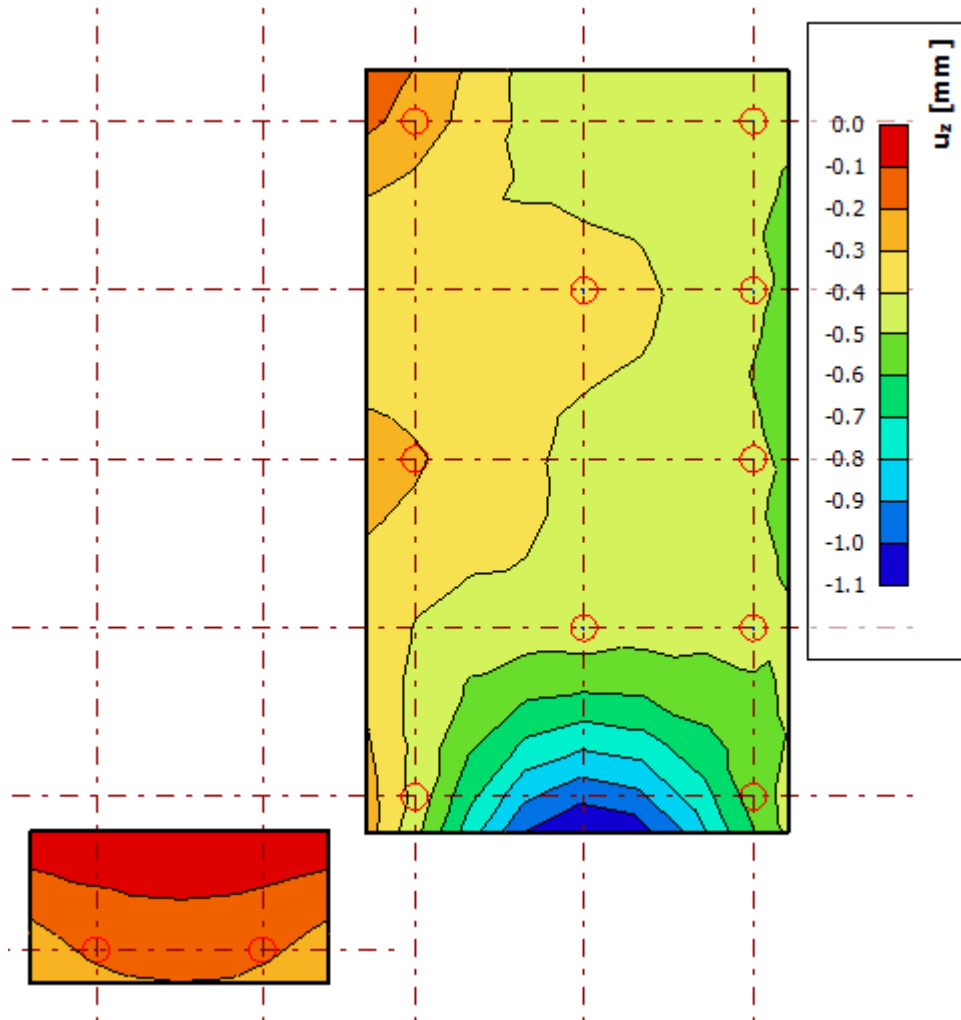
Elastic Deflection in mm:
Dead : (Self Weight + SDL)



Live:

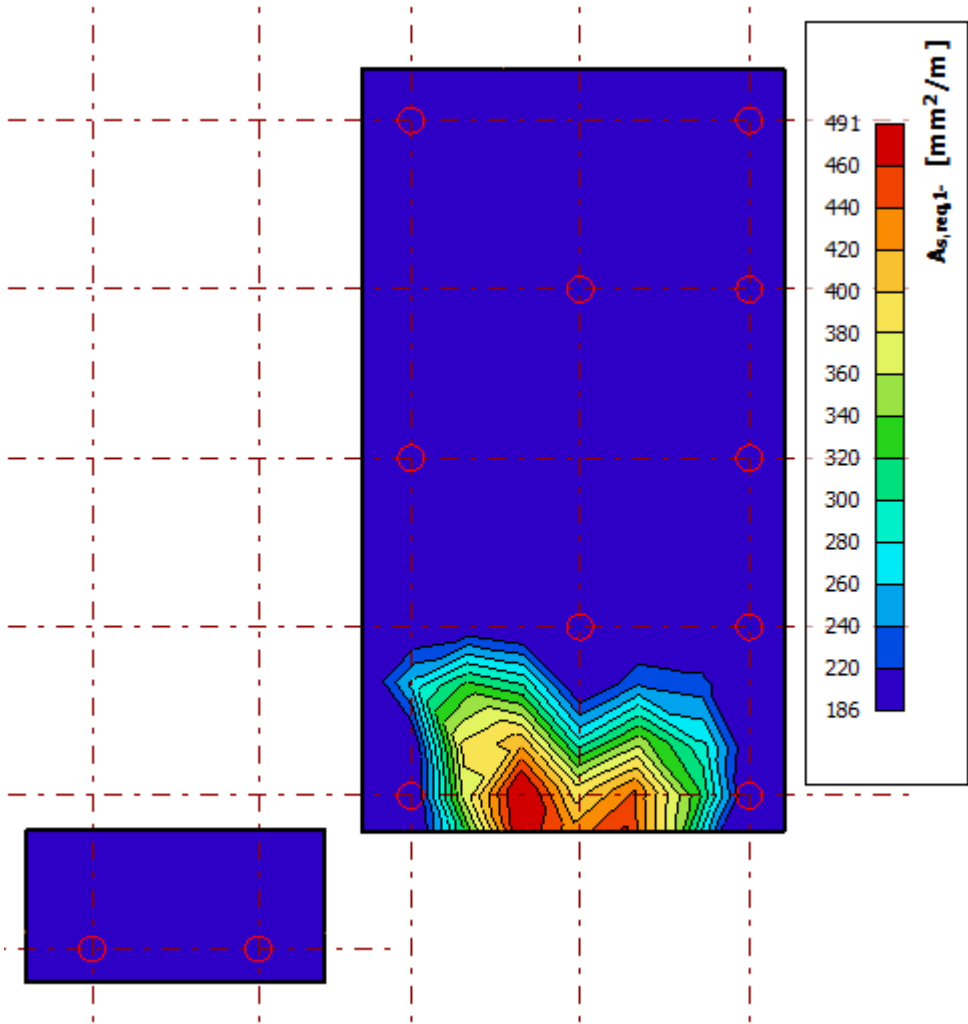


Dead + Live:

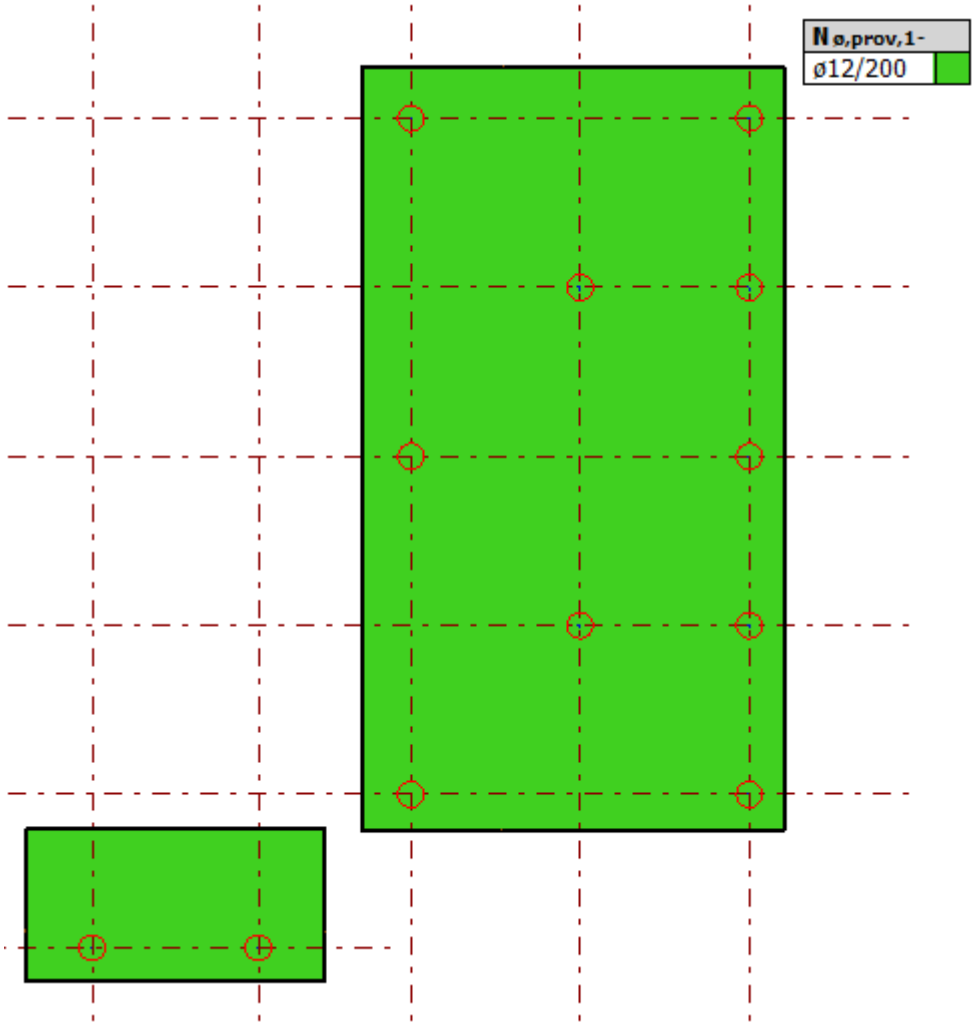


Maximum elastic deflection = 1.1mm

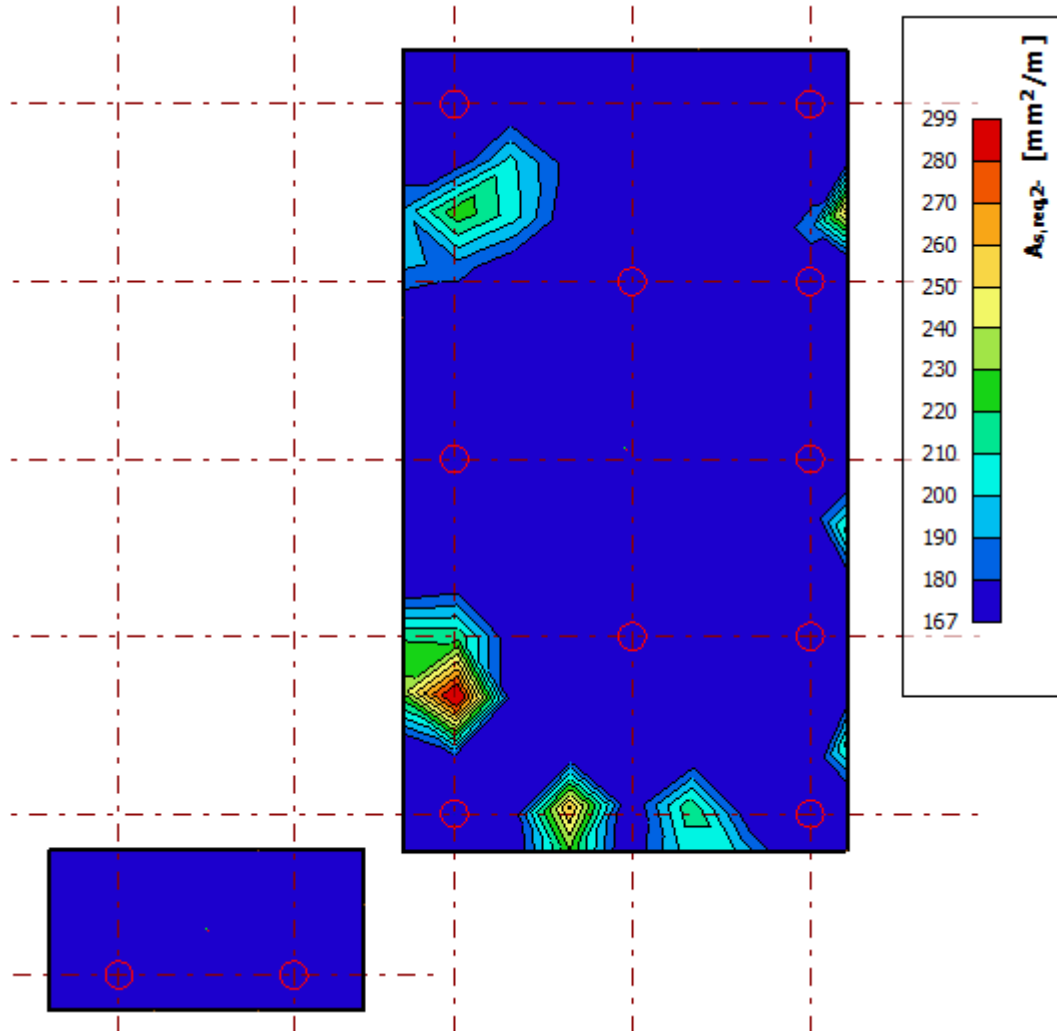
Reinforcement contours: (ULS)
X-Direction Bottom reinforcement
Required reinforcement



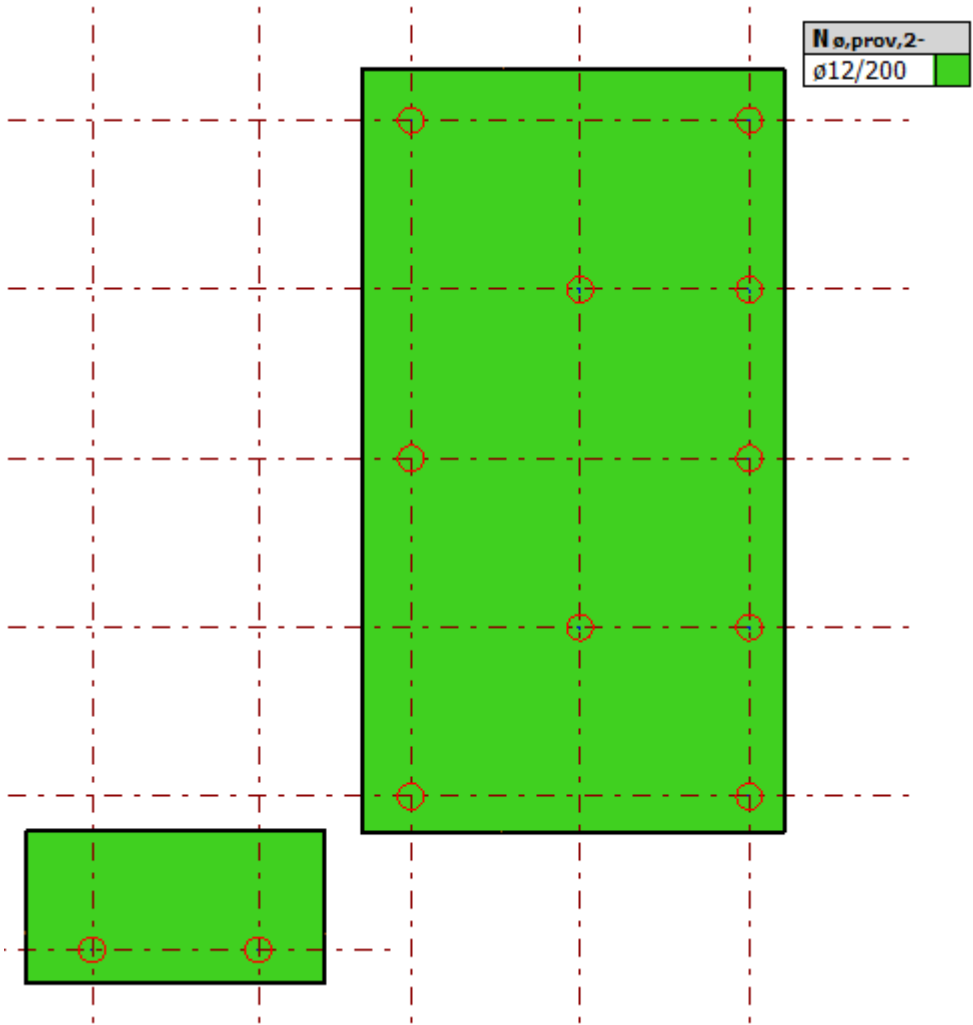
Provided reinforcement:



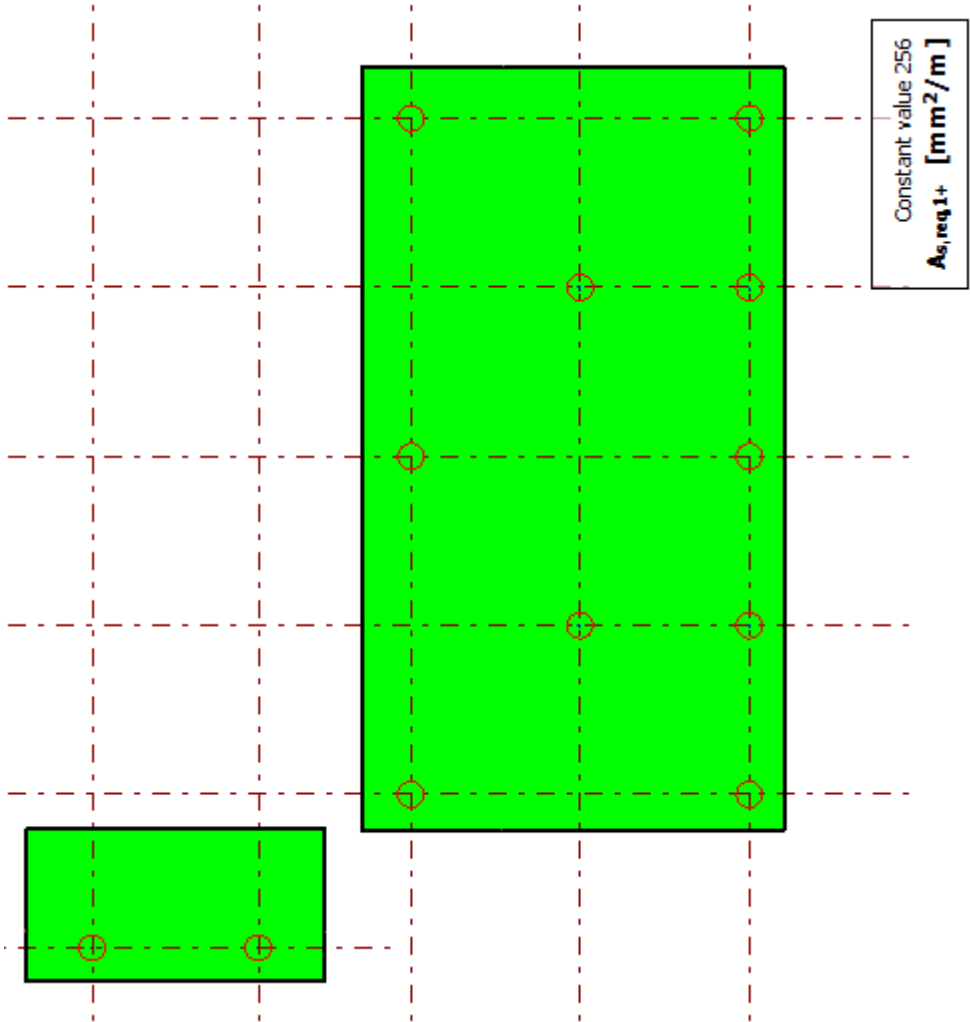
Y-Direction Bottom reinforcement
Required reinforcement



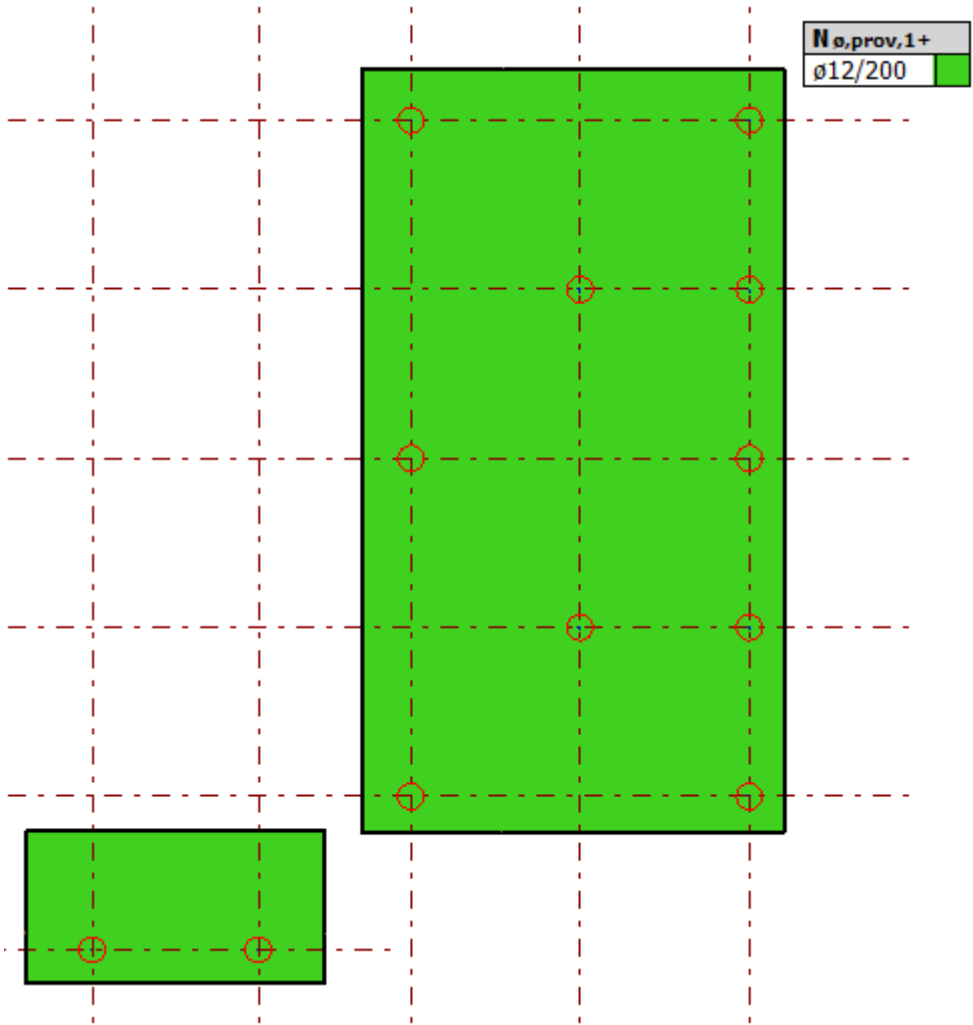
Provided reinforcement:



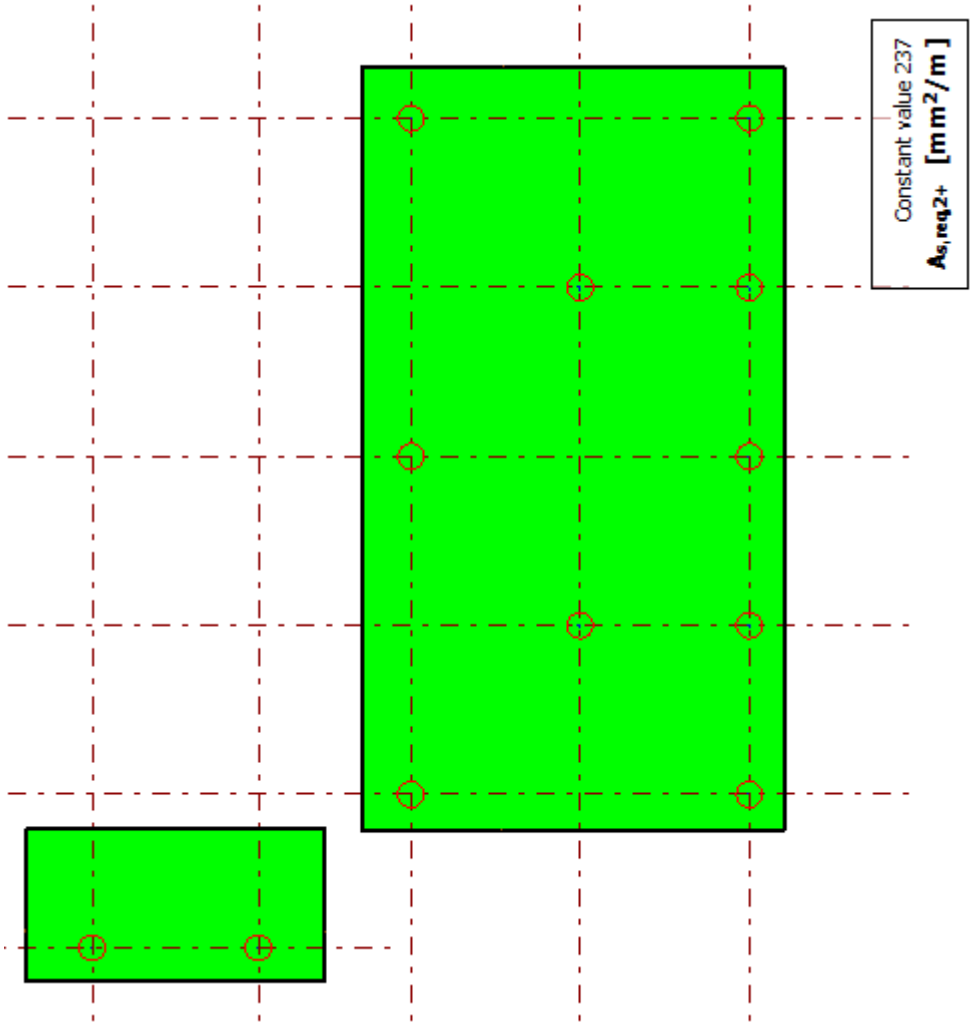
X-Direction Top reinforcement
Required reinforcement



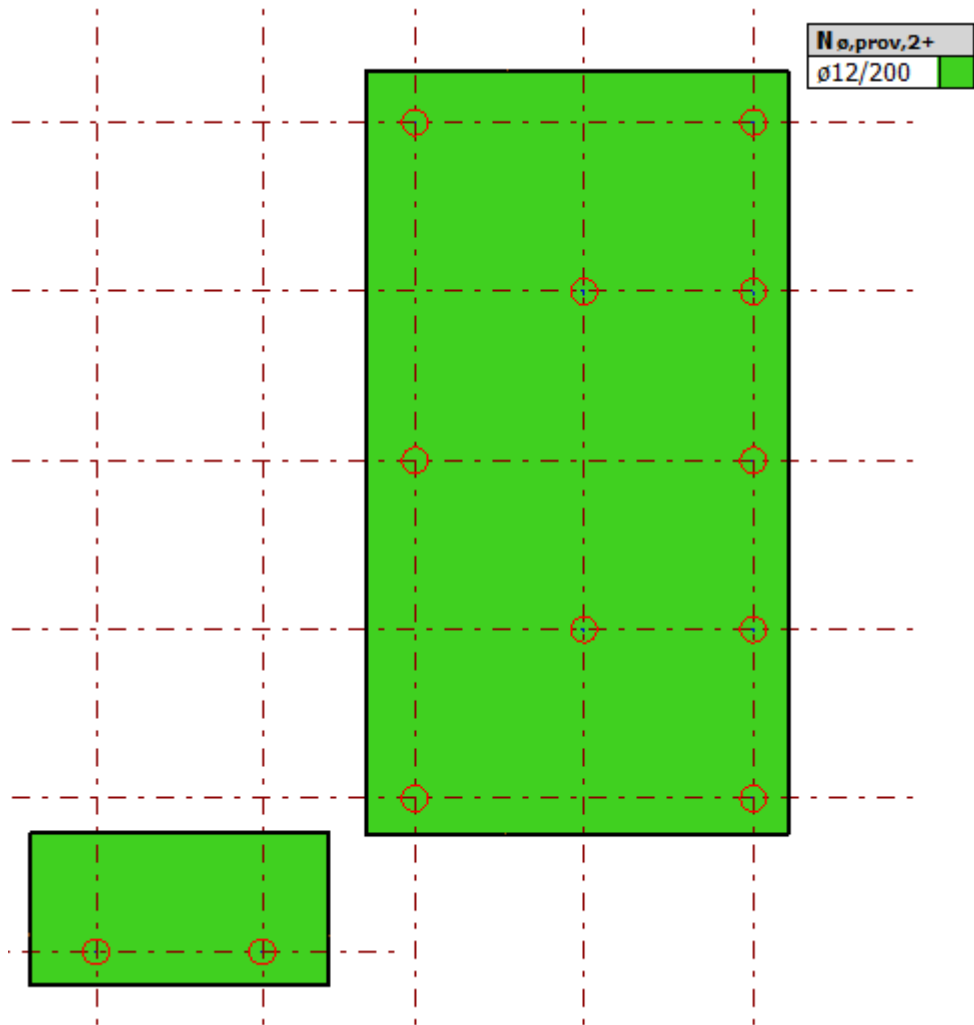
Provided reinforcement



Y-Direction Top reinforcement
Required reinforcement



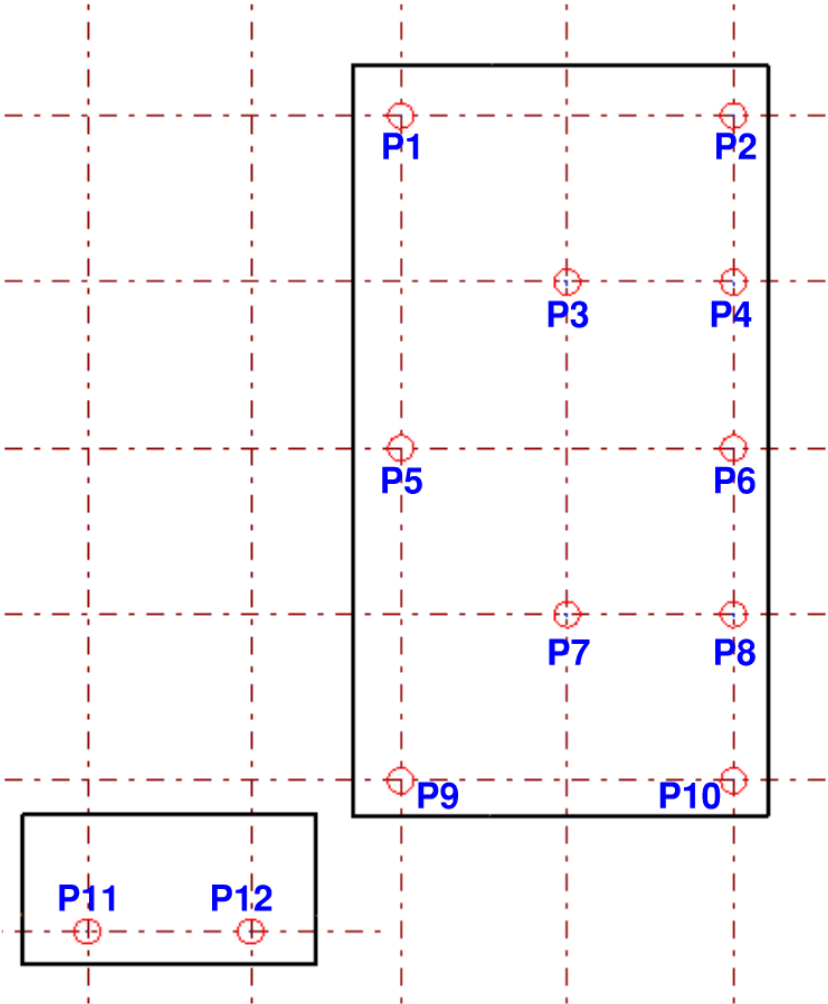
Provided reinforcement



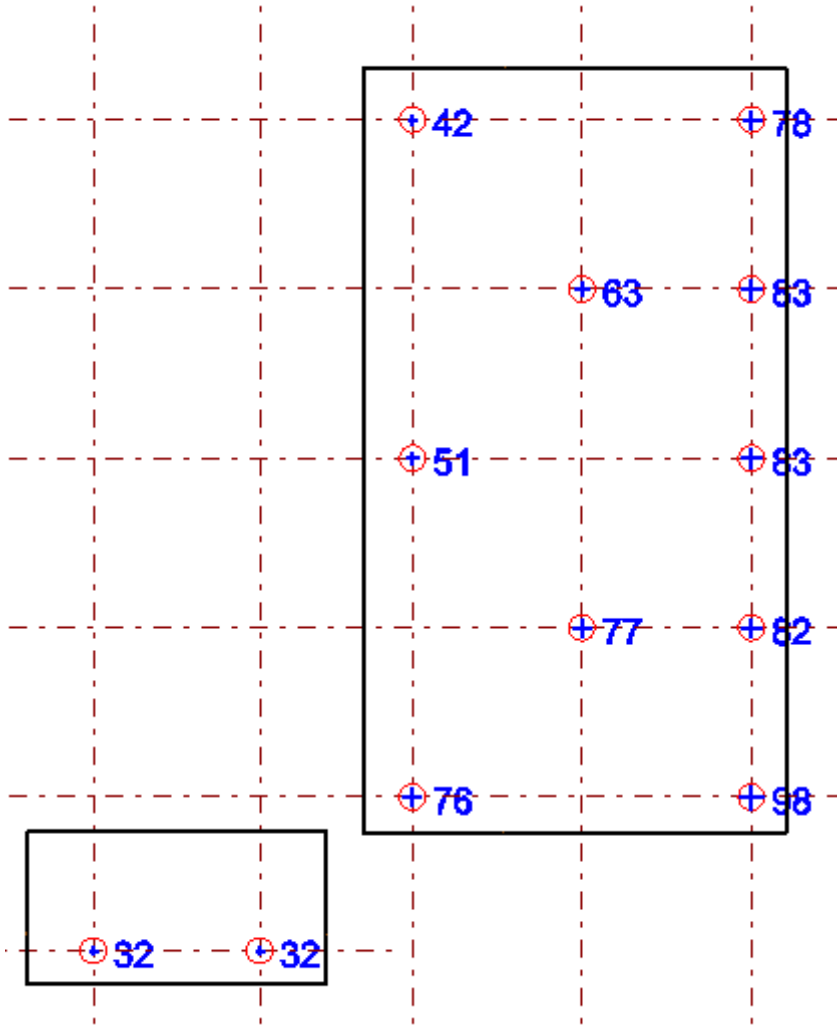
Reinforcement Summary:

Provide H12-200 C/C main mat (Top & Bottom) with H16 additional added locally.

**PUNCHING SHEAR DESIGN
PILE ID's**



PILE FORCES IN KN (ULS)

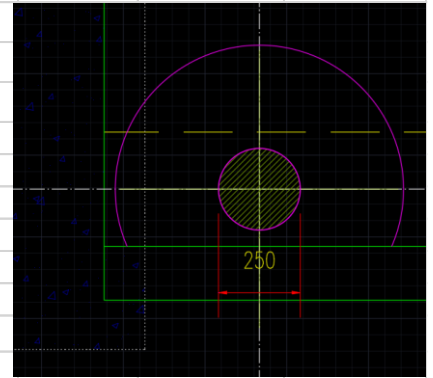


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PILE PUNCHING SHEAR CALCULATIONS (ULS):

Pile P1, P2 & P9

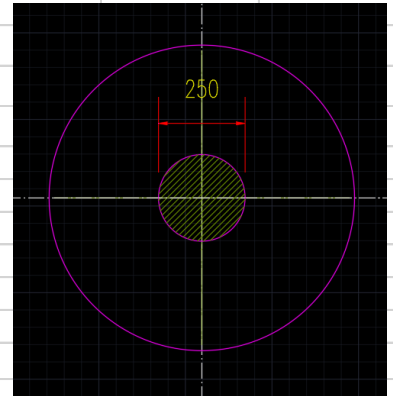
CORNER PILE									
Input:									
Characteristic strength of concrete(f_{ck})		32	N/mm ²						
Characteristic strength of Steel(f_y)		500	N/mm ²						
Punching Force		85	kN						
Depth of Slab		200	mm						
Nominal Cover		30	mm						
Dia of Pile		250	mm						
Loading Data:									
Dead Load			5	kN/m ²					
Super imposed Load			0	kN/m ²					
Live Load			0	kN/m ²					
Total Factored load			6.75	kN/m ²					
Area of Flexural Reinforcement:									
Direction		Dia(mm)	Spacing(mm)	Area (mm ²)					
X-direction		12	200	565					
Y-direction		12	200	565					
Effective Depth (d)		158	mm						
Effective Punching Force (V_{eff})		128	kN	Beta (β) - 1.5					
Shear taken by Concrete(v_c)			0.56	N/mm ²					
Dist. from column face (mm)			Perimeter (mm)	Actual Shear stress (v) (N/mm ²)	Shear taken by Concrete (v_c) (N/mm ²)	Design Check			
@ Column Face			-	474	1.70	<5.58N/mm2 Hence OK			
@2d			316	1745	0.46	0.56	No Shear Links required		



	2 GROVE COTTAGES		
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Pile P3 & P7

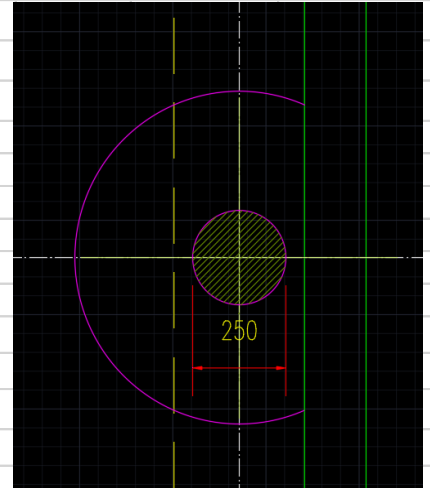
INTERNAL PILE				
Input:				
Characteristic strength of concrete(f_{ck})	32	N/mm ²		
Characteristic strength of Steel(f_y)	500	N/mm ²		
Punching Force	100	kN		
Depth of Slab	200	mm		
Nominal Cover	30	mm		
Dia of Pile	250	mm		
Loading Data:				
Dead Load		5	kN/m ²	
Super imposed Load		0	kN/m ²	
Live Load		0	kN/m ²	
Total Factored load		6.75	kN/m ²	
Area of Flexural Reinforcement:				
Direction	Dia(mm)	Spacing(mm)	Area (mm ²)	
X-direction	12	200	565	
Y-direction	12	200	565	
Effective Depth (d)	158	mm		
Effective Punching Force (V_{eff})	115	kN	Beta (β) - 1.15	
Shear taken by Concrete(v_c)		0.56	N/mm ²	
Dist. from column face (mm)		Perimeter (mm)	Actual Shear stress (v) (N/mm ²)	Shear taken by Concrete (v_c) (N/mm ²)
Design Check				
@ Column Face	-	942	0.77	
@2d	316	2927	0.24	0.56
<5.58N/mm2 Hence OK				
No Shear Links required				



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Pile P4, P5, P6 & P8

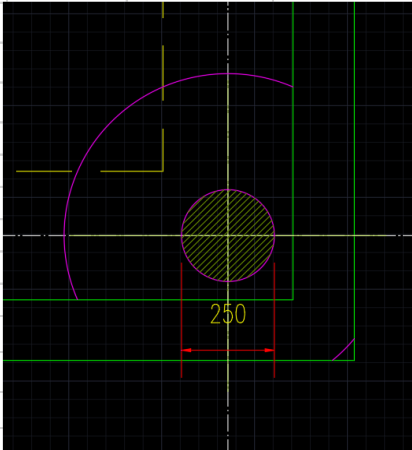
EDGE PILE				
Input:				
Characteristic strength of concrete(f_{ck})	32	N/mm ²		
Characteristic strength of Steel(f_y)	500	N/mm ²		
Punching Force	90	kN		
Depth of Slab	200	mm		
Nominal Cover	30	mm		
Dia of Pile	250	mm		
Loading Data:				
Dead Load		5	kN/m ²	
Super imposed Load		0	kN/m ²	
Live Load		0	kN/m ²	
Total Factored load		6.75	kN/m ²	
Area of Flexural Reinforcement:				
Direction	Dia(mm)	Spacing(mm)	Area (mm ²)	
X-direction	12	200	565	
Y-direction	12	200	565	
Effective Depth (d)	158	mm		
Effective Punching Force (V_{eff})	126	kN	Beta (β) - 1.4	
Shear taken by Concrete(v_c)		0.56	N/mm ²	
Dist. from column face (mm)		Perimeter (mm)	Actual Shear stress (v) (N/mm ²)	Shear taken by Concrete (v_c) (N/mm ²)
Design Check				
@ Column Face	-	724	1.10	< 5.58N/mm2 Hence OK
@2d	316	1745	0.45	0.56 No Shear Links required

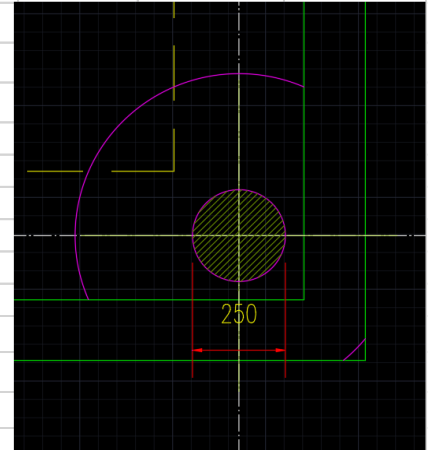


	2 GROVE COTTAGES		
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Pile P10

CORNER PILE				
Input:				
Characteristic strength of concrete(f_{ck})	32	N/mm ²		
Characteristic strength of Steel(f_y)	500	N/mm ²		
Punching Force	105	kN		
Depth of Slab	217	mm		
Nominal Cover	30	mm		
Dia of Pile	250	mm		
Loading Data:				
Dead Load		5.425	kN/m ²	
Super imposed Load		1.8	kN/m ²	
Live Load		2	kN/m ²	
Total Factored load		12.75	kN/m ²	
Area of Flexural Reinforcement:				
Direction	Dia(mm)	Spacing(mm)	Area (mm ²)	
X-direction	16	78	2576	H12-200+H16-100
Y-direction	16	78	2576	H12-200+H16-100
Effective Depth (d)				
	171	mm		
Effective Punching Force (V_{eff})		158	kN	Beta (β) - 1.5
Shear taken by Concrete(v_c)		0.87	N/mm ²	
Dist. from column face (mm)		Perimeter (mm)	Actual Shear stress (v) (N/mm ²)	Shear taken by Concrete (v_c) (N/mm ²)
Design Check				
@ Column Face	-	513	1.80	<5.58N/mm2 Hence OK
@2d	342	1040	0.86	0.87 No Shear Links required

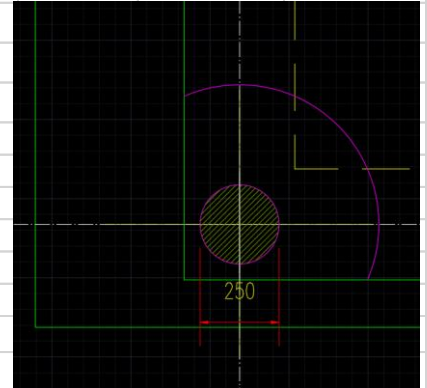




	2 GROVE COTTAGES		
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Pile P11 & P12

CORNER PILE				
Input:				
Characteristic strength of concrete(f_{ck})		32	N/mm ²	
Characteristic strength of Steel(f_y)		500	N/mm ²	
Punching Force		40	kN	
Depth of Slab		200	mm	
Nominal Cover		30	mm	
Dia of Pile		250	mm	
Loading Data:				
Dead Load		5	kN/m ²	
Super imposed Load		0	kN/m ²	
Live Load		0	kN/m ²	
Total Factored load		6.75	kN/m ²	
Area of Flexural Reinforcement:				
Direction		Dia(mm)	Spacing(mm)	Area (mm ²)
X-direction		12	200	565
Y-direction		12	200	565
Effective Depth (d)		158	mm	
Effective Punching Force (V_{eff})		60	kN	Beta (β) - 1.5
Shear taken by Concrete(v_c)		0.56	N/mm ²	
Dist. from column face (mm)		Perimeter (mm)	Actual Shear stress (v) (N/mm ²)	Shear taken by Concrete (v_c) (N/mm ²)
Design Check				
@ Column Face		-	474	0.80
@2d		316	1052	0.35
				0.56



Punching Summary:

No punching shear link required.

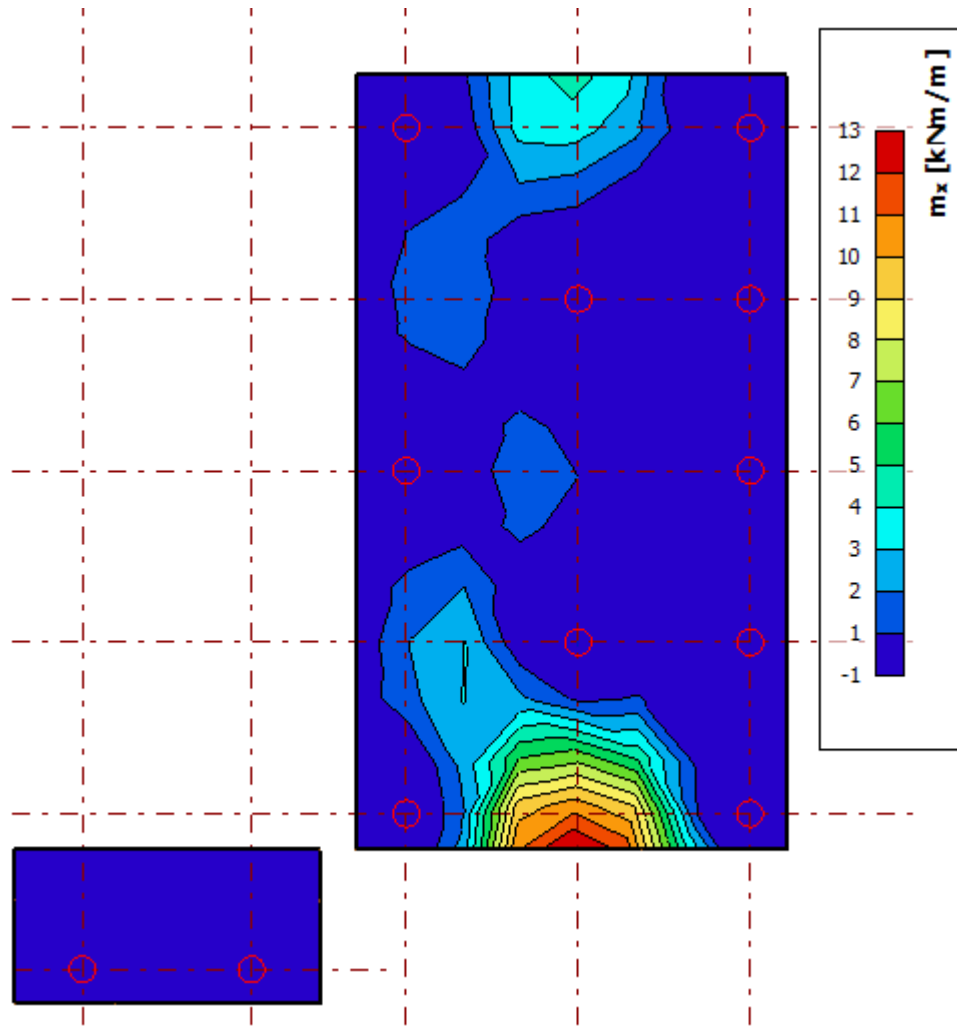
CHECK FOR CRACK WIDTH:

Load combination: SLS

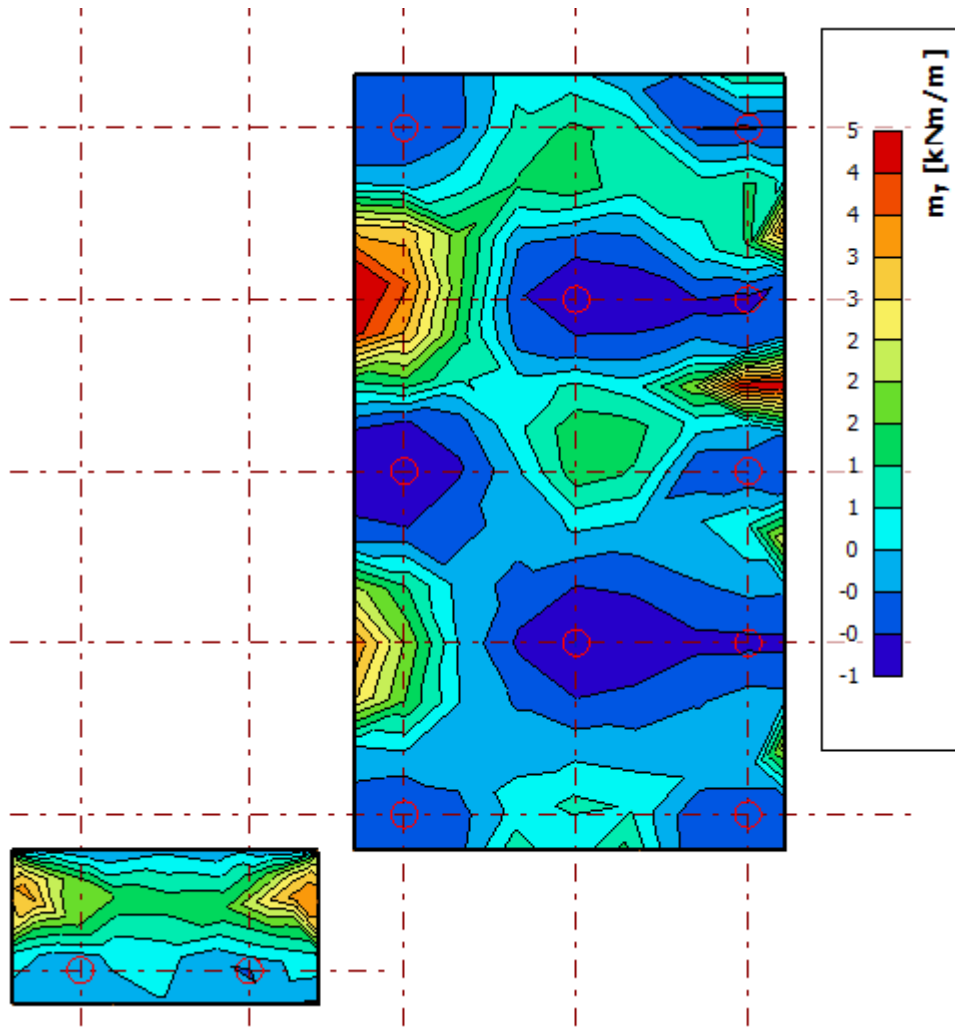
Limiting crack width w_{k1} = 0.3mm

MOMENT CONTOURS (SLS)

Mx max

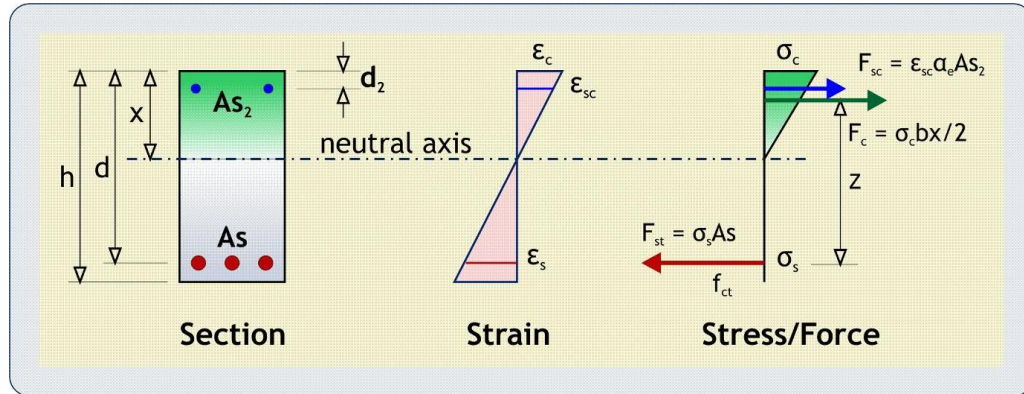


My max



CRACK WIDTH CALCULATIONS: X direction bottom – (H12-200c/c)

LEGEND



INPUT

f_{ck} =	<u>32</u>	MPa	Area of tension steel, A_s =	<u>565</u>	mm ²
f_{yk} =	<u>500</u>	MPa	d =	<u>119</u>	mm
b =	<u>1000</u>	mm	Area of compression steel, A_{s2} =	<u>565</u>	mm ²
h =	<u>200</u>	mm	d_2 =	<u>36</u>	mm
QP moment, M =	<u>13</u>	KNm	Maximum tension bar spacing, S =	<u>200</u>	mm
Age at cracking =	<u>14</u>	days	Max tension bar dia, ϕ_{eq} =	<u>12</u>	mm
Cement type =	<u>N</u>	(S, N, or R)	Short term or long term ?	<u>L</u>	(S or L)
Creep factor, ϕ =	<u>2.0</u>		Cover to A_s , c =	<u>75</u>	mm

CALCULATIONS

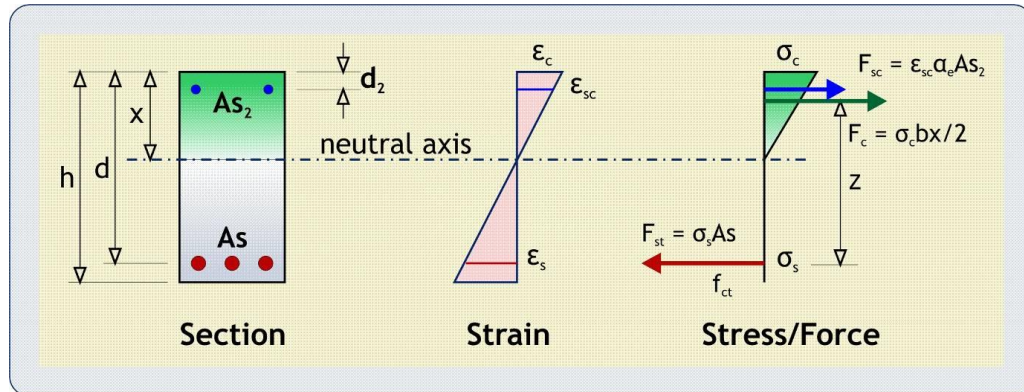
modulus of elasticity of concrete = $22[(f_{ck}+8)/10]^{0.3}$	E_{cm} =	33.3	GPa
moduli of elasticity of steel	E_s =	200.0	GPa
Modular ratio	α_e =	17.99	
mean concrete strength at cracking	$f_{cm,t}$ =	36.07	MPa
mean concrete tensile strength	$f_{ct,eff}$ =	2.73	MPa
uncracked neutral axis depth	x_u =	98.03	mm
uncracked 2 nd moment of area	I_u =	709	mm ⁴ 10 ⁶
$bh^3/12+bh(h/2-x)^2+(\alpha_e-1)[A_s(d-x)^2+A_{s2}(x-d_2)^2]$	M_{cr} =	18.95	kNm
cracking moment = $f_{ct}I/(h-x)$	> 13 kNm → section is uncracked		
fully cracked neutral axis depth	x_c =		mm
$(-A_s\alpha_e-A_{s2}(\alpha_e-1)+[A_s\alpha_e+A_{s2}(\alpha_e-1)]^2+2b[A_s\alpha_e d+A_{s2}d_2(\alpha_e-1)]^{1/2})/b$	σ_c =		MPa
concrete stress = $M/[bx(d-x/3)/2+(\alpha_e-1)A_{s2}(x-d_2)/x(d-d_2)]$	σ_s =		MPa
stress in tension steel = $\sigma_c \cdot \alpha_e(d-x)/x$	$A_{c,eff}$ =		mm ²
effective tension area = $\min[2.5(h-d), (h-x)/3, h/2]b - A_s$	$\rho_{p,eff}$ =		
$A_s/A_{c,eff}$	$S_{r,max}$ =		mm
max final crack spacing = $\min[1.3/(h-x), 3.4c+0.17\phi/\rho_{p,eff}]$	$\epsilon_{sm}-\epsilon_{cm}$ =		μstrain
average strain for crack width calculation	W_k =	0.000	mm

CALCULATED CRACK WIDTH

The section is uncracked. Hence OK.

Y direction bottom – (H12-200c/c)

LEGEND



INPUT

f_{ck} =	32	MPa	Area of tension steel, A_s =	565	mm ²
f_{yk} =	500	MPa	d =	107	mm
b =	1000	mm	Area of compression steel, A_{s2} =	565	mm ²
h =	200	mm	d_2 =	48	mm
QP moment, M =	5	KNm	Maximum tension bar spacing, S =	200	mm
Age at cracking =	14	days	Max tension bar dia, ϕ_{eq} =	12	mm
Cement type =	N	(S, N, or R)	Short term or long term ?	L	(S or L)
Creep factor, ϕ =	2.0		Cover to A_s , c =	87	mm

CALCULATIONS

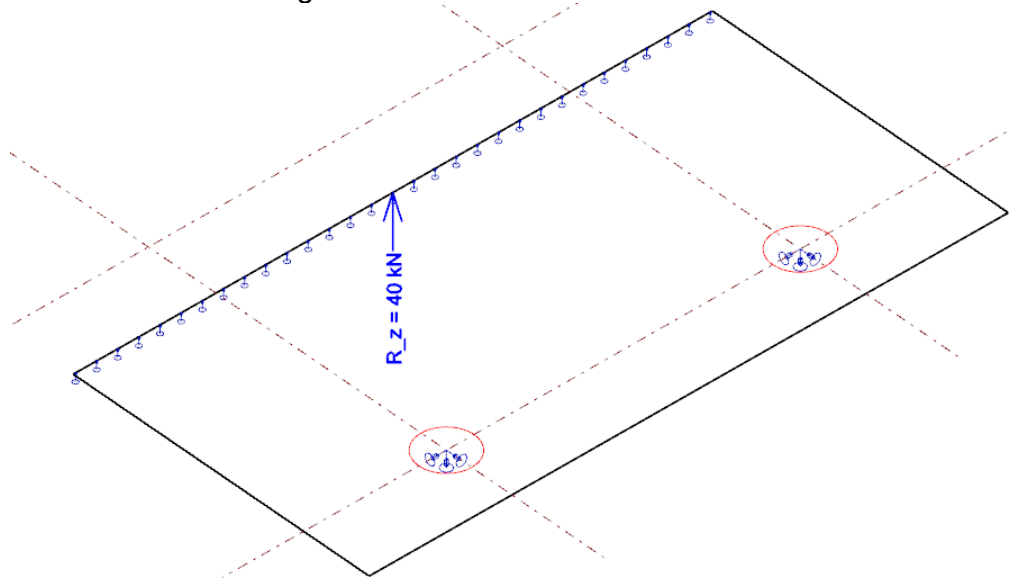
modulus of elasticity of concrete = $22[(f_{ck}+8)/10]^{0.3}$	E_{cm} =	33.3	GPa
moduli of elasticity of steel	E_s =	200.0	GPa
Modular ratio	α_e =	17.99	
mean concrete strength at cracking	$f_{cm,t}$ =	36.07	MPa
mean concrete tensile strength	$f_{ct,eff}$ =	2.73	MPa
uncracked neutral axis depth	x_u =	98.03	mm
uncracked 2 nd moment of area	I_u =	692	mm ⁴ 10 ⁶
$bh^3/12+bh(h/2-x)^2+(\alpha_e-1)[A_s(d-x)^2+A_{s2}(x-d_2)^2]$	M_{cr} =	18.51	kNm
cracking moment = $f_{ct}I/(h-x)$	> 5 kNm → section is uncracked		
fully cracked neutral axis depth	x_c =		mm
$(-A_s\alpha_e-A_{s2}(\alpha_e-1)+[A_s\alpha_e+A_{s2}(\alpha_e-1)]^2+2b[A_s\alpha_e d+A_{s2}d_2(\alpha_e-1)]^{1/2})/b$	σ_c =		MPa
concrete stress = $M/[bx(d-x/3)/2+(\alpha_e-1)A_{s2}(x-d_2)/x(d-d_2)]$	σ_s =		MPa
stress in tension steel = $\sigma_c\alpha_e(d-x)/x$	$A_{c,eff}$ =		mm ²
effective tension area = $\min[2.5(h-d), (h-x)/3, h/2]b - A_s$	$\rho_{p,eff}$ =		
$A_s/A_{c,eff}$	$S_{r,max}$ =		mm
max final crack spacing = $\min[1.3/(h-x), 3.4c+0.17\phi/\rho_{p,eff}]$	$\epsilon_{sm}-\epsilon_{cm}$ =		μstrain
average strain for crack width calculation	W_k =	0.000	mm
CALCULATED CRACK WIDTH			

The section is uncracked. Hence OK.

	2 GROVE COTTAGES		
		Rev: 0	Date:04-02-2025
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ONE WAY SHEAR CAPACITY CHECK OF SLAB SUPPORTED BY EXISTING FOUNDATION:

Total force to existing foundation



One-way shear capacity of slab

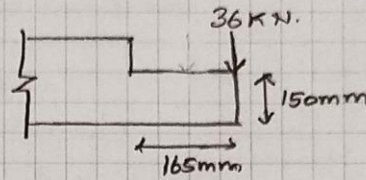
<u>Material Properties</u>			
Concrete Strength	f_{ck}	=	32.0 MPa
Steel Strength	f_y	=	500.0 MPa
<u>Slab Section details</u>			
Breadth Considered	B	=	1000 mm
Depth	D	=	200 mm
Effective Depth	d_{eff}	=	107 mm
<u>Concrete Shear Capacity:</u>			
Top Reinforcement Provided			
Bar Dia		=	12 mm
Spacing		=	200 mm
Area		=	565 sq.mm
ρ_1		=	$A_s / (bd) \leq 0.02$
		=	0.0053
k		=	$1 + (200/d)^{0.5} \leq 2$
		=	2.0000
$V_{Rd,c}$		=	$0.12 \times k \times (100 \times \rho_1 \times f_{ck})^{(1/3)} \geq 0.035 \times k^{1.5} \times f_{ck}$
Value 1		=	0.6160
Value 2		=	0.5600
$V_{Rd,c}$		=	0.62 MPa
Shear Capacity of the section		=	66 kN/m Hence ok

TOE DESIGN:

Total Load = $(22.5 \times 1.35) + (3.7 \times 1.5) = 36 \text{ kN}$

TOE DESIGN

Eccentric Moment = 36×0.165
 $= 5.94 \text{ kNm}$



Ast required = $\frac{M}{0.87 f_y z}$

$z = \frac{d}{2} \left[1 + \sqrt{1 - 3.53 k} \right]$

$d = 150 - 50 - 6 = 94 \text{ mm}$

$k = \frac{M}{f_{ck} b d^2}$

$= \frac{5.94 \times 10^6}{32 \times 1000 \times 94^2} = 0.021 < 0.2$

$z = \frac{94}{2} \left[1 + \sqrt{1 - 3.53 \times 0.021} \right] \text{ (or) } 0.95d$

$z = 89.3 \text{ mm}$

Area of Ast req = $\frac{5.94 \times 10^6}{0.87 \times 500 \times 89.3} = 153 \text{ mm}^2$

Minimum Ast = $0.26 \times \frac{f_{ctm}}{f_{yk}} b d$

$= 0.26 \times \frac{3.02}{500} \times 1000 \times 89.3$

$= 141 \text{ mm}^2$

Provide two layers of H12 @ 200 c/c in both directions.

Shear Check

$V_{ed} = \frac{V_{ed}}{b d} = \frac{36 \times 10^3}{1000 \times 94}$

$= 0.39 \text{ N/mm}^2$

$$V_{Rdc} = 0.12 k (100 \times \rho_1 \times f_{ck})^{1/3}$$

$$100 \times \rho_1 = 100 \times \frac{A_s}{b d} = \frac{100 \times 565}{1000 \times 94} = 0.6$$

$$k = 1 + \sqrt{\frac{200}{d}} = 1 + \sqrt{\frac{200}{94}} = 2.46 > 2$$

$$V_{Rdc} = 0.12 \times 2 (0.6 \times 32)^{1/3}$$

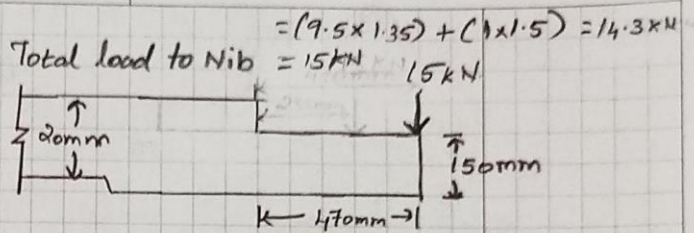
$$= 0.64 \text{ N/mm}^2$$

$$V_{Rdc} > V_{Ed}$$

Safe in Shear.

TOE DESIGN

$$\begin{aligned}\text{Eccentric moment} &= 15 \times 0.47 \\ &= 7.1 \text{ kNm}\end{aligned}$$



$$A_{st} \text{ required} = \frac{M}{0.87 f_y z}$$

$$z = \frac{d}{2} \left[1 + \sqrt{1 - 3.53 k} \right]$$

$$d = 150 - 50 - 12 - 6 = 82 \text{ mm}$$

$$k = \frac{M}{f_{ck} b d^2} = \frac{7.1 \times 10^6}{32 \times 1000 \times 82^2} = 0.033 < 0.2$$

$$z = \frac{82}{2} \left[1 + \sqrt{1 - 3.53 \times 0.033} \right] \text{ (or) } 0.95d$$

$$z = 77.9 \text{ mm}$$

$$A_{st} = \frac{7.1 \times 10^6}{0.87 \times 500 \times 77.9} = 210 \text{ mm}^2$$

$$\text{Minimum } A_{st} = 0.26 \times \frac{f_{ctm}}{f_{yk}} b d$$

$$= 0.26 \times \frac{3.02}{500} \times 1000 \times 82$$

$$= 129 \text{ mm}^2$$

Provide two layers of H12 @ 200 c/c in both directions.

Shear check

$$\tau_{ed} = \frac{V_{ed}}{b d} = \frac{15 \times 10^3}{1000 \times 82}$$

$$= 0.183 \text{ N/mm}^2$$

$$V_{rdc} = 0.12 k (100 \times P_1 \times f_{ck})^{1/3}$$

$$100 \times P_1 = \frac{100 A_s}{b d} = \frac{100 \times 565}{1000 \times 82} = 0.69$$

$$K_L = 1 + \sqrt{\frac{200}{d}} = 1 + \sqrt{\frac{200}{82}} = 2.57 > 2$$

$$V_{rdc} = 0.12 \times 1.27 \times (0.69 \times 32)^{1/3}$$

$$= 0.67 \text{ N/mm}^2$$

$$V_{rdc} > V_{ed}$$

Safe in Shear.

Toe Design Summary:

Provide two layers of H12@200mm c/c in both directions.

Additional reinforcement mark-up:

Concrete Grade :C32/40

Steel Grade :500 N/mm²

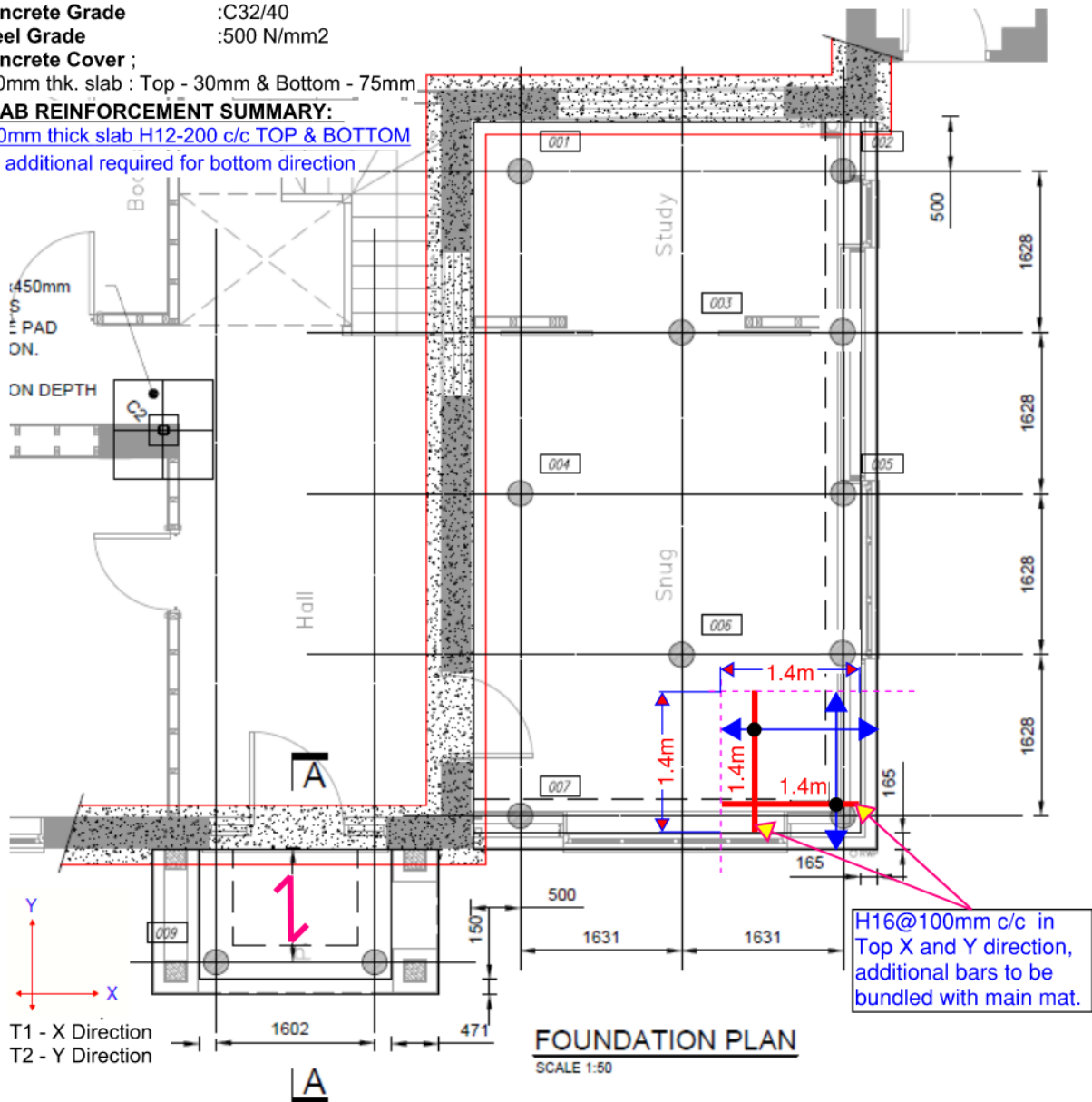
Concrete Cover ;

200mm thk. slab : Top - 30mm & Bottom - 75mm

SLAB REINFORCEMENT SUMMARY:

200mm thick slab H12-200 c/c TOP & BOTTOM

No additional required for bottom direction





Project. 2 Grove Cottages

Drg. Ref. JRG25006-601

By. MDH

Chkd. VLR

Sht. No. 1

Rev. No. P1

drawing title

RC DETAILS OF FOUNDATION SLAB

STATUS : PRELIMINARY

Job No. JRG25006

Member	Bar Mark No.	Type	Size	No. of Memb.	No. in Each	Total	Length per bar (mm)	Shape Code	A*	B*	C*	D*	E	F	R	Weight (Kg)	Rev
FOUNDATION SLAB	01	H	12	1	74	74	3775	00	3775							248.06	
	02	H	12	1	42	42	880	26	350	130	(420)	120	55			32.81	
	03	H	12	1	99	99	1232	13	600	90	(600)					108.32	
	04	H	12	1	12	12	1244	13	600	110	(600)					13.25	
	05	H	12	1	43	43	7000	00	7000							267.29	
	06	H	12	1	19	19	875	26	350	120	(425)	110	50			14.76	
	07	H	12	1	1	1	3825	00	3825							3.4	
	08	H	12	1	1	1	1375	11	700	(700)						1.22	
	09	H	10	1	52	52	1224	13	600	70	(600)					39.27	
	10	H	12	1	22	22	1375	00	1375							26.86	
	11	H	12	1	2	2	1425	00	1425							2.53	
	12	H	12	1	2	2	2375	11	725	(1675)						4.22	
	13	H	12	1	8	8	600	00	600							4.26	
	14	H	12	1	14	14	1175	26	350	120	(725)	110	50			14.61	
	15	H	12	1	18	18	1800	00	1800							28.77	
	16	H	12	1	4	4	850	00	850							3.02	
	17	H	16	1	30	30	1400	00	1400							66.36	
	18	H	10	1	15	15	1024	13	500	70	(500)					9.48	
	19	H	12	1	8	8	1229	13	600	85	(600)					8.73	
	20	H	12	1	4	4	1675	11	125	(1575)						5.95	

* note: dimensions shown underlined are the free dimensions typically shown in parenthesis

Type, Shape Code and Bending Dimensions are in accordance with BS 8666:2020

Diameter	mm	6	8	10	12	16	20	25	32	40	50
Weight	kg	0	0	48.75	788.06	66.36	0	0	0	0	0
CONTINENTAL SIZES											
Diameter	mm	14	18	22	24	26	28				
Weight	kg	0	0	0	0	0	0				

ALL BARS THIS SHEET	
TOTAL	903.17
(kg)	



Project. 2 Grove Cottages

Drg. Ref. JRG25006-601

By. MDH **Chkd.** VLR

Sht. No. 2

Rev. No. P1

Job No. JRG25006

drawing title RC DETAILS OF FOUNDATION SLAB

STATUS : PRELIMINARY

No.	Types Used	Sizes Used	No.of Bars	Total Weights (kgs)
1	H	6	0	0
2	H	8	0	0
3	H	10	67	48
4	H	12	373	788
5	H	16	30	66
6	H	20	0	0
7	H	25	0	0
8	H	32	0	0
9	H	40	0	0
10	H	50	0	0
Total			470	902