| | | | | | | Job No | <u> </u> | Sheet No. | | Rev. |
|-------------|--------------------|--|------------------------|-----------------------------------|--|-------------------------|-----------------|----------------|-------------------|---------------|
| | | Engineerin | | on Sheet | | | | | - | 1.001 |
| ENGI | NEERS | Consulting | Engineers | | | jXX | Х | | 1 | |
| | | | | | | Member/Lo | ocation | | | |
| Job Title | | | - | | Pad, Strip and | O ^{rg.} | | 1 | | |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip a | and Raft | Made by | XX | Date 21 | /11/202 | Chd. |
| | | | | | | | | | | |
| Material | Properties | | | | | | | | | |
| Charactori | ctic strongt | h of concre | to $f(z 6)$ | ON/mm ² | | | | 5 🗸 | N/mm ² | ОК |
| | | itudinal stee | | | | | | | N/mm ² | UK |
| | | ar link steel, | | | | | | | N/mm ² | |
| | oncrete and | | , , . | | Normal | Weight | - | | kN/m ³ | |
| | | | | | | | | | | |
| Factor of | Safety | | | | | | | | | |
| | | | | | | | | | | |
| | | - | - | | S_1 (usually 2. | 5 to 3.0 |)) | 3.0 | | |
| | , , | all sliding r | | | | | | 1.6 | | |
| | | all uplift re | | | S ₄ (usually 1. | 6) | | 1.0 1.6 | | |
| | | | - | | S_4 (usually 1. g on DL to LL | - | | 1.50 | | BS8110 |
| | | | | | ads for sectio | | force | | | cl. 2.4.3.1. |
| | | | /0000 /0 | | | | 2.00 | | | |
| Soil Desc | ription | | | | | | | | | |
| | | | | | | | | | | |
| Water unit | weight, γ_w | = 9.81kN/r | n ³ | | | | | 9.8 | kN/m ³ | |
| | | | | | | | | | | |
| Soil name | <u> </u> | | | | Loose Sand | 1 | | - | | |
| | init weight, | 1 | | | | | | 1 | kN/m ³ | |
| Saturated | bulk unit w | eight, γ _{sat} | | | | | | 20.5 | kN/m ³ | - |
| Undrained | choor strop | ath limit to | adopt 2 | | | | worl | Limit 🔽 | | |
| | | ngth limit to shear strer | | limit) S | | LC | wer l | | kPa | |
| | | shear strer | | | | | | | kPa | |
| Undrained | | | | | (S _{u,ll} +S _{u,ul})/2, | S _{0.01} } | | - | kPa | |
| - | | obtained fro | | , | | | | | | Tomlinson |
| | | | | | _ | | | | | |
| Effective c | ohesion, c' | | | | | Exclude | - | 0.0 | kPa | |
| Effective a | ingle of she | ar resistanc | ce, φ' | | | | | 35.0 | degrees | |
| - | | | | - | T (Durgunogli | | litch | | | Tomlinson |
| Effective a | ingle of fric | tion or 0.66ø' | (Insitu Concre | te Active Zo | one - Soil Interfac | e) | ▼ | 23.1 | degrees | |
| . . | | | | | | | | | | |
| | pacity limit | | wahla haar | ing cono | | | oper | | | |
| Dearing Ca | | SPT, N valu | | шу сара | Drained Soil: | | - | 30.0 | es ? | |
| l | | pacity (low | - | | | 50.0 | • | - | kPa | _ |
| | SPT (lower | | | <u>-</u> | | | | 4 | | |
| | - | pacity (upp | er limit), F | OS ₁ .BC _{ub} | a | | | N/A | kPa | |
| | | r limit), N _{ul} | | , | | | | 10 | | |
| Note that | | | the allowa | ble bear | ing capacity, | BC _{II,a/ul} , | _a at | this stage | because | |
| | | | - | | ffective bearii | ng capa | city | is calculate | ed; | |
| Ground wa | ater level m | odification | for beari GW | VL >= B | ▼ Non Cohe | sive Soil | ◄ | 1.00 | | BS5975 |
| | ļ | Table | 18 — Gro | und wat | er level mod | ificatio | on f | actor | 1 | <u> </u> |
| | | Condition | | | | | | tion factor fo | or: | I |
| | | | | | Cohesive so | | | ohesive soils | | ks |
| | | el at <i>B</i> , or le <i>B</i> is the wi | | | 1.0 | 0. | 5 | | 1.0 | |
| | able to flood | | ath of found | | 0.67 | 0. | 5 | | 1.0 | |
| | | - | | | I | | | | 1 | <u> </u> |
| Bearing ca | pacity ador | ted, BC | | | | | | 300 | kPa | |
| | | | La,(BC ₁₁ + | -BC ,,, , ,)/. | 2, BC _{ul,a} } or | {К _{БРТ} . | V", | | | PT .N ,,, }1: |
| | | | -,, <u>-</u> ,a' | | | | | | | |
| | | | | | | | | | | |
| | • | | | | | • | | • | | - |

| CON | SULTING | Engineerin | g Calculatio | n Shoot | | Job No. | Sheet No. | | Rev. |
|----------------------------|---|---|---|--|---|--|----------------------|-------------|------|
| | NEERS | | | In Sheet | | jXXX | | 2 | |
| | | J | 5 | | | _ | | - | |
| | | | | | | Member/Location | | | |
| Job Title | | | esign - Geot | | | | | | L |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | l Raft | Made by XX | Date 21 | /11/2021 | hd. |
| | | | | | | | | | |
| Analysis | Method | | | | | | | | |
| | | | | | | | | | |
| Undrained | , drained or | | | | | Empirical Ana | lysis 🔻 | | |
| | | | drained, dra | | • | | | | |
| | | | erform dra | | | alyses; | | | |
| | For rocks, | perform dr | ained and e | empirical an | alyses; | | | | |
| | | | | | | | | | |
| | verall uplift | | | \ <i>.</i> | | | No 🔽 | | |
| | | | e (mid third | | | | thus may il I | n certain | |
| instances l | be aeemea | to be over | conservative | e and subse | equentiy igi | norea; | | | |
| F | on Dimens | • | | | | | | | |
| Foundatio | | lons | | | | | | | |
| Foundation | | | | | | Dad Faating | – | | |
| Foundation | i type | | | 1 | | Pad Footing | | | |
| | | | | | | | | | |
| \vdash | | | | | | | | | |
| | | | | | | | | | |
| ⊢∣ | | 7 D | Z | | | | | | |
| | | | ¥ | | | | | | |
| | | | - · | | | | | | |
| Depth of f | oundation f | ounding lev | el from gro | und level [| (> - 0.00) |)0m) | 0.650 | m | ОК |
| - | vater table f | - | | |) (>= 0.00 | | 0.650 | | ΟK |
| • | | - | ater table h | as an effect | tive suhme | raed unit w | | | |
| | | | , thus reduc | | | | | | |
| | | | le forseeabl | - | | | | g capacity, | |
| | - | | ter table ab | | l level, this | representi | ng a flood | event | |
| | | | iver with th | | | | | | |
| _ | | | ound level | - | - | | | (effective) | |
| | | | consider al | | | | | | |
| <u> </u> | | | | | | | | | |
| Foundatio | on Reinfor | cement | | | | | | | |
| | | | | | | | | | |
| Cover to a | ll (bottom a | and side) re | inforcemen | t, cover ₁ (u | sually 75) | | 50 | mm | |
| | | | cover ₂ (usu | | | | 25 | mm | |
| | | | | | | | | | |
| Foundatio | on SLS Loa | ding | | | | | | | |
| | | | | | | | | | |
| Surcharge | at surface, | p _{surface} | | | | | 0 | kPa | |
| Note that | (unlike reta | ining walls) | surface su | rcharging ir | ncreases ov | verall (effec | tive) beari | ng | |
| capacity, t | hus conside | er the case | when there | is no surch | arge unles | s it can be | guaranteed | d; | |
| Consider r | eduction of | working pr | essure due | to surcharg | ge above fo | ounding lev | el, p_0 or p_0 | 1 | |
| in net (effe | ective) worl | king pressu | re, q _{wnet} or | q _{wnet} ' ? | | | Yes 🔻 | | |
| Note that i | for the case | where an | excavation | and backfill | (embedde | d footing) i | takes place | prior to | |
| application | of working | pressure a | at the found | ling level: - | | | | | |
| | | | (above foo | | | | | | |
| | | | of working | | | | | | |
| Note that i | for the case | where an | excavation | without bac | ckfill takes | place prior | to applicat | ion of | |
| | ressure at t | | | | | | | | |
| | | ude additio | nal soil (ah | ove footing |) weiaht F | | | | |
| | | | | | | | | | |
| | | | of working | | | | net Or q wnet | | |
| | do conside | r reduction | | pressure d | ue to p ₀ o | $r p_0' in q_w$ | | | |
| Note that i application | <i>do conside for the case of working</i> | er reduction e where an g pressure a | of working excavation at the found | pressure d had already ling level: - | ue to p ₀ o ⁄ taken pla | $r p_0'$ in q_w ce in the pa | | | |
| Note that i application | do conside for the case of working do not incl | er reduction e where an g pressure a ude additio | of working excavation at the found nal soil (abo | pressure d had already ling level: - ove footing, | ue to p ₀ o ⁄ taken plac) weight, F | r p ₀ ' in q _w , ce in the pa above,soil | ast prior to | | |
| Note that i application | do conside for the case of working do not incl | er reduction e where an g pressure a ude additio | of working excavation at the found | pressure d had already ling level: - ove footing, | ue to p ₀ o ⁄ taken plac) weight, F | r p ₀ ' in q _w , ce in the pa above,soil | ast prior to | | |

| | | | | | | Job No. | Sheet No. | | Rev. |
|------------|--|--------------|---------------------------------------|--------------|-------------|-----------------|----------------|----------|--------|
| | ISULTING E | | | on Sheet | | | | | I.C.V. |
| E N G I | $\mathbf{N} \mathbf{E} \mathbf{E} \mathbf{R} \mathbf{S}$ | Consulting | Engineers | | | jXXX | | 3 | |
| | | | | | | Member/Location | | | |
| Job Title | Structure, M | Iombor Do | sian - Coo | tochnice Pa | d Strip and | Drg. | | | |
| | Member Des | | - | | | Made by XX | Date 31 | /11/202 | Chd. |
| Structure, | Member Des | sign - Geo | lechnics Pa | u, Suip an | | | 21 | /11/202. | |
| | | | | | | | | | _ |
| Executive | e Summary | | | | | | | | |
| | | | | | | | | | |
| | overall net t | - | | | | N/A | N/A | | |
| | verall net effe | | | | | N/A | N/A | | |
| | overall net ef | | | city | | 91% | OK | | |
| | ding resistan | | У | | | 0% | OK | | |
| | lift resistance | | | | | N/A | N/A | | |
| Overall ov | erturning res | sistance ca | pacity | | | 0% | OK | | _ |
| | | | | | | | | | |
| | Pad Footin | - | | | | | | | |
| | Sagging ber | | | | | 5% | ОК | | |
| | Sagging ber | | | | <u>1</u> | 10% | ОК | | |
| | % Min sag r | | | | | 34% | ОК | | |
| | % Min sag r | | | | | 34% | ОК | | _ |
| | Punching sh | | | | | 12% | ОК | | 1 |
| | Punching sh | near at firs | t shear per | imeter | | 14% | ОК | | |
| | Punching sh | near at sec | ond shear | perimeter | | 0% | ОК | | |
| | Ultimate she | ear stress | for bending | g in plane o | of width | 4% | ОК | | |
| | Shear desig | n capacity | for bendin | g in plane | of width | 7% | ОК | | |
| | Ultimate she | ear stress | for bending | g in plane c | of length | 5% | ОК | | |
| | Shear desig | n capacity | for bendin | g in plane | of length | 14% | ОК | | |
| | Detailing re | quirement | S | | | NOT | ОК | | |
| | | - | | | | | | | |
| | Strip Footi | na | | | | | | | |
| | Sagging ber | | nent | | | N/A | N/A | | |
| | % Min sag r | _ | | | | N/A | N/A | | |
| | Ultimate she | | | | | N/A | N/A | | |
| | Shear desig | | | | | N/A | N/A | | |
| | Detailing re | | | | | N/X | | | |
| | | quirement | 5 | | | | | | |
| | Multi Colui | mn Footir | | | | | | | |
| | Sagging ber | | - | o of width | | N/A | N/A | | |
| | Sagging ber | - | · · · · · · · · · · · · · · · · · · · | | 1 | N/A N/A | N/A N/A | | |
| | | - | • | | | N/A N/A | | | |
| | Hogging bei | - | | | 1 | | N/A | | |
| | % Min sag r | | | | | N/A | N/A | | |
| | % Min sag r | | | | | N/A | N/A | | _ |
| | % Min hog i | | | - | | N/A | N/A | | |
| | Punching sh | | | | | N/A | N/A | | |
| | Punching sh | | | | | N/A | N/A | | |
| | Punching sh | | | | | N/A | N/A | | |
| | Ultimate she | | | | | N/A | N/A | | |
| | Shear desig | | | | | N/A | N/A | | |
| | | oar stross | for bending | g in plane c | - | N/A | N/A | - | |
| | | | | | | | | | |
| | Shear desig | n capacity | | g in plane | of length | N/A | N/A | | |
| | | n capacity | | g in plane | of length | N/A N, | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |
| | Shear desig | n capacity | | g in plane | of length | | | | |

| | | | | | | Job No. | Sheet No. | | Rev. |
|--------------|---------------|---------------|--------------|--------------|----------------------|-----------------|------------|----------------------|--------|
| | | Engineerin | | on Sheet | | | | | 1.001 |
| ENGI | N E E R S | Consulting | Engineers | | | jXXX | | 4 | |
| | | , | | 1 | | Member/Location | | | |
| Job Title | Structure | Member De | sian - Geo | Lechnics Pa | d Strin and | Drg. | L | | |
| | - | esign - Geol | - | | | - · | Date 21 | /11/2021 | hd. |
| Sti uctui e, | | | | u, Strip and | | · • • • • | | ./11/2021 | |
| | | | | | | | <u> </u> | | |
| | | | | | | | <u> </u> | | |
| | a | | | | | | <u> </u> | | |
| | Combined | | L | | | | | | |
| | | ending mon | | | | N/A | N/A | | |
| | | ending mon | • | | | N/A | N/A | | |
| | | ending mon | | | | N/A | N/A | | |
| | _ | reinforcem | | | | N/A | N/A | | |
| | - | reinforcem | | - | | N/A | N/A | | |
| | - | g reinforcem | | | | N/A | N/A | | |
| | _ | shear at colu | | | | N/A | N/A | | |
| | | shear at firs | | | | N/A | N/A | | |
| | _ | shear at sec | | - | | N/A | N/A | | |
| | | hear stress | | | | N/A | N/A | | |
| | | ign capacity | | | | N/A | N/A | | |
| | | hear stress | | | | N/A | N/A | | |
| | Shear des | ign capacity | for bendin | g in plane o | of length | N/A | N/A | | |
| | Detailing r | requirement | S | | | N, | /A | | |
| | | | | | | | | | |
| | Strap Foo | oting | | | | | | | |
| | Sagging b | ending mon | nent in plar | ne of width | of outer for | N/A | N/A | | |
| | Hogging b | ending mon | nent in bea | m | | N/A | N/A | | |
| | % Min sag | reinforcem | ent in plan | e of width (| of outer foo | N/A | N/A | | |
| | % Min hoc | g reinforcem | ent in bear | m | | N/A | N/A | | |
| | Punching s | shear at colu | umn base f | ace | | N/A | N/A | | |
| | | shear at firs | | | | N/A | N/A | | |
| | - | shear at sec | | | | N/A | N/A | | |
| | | hear stress | | - | f width of c | | N/A | | |
| | | ign capacity | | | | | N/A | | |
| | | hear stress | | | | N/A | N/A | | |
| | - | ign capacity | | | | N/A | N/A | | |
| | | requirement | | | | - | /A | | |
| | | | 5 | | | | | | |
| | Raft | | | | | | | | |
| | | nforcomont | bacad on t | ha combine | tion of mu | lti column fi | Latings of | mbinod | |
| | Design rel | nforcement | Jaseu ON E | | | | Joungs, CO | lined | |
| | | | | | | | 010/ | | |
| overall uti | ilisation sun | | | <u> </u> | | | 91% | | |
| 0/ 0 | - | | | <u> </u> | | | 0.20 | 0/ | |
| | | nent in plan | | <u> </u> | | <u> </u> | 0.38 | % | |
| | - | nent in plan | - | | | faction > | 0.38 | % | |
| | - | ment in plan | _ | | | rooting) | N/A | % | |
| | | prcement qu | | | | | 59 | kg/m ³ | |
| | | tity in kg/m | | | | | | | |
| Material co | | | concrete, c | | units/m ³ | steel, s | 3200 | units/tonn | e I |
| Reinforced | l concrete r | material cos | t = c+(est. | rebar quar | າt).s | | 449 | units/m ³ | |
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| | | | | | Job No. | Sheet No. | | Rev. |
|--|--|--------------------------------|--------------------------------|---------------------------------|--|----------------------|--------------------------------|----------------------|
| CONSULTING E N G I N E E R S | - | - | on Sheet | | jXXX | | 5 | |
| | | | | | Member/Location | | 5 | |
| lob Title Structure, | Mombor D | ocian - Coo | technics Pa | d Strip and | Drg. | | | |
| Structure, Member De | | - | | a, ourp and | | Date 21 | /11/2021 | Shd. |
| | | | | | 7 | | | |
| Relevant Foundatio | n Parame | ters | | | | | | |
| Relevant foundation t | | | | | Da | d Footing | | |
| | уре | | | | r a | | | |
| | Overall | |) Bearing (| Capacity a | | Sliding R | esistance | Capacity |
| | В | (m) | L | (m) | B' | (m) | L' | (m) |
| Pad Footing | B _{pad} | 0.600 | | 0.750 | B _{pad} ' | 0.557 | L _{pad} ' | 0.750 |
| Strip Footing Multi Column Footir | B _{strip} B _{multi} | N/A N/A | infinity L _{multi} | N/A N/A | B _{strip} ' B _{multi} | N/A N/A | infinity L _{multi} | N/A N/A |
| Combined Footing | B _{com} | N/A | | N/A | B _{com} | N/A | | N/A |
| Strap Footing | B _{strap,1} | N/A | L _{strap,1} | N/A | B _{strap,1} | N/A | L _{strap,1} | N/A |
| Raft | B _{raft} | N/A | L _{raft} | N/A | B _{raft} | N/A | L _{raft} | N/A |
| | В | 0.600 | L | 0.750 | Β' | 0.557 | L' | 0.750 |
| Proce working reserve | | | | | | | | |
| Gross working pressu Vote q _w above is q _{w.} | | footina · | | | | 102 | кра | |
| | | | | | | | | |
| | Overall | Sliding Re | esistance (| Capacity | Overal | l Uplift Re | sistance C | apacity |
| | Vertical | (kN or | Horizont | (kN or | e _B (m) | e _{B,limit} | e _L (m) | e _{L,limit} |
| | Load | kN/m) | al Load | kN/m) | | (m) | | (m) |
| Pad Footing | F _{pad,v} ' | 43 | F _{pad,h} | 0 | 0.021 | 0.100 | 0.000 | 0.125 |
| Strip Footing Multi Column Footir | F _{strip,v} ' N/A | N/A N/A | F _{strip,h} N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A |
| Combined Footing | N/A N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A | N/A N/A |
| Strap Footing | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Raft | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| | F _v ' | 43 | Fh | 0 | 0.021 | 0.100 | 0.000 | 0.125 |
| | | | | | | | | |
| | Dverall Ov | erturning ™ _{rt,B} | Resistanc | e Capacity M _{rt,L} | | | | |
| | (kNm or | (kNm or | (kNm or | (kNm or | | | | |
| Pad Footing | <u>k Nm /m</u>) | 2 Nm/m) 7 | <u>k Nm /m</u>) | 10 kNm/m | | | | |
| Strip Footing | N/A | N/A | N/A | N/A | | | | |
| Multi Column Footir | | N/A | N/A | N/A | | | | |
| Combined Footing | N/A | N/A | N/A | N/A | | | | |
| Strap Footing Raft | N/A | N/A | N/A | N/A | | | | |
| Mail | N/A 0 | N/A 7 | N/A 0 | N/A 10 | | | | |
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| CON | | | ~ | | | | | Job No. | Sheet N | 0. | Rev. |
|------------------|--------------|---|-----------------------|--------------------|--|--|----------------------------------|------------------|--------------|--------------|--------------------------|
| | | | | | g Calculat Engineers | | | jXXX | | 6 | |
| ENGI | | | 5 CONSC | anting | Lingineers | | |]~~~ | | 0 | |
| | | | | | | | | Member/Locati | on | | |
| Job Title | | | | | | | Pad, Strip a | | | | |
| Structure, | Mer | nber [| Design - | - Geo | technics P | ad, Strip | and Raft | Made by X | X Date 2 | 1/11/20 | 21^{Chd.} |
| | | | | | | | | | | | |
| Undraine | d O | verall | Net B | earin | g Capacit | y | | | | | |
| - · · | | | | | | | | | | | |
| Total surc | | | | - | | | | | - | A kPa | |
| | Ca | se wn | | | >= MAX | (B, L) | | | N/ | | |
| | Ca | so wh | | | _e +γ _{dry} .D - D) < MA | | | | | /A kPa | |
| | Ca | | | | _e +γ _{dry} .D | | | | N/ | A /A kPa | |
| | Ca | se wh | en (z " | | | | | | N/ | | |
| | | | | | _e +γ _{dry} .D | | | | | A /A kPa | |
| | Ca | se wh | | | < 0 and 2 | z., >= 0 | | | N/ | | |
| | | | | | e+γ _{sat} .(D-z | | | | | /A kPa | |
| | Ca | se wh | en z _u | | | | | | N/ | | |
| | | | | | $r_{e} + \gamma_{sat} \cdot D + \gamma_{sat}$ | w.(-z _u) | | | | /A kPa | |
| | | | | | | | | | | | |
| Net bearir | ng ca | pacity | , q _{fnet} = | = q _f - | p ₀ | | | | N/ | A kPa | |
| | - | | | | $y, q_f = s_c$ | d _c .N _{c,strip} . | $S_u + p_0$ | | N/ | A kPa | Terzaghi |
| | L r | | | | | | | | | | |
| | \downarrow | 10 | | | 1 | | | 1 1 | 7 | | |
| | \parallel | | | | | | | | | | |
| | | 9 | | | | ircle or sque | are | | - | | |
| | | 8 | | | | | | | | | |
| | | 0 | | | | | | | - | | |
| | | , 7 | $ \rightarrow $ | - | | Strip | | + | | | |
| | | ~ | | 1 | | | | | | | |
| | | octor 9 | | | | | * | ~ | - | | |
| | | Bearing capacity factor, N _C | | | | | 0 | | | | |
| | | bac | | | | | 1 1-4 | >0 | | | |
| | | 0 4 6 | | -+ | | | Al recter | nale | | | |
| | | Barir | | | | | N _c rectar = (0.84 | +0.16 <u>B</u>) | | | |
| | | œ .1 | | | | | x Nc squ | | | | |
| | | 2 | | | | | + + | + + + | | | |
| | | | | | | | | | | | |
| | | 1 | | | | | | | - | | |
| | | | | | | | | | | | |
| | | 0 | | 1 | | 2 n denth / hr | 3 eadth, <i>D/B</i> | 4 | 5 | | |
| | T L | | | | Touridatio | | outin, 070 | | | | |
| | | | | | or, $s_c = 1$ | | | | N, | /A | EC7 |
| | | | | | | | 0/B') ^{0.5} for D/ | ′B' <= 4.0 | N, | /A | N/A |
| | | | | | pacity fact | | | π) = 5.14, | N, | /A | Skemptor |
| | | | | | | | | | | | |
| Net worki | | | | | , - (p ₀ or 0 |) | | | | A kPa | |
| | | | rking p | | | | | | - | A kPa | |
| | | | | | | | following ana | | | | |
| - | | | - | | | - | , conservativ | - | | | |
| | | | | | | he soil in | terface above | e the found | ling level a | nd any | |
| wall embe | edme | nt bel | ow the | tound | ding level; | | | | | | |
| Indrainad | | roll or | there | ng 65 | nacity (fr | torod) - | | | | | |
| | | | | | pacity (fac | | | | | A kPa | |
| | | | | | | | ABS (q _{wnet}) / | | | | N/A |
| | | | | | | | present the | susceptibil | ity to base | neave | |
| instability | as V | ien as | | zi dil 1 | net bearin <u>e</u> | y capacity | ' <i>i</i> | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | I | | | | |

| | | | Job No. | Sheet No. | | Rev. |
|---------------------|---|--------------------------|------------------------------|----------------------|--------------------------|-----------------------|
| | G Engineering Calculation Sheet S Consulting Engineers | | jXXX | | 7 | |
| | | | _ | | / | |
| | | <u> </u> | Member/Location | | | |
| | e, Member Design - Geotechnics Pad, | | | Data D1 | (11 (202) | • Chd |
| Structure, Member | Design - Geotechnics Pad, Strip and R | kart | Made by XX | Date 21 | /11/202 | |
| Drained Overall N | let Effective Bearing Capacity | | | | | |
| | | | | | | |
| Effective surcharge | above founding level, p_0 ' | | | N/A | kPa | |
| Unit weight, γ' | | | | | kN/m ³ | |
| Case wl | hen (z _u -D) >= MAX (B, L) | | | N/A | | |
| | $p_0' = p_{surface} + \gamma_{dry} D$ | | | | kPa | |
| | $\gamma' = \gamma_{dry}$ | | | | kN/m ³ | |
| Case wl | hen $0 < (z_u - D) < MAX (B, L)$ | | | N/A | - | |
| | $p_0' = p_{surface} + \gamma_{dry} . D$ | | | | kPa | |
| C | $\gamma' = z_u / MAX(B,L) \cdot [\gamma_{dry} - (\gamma_{sat} - \gamma_w)]$ | + (γ _{sat} - | γ _w) | | kN/m ³ | |
| Case wi | $hen (z_u - D) = 0$ | | | N/A | kDo. | |
| | $p_0' = p_{surface} + \gamma_{dry}.D$ $\gamma' = \gamma_{sat} - \gamma_w$ | | | | kPa kN/m ³ | + |
| Case w | $\frac{\gamma - \gamma_{sat} - \gamma_w}{hen (z_u - D) < 0 and z_u >= 0}$ | | | N/A | | |
| | $p_0' = p_{surface} + (\gamma_{sat} - \gamma_w) \cdot (D - z_u) + \gamma_{dry} \cdot z_u$ | | | N/A | kPa | 1 |
| | $\gamma' = \gamma_{sat} - \gamma_{w}$ | | | | kN/m ³ | 1 |
| Case wi | hen $z_u < 0$ | | | N/A | | |
| | $p_0' = p_{surface} + \gamma_{sat} \cdot D + \gamma_w \cdot (-z_u) - \gamma_w \cdot (D + v_w) \cdot (-z_w) - \gamma_w \cdot (D + v_w) \cdot (-z_w) \cdot (-z_w) - \gamma_w \cdot (D + v_w) \cdot (-z_w) - \gamma_w -$ | | | N/A | | |
| | Note that the above equation reduc | ces to p _c | $p' = p_{surface}$ | | | |
| | $\gamma' = \gamma_{sat} - \gamma_{w}$ | | | N/A | kN/m ³ | |
| | | | | | | |
| | g capacity, $q_{\text{fnet}}' = q_f' - p_0'$ | | | N/A | | |
| | fective bearing capacity, q _f ' | | | N/A | | Terzaghi |
| | $= s_c \cdot d_c \cdot N_{c, strip} \cdot c'$ | | | N/A | | |
| | + $s_q.d_q.N_{q,strip}.p_0'$ + $s_{\gamma}.d_{\gamma}.N_{\gamma,strip}.B'/2.\gamma'$ | | | | kPa kPa | |
| | + 3γ · $\alpha\gamma$ · $\alpha\gamma$, strip. D / 2. γ | | | N/ A | кга | |
| 860110 | Ne Ne Ne Ne Ne Ne Ne Ne Ne Ne | Bearing capacity fac | | 20 30 Friction ar | | 60 70 ations on rock. |
| Tansen | | | | 0 refactly in | | |
| Equation | s for bearing capacity Prandtl, Reissner and | d Hansen E | equations for So | oils 🔻 | | |
| | on Factors | | | L | | |
| | Shape factor, $S_c = (S_q \cdot N_q - 1)/(N_q - 1)$ | | | N/A | | EC7 |
| | Depth factor, $d_c = 1 + 0.4 \arctan(D/B)$ | | | N/A | | |
| | Note B in the above equation is B'; | | | | | |
| | Bearing capacity factor, N _{c,strip} | | | N/A | | |
| | Soils $N_{c,strip} = (N_{q,strip}-1).cot\phi'$ | $N_{c} = (N_{c} = N_{c}$ | a - 1) cot ¢' n²(45°+∳/2) | N/A | | EC7 (Prand |
| | Rocks $N_{c,strip}$ N_c $2N_{o}^{1/2}(N_{o}+1)$ | nv _∲ .⊓a | n (45° + ¢/2) | N/A | Kulh | awy and Go |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| | NSULTING | Engineerin | a Calculatio | n Chaot | Job No | . Sheet No. | Rev. |
|---|--|--|---|--|---|--|--|
| | INEERS | | | in Sheet | jXXX | κ 8 | |
| | | | | | Member/Lo | cation | |
| ob Title | Structure. | Member De | esian - Geot | echnics Pad, Str | in and ^{Drg.} | | |
| | | | - | d, Strip and Raft | | XX Date 21/1 | L1/2021 ^{Chd.} |
| | | | | -, | | | |
| | | | | | | | |
| | | | | | | | |
| | Surcharg | e Factors | | | | | |
| | | Shape fact | | + (B' / L') sin <i>φ</i> ', | | N/A | EC7 |
| | | Depth fact | or, d _q 1+2 | $\tan \varphi'(1 - \sin \varphi')^2$ | rctan | N/A | |
| | | | | | B' | | |
| | | | pacity facto | | | N/A | |
| | | | | tan ² (45 ⁻ + φ'/2) : N ₆ ² N ₆ : Tan ² | /15°±↓/2) | N/A | EC7 (Reis |
| | Colf Wain | ROCKS | N _{q,strip} N _a | $N_{\phi}^2 = N_{\phi}^2$ Tan ² | 45°+¢/2) | N/A | Kulhawy and |
| | Self weig | Shape fact | | – 0,3 (<i>B'/L'</i>), | | N/A | EC7 |
| | | Depth fact | | | | N/A N/A | EC7 |
| | | | pacity facto | | | N/A | |
| | | | | O(N _{q,strip} -1).ta N _γ | = 2 (N ₀ - 1) tan | - | EC7 (Har |
| | | | | $N_{\phi}^{1/2}(N_{\phi}^{2}-1)$ N_{ϕ} | | | Kulhawy and |
| | | | Watth | | | | |
| | 2 | ° | | | 4.0 | 1 1 1 | |
| | | | ¢ = | 45° | | | 5 67 |
| | 1 | .8 | | | 3.5 | ¢=45 | |
| | s 1 | 6 | 1 | 7. | | ¢-45 | |
| | Shape factor, se | | | | 30 | | |
| | de 1. | 4 | 4 | 40° | 5 | =402 | 3.59 8 |
| | S) | | | =30° | 3 2 5 | | 0/1 |
| | 1, | 2 | 1 | 30 | 2 6 | = 35° | 2 56 5 |
| | - mainte | 1 | | 0-25° | 8 20 | N | |
| | | | | =30° 0-25° / | | = 30° = 25° | 2 04 |
| | octor, | 8 | | =35° | | =20= | 1.65 |
| | Shape factor, s _y | | | 40° | | = 0-10° | 1.56 |
| | sha o | 6 | | 45° | | | |
| | 0. | 50 0.2 | 0.4 0.6 | 0.8 1.0 | 100 | 5 10 15 | 20 |
| | postalij n | | readth / length, | | | Depth / breadth, D/B_{g} | |
| | Fig. 2.9 | Shape factors sc | and s_{γ} (after Br | inch Hansen ^{2.1}). | 2.11 Depth fa | actor d_c (after Brinch Ha | ansen ²⁻¹). |
| | | | | | | | |
| | Shape of b | ase s _c | Sq | 3γ | | | |
| | Continuous | | | 1.0 | | | |
| | | | + 0.2B/L = 1 + 0 | 2B/L 1 - 0.4B/L | | | |
| | Rectangle | 1.3 | 1.2 | 0.8 | | | |
| | Square | | | | | | |
| | Square | 1.3 | | 0.8 | | | |
| | Square Circle (B = | = diameter) 1.3 | 1.2 | 0.8 | | | |
| et effect | Square Circle (B = | e diameter) 1.3 | 1.2 $q_{wnet}' = q_w'$ | 0.8 | | N/A k | |
| et effect | Square Circle (B = | e diameter) 1.3 1.3 pressure, c king pressu | 1.2 $q_{wnet}' = q_w' - q_w$ | - (p ₀ ' or 0) | | N/A k | Ра |
| et effect | Square Circle (B = | e diameter) 1.3 1.3 pressure, c king pressu ssure at fou | 1.2 $q_{wnet}' = q_w' + re, q_w$ $nding level,$ | $(p_0' \text{ or } 0)$, $u = \gamma_w \cdot MAX$ (E |) – z _u , 0) | N/A k | Pa Pa |
| | Square Circle (B = Circle working Gross work Water press Gross effe | e diameter) 1.3 1.3 pressure, c king pressu ssure at fou ctive workir | 1.2 $q_{wnet}' = q_w' - re, q_w$ inding level, ng pressure | $(p_0' \text{ or } 0)$ $(u = \gamma_w \cdot MAX (D))$ $(u = q_w - u)$ | | N/A k N/A k N/A k | Pa Pa |
| ote a ne | Square Circle (B = Circle (Circle (Cir | a diameter) 1.3 pressure, c king pressu ssure at fou ctive workin t' indicates | 1.2 q _{wnet} ' = q _w ' - re, q _w inding level, ng pressure an excavati | $(p_0' \text{ or } 0)$ $(u = \gamma_w \cdot MAX (I)$ $(q_w' = q_w - u)$ $(v, the following)$ | analysis asc | N/A k N/A k N/A k rertains the | Pa Pa Pa |
| lote a ne usceptib | Square Circle (B = Circle (B = Gross working Water press Gross effect gative q wnet ility of the sy | e diameter) 1.3 pressure, c king pressu ssure at fou ctive workin t' indicates ystem to ba | 1.2 $q_{wnet}' = q_w' - re, q_w$ inding level, ang pressure an excavator ase heave in | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | analysis asc vatively howe | N/A k N/A k N/A k ertains the ever ignoring the | Pa P |
| <i>lote a ne usceptib</i> i ontributi | Square Circle (B = Circle (Circle | a diameter) 1.3 pressure, c king pressu ssure at fou ctive workin t' indicates ystem to bar earing resis | 1.2 $q_{wnet}' = q_w' - re, q_w$ inding level, ng pressure an excavations ase heave in stance of the | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | analysis asc vatively howe | N/A k N/A k N/A k rertains the | Pa P |
| <i>lote a ne usceptib</i> i ontributi | Square Circle (B = Circle (B = Gross working Water press Gross effect gative q wnet ility of the sy | a diameter) 1.3 pressure, c king pressu ssure at fou ctive workin t' indicates ystem to bar earing resis | 1.2 $q_{wnet}' = q_w' - re, q_w$ inding level, ng pressure an excavations ase heave in stance of the | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | analysis asc vatively howe | N/A k N/A k N/A k ertains the ever ignoring the | Pa P |
| lote a ne usceptib ontributi vall embe | Square Circle (B = Circle (B = Gross working Water press Gross effect gative q wnet ility of the sy on of the sh edment belo | a diameter) 1.3 pressure, c king pressu ssure at fou ctive workin t' indicates ystem to ba earing resis w the found | 1.2 $q_{wnet}' = q_w' + re, q_w$ anding level, an excavator an exca | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | analysis asc vatively howe bove the four | N/A k N/A k N/A k ever ignoring the nding level and a | Pa P |
| lote a ne usceptib ontributi vall embe rained o | Square Circle (B = Circle (B = Circle (B = Gross working Water press Gross effect gative q wnet ility of the sy on of the sh edment belo | a diameter) 13 13 pressure, c king pressu ssure at fou ctive workin t' indicates ystem to ba earing resis w the found ffective bea | 1.2 $q_{wnet}' = q_w' - re, q_w$ inding level, an excavation an excavation | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four bove the four | N/A k N/A k N/A k ever ignoring the nding level and a N/A k | Pa Pa Pa any Pa |
| lote a ne usceptibli pontributi vall embe prained o prained o | Square Circle (B = Circle (Circle | aiameter) 1.3 pressure, c king pressu king pressu ssure at fou ssure at fou ctive working t' indicates ystem to bas earing resis w the found ffective bea ffective bea | 1.2 $q_{wnet}' = q_w' + re, q_w$ inding level, an excavation an excavation be heave in stance of the ding level; ring capacitor ring capacitor | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four t' / FOS ₁ 3S (q _{wnet} ') / (| N/A k N/A k ertains the ever ignoring the nding level and a N/A k | Pa P |
| ote a ne usceptib ontributi all embe rained o rained o ote an a | Square Circle (B = Circle (B = Circle (B = Circle (B = Circle (B = Water press Gross world Water press Gross effet gative q wnet ility of the sp on of the sh edment belo werall net effet bsolute function | a diameter) 13 pressure, construction of the second secon | 1.2 $q_{wnet}' = q_w' - re, q_w$ anding level, ang pressure an excavator ase heave in stance of the ding level; ring capacit ring capacit lied to the a | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four bove the four bove the four bove the four the susceptil | N/A k N/A k N/A k ever ignoring the nding level and a N/A k | Pa P |
| lote a ne usceptibl ontributi vall embe prained o prained o lote an a nstability | Square Circle (B = Circle (B = Circle (B = Circle (B = Circle (B = Water press Gross world Water press Gross effet gative q wnet ility of the sp on of the sh edment belo werall net effet bsolute function | a diameter) 13 pressure, construction of the second secon | 1.2 $q_{wnet}' = q_w' - re, q_w$ anding level, ang pressure an excavator ase heave in stance of the ding level; ring capacit ring capacit lied to the a | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four bove the four bove the four bove the four the susceptil | N/A k N/A k ertains the ever ignoring the nding level and a N/A k | Pa P |
| lote a ne usceptib ontributi vall embe vrained o vrained o lote an a | Square Circle (B = Circle (B = Circle (B = Circle (B = Circle (B = Water press Gross world Water press Gross effet gative q wnet ility of the sp on of the sh edment belo werall net effet bsolute function | a diameter) 13 pressure, construction of the second secon | 1.2 $q_{wnet}' = q_w' - re, q_w$ anding level, ang pressure an excavator ase heave in stance of the ding level; ring capacit ring capacit lied to the a | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four bove the four bove the four bove the four the susceptil | N/A k N/A k ertains the ever ignoring the nding level and a N/A k | Pa P |
| ote a ne usceptiblo pall embe rained o rained o ote an a ostability | Square Circle (B = Circle (B = Circle (B = Circle (B = Circle (B = Water press Gross world Water press Gross effet gative q wnet ility of the sp on of the sh edment belo werall net effet bsolute function | a diameter) 13 pressure, construction of the second secon | 1.2 $q_{wnet}' = q_w' - re, q_w$ anding level, ang pressure an excavator ase heave in stance of the ding level; ring capacit ring capacit lied to the a | $\begin{array}{c} 0.8\\ 0.6\\ \hline \end{array}$ | a analysis asc vatively howe bove the four bove the four bove the four bove the four bove the four the susceptil | N/A k N/A k ertains the ever ignoring the nding level and a N/A k | Pa P |

| | | | | | | Jak Na | | | Davis |
|---|--|--|--|--|---|---|--|--------------|-----------|
| CON | SULTING | Engineerin | g Calculatio | on Sheet | | Job No. | Sheet No. | | Rev. |
| ENGI | NEERS | Consulting | Engineers | | | jXXX | | 9 | |
| | 1 | | | | | Member/Location | | | |
| | | | | | | | | | |
| Job Title | | Member De | - | | | Drg. | 1 | | 1 |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | hd. |
| | | | | | | | | | |
| Empirical | l Overall N | et Effectiv | e Bearing | Capacity | | | | | |
| | | | | | | | | | |
| Effective s | urcharge al | bove foundi | ng level, p | ') | | | 12 | kPa | |
| | | en (z _u -D) | | | | | Invalid | | |
| | | $p_0' = p_{surface}$ | | | | | | kPa | |
| | Case whe | $r 0 < (z_u)$ | | (B.L) | | | Invalid | | |
| | | $p_0' = p_{surface}$ | | - (-/ -/ | | | | kPa | |
| •) | Case whe | en (z _u -D) | , | | | | Valid | КI Ü | |
| .) dman | case whe | 1 | | | | | | L/Do | |
| lman | Cara such a | $p_0' = p_{surfact}$ | | | | | | kPa | |
| | Case whe | en (z _u -D) | | | | | Invalid | | |
| | | | $_{ce}$ +(γ_{sat} - γ_{w}). | $(D-Z_u)+\gamma_{dry}$ | Z _u | | | kPa | |
| | Case whe | | | | | | Invalid | | |
| | | | $_{ce}+\gamma_{sat}.D+\gamma_{v}$ | | | | | kPa | |
| | | Note that t | the above e | equation rec | duces to p o | ' = p _{surface} | + $(\gamma_{sat} - \gamma_w)$ | .D; | |
| lman | | | | | | | | | |
| Net effecti | ive bearing | capacity, q | $q_{fnet}' = q_f' - p_f$ | o ₀ ' | | | 300 | kPa | |
| | | ctive bearin | | | p ₀ ' | | 312 | kPa | |
| | | | | | | | | | |
| Net effecti | ive working | pressure, o | , a _{wnet} ' = a _w ' | -(p ₀ ' or 0) | | | 91 | kPa | |
| | 1 | king pressu | | / | | | 102 | | |
| | | ssure at fou | | , u = γ M | 1AX (D – z | , 0) | | kPa | |
| | | | | | | | 102 | | |
| | Gross effe | | | | | | 102 | Ki u | |
| Note a neg | Gross effe | | | | | veis accerta | inc the | | |
| | gative q _{wne} | t' indicates | an excavat | ion, the fol | lowing anal | | | ha | |
| susceptibil | gative q _{wne} lity of the s | _t ' indicates ystem to ba | an excavat ase heave ii | ion, the fol nstability, c | lowing anal onservative | ely however | ⁻ ignoring tl | | |
| susceptibil contributic | gative q _{wne} lity of the s on of the sh | _t ' indicates ystem to ba earing resis | <i>an excavat</i> ase heave in stance of th | ion, the fol nstability, c e soil interf | lowing anal onservative | ely however | ⁻ ignoring tl | | |
| susceptibii contributic | gative q _{wne} lity of the s | _t ' indicates ystem to ba earing resis | <i>an excavat</i> ase heave in stance of th | ion, the fol nstability, c e soil interf | lowing anal onservative | ely however | ⁻ ignoring tl | | |
| susceptibil contributic wall embe | gative q _{wne} lity of the s on of the sh dment belo | t' indicates ystem to ba earing resis w the found | an excavat ase heave in stance of th ding level; | <i>ion, the fol</i> <i>nstability, c</i> <i>e soil interl</i> | lowing anal onservative face above | ely however the foundin | g level and | l any | |
| susceptibil contributic wall embe Empirical o | gative q _{wne} , lity of the s on of the sh dment belo overall net o | t' indicates ystem to ba earing resis w the found effective be | an excavat ase heave in stance of th ding level; aring capac | ion, the fol nstability, c e soil interf city (factore | lowing anal onservative face above ed), q _{fnet} ' / | ely however the foundin FOS ₁ | g level and 19 level and 100 | l any kPa | |
| susceptibil contributic wall embe Empirical (Empirical (| gative q _{wne} lity of the s on of the sh dment belo overall net o overall net o | t' indicates ystem to ba earing resis w the found effective be effective be | an excavat ase heave ii stance of th ding level; aring capac aring capac | ion, the fol. nstability, c e soil interf city (factore city utilisation | lowing anal onservative face above d), q _{fnet} ' / on = ABS (| ely however the foundin FOS ₁ q _{wnet} ') / (q _{fr} | g level and g level and 100 91% | kPa | OK |
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| | SULTING NEERS | | g Calculatic Engineers | n Sheet | | jXXX | | 10 | |
| | | | _ | | | Member/Locati | on | | |
| 1. h. Title | Chrusture | Mambar D | naian Caal | ta abrica Da | d Ctuin and | Drg. | on | | |
| | | | esign - Geo technics Pa | | | - | X Date 2 | 21/11/2021 | Chd. |
| Structure, | | esign - Geo | | u, Strip and | | · ^ | | .1/11/2021 | |
| Overall SI | iding Resi | stance Ca | pacity | | | | | | |
| | _ | | l resistance | capacity co | onsidered, | passive re | esistance o | f soil in an | |
| | | | ered, argua | | | | | | |
| retaining w | all analysis | should thi | s additional | capacity b | e required | and can b | e guarante | eed; | |
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| | | | <i>his required</i> ad, k _{SLStoDL} . | | e Ioad comp | oonent ca | | 26 kN or kN/ | m |
| | lation SLS | | | V | | | | 0 kN or kN/ | |
| | | | | | | | | | 1 |
| Overall slid | ling resista | nce capacit | y (factored) |), F _{s,cap} | | | | 7 kN or kN/ | m |
| 1 | Undrained | | $F_{s,cap} = (B')$ | | S ₂ | | N | /A kN or kN/ | 1 |
| | Drained An | nalysis | $F_{s,cap} = k_{SL}$ | _{StoDL} .F _v '.tan | δ' / FOS ₂ | | N | /A kN or kN/ | |
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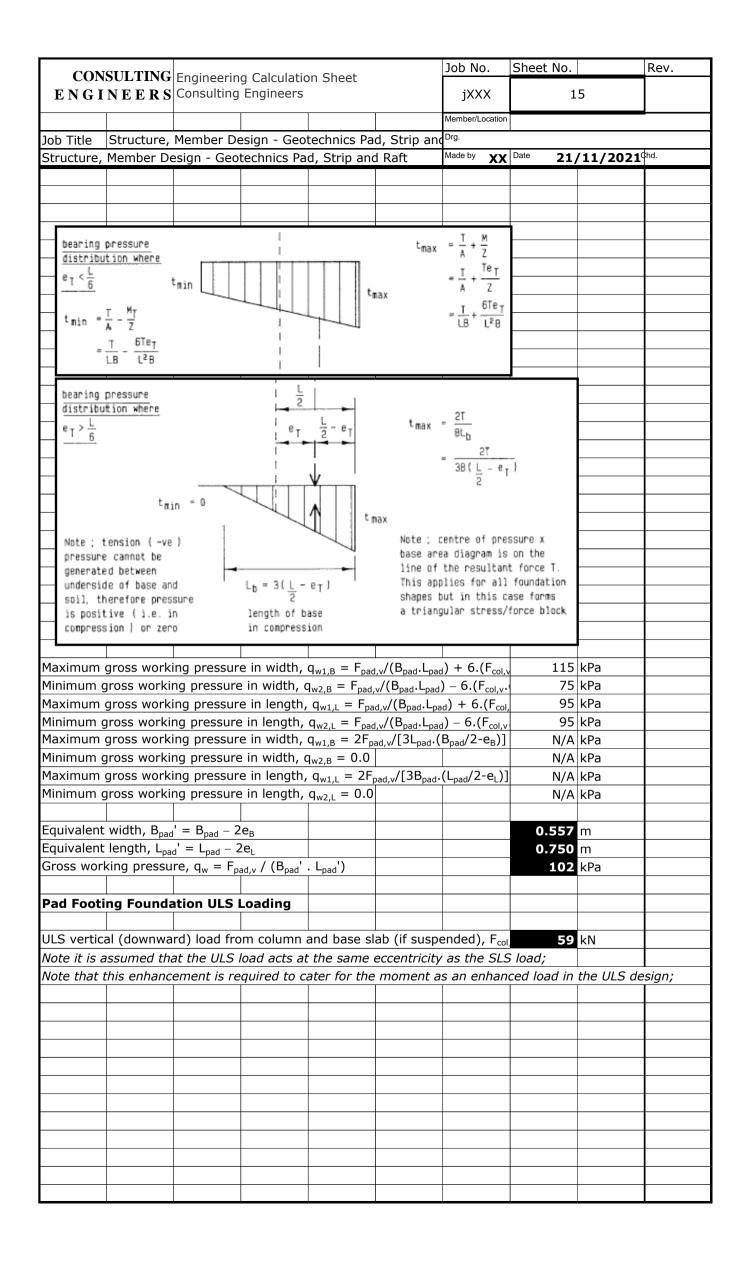
| CONS | | Fraincarin | a Calaulatia | n Chaot | | Job No. | Sheet No. | | Rev. |
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| ENGI | NEERS | Engineerin Consulting | Engineers | on Sheet | | jXXX | 1 | .1 | |
| | | | | | | Member/Location | | | |
| Job Title | Structure, | Member De | esian - Geo | technics Pa | d, Strip and | | | | |
| Structure, N | | | | | | Made by XX | Date 21 | /11/2021 | Shd. |
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| Overall Up | lift Resist | tance Capa | acity | | | | | | |
| Overall upli | ft in width | resistance | canacity ut | ilisation = e | | | N/A | | N/A |
| Overall upli | ft in length | resistance | capacity u | tilisation = | $e_L / e_{L,limit}$ | | N/A | | N/A |
| Overall upli | ft resistand | ce capacity | utilisation | = MAX (e _B , | / e _{B,limit} , e _L | / e _{L,limit}) | N/A | | N/A |
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| CON | SUI TING | Engineerin | a Calculatio | n Shoot | | Job No. | Sheet No. | | Rev. |
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| ENGI | N E E R S | Consulting | Engineers | JII Sheet | | jXXX | 1 | .2 | |
| | | | | | | Member/Location | | | |
| ob Title | Structure, | Member De | esign - Geo | technics Pa | d, Strip and | Drg. | | | |
| | | esign - Geo | | | | Made by XX | Date 21 | /11/2021 | hd. |
| | | | | | | | | | |
| Overall O | verturning | g Resistan | ce Capacit | : y | | | | | |
|) Verall ove | erturnina in | width resis | stance capa | citv utilisat | $ion = M_{ot R}$ | / M _{r+ P} | 0% | | ОК |
| Overall ove | erturning in | length res | istance cap | acity utilisa | tion = $M_{ot,L}$ | / M _{rt,L} | 0% | | ОК |
| Overall ove | erturning re | esistance ca | pacity utilis | sation = MA | X (M _{ot,B} / N | M _{rt,B} , M _{ot,L} / | 0% | | ОК |
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| Cell Refer | ences | | | | | | |
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| concrete | grade | | | | | 3 | |
| 25 | | | | | | | |
| 30 | | | | | | | |
| 35 | | | | | | | |
| 40 | | | | | | | |
| 45 50 | | | | | | | |
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| 95 | | | | | | | |
| 100 105 | | | | | | | |
| 105 | | | | | | | |
| 115 | | | | | | | |
| 120 | | | | | | | |
| | | | | | | | |
| longitudir | nal reinforcement | steel grade | | | | 2 | |
| 250 | | | | | | | |
| 460 | | | | | | | |
| | | | | | | | |
| shear link | reinforcement s | teel grade | | | | 2 | |
| 250 | | | | | | | |
| 460 | | | | | | | |
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| type of co | oncrete | | | | | 1 | |
| Normal We | hight | | | | | | |
| Light Weig | | | | | | | |
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| soil name | l | | | | | 36 | |
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| undrained | l shear strength l | limit to adop | t | | | 1 | |
| | • | | | | | | |
| Lower Limi Middle Lim | | | | | | | |
| Upper Lim | | | | | | | |
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| ignore eff | ective cohesion | | | | | 2 | |
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| Include | | | | | | | |
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| - 66 1 - | | | | | | | |
| errective | angle of friction | | | | | 5 | |
| 1 00%' (Ca | st in Place Concrete | - Soil Interfa | (e) | | | 1.00 | |
| | ecast Concrete - So | | | | | 0.90 | |
| | nber - Soil Interface | | | | | 0.85 | |
| | ugh Corrugated Ste | | face) | | | 0.80 | |
| | situ Concrete Active | | | | | 0.66 | |
| | nooth Coated Steel | | | | | 0.60 | |
| | situ Concrete Passiv | | - | 1 | 1 | 0.50 | |

| ~ ~ ~ ~ ~ | | | | | | Job No | o. | Sheet | No. | | Rev. |
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| | | | g Calculatio | on Sheet | | | | 0 | | _ | |
| ENGI | NEERS | Consulting | Engineers | | | jХХ | X | | 1 | 3 | |
| | | | | | | Member/L | ocation | | | | |
| ob Title | Structure, | Member De | esign - Geo | technics Pa | d, Strip and | Drg. | | 1 | | | |
| | | | technics Pa | | | Made by | xx | Date | 21 | /11/2021 | Chd. |
| | | | | | | | 2171 | | / | / | |
| Pad Footi | na Founda | ation Dime | ensions | | | | | | | | |
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| Nidth, B _{pac} | . (<= md) | | | | | | | 0 | .600 | m | ОК |
| | $(>=B_{pad})$ | | | | | | | | .750 | | ОК |
| | | se slab, t _{1,r} | | | | | | | .200 | | |
| | | ,1 | no base slat |) b. then ente | r 0.000m) | | | | .000 | | |
| | | | $t_{1,pad} + t_{2,pad}$ | | | | | | .200 | | |
| | | | unching she | | | F | Rectar | | .200 | | |
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| | | | ed in the ce | | | | | | 2.4111 | - | |
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| Pad Footi | na Founda | tion Doin | forcement | | | | | | | | |
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| | | - | | ing in width | · · · · · · · · · · · · · · · · · · · | | | | | | |
| Cogging st | ool roinford | omont diar | notor in wie | 1+h ⊥ | | | | 10 | _ | | |
| | | | neter in wid | - | | | | 12 | | mm | |
| | | | h for resista | | - | | | - | | mm | |
| Sagging st | eel area pr | ovided in w | vidth, A _{s,prov,} | $x_{,x,s} = (\pi \cdot \phi_{sx})^2$ | /4)/p _{sx} | | | 10 | | mm²/m | |
| | | | meter in len | , | | | | 12 | | mm | |
| | | | h for resista | | 1 | | | | | mm | |
| Sagging st | eel area pr | ovided in le | ength, A _{s,pro} | _{ν,y,s} = (π.φ _{sy} | ²/4)/p _{sy} | | | | 754 | mm²/m | |
| | | | | | | | | | | - | |
| | | | ar perimete | , | | | | None | | mm | |
| | _ | | ar perimeter | - 1 | | | 2 | | 30 | - | |
| | | | t shear per | | $p_{rov,2} = n_{1,2}$ | π.φ _{link,2} | ²/4 | | | mm ² | |
| | | | hear perime | , | | | | None | | mm | |
| | | | hear perime | | | | | | 30 | | |
| Area provi | ded by all I | inks for sec | ond shear | perimeter, | $A_{sv,prov,3} = I$ | n _{I,3} .π.φ _{li} | nk,3 ² / | | 0 | mm ² | |
| | | | in width, _{φlin} | | | | | | | mm | |
| | | | or bending i | | 1 | | | | | /m | |
| | | | etre for ben | ding in wid | th, A _{sv,prov,x} | = n _{link} | ,x.π.¢ | | | mm²/m | |
| | | ling in widt | | | | | | | | mm | |
| | | | in length, ϕ | | | | | | | mm | |
| | | | or bending i | | ., | | | | 4 | /m | |
| | | | etre for ben | ding in leng | gth, A _{sv,prov} , | _y = n _{lin} | _{k,y} .π. | | 0 | mm²/m | |
| | | ling in leng | | | | | | | 150 | mm | |
| | | | | | | | | | | | |
| Effective d | epth to sag | ging steel | in width, d _x | $_{,s} = T_{pad} - c$ | over ₁ - MA | X (φ _{link} , | 2, φ _{lin} | | 132 | mm | |
| ffective d | epth to sag | ging steel | in length, d | $_{y,s} = T_{pad} -$ | cover ₁ - MA | AX (¢link | ,2 , φ _{li} | | 144 | mm | |
| | | | in length is | | | | | | | | l l |
| t is assum | - | | | | | | - | | | | ſ |
| t is assur | | ÷ | antity | | | | | | <u>59</u> | kg/m ³ | |
| | steel reinfo | orcement qu | adherey | | | | | | | | |
| Estimated | | | | curtailment | ; No laps; | Links ig | gnore | ed; | | | |
| Estimated | | | T _{pad}]; No | curtailment | ; No laps; | Links ig | gnore | ed; | | | |
| Estimated | | | | curtailment | ; No laps; | Links ig | gnore | ed; | | | |
| Estimated | | | | curtailment | ; No laps; | Links i <u>e</u> | gnore | ed; | | | |
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| Estimated | | | | curtailment | ; No laps; | | gnore | ed; | | | |

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| Pad Footi | ing Founda | ation SLS | Loading | | | | | | |
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| | _ | | | | | Member/Loc | ation | | |
| Job Title | 1 | | | technics Pa | | Drg. Made by | and Data | | • Chd |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | a Kaft | Wade by | XX Date 2: | L/11/202 | |
| Pad Footi | ing Founda | ation Reint | forcement | Design | | | | | |
| | | | | | | | | | |
| Gross UL | S Pressure | | | | | | | | |
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| Gross ULS | pressure, o | $q_{w,ULS} = F_{col}$ | _{,v,uls} / (B _{pad} | . L _{pad}) | | | 13 | l kPa | |
| | 1 | I | l | | | | | | |
| | | S | hear force | diagram | ר ר | | | | |
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| | \mathbf{v} | Den | | ne diagram | ┛┢─ | | | | |
| | | | | | | | | | |
| Sagging | Bending M | oment De | sign in Pla | ne of Widt | th | | | | |
| | | | | | | | | | |
| | t column ba | | | | -(b or D))/2 | 2] ² / 2 | | 2 kNm | |
| Moment a | t column ba | se face per | metre, M _x | /L _{pad} | | | | 2 kNm/m | _ |
| | | | | | | | | | |
| | moment cap | | | | 1000.d _{x,s} 2 | | | 5 kNm/m | |
| | tress, [M/bo | | | | | | | 3 N/mm ² | |
| | tress ratio, , $z_x = d_{x,s}$. | | | | | | 0.00 | 4 5 mm | ОК |
| Area of te | $r_{x,s} = u_{x,s}$. nsion steel | <u>[0.5 + (0.2</u> required Δ | = (M / I) |] <= 0.95 | u _{x,s} f) ⁊ 1 | | | $1 \text{ mm}^2/\text{m}$ | |
| | | | s,x = (11x/ =p | ad) / [(0.55 | 'y). ^z x] | | | | |
| Area of te | nsile steel r | einforceme | nt provided | , As proving | | | 75 | 4 mm²/m | |
| | ending mon | | | | = A _{s.x} / A _{s.pr} | OV-X-S | 5% | - | ОК |
| | | • | | | 3,7 3,91 | | | | |
| Requireme | ent to conce | entrate 2/3 | rebar withi | n 1.5d _{x,s} fro | 375 | < 4 | 70 No | 0 | 3.11.3.2 |
| [Yes if L _{pa} | _d /2>3/4(h | or D)+9/4a | l _{x,s} ; No if n | not;] | тт | n | าฑ | | BS8110 |
| | | | | | | | ally reflected | in the | |
| detailing c | consideration | ns and as s | uch should | be specifica | ally reconsi | dered; | | | |
| 0/ 14 | | | C | | 1000 - | 0050 | | | |
| | reinforcem | | | | .1000.1 _{pad} | G250; > | | 8 % | 01/ |
| % Min sag | reinforcem | ient in plan | e or wiath i | utilisation | | | 34% | 0 | ОК |
| Sagging | Bending M | oment De | sian in Pla | ne of Lenc | l 1th | | | | |
| | | | | | | | | | |
| Moment a | t column ba | se face, M _v | $= q_{w \parallel s}$. | B _{nad} . [(L _{nad} . | -(h or D))/2 | $21^2 / 2$ | | 3 kNm | |
| | t column ba | | | | | | | 4 kNm/m | |
| | | | | | | | | | |
| Concrete r | moment cap | acity per n | netre, M _{u,y} : | = 0.156f _{cu} .1 | 000.d _{y,s} ² | | | 3 kNm/m | |
| | tress, [M/bo | | | | | | | 1 N/mm ² | |
| | tress ratio, | | | | | | 0.00 | | ОК |
| | $z_y = d_{y,s}$. | | | | | | | 7 mm | |
| Area of te | nsion steel | equirea, A | _{s,y} = (M _y /B _p | _{bad}) / [(0.95 | ι _γ).∠ _γ] | | | 4 mm²/m | |
| Area of te | nsile steel r | einforceme | nt provideo | A | | | 75 | 4 mm²/m | |
| | ending mon | | | | = A _{cy} / A _c | | 10% | | ОК |
| | | | | | ···s,y / ··S, | 00,9,5 | - 10 / | | |
| Requireme | ent to conce | entrate 2/3 | rebar withi | n 1.5d _{v.s} fro | 300 | < 4 | 97 No | D | 3.11.3.2 |
| | _{ad} /2>3/4(b | | | | mm | | าฑ | | BS8110 |
| | | | | | it is not au | itomatica | ally reflected | in the | |
| | consideratio | | | | | | | | |
| | | | | | | | | | |
| | reinforcem | | | | 4.1000.T _{pac} | g250; | | 8 % | |
| % Min sag | reinforcem | ent in plan | e of length | utilisation | | | 34% | 0 | ОК |
| | | | | | | | | | |
| | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

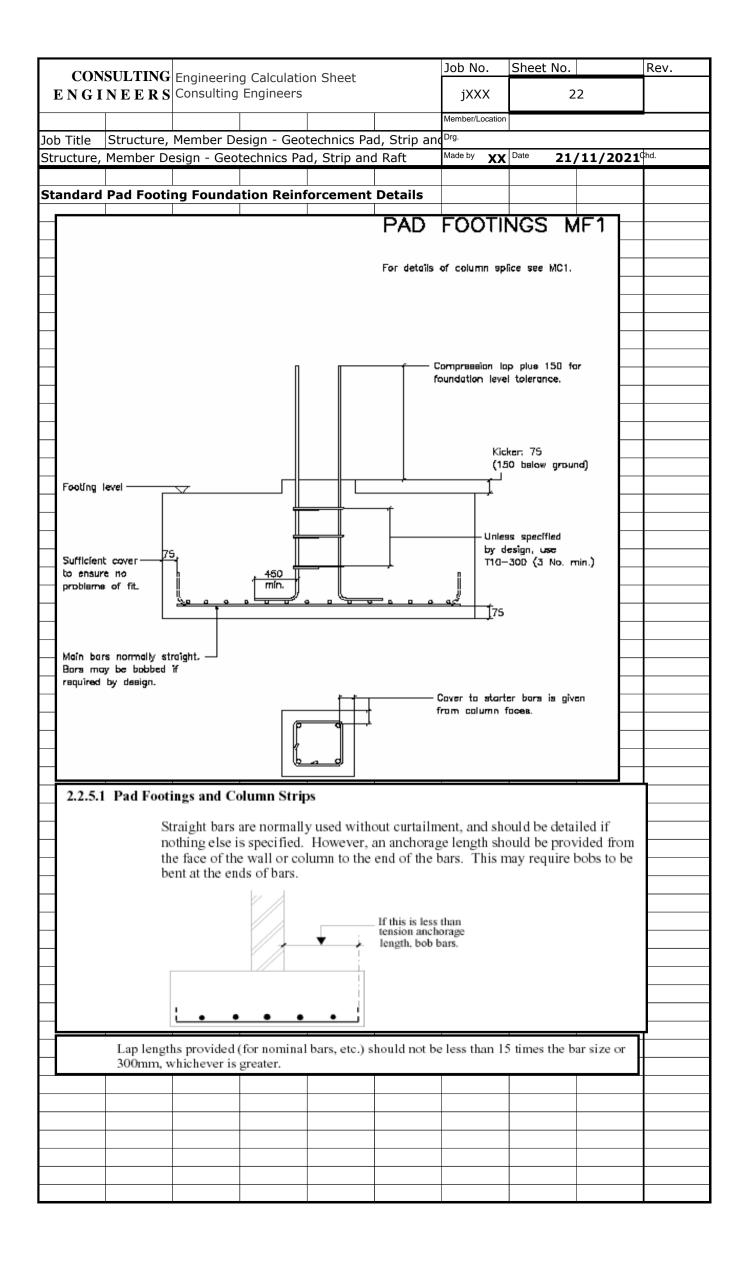
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| | N E E R S | | | in Sheet | | jXXX | 1 | 7 | |
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| ob Title | | Member De | | | | | Data a f | | du |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | und. |
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| | | <u> </u> | | | | | | | |
| Punching | Shear Des | sign | | | | | | | |
| | | | | | ah (if avan | | = | 1.51 | |
| | al (downwa | | | | | | | kN 2 | |
| Area of co | lumn base s | section, A _{c1} | = b.h (rect | tangular) ol | $r \pi D^2/4$ (Cir | cular) | 52900 | | |
| | ffective dep | | | | + a _{y,s})/2 | | | mm 2 / | |
| | nsile steel re | | | | | | | mm^2/m | |
| | nsile steel re | | | | | | | mm^2/m | |
| | rea of tensil | | iforcement | provided, A | As,prov,s | | | mm²/m | |
| w = 100A | s,prov,s/(1000 | $\frac{1}{(2\pi)^{1/3}}$ | N 1/4 | | $(100,1)^{1/4}$ | 0.67 | 0.55 | | |
| $v_{\rm c} = (0.79)$ | /1.25)(ρ _w f _{cu} | <u>,/25)^{-/3}(400</u> |)/d) ^{-, -} ; ρ _w < | 3; f _{cu} <40; | (400/d)*/'> | >0.67 | 0.75 | N/mm ² | |
| | | | | <u> </u> | | | | | |
| Jolumn B | Base Face F | Perimeter | ļ | | | | | | |
| Chart (| | | | | | | | | |
| Snear forc | e at column | 1 Dase face, | $v_1 = F_{col,v,v}$ | _{uls} - q _{w,ULS} ./ | • _{c1} | | 1 | kN | |
| | hear force, | | | | | | | kN | |
| | = 1.00 . V | | moment ef | rects have l | been accou | inted for in | | | ,uls i |
| _olumn ba | ase face per | imeter, u ₁ | | | | | 1 | mm | |
| | | | | | ngular | | cular | | |
| Internal co | | | | 2.(b+h) | | | N/A | mm | |
| Edge colur | | | 2b+ | h or 2h+b | | 3/4(π.D) | | mm | |
| Corner col | | | | (b+h) | | π.D/2 | | mm | |
| Shear stre | ss at colum | in base face | e perimeter | $v_1 = V_{eff,1}$ | / u ₁ d (< 0 | .8f _{cu} ^{0.5} & 5N | 0.55 | N/mm ² | |
| Ultimate s | hear stress | utilisation | | | | | 12% | | ОК |
| | | | | | | | | | |
| First Shea | ar Perimet | :er | | | | | | | |
| | | | | | | | | | |
| Shear forc | e 1.5d from | ו column ba | ase face, V_2 | $= F_{col,v,uls} -$ | - q _{w,ULS} .A _{c2} | | 22 | kN | |
| | | | | Rectar | ngular | Circ | cular | | |
| Internal co | olumn: | | (b+3 | 3d).(h+3d) | 0.41 | $(D+3d)^{2}$ | N/A | m ² | |
| Edge colur | nn: (b+1 | .5d).(h+3d |) or (h+1.5 | 5d).(b+3d) | 0.28 | d).(D+3d) | N/A | m ² | |
| Corner col | umn: | | (b+1.5d) |).(h+1.5d) | 0.19 | $(D+1.5d)^{2}$ | N/A | m ² | |
| Effective s | hear force, | $V_{eff,2} = 1.0$ | 0.V ₂ | | | | | kN | |
| Note V _{eff,2} | = 1.00 . V | ′ ₂ because | moment ef | fects have | been accou | inted for in | the derivat | tion of F col,v | uls i |
| | ase first per | | | | | | 1518 | | |
| | | | | Recta | ngular | Circ | ular | 1 | 1 |
| Internal co | lumn: | 1 | 2.(| b+h)+12d | - | 4D+12d | N/A | mm | 1 |
| Edge colur | | 2 | 2b+h+6d or | | | 3D+6d | | mm | 1 |
| Corner col | | | | (b+h)+3d | | 2D+3d | | mm | 1 |
| | ess at colum | n base first | | | | 20150 | | N/mm ² | 1 |
| | pacity enhar | | | | | nort" and a | | | |
| | ed v _c as cla | | | | | | | | |
| | against en | | | | | | - | | |
| | | | | | | | | / | |
| | Case $v_2 <$ | ↓ | | | | | VALID | | |
| | | No links re | auirod | | | | VALID | | |
| | | v ₂ < 1.6 v _c | | | | | NI / A | | |
| | | $v_2 \setminus 1.0V_c$ | | <u> </u> | | | N/A | | |
| | | ∇ 4 → | $(v - v_c)r$ | ud | NI / A | | NI / A | | |
| | | $\Delta A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)u}{0.95f_y}$ | v | N/A | >= | N/A | mm ² | |
| | | Note St | -1 | 0.4 700.0 | <i></i> | | | | |
| | | Note ΣA_i | $_{\rm sv} \sin \alpha >$ | 0.4ud/0.9 | əf _{yv} . | | | | |
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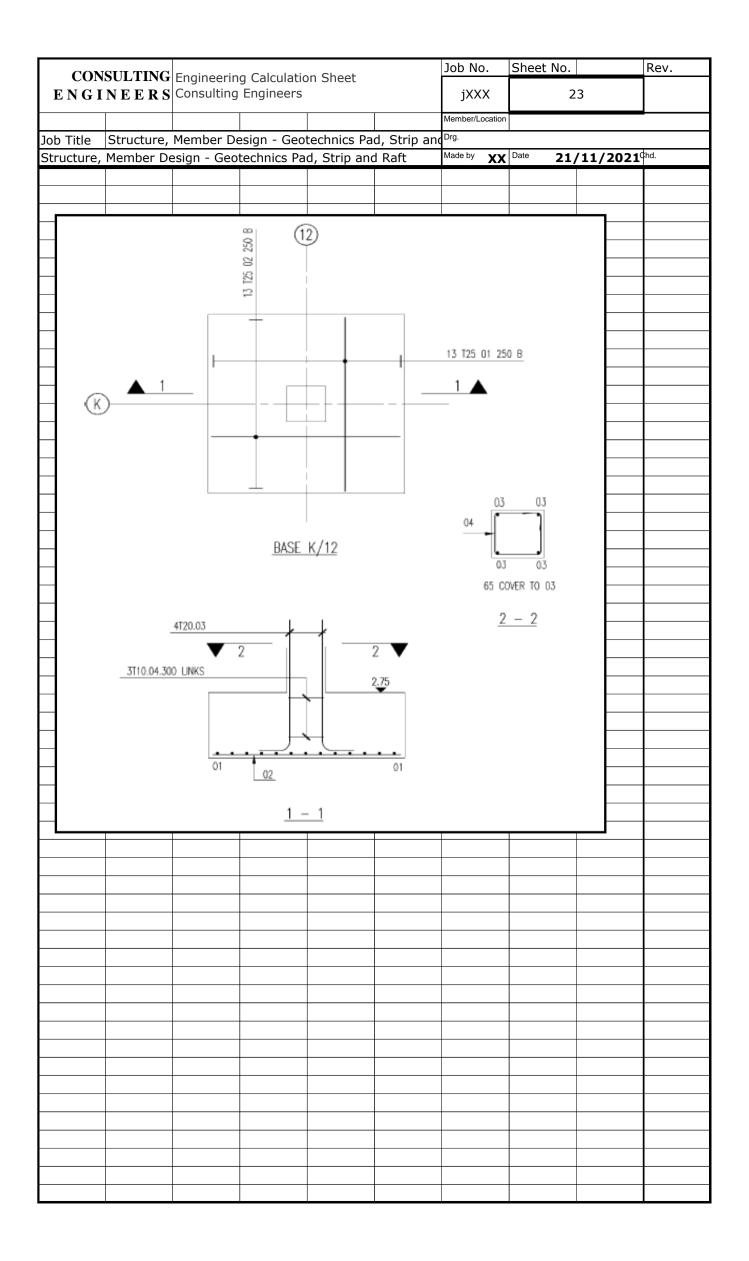
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| | | | | | | | Member/Location | | | |
| ob Title | Structure, | Member [| Design - G | eotecł | nnics Pa | d, Strip an | | | | |
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| | | | | | | | | | | |
| | Case 1.6v | $_{\rm c} < v_2 < 2$ | 2.0ν _c | | | | | N/A | | |
| | | | 5(0.7 | n - n | and | | | | | |
| | | $\Sigma A_{\rm sv} \sin$ | $\alpha \geq \frac{5(0.7)}{0}$ | 95f | | N/A | >= | N/A | mm ² | |
| | | | 0 | .50/ _{yv} | | | | | | |
| | | Note Σ | $A_{sv}sin\alpha$ | > 0. | 4ud/0.9 | $5f_{yy}$. | | | | |
| | Case $v_2 >$ | 2.0v _c | | | | | | N/A | | |
| | | | | | | | | | | |
| irst shea | r perimeter | shear utili | isation | | | | | 14% | | ОК |
| | | | | | | | | | | |
| Second S | hear Perin | neter | | | | | | | | |
| | | | | | | | | | | |
| Shear forc | ce 2.25d fro | m column | base face | e, V ₃ = | F _{col.v.us} | - q _{w.ULS} .A | :3 | -1 | kN | |
| | | | | | | ngular | | ular | | |
| Internal co | olumn: | | (b+4. | 5d).(h | +4.5d) | - | $(D+4.5d)^2$ | | m ² | |
| | ŕфнŧ2.25d). (| (h+4.5d) | | | | | | | m ² | |
| Corner col | | | (b+2.25 | | | | $(2 + 1164)^{2}$ $(2 + 2.25d)^{2}$ | | m ² | |
| | shear force, | $V_{off 3} = 1.$ | | | | 0.20 | 121200) | | . kN | _ |
| Vote V | $h = 1.00 \cdot V$ | because | e moment | effect | s have | l been accol | unted for in | | | |
| | ase second | | | | | | | | 2 mm | ,v,uis / |
| | | | , u ₃ | | Recta | ngular | Circ | ular | | |
| Internal co | olumn: | | | 2 (h±k | n)+18d | 5 | 4D+18d | | mm | |
| | | | | - | | | 3D+9d | - | mm | |
| Edge coluı Corner col | | | 20+11+90 | |)+4.5d | | 2D+3d | | | _ |
| | ess at colum | n haco co | | | | | 20+4.50 | - | mm N/mm ² | |
| Shear Stre | | | | | v3 – ve | | | 0.00 | IN/11111 | _ |
| | Case $v_3 <$ | | | | | | | | | _ |
| | | vc No links r | aguirad | | | | | VALID | | |
| | Case $v_c <$ | | | | | | | | | |
| | | v ₃ < 1.0 | /c | | 7 | | | N/A | | |
| | | 54 | (v-v |)ud | | N1 / A | | NI / A | 2 | _ |
| | | $\Delta A_{sv} sin$ | $\alpha \geq \frac{(v-v)}{0.95}$ | $5f_{yy}$ | | N/A | >= | N/A | mm ² | |
| | | Nutre T | 4 1 | | 1 10.0 | | | | | |
| | C === 1 C | | $A_{\rm sv} \sin \alpha$ | > 0. | 4ud/0.9 | of _{yv} . | | | | _ |
| | Case 1.6v | | | | | | | N/A | | _ |
| | | V 4 · | 5(0.7 | $(v - v_{e})$ |)ud | | | | 2 | |
| | | $\Delta A_{sv} \sin \theta$ | $\alpha \geq \frac{5(0.7)}{0}$ | .95f _{vv} | | N/A | >= | N/A | mm ² | |
| | | | | | | ~ ^ _ | | | | |
| | 0- | | $A_{\rm sv} \sin \alpha$ | > 0. | 4ud/0.9 | əf _{yv} . | | | | _ |
| | Case $v_3 >$ | 2.0 ν _c | | | | | | N/A | | _ |
| _ | | | | | | | | | | |
| second sh | lear perimet | er shear ι | utilisation | | | | | 0% | | ОК |
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| | | | ter is beyo | ond the | e physic | cal extreme | es of the fou | Indation ar | nd as such | punching |
| hear failu | ire is not cri | itical; | | | | | | | | |
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| 1 1/ NN | | | | Charat | | Job No. | Sheet No. | | Rev. |
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| | ISULTING | - | - | on Sheet | | jXXX | 1 | 9 | |
| LIGI | | | | . <u></u> | | | | 5 | |
| · · | | | | | | Member/Location | | | |
| ob Title | - | Member De | - | | | | Data D at | | d |
| tructure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 ^{cr} | id. |
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| | <u> </u> | | | | | | | | |
| hear De | sign for Be | ending in F | Plane of W | idth | | | | | |
| . | | (| <u> </u> | | | | | | |
| | e at columr | | | | [(B _{pad} -(b or | ·D))/2] | 18 | | |
| | e at column | | | , , | | (D. (h | | kN/m | |
| | ce at 1.0d _{x,s} | | | | | (B _{pad} -(D or | | kN | |
| | e at 1.0d _{x,s} | | | | • | | 7 | kN/m | |
| ote the a | above shear | forces are | for bending | in plane of | f width; | | | | |
| | | <u> </u> | | | | | | 2 | |
| | hear stress | | | | | _{bad})/(1000.d | | N/mm ² | |
| ltimate s | hear stress | for bending | j in plane o | f width utili | isation | | 4% | | ОК |
| | | | | | | | | | |
| | ear stress fo | | | | | | | N/mm ² | |
| | pacity enhai | | | | | | | | |
| | ed v _c as cla | | | | | | | oport" and | |
| | g against en | | | | ort" as clau | ise 3.4.5.8 | BS8110;) | | |
| rea of ter | nsile steel r | einforceme | nt provided | , A _{s,prov,x,s} | | | 754 | mm²/m | |
| , = 100A | s,prov,x,s/(10 | 00.d _{x,s}) | | | | | 0.57 | % | |
| .x = (0.7 | '9/1.25)(ρ _w f | $f_{cu}/25)^{1/3}(40)$ | $00/d_{x,s})^{1/4};$ | p _w <3; f _{cu} <4 | 40; (400/d _x | s) ^{1/4} >0.67 | 0.77 | N/mm ² | |
| | | | | | | ,57 | | | |
| heck v _d | x < v _{c,x} for | no links | | | | | VALID | | |
| u, | | shear capac | ity v _{ev} .(100 |)0.d _v _) | | | | kN/m | |
| | | | | | | | | | |
| heck v | _x < v _{d,x} < 0 | | or nominal | l links | | | N/A | | |
| | Provide no | minal links | such that / | \sqrt{S} | / //////////////////////////////////// |) 05f) i o | | mm²/mm/n | 2 |
| | | and nominal | | | | , | | kN/m | 1 |
| | | | | | 0.4 + v _{c,x}). | (1000.u _{x,s}) | 155 | KIN/III | |
| hock v | > 0 4 + 3 | for doc | ian linka | | | | N / A | | |
| | x > 0.4 + v | | | | | | N/A | | |
| | Provide si | iear links A _s and design l | $\frac{1}{10}$ / 5 > 100 | $\frac{0.(v_{d,x}-v_{c,x})}{0.(v_{d,x}-v_{c,x})}$ |)/(0.951 _{yv}) | $\frac{1.e.}{0.05}$ | 0.92 | mm ² /mm/n | n |
| | | | lliks sliedi | | sv,prov,x/⊃ _x). | (0.951 _{yv}).u _x | 102 | kN/m | |
| | <u> </u> | <u> </u> | | | | | | | |
| | | | tre. As service | | | | | 2. | |
| /1 | | inks per me | | ,x | | | | mm²/m | |
| | _{rov,x} / S _x val | lue | | | | | 0.00 | mm²/m mm²/mm/n | |
| esign she | _{rov,x} / S _x vai ear resistan | lue | | | Itilisation | | | | n OK |
| esign she | , | lue | | | Itilisation | | 0.00 | | |
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| lob Title | | Member De | - | | | Drg. | 1 | | |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | hd. |
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| | <u> </u> | | | | | | | | |
| Shear De | sign for Be | ending in F | Plane of Le | ength | | | | | |
| Shoor forc | so at column | haco faco | | P | [/] (hor | וכ/נוס | 20 | LIN | |
| | e at column | | | | [(L _{pad} -(n or | D))/2] | 20 | | |
| | e at columr e at 1.0d _{y,s} | | | | | (l(h or | | kN/m kN | |
| | ce at 1.0d _{y,s} | | | | | | | kN/m | |
| | above shear | | | | <i>i</i> i | | | KIN/III | |
| | | | | | | | | | |
| Iltimate s | hear stress | for bending | in plane o | flenath, v. | +=(V+/F | (1000) | 0.24 | N/mm ² | |
| | hear stress | | | | | | 5% | , | ок |
| | | | | | | | | | |
| Design she | ear stress fo | or bending i | in plane of | length, v _{d.v} | $=(V_y/B_{pad})/$ | (1000.d _{v.s}) | 0.11 | N/mm ² | |
| | pacity enha | | | | | | | | |
| | ed v _c as cla | | | | | | | | |
| | n against en | | | | | | | | |
| Area of ter | nsile steel r | einforceme | nt provided | , A _{s,prov,y,s} | | | 754 | mm²/m | |
| $p_{w} = 100A$ | s,prov,y,s/(10 | 00.d _{y,s}) | | | | | 0.52 | | |
| $v_{c,y} = (0.7)$ | '9/1.25)(ρ _w f | _{cu} /25) ^{1/3} (40 |)0/d _{y,s}) ^{1/4} ; | ρ _w <3; f _{cu} <4 | 0; (400/d _y | _{,s}) ^{1/4} >0.67 | 0.74 | N/mm ² | |
| | | | | | | | | | |
| Check v _{d,} | $y < v_{c,y}$ for | | | | | | VALID | | |
| | Concrete s | hear capac | ity v _{c,y} .(100 | 00.d _{y,s}) | | | 106 | kN/m | |
| | | | | | | | | | |
| | $y < v_{d,y} < 0$ | | | | | | N/A | 2 | |
| | Provide no | | | | | | 0.92 | mm²/mm/ı | n |
| | Concrete a | and nominal | i links snea | r capacity (| 0.4 + v _{c,y}). | (1000.d _{y,s}) | 164 | kN/m | |
| | | | | | | | | | |
| hock y | >0.1+ | for dec | ian links | | | | N / A | | |
| Check v _{d,} | y > 0.4 + v | / _{c,y} for des ear links A | ign links | (y - y) | /(0.95f) i | ο Δ / S · | N/A | $mm^2/mm/l$ | ~ |
| Check v _{d,} | Provide sh | ear links A _s | v / S > 100 |)0.(v _{d,y} -v _{c,y}) capacity (A |)/(0.95f _{yv}) i /S_) | .e. A _{sv} / S (| 0.92 | mm²/mm/i kN/m | n |
| Check v _{d,} , | Provide sh | / / _{c,y} for des ear links A _s and design l | v / S > 100 |)0.(v _{d,y} -v _{c,y}) capacity (A | /(0.95f _{yv}) i _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d _y | 0.92 | mm²/mm/ı kN/m | n |
| | Provide sh Concrete a | ear links A _s and design l | v / S > 100 inks shear | capacity (A | /(0.95f _{yv}) i _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d _y | 0.92 106 | kN/m | n |
| Area provi | Provide sh Concrete a ided by all I | ear links A _s and design l inks per me | v / S > 100 inks shear | capacity (A | /(0.95f _{yv}) і _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d _y | 0.92 106 | kN/m mm ² /m | |
| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I rov,y / Sy val | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d _y | 0.92 106 | kN/m mm ² /m mm ² /mm/i | n |
| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d | 0.92 106 0 0.00 | kN/m mm ² /m mm ² /mm/i | |
| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I rov,y / Sy val | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S (0.95f _{yv}).d _y | 0.92 106 0 0.00 | kN/m mm ² /m mm ² /mm/i | n |
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| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I rov,y / Sy val | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S : (0.95f _{yv}).d _y | 0.92 106 0 0.00 | kN/m mm ² /m mm ² /mm/i | n |
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| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I rov,y / Sy val | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S : (0.95f _{yv}).d _y | 0.92 106 0 0.00 | kN/m mm ² /m mm ² /mm/i | n |
| Area provi Tried A _{sv,pr} | Provide sh Concrete a ided by all I rov,y / Sy val | ear links A _s and design l inks per me ue | v / S > 100 inks shear etre, A _{sv,prov} | capacity (A | _{sv,prov,y} /S _y). | .e. A _{sv} / S : (0.95f _{yv}).d _y | 0.92 106 0 0.00 | kN/m mm ² /m mm ² /mm/i | n |
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| CON | SULTING | Engineerin | a Calculatio | n Chaot | | Job No. | Sheet No. | | Rev. |
|---------------|---------------|------------|------------------------------|--------------|----------------------------|--|------------|----------|----------|
| | N E E R S | | g Calculatic Engineers | an Sheet | | jXXX | 2 | 1 | |
| | | | | | | Member/Location | | | |
| ob Title | Structure, | Member De | esign - Geol | technics Pa | d. Strip and | Drg. | | | |
| | | | technics Pa | | | Made by XX | Date 21 | /11/2021 | Chd. |
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| Detailing | Requirem | ents | | | | | | | |
| All detailing | g requireme | ents met ? | | | | | ΝΟΤ ΟΚ | | |
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| | | | pitch in pla | | | | | mm | OK |
| hax sayyır | ig steel reif | norcement | pitch in pla | ine of lengt | n (< 30 _{y,s} , - | 50mm)</td <td>150</td> <td>mm</td> <td>ОК</td> | 150 | mm | ОК |
| Max | imum spaci | ng: 0.5% | % Ast or less | - 300mm | | | | | |
| | | | ween 0.5% a 6 Ast or grea | | | | | | |
| | | 1.07 | o Asi or grea | ater - 175mi | | | | | |
| | a staal rain | forcomont | pitch in pla | ne of width | | | 150 | mm | ОК |
| | - | | pitch in pla | | | | | mm mm | OK OK |
| | | | | | | | | | |
| | - | | pitch in pla | | - | - | | mm | ОК |
| | - | | pitch in pla | - | | | | mm | ОК |
| vote no all | owance has | s been mad | ie for laps i | n the min p | ntch as not | aeemed to | be require | a; | |
| % Max sac | iging reinfo | rcement in | plane of wi | dth (<= 0. | 04.1000.T _r |) | 0.38 | % | ОК |
| | | | plane of le | | | | 0.38 | | ОК |
| | | | | | | | | | |
| | | | neter in pla | | | | | mm | NOT OF |
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| 0.40ø' | | | | | | | | 0.40 | |
| 0.30ø' | | | | | | | | 0.30 | |
| 0.20ø' | | | | | | | | 0.20 | |
| 0.10ø' | | | | | | | | 0.10 | |
| 0.00ø' (No | Friction In | terface) | | | | | | 0.00 | |
| bearing c | apacity lir | nit to ado | ot | | | | | 3 | |
| Lower Lim | it | | | | | | | | |
| Middle Lim | | | | | | | | | |
| Upper Lim | | | | | | | | | |
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| bearing c | apacity va | lues from | allowable | bearing c | apacity, B | C _{II,a/ul,a} va | ues or SP [.] | 2 | |
| BC _{II,a/ul,a} | | | | | | | | | |
| Ν | | | | | | | | | |
| factor for | SPT, N va | lue | | | | | | 2 | |
| Undrained | Soil: 42.6 | | | | | | | 42.6 | |
| Drained So | oil: 30.0 | | | | | | | 30.0 | |
| ground w | ater level | modificat | ion for bea | aring capa | city | | 1 | 2 | |
| <u> </u> | | | | 3 P # | | GWL >= B | | h Flooding | |
| Cohesive S | Soil | GWL >= B | | | | 1.00 | | _ | |
| Non Cohes | | GWL > = B GWL < B | | | | 1.00 | | | |
| Rock | | th Flooding | | | | 1.00 | 1.00 | | |
| RUCK | VVI | | | | | 1.00 | 1.00 | 1.00 | |
| method o | f analysis | | | | | | | 3 | |
| | | | | | | | | | |
| Undrained | | | | | | | | | |
| Drained Ar | , | | | | | | | | |
| Empirical A | Analysis | | | | | | | | |
| evaluate | overall up | lift resista | ince | | | | | 2 | |
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| foundatio | n type | | | | | | | 1 | |
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| Pad Footin | - | | | | | | | | |
| Strip Footi | | | | | | | | | |
| | nn Footing | | | | | | | | |
| Combined | | | | | | | | | |
| Strap Foot | ing | | | | | | | | |
| Raft | | | | | | | | | |
| consider | surcharge | above fou | Inding leve | el in net (e | effective) | working p | ressure | 1 | |
| Yes | | | | | | | | | |
| No | | | | | | | | | |
| | | | | | | | | | |
| column b | ase sectio | птуре | | | 1 | 1 | 1 | 1 | |
| Rectangula | ar | | | | | | | | |
| Circular | | | | | | | | | |
| | | | | | - | | | - | |
| column b | ase locatio | | | | 2 | 1 | 1 | 2 | |
| Interior | | | | | | | | | |
| | | th Direction | | | | | | | |
| Edge for S | pan in Leng | gth Directio | n | | | | | | |

| | | | | Job No. | Sheet No. | | Rev. |
|--|---|--|-------------------|---------------------------|----------------|-------------------|---------------------------|
| CONSULTING Engi E N G I N E E R S Cons | | | | jXXX | 2 | 24 | |
| | | | | Member/Location | | | |
| lah Titla Chrystyre Mar | har Dasian Ca | ata abaica Da | d Ctrip op | | | | |
| Job Title Structure, Mem Structure, Member Design | ber Design - Geo | | | Made by XX | Date 21 | /11/2021 | chd. |
| Structure, Member Design | | au, suip and | | XX | 21 | /11/2021 | |
| Strip Footing Foundatio | n Dimensions | | | | | | |
| <u> </u> | | | | | | | |
| Width, B _{strip} | | | | | 2.500 | m | |
| Thickness beneath base sl | | | | | 1.000 | m | |
| Thickness of base slab, $t_{2,s}$ | | | er 0.000m |) | 0.000 | m | |
| Thickness of foundation, T | $t_{strip} = t_{1,strip} + t_{2,strip}$ | strip | | | N/A | m | |
| Wall width, b | | | | | _ | mm | |
| Note where applicable, it is | s assumed that t | he wall is al | ways interi | or and loca | ted in the c | entre | |
| of the strip footing B _{strip} ; | | | | | | | |
| Strin Easting Esundatio | n Doinforcomo | | | | | | |
| Strip Footing Foundatio | | | | | | | |
| | | | | | | | |
| | | | | | | | 1 |
| | ──▋ ┴──┓┍─── | | | | | | |
| L | Sago | ging in width | | | | | |
| Sagging steel reinforceme | nt diameter, ϕ_s | | | | 20 🔻 | mm | |
| Sagging steel reinforceme | | | | | 200 | mm | |
| Sagging steel area provide | ed, $A_{s,prov,s} = (\pi.\phi)$ | ² /4)/p _s | | | N/A | mm²/m | |
| | | | | | | | |
| Shear link diameter, ϕ_{link} | | | | | | mm | |
| Number of link legs per me | | | | | - | /m | |
| Area provided by all links | per metre, A _{sv,pro} | $n_{\text{link}} = n_{\text{link}} \cdot \pi \cdot \phi_{\text{link}}$ | _{nk} ²/4 | | | mm²/m | |
| Pitch of links, S | | | | | 150 | mm | |
| | | | - /2 | | | | |
| Effective depth to sagging | steel, $a_s = I_{strip}$ | - cover ₁ - ϕ_{li} | nk - Øs/ 2 | | N/A | mm | |
| Estimated steel reinforcem | | | | | N / A | kg/m ³ | |
| $[7.850.(A_{s,prov,s})/T_{strip}]$ | | t' No lans' | l inks ianor | ed: Distribu | | - | |
| | | | | | | | |
| Strip Footing Foundatio | n SLS Loading | | | | | | |
| | | | | | | | |
| SLS vertical (downward) lo | bad from wall and | d base slab | (if suspend | led), F _{wall,v} | 1000 | kN/m | N/A |
| Eccentricity of F _{wall,v} from o | | | | | 0.100 | m | |
| SLS horizontal load from w | vall, F _{wall,h} (define | ed to add to | e eccentrio | city) | 0 | kN/m | |
| SLS moment from wall, M_v | wall (defined to ac | ld to e eccei | ntricity) | | 0 | kNm/m | |
| Note F _{wall,h} and M _{wall} are o | | | | | | | es; |
| Strip footing (projection be | | | | | | kN/m | |
| Additional soil (above foot | | | | | | kN/m | <u> </u> |
| Note additional soil above | - | | | - | | | - |
| is below ground level and | | | | | | | $c \approx \gamma_{sat};$ |
| Note that this has a stabili. | - | | ct to destai | ullizing mon | nents, thus | DOTH | |
| <i>inclusive and exclusive cas</i> Water pressure at founding | | | 0) | | NI / A | kPa | |
| Water uplift force at found | | | , 0) | | | kPa kN/m | |
| Total foundation SLS vertion | | | = F + F | | | kN/m | |
| Total foundation SLS effect | | | | | | kN/m | 1 |
| | | | , sup,v | Julip,v Wd | | kN/m | 1 |
| | , suip,i | | | | | , | 1 |
| | | | | | | | 1 |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| Total foundation SLS horiz | | | | | | | |
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| <i></i> | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | | | | | Job No. | Sheet No. | | Rev. |
|-------------|---|---------------------------------------|---|---|-----------------------------|---|----------------|------------|-------|
| | | | g Calculatio | on Sheet | | | | г. | |
| ENGI | NEERS | Consulting | Engineers | | | jXXX | 2 | 5 | |
| | | | | | | Member/Location | | | |
| | | | esign - Geol | | | | | | 1 |
| Structure, | Member De | sign - Geol | technics Pa | d, Strip and | 1 Raft | Made by XX | Date 21 | /11/2021 | hd. |
| | | | | | | | | | |
| | | | | | | | | | |
| Equivalont | occontricity | - ABS | | M + F | T)/F | | NI/A | m | |
| | | | $S(F_{wall,v}.e +$ | | | strip,v / 6) / FOS ₃ | N/A N/A | | |
| | | | | | imit – (Dstrip | / 0) / 1033 | N/A | 111 | |
| Overturnin | a moment, | $M_{ot R} = M_{w}$ | _{all} + F _{wall,h} .T | - ctrip | | | N/A | kNm/m | |
| | | | | | rin+Fabove soil | I-F _{water}).B _{strij} | | kNm/m | |
| | , | | | | | | , , | , | |
| Maximum g | gross worki | ng pressur | $e, q_{w1} = F_{st}$ | $_{rip,v}/B_{strip} +$ | 6.(F _{wall.v} .e | $+ M_{wall} + F_{v}$ | , N/A | kPa | |
| Minimum g | ıross workiı | ng pressure | $e, q_{w2} = F_{stri}$ | _{ip,v} /B _{strip} – 6 | 5.(F _{wall,v} .e + | $- M_{wall} + F_{wall}$ | | | |
| Maximum g | gross worki | ing pressure | e, $q_{w1} = 2F_{e}$ | strip,v/[3.(B _{st} | | | N/A | kPa | |
| | | | $q_{w2} = 0.0$ | | | | N/A | kPa | |
| | | | | | | | | | |
| | | $_{\rm p}$ ' = B _{strip} – 2 | | | | | N/A | | |
| Gross work | king pressu | re, $q_w = F_{st}$ | rip,v / B _{strip} ' | | | <u> </u> | N/A | kPa | |
| | | | | | | <u> </u> | | | |
| Strip Foot | ing Found | lation ULS | Loading | | <u> </u> | | | | |
| | | | | | /: c | | | 1.5.7 | |
| | | | | | | ed), F _{wall,v,u} | | kN/m | |
| | | | | | | <i>i as the SLS</i> | | | |
| Note that t | his enhanc | ement is re | quired to ca | ater for the | moment a | is an enhani | ced load in | the ULS de | sign; |
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| CONSULTING Engineering Calculation Sheet | | | | | | Job No. | Sheet No. | | Rev. |
|--|-----------------|----------------------|------------------------------|----------------------------|--------------------------------|---------------|-----------|-------------------|------|
| | | Consulting | | in Sheet | | jXXX | | 26 | |
| LIGI | | y | | | | | | | |
| | | | | | | Member/Locati | on | | |
| | | Member De | | | | | | | 1 |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | l Raft | Made by X | X Date 21 | /11/2021 | hd. |
| | | | | | | | | | |
| Strip Foot | ting Found | lation Reir | nforcemen | t Design | | | | | |
| | | | | | | | | | |
| Gross ULS | 6 Pressure | | | | | | | | |
| Crease LIL C | | | (D | | | | | | |
| Gross ULS | pressure, d | $q_{w,ULS} = F_{wa}$ | I,v,uls / B _{strip} | | | | N/A | kPa | |
| | | | | | | | | | |
| | | S | hear force of | liagram | ו ⊢ | | | | |
| | $ \rightarrow $ | | ding mome | | • | | | | |
| | \mathbf{v} | Den | ang mome | it ulayi am | ┛╞── | | | | |
| | | | | | | | | | |
| Sagging F | Bendina M | oment Des | sian | | | | | | |
| | | | - 5-1 | | | | | | |
| Moment at | wall face r | ber metre, N | 1 = a, | [(B _{strin} -h)/2 | $21^2 / 2$ | | N/A | kNm/m | |
| | | | ۳w,ULS ' | LI-Sup V/L | _ , _ | | | | |
| Concrete n | noment car | acity per m | netre, M., = | 0.156f _{cu} .10 | 00.d _s ² | | N/A | kNm/m | |
| | | I^2] = M / [(| | | <u></u> | | | N/mm ² | |
| | | $K = [M/bd^2]$ | | .156 | | | N/A | | N/A |
| | | .5 + (0.25 | | | | | N/A | mm | |
| | | required, A | | | | | N/A | mm²/m | |
| | | | | | | | | | |
| | | einforceme | | | | | N/A | mm²/m | |
| Sagging be | ending mon | nent utilisat | $ion = A_s / A_s$ | A _{s,prov,s} | | | N/A | | N/A |
| | | | | | | | | | |
| | | ent (>= 0. | | T _{strip} G250; | >= 0.001 | 3.1000.T | | | |
| % Min sag | reinforcem | ent utilisati | on | | | | N/A | | N/A |
| | | | | | | | | | |
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| CON | JCULTINC | En elle e enire | . Calaulatia | Chash | | Job No. | Sheet No. | | Rev. |
|-----------------------------------|--|---|---|--|---|--|---------------------------------|---|-------------|
| | ISULTING I N E E R S | - | - | on Sheet | | jXXX | 2 | 27 | |
| | | | 5 | | | Member/Location | | | |
| | Structuro | Mombor D | ocian Coo | technics Pa | d Strip and | | | | |
| o Title | Member De | | | | | Made by XX | Date 71 | /11/2021 | Chd. |
| ucture, | | esign - Geo | | u, Suip and | | ~~~~ | | /11/2021 | |
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| ear De | sign | | | | | | | | |
| | | | | | | | | | |
| | ce at wall fa | | | | | | | kN/m | |
| ear forc | ce at 1.0d _s f | rom wall fa | ice per met | re, v = q _{w,L} | _{JLS} . [(B _{strip} - | ·D)/2-a _s j | N/A | kN/m | |
| imate s | hear stress | V=V/(1 | 1000.d_) (< | 0.8f ^{0.5} & | 5N/mm ²) | | N/A | N/mm ² | |
| | shear stress | | | | | | N/A | - | N/A |
| | | | | | | | | | |
| sign she | ear stress, v | v _d =V/(1000 | .d _s) | | | | N/A | N/mm ² | |
| | pacity enhai | | | | | | nparing aga | inst | |
| | ed v _c as cla | | | | | | | oport" and | |
| | g against en | | | | ort" as clau | ıse 3.4.5.8 | | 2 | |
| | nsile steel r | | nt provided | , A _{s,prov,s} | | | | mm²/m | |
| | $A_{s,prov,s}/(100)$ | | $2(1)^{1/4}$ | 12.6.12 | (400(1)) ^{1/4} | | N/A | | |
| = (0.79 | 9/1.25)(ρ _w f _{cι} | ,/25)⁺́~(40(| J/α _s)⁺′'; ρ _w < | <3; f _{cu} <40; | (400/d _s) ^{1/1} | >0.67 | N/A | N/mm ² | |
| eck v | < v _c for no | linke | | | | | N/A | | |
| ver vd | 1 | | ity v _c .(1000 |).d _c) | | | - | kN/m | |
| | | | | | | | | KN/III | |
| | | | | | | | | | |
| eck v _c | < v _d < 0.4 | + v _c for n | ominal lin | ks | | | N/A | | |
| eck v _c | < v _d < 0.4 Provide no | | | | 4.(1000)/((|).95f _{vv}) i.e. | N/A | | ľm |
| | Provide no Concrete a > 0.4 + v _c Provide sh | minal links and nomina for desigr ear links A _s | such that A l links shea h links sw / S > 100 | $A_{sv} / S > 0.4$ r capacity (00.(v_d - v_c)/(0 | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A | mm²/mm/ kN/m | |
| eck v _d | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a | minal links and nomina for desigr ear links A _s and design l | such that A I links shea I links I links I links shear | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m | |
| eck v _d | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I | minal links and nomina for design ear links A _s and design l inks per me | such that A I links shea I links I links I links shear | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $\frac{1}{100} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $\frac{1}{100} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | Ím Ím |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $\frac{1}{100} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $\frac{1}{100} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
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| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $y_{y} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
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| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $y_{y} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $y_{y} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
| ea provi ed A _{sv,pr} | Provide no Concrete a > 0.4 + v _c Provide sh Concrete a ided by all I rov / S value | minal links and nomina for desigr ear links A _s and design l inks per me | such that A I links shea n links $y_{y} / S > 100$ links shear etre, A _{sv,prov} | $A_{sv} / S > 0.4$ r capacity ($0.(v_d - v_c)/(0)$ capacity (A | 0.4 + v _c).(| 1000.d _s) A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm/ kN/m mm²/mm/ kN/m mm²/m | m m m |
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| | | Consulting | | | | jXXX | 2 | 28 | | |
| | | | | | | Member/Location | | | | |
| ob Title | Structure, | Member De | esign - Geo | technics Pa | d, Strip and | Drg. | | | | |
| | | | | d, Strip and | | Made by XX Date 21/11/2021 ^{Chd.} | | | | |
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| Max | imum spaci | | % Ast or less | | | | | | | |
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| | | forcement s been maa | | | itch as not | deemed to | | mm d; | N/A | |
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| % Max sag | iging reinfo | rcement (< | = 0.04.10 | 00.T _{strip}) | | | N/A | % | N/A | |
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| CON | NSULTING Engineering Calculation Sheet INEERS Consulting Engineers | | | | | Job No. | Sheet No. | | Rev. |
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| | NEERS | Consulting | Engineers | on Sheet | | jXXX | 2 | .9 | |
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| ENGI | NEERS | Consulting | Engineers | In Sheet | | jXXX | 30 | | |
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| ENGI | NEERS | Consulting | Engineers | in Sheet | | jXXX | 31 | | |
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| Job Title Structure, Member Design - Geotechnics Pad, Strip and | ENGI | NEERS | Consulting | Engineers | In Sheet | | jXXX | 34 | | |
| Job Title Structure, Member Design - Geotechnics Pad, Strip and Drg. | | | | | | | | | | |
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| longitudir | nal hogging rebar d | iameter | | | 5 | 5 | 5 | |
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| shear link | diameter | | 1 | 1 | 4 | 1 | 1 | |
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| | | | | $f_{,x,s} = (\pi.\phi_{sx})^2$ | ² /4)/p _{sx} | | | 1 | | mm²/m | |
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| Hogging st | eei area pr | ovided in ie | engtn, A _{s,pro} | $p_{v,y,h} = (\pi.\phi_h)$ | y /4)/p _{hy} | | | | N/A | mm²/m | |
| Shear link | diameter fr | r first char | ar perimete | <u>г</u> фил | | | | None | • | mm | + |
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| | | | | imeter, A _{sv,} | $r_{rov, 2} = r$ | L. 1 | , ² /4 | | | mm ² | 1 |
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| | | | - | perimeter, | A _{sv,prov,3} | = n _{l.3} .π. | $\phi_{\text{link.3}}^2$ | | | mm² | 1 |
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| Number of | link legs p | er metre fo | or bending i | n width, n _{lir} | ık,x | | | | 4 | /m | |
| | | | | ding in wid | | $n_{v,x} = n_{l}$ | _{ink,x} .π.¢ | | N/A | mm²/m | |
| Pitch of lin | ks for bend | ling in widt | h, S _x | | | | | | | mm | |
| Shear link | | | | $\eta_{\text{link},y} = \phi_{\text{link},2}$ | | | | | | mm | |
| | | | | n length, n _l | ., | | | | | /m | |
| Number of | | | | iding in leng | gth, A _{sv,p} | _{rov,y} = r | l _{link,y} .π. | | | mm²/m | |
| Number of Area provi | | | th. S. | | | | | | 150 | mm | |
| Number of Area provi | ded by all I ks for bend | ling in leng | | | 1 | 1 | | 1 | | | |
| Number of Area provi Pitch of lin | ks for bend | | | _ | | | | | | | |
| Number of Area provi Pitch of lin Effective d | ks for bend epth to sag | iging steel | in width, d _x | , _s = T _{multi} - | | | | | | mm | |
| Number of Area provi Pitch of lin Effective d Effective d | ks for bend epth to sag epth to sag | iging steel iging steel | in width, d_x in length, d | $_{y,s} = T_{multi} -$ | cover ₁ - | MAX (| | | N/A | mm | |
| Number of Area provi Pitch of lin Effective d Effective d Effective d | ks for bend epth to sag epth to sag epth to hog | iging steel iging steel iging steel | in width, d _x in length, d in length, d | $y_{y,s} = T_{multi} - I_{y,h} = T_{multi} - I_{y,h}$ | cover ₁ - - cover ₁ | - φ _{hy} /2 |)link,2 , (| | N/A | | |
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| otal found | lation SLS | vertical (do | wnward) lo | ad, F _{multi,v} = | = F _{col,v} + F _u | under,multi + F | N/A | kN | |
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| Moment a | it column ba | l se centrelir | ре М — а | | $(B_{\rm m}/2)^2$ | / 2 | N / A | kNm | |
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| | tress ratio, | | | | | | N/A | | N/A |
| | $r_{x,s} = d_{x,s}$. | | | | d _{y s} | | N/A | mm | |
| | ension steel | | | | | | | mm²/m | |
| | | | | | , | | | , | |
| Area of te | nsile steel r | einforceme | nt provideo | d, A _{s,prov,x,s} | | | N/A | mm²/m | |
| Sagging b | ending mon | nent in plar | ne of width | utilisation = | = A _{s,x} / A _{s,pr} | ov,x,s | N/A | | N/A |
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| Doguissis | · | ntrata 2/2 | | | | | | | |
| Requirem | ent to conce | entrate Z/S | rebar with | in 1.5d _{x,s} fro | N/A | < N/A | N/A | | 3.11.3.2 |
| | ent to conce _{oulti} /2>3/4(h | | | | N/A mm | < N/A mm | N/A | | 3.11.3.2 BS8110 |
| [Yes if L _m | | or D)+9/4 | d _{x,s} ; No if | not;] | тт | mm | | | |
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| [Yes if L _m Note that detailing o % Min sag % Min sag Sagging | Bending M | or D)+9/4 above requins and as s nent in plan nent in plan oment Des | d _{x,s} ; No if irement be uch should e of width e of width sign in Pla | not;] applicable, be specifica (>= 0.0024 utilisation ane of Leng | mm it is not au ally reconsi .1000.T _{mult} | mm tomatically dered; i G250; >= | reflected in N/A N/A | n the % | BS8110 |
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| | | Engineerin Consulting | - | on Sheet | | jXXX | | 38 | |
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| | _ | | | | | Member/Location | | | |
| Job Title | | Member De | - | | | | Data | (111) | dea |
| Structure, | Member De | esign - Geol | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | Cha. |
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| | | | | | | | | | |
| Hoaaina I | Bendina M | oment De | sion in Pla | ne of Len | ath | | | | |
| | | | | | | | | | |
| Moment, M | $I_v = 0.07$. | q _{w,ULS} . B _{mul} | L_{multi}^2 | | | | N/A | kNm | Т.3.5 |
| | | ent based o | | span 0.07 ii | nstead of e | nd span 0.(| | | BS8110 |
| Moment pe | er metre, M | _y /B _{multi} | | | | | N/A | kNm/m | |
| | | | | | | | | | |
| | | bacity per m | | | L000.d _{y,h} ² | | | kNm/m | |
| | | $[J^2]_y = (M_y/E)$ | | | | | | N/mm ² | |
| | | $K_{y} = [M/bd^{2}]$ | | | | <u> </u> | N/A | | N/A |
| Lever arm, | $z_y = a_{y,h}$. | [0.5 + (0.2 required, A _s | <u>'</u> :::::::::::::::::::::::::::::::::::: | < = 0.95 | u _{y,h} 5f) 7 1 | | | mm mm²/m | |
| | | | _{3,y} – (11 _y / D _n | | | | | m /m | |
| Area of ter | nsile steel n | einforcemei | nt provided | , As provide | | | N/Δ | mm²/m | 1 |
| Hoggina be | ending mon | nent in plar | ie of length | utilisation | $= A_{s.v} / A_{c}$ | L prov.v.h | N/A | | N/A |
| | | | | | 3, , , 5, | | | • | |
| Requireme | nt to conce | entrate 2/3 | rebar withi | n 1.5d _{v.h} fro | N/A | < N/A | N/A | <u></u> | 3.11.3.2 |
| | | or D)+9/4 | | , , | , mm | | | | BS8110 |
| | | above requi | | | it is not au | itomatically | reflected i | n the | |
| detailing co | onsideratio | ns and as s | uch should | be specifica | ally reconsi | dered; | | | |
| | | | | | | | <u> </u> | | |
| | | nent in plan | | | 4.1000.T _{ml} | _{ulti} G250; >: | | | |
| % Min hog | reinforcem | nent in plan | e of length | utilisation | | | N/A | | N/A |
| | | | | | | | | | |
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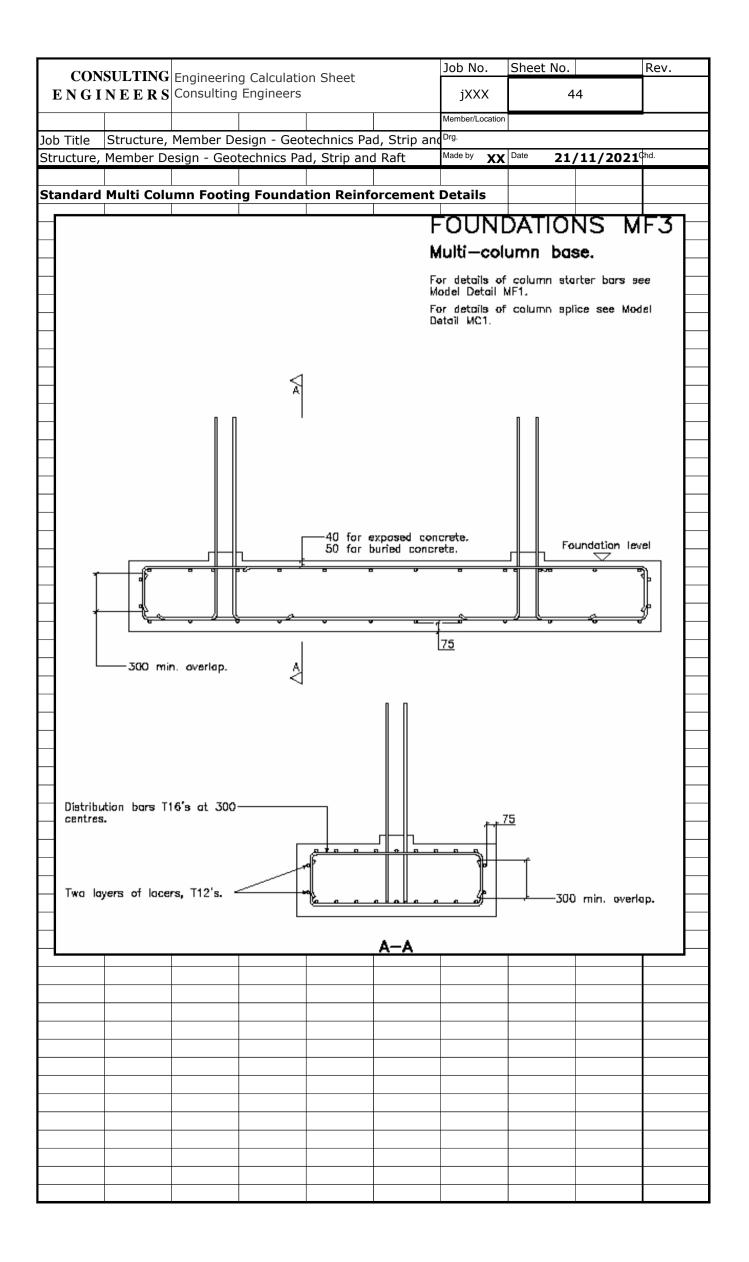
| CONSULTING | | e Celevietia | ch a at | | Job No. | Sheet No. | | Rev. |
|--|--|------------------------------------|--|--|---------------------------------------|-------------------------|--------------------|----------|
| CONSULTING E N G I N E E R S | | | JII Sheet | | jXXX | 3 | 39 | |
| | | 1 | 1 | | Member/Location | | | |
| ob Title Structure | , Member De | l esian - Geo' | technics Pa | d Strip and | Drg. | | | |
| Structure, Member D | | | | | Made by XX | Date 21 | /11/2021 | Chd. |
| | | | u, serip une | | | | /11/2021 | • |
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| | | | | | | | | |
| Punching Shear De | sign | | | | | | | |
| JLS vertical (downwa | ard) load fro |) om column ; | and base sl | ab (if susp | ended), F _{col} | N/A | kN | |
| Area of column base | section, A _{c1} | = b.h (rect | tangular) o | r πD²/4 (cir | cular) | N/A | mm ² | |
| Average effective de | pth of both I | rebar layers | $s, d = (d_{x,s})$ | + d _{y,s})/2 | | N/A | mm | |
| Area of tensile steel | reinforceme | nt provided | , A _{s,prov,x,s} | | | N/A | mm²/m | |
| Area of tensile steel | reinforceme | nt provided | , A _{s,prov,y,s} | | | N/A | mm ² /m | |
| Average area of tens | | | | As.prov.s | | | mm ² /m | |
| $p_{w} = 100A_{s,prov,s}/(100)$ | | | | | | N/A | | |
| $v_{\rm c} = (0.79/1.25)(\rho_{\rm w}f_{\rm c})$ | $(25)^{1/3}(400)$ | $(d)^{1/4}$; out | 3: f_<40: | (400/d) ^{1/4} > | >0.67 | | N/mm ² | |
| | <u>.u/_2/ (100</u> | /-/ /PW | -, - <u>cu</u> - / · · · · · · · · · · · · · · · · · · | | | | ••,••• | 1 |
| Column Base Face | Perimeter | | | | | | | |
| Choor force at column | | | | | | | | |
| Shear force at colum | | | uls - Y _{w,ULS} .F | ^ c1 | | | kN | |
| Effective shear force | | | | | | N/A | kN | 1 |
| Note $V_{eff,1} = 1.00$. | | no moment | t effects ass | sumed ; | | | | |
| Column base face pe | rimeter, u ₁ | <u> </u> | | | | | mm | 1 |
| | | | | ngular | | ular | | |
| internal column: | | | 2.(b+h) | N/A | <i>π.D</i> | - | mm | |
| Edge column: | | 2b+ | h or 2h+b | N/A | 3/4(π.D) | N/A | mm | |
| Corner column: | | | (b+h) | N/A | π.D/2 | N/A | mm | |
| Shear stress at colur | nn base face | e perimeter | $v_1 = V_{eff.1}$ | / u ₁ d (< 0 | .8f _{cu} ^{0.5} & 5N | N/A | N/mm ² | |
| Jltimate shear stress | | | | | | N/A | - | N/A |
| First Shear Perime | tor | | | | | | | |
| | | | | | | | | |
| Shear force 1.5d from | n column ba | ase face, V ₂ | $= F_{col, y, uls} -$ | $- \mathbf{q}_{w w s} \mathbf{A}_{c2}$ | | N/A | kN | |
| | | | | ngular | Circ | | | |
| Internal column: | | (b+? | 3d).(h+3d) | - | $(D+3d)^{2}$ | | m ² | |
| | 1.5d).(h+3d | | | | d).(D+3d) | | m ² | |
| Corner column: (D+) | | 1 |).(h+1.5d) | | $(D+1.5d)^2$ | | m ² | |
| | <u> </u> | , , |).(<i>II+1.50)</i> | N/A | D+1.5a) | | | |
| Effective shear force | 1 | | t offects - | cumo de | | IN/A | kN | |
| Note $V_{eff,2} = 1.00$. | | no moment | t effects as | sumed; | | | | |
| Column base first pe | rımeter, u ₂ | ļ | ļ | | | | mm | 1 |
| | | | Rectar | - | | ular | | |
| nternal column: | | | b+h)+12d | | 4D+12d | - | mm | |
| Edge column: | 2 | 2b+h+6d or | | | 3D+6d | N/A | mm | <u> </u> |
| Corner column: | | | (b+h)+3d | | 2D+3d | N/A | mm | |
| Shear stress at colur | nn base first | t perimeter, | $v_2 = V_{eff,2}$ | / u ₂ d | | N/A | N/mm ² | |
| Shear capacity enha | ancement by | [,] calculating | v_d at 1.50 | d from "sup | oport" and c | comparing a | against | |
| inenhanced v _c as cl | ause 3.7.7.6 | 5 BS8110 e | mployed in | nstead of | calculating | v _d at "supp | port" and | |
| comparing against ei | nhanced v _c | within 1.5d | of the "sup | pport" as cl | lause 3.7.7. | 4 BS8110; |) | |
| | | | ļ | | | | | 1 |
| Case v ₂ < | | | | | | N/A | | 1 |
| | No links re | | | | | | | 1 |
| Case v_c < | < v ₂ < 1.6 v _c | | | | | N/A | | |
| | | (v-v) | ud | | | | | |
| | $\Sigma A_{\rm sv} \sin \alpha$ | $t \ge \frac{(v - v_c)u}{0.95f_v}$ | | N/A | >= | N/A | mm ² | |
| | | | | | | | | |
| | Note ΣA | $_{sv}sin\alpha$ > | 0.4 <i>ud</i> /0.9 | 5f _{yv} . | | | | |
| | | 1 | 1 | 1 | 1 | 1 | 1 | I |
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| | Member De | | - | | | Made by XX | Date 21 | /11/202: | L ^{Chd.} |
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| | | | <u> </u> | | | | | | |
| | | | | | | | | | _ |
| | Case 1.6v | $c < v_2 < 2$ | .0ν _c | | | | N/A | | |
| | | - | $\epsilon \geq \frac{5(0.7v)}{0.95}$ | $-v_c$) ud | | | | | |
| | | $\Sigma A_{sv} sino$ | (≥ | 5 <i>f</i> | N/A | >= | N/A | mm ² | |
| | | | | | | | | | |
| | | Note ΣA | $s_{sv}sin\alpha >$ | 0.4ud/0.9 | $95f_{yy}$. | | | | |
| | Case $v_2 >$ | 2.0 v _c | | | | | N/A | | |
| | | | | | | | | | |
| First shea | r perimeter | shear utilis | ation | | | | N/A | | N/A |
| | | | | | | | | | |
| Second S | hear Perin | neter | + | | | | | | |
| | | | + | | | | | | |
| Shear for | ce 2.25d fro | m column ' | base face | $V_2 = F_{a-1}$ | - <u>a.</u> | -2 | N/A | kN | |
| | | | | | ngular | | ular | | 1 |
| Internal | olumni | | (h 1 1 5- | | - | | | m ² | |
| Internal co | | (b. 4 5 .)) | • | 1).(h+4.5d) | | $(D+4.5d)^2$ | | | |
| | m bn ŧ2.25d).(' | | | | | .(D+4.5d) | | m ² | |
| Corner col | | | | .(h+2.25d) | N/A |)+2.25d) ² | | m² | |
| | shear force, | | | | | | N/A | kN | |
| Note V _{eff,3} | $_{3} = 1.00 . V$ | 3 because | no momen | nt effects as | sumed; | | | | |
| Column ba | ase second p | perimeter, | U ₃ | | | | | mm | |
| | | | | Recta | ngular | Circ | cular | | |
| Internal co | olumn: | | 2. | (b+h)+18d | | 4D+18d | N/A | mm | |
| Edge colui | | : | | r 2h+b+9d | | 3D+9d | | mm | |
| Corner col | | | | (b+h)+4.5d | | 2D+4.5d | | mm | |
| | ess at colum | n hase sec | | | | 2017.30 | | N/mm ² | |
| | | | | $v_3 - v_6$ | ent,3 / ugu | | N/A | 11/11111 | - |
| | Cacat | | + | | | | NI / A | | |
| | Case $v_3 <$ | - | | | | | N/A | | |
| | | No links re | | | | | | | |
| | Case $v_c <$ | ν ₃ < 1.6ν _α | | | | | N/A | | |
| | | | $(v-v_{-})$ | ud | | | | | |
| | | $\Sigma A_{sv} \sin \alpha$ | $\epsilon \geq \frac{(v - v_c)}{0.95f_c}$ | | N/A | >= | N/A | mm ² | |
| | | | | <i></i> | | | | | |
| | | Note , ΣA | $s_{sv}sin\alpha >$ | 0.4ud/0.9 | $95f_{yy}$. | | | | |
| | Case 1.6v | $c < v_3 < 2$ | .0vc | TL | | | N/A | | |
| | | | | | | | - | | |
| | | $\Sigma A_{} \sin \theta$ | $\epsilon \geq \frac{5(0.7v)}{0.92}$ | $-v_{c}$)ud | N/A | >= | N/A | mm ² | |
| | + | svento | 0.9 | 5f _{yv} | , | - | ,. | | |
| | | Note ΣA | $s_{sv}sin\alpha >$ | 0.4ud/0.9 | 5f | | | | 1 |
| | Case $v_3 >$ | | syonia | 0.400.0 | Jyv. | | N / A | | |
| | | 2.0%c | + | | | | N/A | | |
| <u> </u> | <u> </u> | <u> </u> | | | | | | | |
| Second sh | near perimet | er snear u | tilisation | | | | N/A | | N/A |
| | | L | <u> </u> | | <u> </u> | | | | |
| | gative shear | | | | | | | | |
| | that the she | | er is beyon | d the physic | cal extreme | es of the fou | Indation an | d as such | punching |
| indicates t | | itical; | ļ | | | | | | |
| indicates t | ire is not cri | · · · · | 1 | | | | | | |
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| | SULTING | - | - | on Sheet | | jXXX | 4 | 1 | |
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| hear De | sign for Be | ending in F | Plane of W | idth | | | | | |
| | | | | | | | | | |
| | e at columr | | | | | /2 | N/A | | |
| | e at columr | | | / | | | | kN/m | |
| | e at 1.0d _{x,s} | | | | | | | | |
| | e at 1.0d _{x,s} | | | | | L _{multi} | N/A | kN/m | |
| ote the a | bove shear | forces are | for bending | in plane o | f width; | | | | |
| | | | | | | | | | |
| timate s | hear stress | for bending | g in plane o | f width, v _{ult} | $t_{t,x} = (V_{x,ult}/L_r)$ | _{nulti})/(1000. | N/A | N/mm ² | |
| timate s | hear stress | for bending | g in plane o | f width utili | isation | | N/A | | N/A |
| | | | | | | | | | |
| esign she | ear stress fo | or bending | in plane of | width, v _{d,x} = | =(V _x /L _{multi})/ | (1000.d _{x,s}) | N/A | N/mm ² | |
| | pacity enhai | | | | | | | | |
| | $ed v_c$ as cla | | | | | | | | |
| | against en | | | | | | | | |
| | nsile steel r | | | | | _ | | mm²/m | |
| = 100A | s prov x s/(100 | 00.d _{x s}) | | | | | N/A | | |
| = (0.7) | 9/1.25)(ρ _w f | $f_{1/25}^{1/3}(40)$ | $10/d$ $)^{1/4}$ | n < 3' f. <4 | 10·(400/d |) ^{1/4} >0.67 | | N/mm ² | |
| , <u>x</u> – (0.7 | <u></u> | | , (), (), (), (), (), (), (), (), (), () | Jw ~ J , r _{cu} ~ 1 | $\left[\right]$ | (,s) > 0.07 | | 11/11/11 | |
| heck v . | x < v _{c,x} for | no links | | | | | N/A | | |
| | | shear capac | ity y (100 |)0 d) | | | _ | kN/m | |
| | | | $\nabla_{c,x}$ | 10.u _{x,s}) | | | N/A | KIN/III | |
| hacky | | | | Linka | | | | | |
| песк v _{с,} , | $x < v_{d,x} < 0$ | $\frac{1.4 + V_{c,x}}{1.4 + V_{c,x}}$ | | | | | N/A | 2 | |
| | Provide no | | | | | , | | mm²/mm/i | n |
| | Concrete a | and nominal | l links sheai | r capacity (| $0.4 + v_{c,x}$). | $(1000.d_{x,s})$ | N/A | kN/m | |
| | | | <u> </u> | | | | | | |
| heck v _{d,:} | x > 0.4 + v | | | | | | N/A | | |
| | | ear links A _s | | | | | | mm²/mm/ı | n |
| | Concrete a | and design l | inks shear | capacity (A | $sv, prov, x/S_x).$ | (0.95f _{yv}).d _x | N/A | kN/m | |
| | | | | | | | | | |
| os nrovi | | | atura A | | | | | | |
| | ded by all li | | etre, A _{sv,prov} | ,х | | | | mm²/m | |
| ied A _{sv,pr} | _{rov,x} / S _x val | ue | | | | | | mm²/m mm²/mm/i | n |
| ied A _{sv,pr} | | ue | | | ıtilisation | | | | |
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| ried A _{sv,pr} | _{rov,x} / S _x val | ue | | | utilisation | | N/A | | m N/A |
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| | ISULTING | | | on Sheet | | jXXX | 1 | 2 | |
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| Shear De | sign for Be | ending in F | Plane of Le | ength | | | | | |
| Choor for | | hace contr | roling V | | | | | LAN | |
| | e at column | | | | | | N/A | KN | T.3.5 |
| | r coefficient | | | | | span 0.6; | | kN/m | BS8110 |
| | ce at column ce at 1.0d _{y,s} | | | | | B | N/A | | |
| | ce at 1.0d _{y,s} | | | | | | - | kN/m | |
| | above shear | | | | | D _{multi} | N/A | KIN/III | |
| | | TUILES are | | j ili plane u | l length, | | | | |
| Iltimato c | hoar stross | for bonding | in nland o | flongth v | / | | N / A | N/mm ² | |
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| | bacity enha | | | ., | , | | | | |
| | ed v _c as cla | | | | | | | | |
| | against en | | | | | | | | |
| | nsile steel r | | | | | 130 5.4.5.0 | - | mm²/m | |
| | s,prov,y,s/(10 | | | , As,prov,y,s | | | N/A N/A | - | |
| $v_{\rm w} = 1007$ | ′9/1.25)(ρ _w f | · /25) ^{1/3} (/(|)0/d) ^{1/4} . | | 10· (400/d |) ^{1/4} >0.67 | | N/mm ² | |
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| heck v. | y < v _{c,y} for | no links | | | | | N/A | | |
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| structure, | Member De | esign - Geo | technics Pa | d, Strip a | nd Raft | | Made by | XX | Date | 21, | /11/2021 | Lona. |
| Combino | d Footing l | Foundation | Dimoncia | nc | | | | | | | | |
| | the combine | | | | efficient | 1150 | of a fo | otina | n is re | auire | d than | |
| | ional pad fo | | | | | | | | | - | | |
| | employmen | - | | | | | | | | | - | |
| | noments a | | | | | | | | | - | | |
| oth sagg | ing and hog | ging mome | nts akin to | a continu | ious bear | n or | slab. A | l cor | nbine | d foot | ing differs | |
| rom a mι | ılti column f | footing in th | e fact that | the colur | nn loads a | are r | not uni | form | , and | thus | require | |
| | imensions o | | ined footing | l be such | that the | resu | ltant lo | oad p | basses | s thro | ugh the | |
| entroid o | <i>f the base a</i> | irea; | | | | | | | | | | |
| | | | | | | | | | - | 1 200 | | |
| | $m (<=L_{com})$ $m (>=B_{com})$ |) | | | | | | | | 2.300 1.600 | | N/A |
| | ernal span, | |) | | | | | | | 4.600 3.000 | | N/A N/A |
| | $y_c = (F_{col,v,2})$ | | | | | | | | - | N/A | | |
| | ternal span, | | | .000) | | | | | | N/A | | N/A |
| | ternal span, | | | | 000) | | | | | N/A | | N/A |
| | combined fo | | | | | s a fu | <i>inction</i> | of t | he loa | - | | |
| Should the | e relative lo | ads vary gr | eatly, the e | ffectiven | ess of the | e con | nbined | foot | ting re | educe | s; | |
| | | | L _{com} | | | | ► | | | | | |
| | I | | | | | | 7.♠ | | | | | |
| | | → y | C | | | | \square | | | | | |
| | | | | | | | В | com | | | | |
| | Column 1 | | | | Column 2 | 2 | | | | | | |
| L | | | | | | | _↓↓ | | | | | |
| | cpm,1 | | L _{com,3} | | | om,2 | ▶ | | | | | |
| | beneath ba | se slab, t _{1.c} | | | | | | | (| 0.800 | m | |
| | of base sla | 1 - | - | b, then e | nter 0.00 | 0m) | | | | 0.000 | | |
| Thickness | of foundation | on, $T_{com} = t$ | $t_{1,com} + t_{2,com}$ | m | | | | | | N/A | m | |
| Column ba | ase section | type <i>(for pι</i> | inching she | ar only) | | | R | ectan | gular | ▼ | | |
| | ase location | | - | | Interior | | | — - | | ▼ | | |
| | base depth | | | | | - | | ▼ | | | mm | |
| | base width, | | | | | | Edge | ▼ | | | mm | |
| | base depth base width, | | | | | - | ۲۹۹۹ | ▼ - | | | mm mm | |
| | re applicable | | | | | | - | ▼ as I | a | | | mn |
| | vays interio | | | | | | | | | | | |
| | | | | | | | <u> </u> | con | | J | com, | |
| Combine | d Footing I | Foundation | n Reinforc | ement | | | | | | | | |
| | | | | | | | | | | | | |
| | | | Нодд | ing in len | gth | | | | | | | |
| | | | | ing in len | | | | | | | | |
| | | | | | | | | | | | | _ |
| Sagaing o | teel roinford | | | | | | | | 20 | • | mm | |
| | teel reinford teel reinford | | | | idth n | | | | 20 | | mm mm | |
| | teel area pr | | | | | | | | | | mm²/m | - |
| | teel reinford | | | | <u>57 1 1 HSX</u> | | | | 20 | - | mm | |
| | teel reinford | | | , | ngth, p _{sv} | | | | | 200 | mm | 1 |
| | teel area pr | | | | - 1 | y | | | | | mm²/m | 1 |
| logging s | teel reinford | cement diar | neter in len | gth, ϕ_{hy} | | | | | 16 | • | mm | |
| | teel reinford | | | | , | | | | | | mm | |
| logging s | teel area pr | ovided in le | ength, A _{s,pro} | $v,y,h = (\pi.$ | φ _{hy} ²/4)/p _h | ıy | | | | N/A | mm²/m | |
| | | | | | _ | | | | | | | |
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| CON | | | | | | Job No. | Sheet No | | Rev. |
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| | ISULTING | | | on Sheet | | jXXX | | 47 | |
| Endi | | | | | | Member/Location | | 17 | |
| Job Title | Structuro | Mombor D | esign - Geo | tochnics Pa | d Strip and | Drg. | | | |
| | Member De | | - | | | Made by XX | Date 2 | 1/11/2021 | Çhd. |
| Structure, | | | | | | | | 1/11/2021 | |
| | | | | | | | | | |
| | | | | | | | | | |
| | diameter fo | | | , | | | None 🗨 | mm | |
| | f link legs fo | | | | | 2 | 3 | - | |
| | ided by all I | | | | $p_{rov,2} = n_{l,2}$ | $\pi \cdot \phi_{\text{link},2}^2/4$ | | A mm ² | |
| | diameter fo | | | 1- | | | | mm | |
| | f link legs fo ided by all l | | | | <u>ــــــــــــــــــــــــــــــــــــ</u> | n. π. μ. ² / | 3 N / | A mm ² | |
| Shear link | diameter fo | or bendina | in width, du | perimeter, n | ¬sv,prov,3 — I | 1,3• <i>π</i> •Ψlink,3 / | | 0 mm | |
| | f link legs p | | | 1 1 | l Ik.x | | | 4 /m | |
| | ided by all I | | | | , | $= n_{\text{link.x}}.\pi.\phi$ | | A mm ² /m | |
| Pitch of lir | nks for bend | ling in widtl | h, S _x | | | , | | 0 mm | |
| | diameter fo | | | | | | | 0 mm | |
| | f link legs p | | | | ., | | | <mark>4</mark> /m | |
| | ided by all I | | | ding in leng | gth, A _{sv,prov,} | $y = n_{\text{link},y}.\pi$. | | A mm ² /m | |
| Pitch of lir | iks for bend | ling in lengt | tn, S _y | | | | 15 | <mark>0</mark> mm | |
| Effortivo | lonth to co- | aina ataal : | | _ 		_ | | V (+ 1 | N1 / | A mm | |
| | lepth to sag lepth to sag | iging steel i | in length d | <u>,s = 1_{com} - C – T –</u> | $cover_1 - MA$ | ΔΧ (Φlink,2, Φlir ΔΧ (Δ | IN/ | A mm A mm | |
| | lepth to bog | | | | | | | A mm | |
| | ned that sag | | | | | | | | |
| | | | | | | | | | |
| Estimated | steel reinfo | prcement qu | Jantity | | | | N/ | A kg/m ³ | |
| [7.850 . (| $(A_{s,prov,x,s} + A)$ | A _{s,prov,y,s} +A | s,prov,y,h)/ | T _{com}]; No a | curtailment | ; No laps; L | | red; Distrib | ition steel i |
| | | | | | | | | | |
| Combine | d Footing l | Foundatio | n SLS Loac | ling | | | | | |
| | | | | | | | | | |
| | al (downwa | | | | • | | | 0 kN | N/A |
| | al (downwa footing (pr | - | | | | | | 0 kN | N/A |
| | soil (above | | | | | | | A kN A kN | |
| | | | | 1 | | | | op of the fo | l otina |
| | | | | | | | | pted, and ρ | |
| | dation SLS | | | | | | | A kN | |
| | | | | | , | | | | |
| Gross wor | king pressu | ire, $q_w = F_{co}$ | _{om,v} / (B _{com} | . L _{com}) | | | N/ | A kPa | |
| | | | | | | | | | |
| Combine | d Footing l | Foundatio | n ULS Load | ding | | | | | |
| | | | | 1 | | | | | |
| | al (downwa al (downwa | | | | - | | | A KN | |
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| CON | | - | Cala dati | Charach | | Job No | o. She | et No. | | Rev. |
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| | NSULTING I N E E R S | - | - | on Sheet | | jХХ | x | 4 | 18 | |
| LIGI | | j | | | 1 | | | | | |
| | | <u> </u> | | | | Member/Lo | ocation | | | |
| ob Title | | | - | technics Pa | | Drg. Mada hu | Doto | | | dha |
| structure, | , Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by | XX Date | 21 | /11/2021 | una. |
| | | | | | | | | | | _ |
| Combine | d Footing l | Foundatio | n Reinforc | ement Des | sign | | | | | _ |
| | | | | | | | | | | _ |
| Jross UL | S Pressure | 2 | | | | | | | | |
| Frose LILS | nressure | a – (F | |)/(B | | | | N/A | k Do | |
| | S pressure, o | | ol,v,1,uls | ol,v,2,uls) / (D | com・∟com/ | | | N/A | кра | |
| | | | | | | | | | | _ |
| | \sim | | | | Shear force | e diagra | am | | | |
| | | | | | nding mom | | | | | |
| | 4 | | | De | nung mon | | yrann | | | |
| | | 1 | 1 | 1 | | 1 | | | | |
| Sagging | Bending M | oment De | sign in Pla | ne of Widt | th | | | | | |
| | | | | | | | | | | |
| 4oment a | it column ba | ase centrelii | ne, $M_x = q_w$ | , _{ULS} . L _{com} . | $(B_{com}/2)^2/$ | 2 | | N/A | kNm | |
| | it column ba | | | | | | | | kNm/m | |
| | | | | | | | | | | |
| | moment cap | | | | $1000.d_{x,s}^{2}$ | | | N/A | kNm/m | |
| | tress, [M/bo | | | | | | | N/A | N/mm ² | |
| | tress ratio, | | | | | | | N/A | | N/A |
| | $n, z_x = d_{x,s} .$ | | | | | | | | mm | |
| Area of te | nsion steel | required, A | $\frac{1}{M_x} = (M_x/L_c)$ | _{om}) / [(0.95 | f _y).z _x] | | | N/A | mm²/m | |
| | | | | | | | | | | |
| | nsile steel r | | | | | | | | mm²/m | |
| Sagging b | ending mor | nent in plar | ne of width | utilisation = | = A _{s,x} / A _{s,pr} | rov,x,s | | N/A | | N/A |
| | | | <u> </u> | | | | | | | |
| | ent to conce | | | | | < , | N/A | N/A | | 3.11.3.2 |
| | ax(L _{com,1} , L _c | | | | | | | | | BS8110 |
| | should the | | | | | | cally refle | ected II | n the | - |
| ietailing c | consideratio | ns and as s | uch snoula | be specifica | ally reconsi | aerea; | | | | |
| % Min car | g reinforcem | ont in plan | o of width (| (> - 0.0024) | 1000 T | G250: | ~- | N/A | 0/ | |
| | g reinforcem | | | | .1000.1 _{com} | G250, | ~- | N/A | | N/A |
| | | | | Julisation | | | | N/A | | N/A |
| Sagging | Bending M | oment De | sian in Pla | ne of Lenr | ath | | | | | |
| Jagging | | | | | | | | | | |
| Moment a | it column ba | ase face. M. | . = 0 | B _{aam} , [max | $(1_{arm 1} - h_1/2)$ | | -h ₂ /2 | N/A | kNm | |
| | it column ba | | | | | -/ -com,2 | | | kNm/m | |
| | | | , y/ | | | | | | , | 1 |
| Concrete i | moment cap | pacity per n | netre, Muy | = 0.156f _{cu} .1 | 1000.d _{v.s} ² | | | N/A | kNm/m | 1 |
| | tress, [M/bo | | | | ,,,, | | | | N/mm ² | |
| | tress ratio, | | | | | | | N/A | | N/A |
| _ever arm | $r_{y} = d_{y,s}$. | [0.5 + (0.2 | 25-K _y /0.9) ⁰ | ^{.5}] <= 0.95 | d _{y,s} | | | N/A | mm | |
| Area of te | nsion steel | required, A | $s_{s,y} = (M_y/B_c)$ | _{com}) / [(0.95 | $[f_y).z_y]$ | | | N/A | mm²/m | |
| | | | | | | | | | | 1 |
| | nsile steel r | | | | | | | | mm²/m | |
| Sagging b | ending mor | nent in plar | ie of length | utilisation | $= A_{s,y} / A_{s,y}$ | prov,y,s | | N/A | | N/A |
| | <u> </u> | <u> </u> | <u> </u> | | | | | | | <u> </u> |
| | ent to conce | | | | | | N/A | N/A | | 3.11.3. |
| | _{om} /2>3/4mi | | | | | | mm | | | BS8110 |
| | should the | | | | | | cally refle | ected ii | n the | |
| ietailing c | consideratio | ns and as s | ucn should | De specifica | ally reconsi | aered; | | | | |
| | | l ant in plan | o of longth | | / / 1000 T | 6250 | | NI / A | 0/ | |
| Min an- | a reiniorcem | ient in plan | | | יי.⊥000.1 _{cor} | n GZOU | , | N/A | | N/A |
| % Min sag | | ant in place | o of longth | utilication | | | | | | |
| | g reinforcem | nent in plan | e of length | utilisation | | | | N/A | | N/A |

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| | | Engineerin Consulting | - | on Sheet | | jXXX | 4 | 9 | |
| ENGI | | concurring | Linghieero | 1 | 1 | | | 5 | |
| | _ | | | | | Member/Location | | | |
| | | Member De | - | | | Drg. | Data a d | | dha |
| Structure, | Member De | esign - Geot | technics Pa | d, Strip and | d Raft | Made by XX | ^{Date} 21 | /11/2021 | una. |
| | | | | | | | | | |
| | | | | | | | | | |
| Hogging F | Bendina M | oment De | sign in Pla | ne of Len | ath | | | | |
| | | | | | | | | | |
| Distance to | zero shea | r force fron | n column 1, | $L_{com,4} = (F)$ | $F_{col,v,1,uls} - q_w$ | ULS.B _{com} .L _{cor} | N/A | m | |
| | | uls . L _{com,4} - | | | | | | kNm | |
| Moment pe | er metre, M | y/B _{com} | | | | | N/A | kNm/m | |
| | | | | | | | | | |
| | | pacity per m | | | 1000.d _{y,h} ² | | | kNm/m | |
| | | $[d^2]_y = (M_y/E)$ | | | | | | N/mm ² | |
| Bending st | ress ratio, | $K_{y} = [M/bd]$ | $\frac{1}{y} / t_{cu} <=$ | U.156 | .d | | N/A | mm | N/A |
| Lever arm, | $z_y = a_{y,h}$ | [0.5 + (0.2 required, A | $\frac{25 - K_y / 0.9}{= (M / P)}$ |] <= 0.95 | ou _{y,h} 5f) ⁊ 1 | | | mm mm²/m | |
| | | | s,y — (11y/ D _C | | y)y] | | | 11111 / M | |
| Area of ter | nsile steel n | einforceme | nt provided | , As provide | | | N/A | mm²/m | 1 |
| | | nent in plar | | | $= A_{s,v} / A_s$ | prov,v.h | N/A | - | N/A |
| | - | | | | 5,, 5, 5, | | | | |
| Requireme | nt to conce | entrate 2/3 | rebar withi | n 1.5d _{y,h} fro | N/A | < N/A | N/A | | 3.11.3.2 |
| | | in(b ₁ or D ₁ | | | | | | | BS8110 |
| | | above requi | | | | | reflected ir | n the | |
| detailing co | onsideratio | ns and as s | uch should | be specifica | ally reconsi | dered; | | | |
| | | | | | | | | | |
| | | nent in plan | | | 4.1000.T _{col} | _m G250; >= | | | |
| % Min hog | reinforcem | nent in plan | e of length | utilisation | | | N/A | | N/A |
| | | | | | | | | | |
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| | ISULTING | | | on Sheet | | jXXX | | 50 | |
| 21101 | | | | | | Member/Location | | | |
| | Characteria | Manahan Da | | ta alemia a Da | | Drg. | | | |
| Job Title | | Member De | | | | Made by XX | Date 1 | 1/11/2021 | bd |
| structure, | Member De | esign - Geo | lechnics Pa | u, Strip and | | XX | Z. | L/11/2021 ^c | |
| | | | | | | | | | |
| | | | | | | | | | |
| Punching | Shear De | sign | | | | | | | |
| Tritical col | lumn 1 or 2 | ie MAX(F | /(b. | | $((h_2, h_2))$ | or MAX(F | N/# | | |
| | al (downwa | | | | | | | A kN | |
| | column base | - | | | | | - | Amm | |
| | column base | | | | | | | A mm | |
| | lumn base s | | | | | cular) | | A mm ² | |
| | ffective dep | | | | | | | Amm | |
| | nsile steel r | | | | y,377 | | | A mm ² /m | |
| | nsile steel r | | | | | | | mm^2/m | |
| | rea of tensi | | | | | | | $\frac{1}{1}$ mm ² /m | |
| | s,prov,s/(100 | | | | 5,00,5 | | | A % | |
| $v_{\rm c} = (0.79)$ | /1.25)(ρ _w f _{cι} | /25) ^{1/3} (400 |)/d) ^{1/4} ; ρ _w < | 3; f _{cu} <40; | (400/d) ^{1/4} > | >0.67 | | A N/mm ² | |
| | | | | | | | | | |
| Joiumn E | Base Face I | Perimeter | | | | | | | |
| Shear forc | ce at columr | h base face, | $V_1 = F_{col.v.}$ | _{uls} - q _{w,ULS} .A | Å _{c1} | | N// | A kN | |
| | hear force, | | | | | | | A kN | |
| | = 1.00 . V | | | t effects as | sumed ; | | ,. | | |
| | ase face per | | | | , | | N// | A mm | |
| | | | | Rectar | ngular | Circ | ular | | |
| Internal co | lumn. | | | 2.(b+h) | - | π.D | | mm | |
| Edge colui | | | 2b+ | h or 2h+b | | 3/4(π.D) | , | mm | |
| Corner col | | | 201 | (b+h) | | π.D/2 | | | |
| | ess at colum | n haco faco | porimotor | | | Qf 0.5 8. 5M | N/A | MM N/mm ² | |
| | hear stress | | | , v ₁ — v _{eff,1} | / u ₁ u (< 0 | | N// | - | N/A |
| | | | | | | | | | N/A |
| Eirct Sho | ar Perimet | or | | | | | | | |
| i ii st She | | | | | | | | | |
| Shoar forc | L ce 1.5d from |) a column ha | se face V. | – F | Λ | | N// | A kN | |
| | | | | | ngular | Circ | ular | | |
| Internal a | | | (6.1.7 | | | | | | |
| Internal co | | | • | 3d).(h+3d) | - | $(D+3d)^{2}$ | 1 | m ² | |
| Edge colui | | .5d).(h+3d | | | | d).(D+3d) | | m ² | |
| Corner col | | V 10 | |).(h+1.5d) | N/A | (D+1.5d) ² | | m ² | |
| | shear force, | | | t offerste | | | N// | A kN | |
| | $v = 1.00 \cdot V$ | | no moment | t errects as | sumea; | | | _ | |
| Column ba | ase first per | imeter, u ₂ | | | | | | A mm | |
| | | | | | ngular | | ular | | |
| Internal co | | | - | b+h)+12d | | 4D+12d | - | mm | |
| Edge colui | | 2 | b+h+6d or | - 2h+b+6d | - | 3D+6d | | mm | |
| Corner col | | | | (b+h)+3d | | 2D+3d | | mm | |
| | ess at colum | | | | | | | N/mm ² | |
| Shear cap | bacity enhai | ncement by | ^r calculating | v_d at 1.50 | d from "sup | oport" and c | comparing | against | |
| | ed v _c as cla | | | | | | | | |
| comparing | g against en | hanced v _c | within 1.5d | of the "sup | pport" as ci | lause 3.7.7. | 4 BS <mark>8110</mark> | ;) | |
| | Case v ₂ < | V. | | | | | N/A | | |
| | | No links re | auired | | | | | | |
| | Case $v_c <$ | v ₂ < 1.6 v _c | | | | | N/A | | |
| | | | | u d | | | | | |
| | | | (n - n) | ua | | + | | | |
| | | $\Sigma A_{m} \sin \alpha$ | $\geq \frac{(v-v_c)}{v_c}$ | | N/A | >= | N/A | mm I | |
| | | $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v-v_c)}{0.95f_y}$ | v | N/A | >= | N/A | mm ² | |
| | | | $\geq \frac{(v - v_c)}{0.95 f_y}$ | v 0.4 <i>ud/</i> 0.9 | | >= | N/A | | |

| | | | | | | Job No. | Sheet No. | | Rev. |
|-------------|-----------------------|-----------------------------|--------------------------------------|----------------------|--------------|-----------------------|--------------|---------------------|----------|
| | ISULTING | | | | | | | · - | |
| ENGI | INEERS | Consulting | , Engineers | | | jXXX | ⁵ | 51 | |
| | | | | | | Member/Location | | | |
| Job Title | Structure, | Member D | esign - Gec | technics Pa | d, Strip an | d Drg. | 1 | | |
| | Member De | | - | | | Made by XX | Date 21 | /11/202 | Chd. |
| , | | | | | | | - | | |
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| | | | - | | | | | | |
| | | | | | | | | | - |
| | | | | | | | | | |
| | | | | | | | | | _ |
| | Case 1.6v | | | | | | N/A | | _ |
| | | - | $\epsilon \geq \frac{5(0.7v)}{0.95}$ | $-v_c$) ud | | | | | |
| | | $\Sigma A_{sv} \sin \theta$ | $l \ge$ | 5 <i>f</i> | N/A | >= | N/A | mm ² | |
| | | | | | | | | | |
| | | Note ΣA | $s_{sv}sin\alpha >$ | 0.4ud/0.9 | $5f_{yy}$. | | | | |
| | Case $v_2 >$ | 2.0 v _c | | | | | N/A | | |
| | | | | | | | | | |
| First shear | r perimeter | shear utilis | ation | | | | N/A | | N/A |
| | | | | | | | | | |
| Second S | hear Perin | neter | 1 | | | | | | 1 |
| | | - | 1 | | | | | | 1 |
| Shear forc | ce 2.25d fro | m column | base face. | $V_3 = F_{colyouth}$ | - q., | -3 | N/A | kN | 1 |
| | | | | | ngular | | cular | | 1 |
| Internal co | olumn | | (h±1 50 | 1).(h+4.5d) | - | $(D+4.5d)^2$ | | m ² | |
| | т bn +2.25d).(| (b_1 5d) ~ | | , , | - | .(D+4.5d) | | m m ² | - |
| Corner col | | | | | | | | m ² | + |
| | | | | .(h+2.25d) | N/A |)+2.25d) ² | | | |
| | shear force, | | | | | | N/A | KIN | |
| | $_{3} = 1.00 \cdot V$ | | | it errects as | sumea; | | | | |
| Column ba | ase second p | perimeter, | <u>u₃</u> | | | | | mm | |
| | | | <u> </u> | | ngular | | cular | | |
| Internal co | | | | (b+h)+18d | | 4D+18d | | mm | |
| Edge colur | mn: | Ž | 2b+h+9d o | r 2h+b+9d | N/A | 3D+9d | N/A | mm | |
| Corner col | | | | b+h)+4.5d | | 2D+4.5d | N/A | mm | 1 |
| Shear stre | ess at colum | n base sec | | | | | | N/mm ² | |
| | | | | | | | | | |
| | Case $v_3 <$ | ν _c | | | | | N/A | | 1 |
| | | No links re | equired. | | | | - | | |
| | Case $v_c <$ | | | | | | N/A | | |
| | | | | | | | | | |
| | + | $\Sigma A = \sin \alpha$ | $c \ge \frac{(v - v_c)}{0.95f_c}$ | ud | N/A | >= | N/A | mm ² | |
| | | 211 _{sv} onto | $-$ 0.95 $f_{\rm c}$ | yv | | ~ _ | | 111111 | |
| | | Noto 54 | aina | 0.4 <i>ud</i> /0.9 | s.€ | | | | |
| | Case 1.6v | | | 0.400.9 | Jyv. | | NI / A | | + |
| | Case 1.0V | | | <u> </u> | | | N/A | | + |
| | | V 4 · | 5(0.70 | $-v_{e}$)ud | | | | 2 | |
| | | $LA_{sv}sin0$ | $\epsilon \geq \frac{5(0.7v)}{0.95}$ | $5f_{yy}$ | N/A | >= | N/A | mm ² | |
| | | | | - | | | | | |
| | <u> </u> | | $s_{sv}sin\alpha >$ | 0.4 <i>ud</i> /0.9 | $5f_{yv}$. | | | | |
| | Case $v_3 >$ | 2.0ν _c | <u> </u> | | | | N/A | | |
| | | | | | | | | | |
| Second sh | near perimet | er shear u | tilisation | | | | N/A | | N/A |
| | | | | | | | | | |
| Note a neo | gative shear | r stress v_2 | and/or v_3 | on a corre | ctly specifi | ed column (| wrt interna | l, edge or | corner) |
| | that the she | ar perimet | er is beyon | d the physic | cal extreme | es of the fou | Indation an | d as such | punching |
| | iro ic net e | itical; | | | | | | | |
| indicates t | ii e is not ch | | | | | | | | |
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| CON | ISULTING | Engineerin | a Calculatio | n Chaot | | Job No. | Sheet No. | Rev. |
|-------------|--|---|---|----------------------------------|------------------------------|---------------------------------------|-----------|---------------------------|
| | ISULTING | - | - | m sheet | | jXXX | 5 | 2 |
| | | | 5 | | | Member/Location | _ | |
| - la Titl - | Chrusting | Mambar | alan Caal | tachnica Da | d Ctuin and | | | |
| ob Title | | Member De | - | | · · · · | | Date 21 | (11 / 2021(thd |
| tructure, | Member De | esign - Geo | lechnics Pa | u, Strip and | | Made by XX | 21 | /11/2021 ^{Chd.} |
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| | | | | | | | | |
| boar Do | sign for B | anding in I | lano of W | lidth | | | | |
| | sign for Be | | | | | | | |
| hear forc | e at colum | hase cent | reline V | - a | B / | 2 | N/A | |
| | e at column | | | | | <u>د</u> | | kN/m |
| | e at 1.0d _{x,s} | | | 1 | | (B / | | |
| | $e at 1.0d_{x,s}$ | | | | | | | kN/m |
| | above shear | | | | | -com | | |
| | | | | | | | | |
| ltimate s | hear stress | for bending | in nlane o | fwidth v. | =(\//l |)/(1000 c | N/A | N/mm ² |
| | hear stress | | | | | | N/A | N/ |
| | | | | | | | | |
| esian she | ear stress fo | or bending | in plane of | width. va= | =(V_/L)/(| (1000.d) | N/A | N/mm ² |
| | pacity enha | | | | | | | |
| | ed v _c as cla | | | | | | | |
| | against en | | | | | | | , |
| | nsile steel r | | | | | | | mm²/m |
| | s,prov,x,s/(10 | | | / · ·s,prov,x,s | | | N/A | |
| = (0.7) | '9/1.25)(ρ _w f | $(25)^{1/3}$ | 0/d) ^{1/4} | | L0· (400/d |) ^{1/4} >0.67 | | N/mm ² |
| ,x = (0.7 | <u>9/1.29/(Pwi</u> | <u>cu</u> /23) (40 | , () () () () () () () () () () () () () (| _w ~, _{cu} ~¬ | , (+00/u _x | ,s) >0.07 | N/A | |
| heck v. | _x < v _{c,x} for | no links | | | | | N/A | |
| | - | hear capac | ity y (100 |)0 d) | | | _ | kN/m |
| | | | | Jo.u _{x,s}) | | | N/A | |
| heck v | < v. < (|)4 ± v fa | or nominal | l links | | | N/A | |
| | x < v_{d,x} < 0 Provide no | minal links | such that / | | // (1000)/((|) 95f) i o | | mm²/mm/m |
| | | | | | | $(1000.d_{x,s})$ | | kN/m |
| | | | | | 0.+ + v _{c,x}). | (1000.u _{x,s}) | N/A | KIN/III |
| heck v . | _x > 0.4 + \ | , for des | ian links | | | | N/A | |
| | | | | 0 (y - y) | //// 95f) i | .e. A _{sv} / S > | - | mm²/mm/m |
| | | | | | | $(0.95f_{yv}).d_x$ | | kN/m |
| | | | | | sv,prov,x/ O _x /. | (0.551 ₉₀).u _x | N/A | KIN/III |
| roa provi | ided by all I | inks nor me | tro A | | | | NI/A | mm²/m |
| | _{rov,x} / S _x val | | Suc, A _{sv,prov} | ,x | | | | mm ² /mm/m |
| /1 | ear resistan | | ling in pland | of width u | Itilication | | N/A | <u>nim / nin/ m</u> N/ |
| esign she | | | | | | | N/A | N/: |
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| | | | | | Job No. | Sheet No. | | Rev. |
|---|---------------------------|----------------------------|---|---------------------------|---------------------------------------|----------------|------------------------|--------|
| CONSULTING E N G I N E E R S | Engineerin | g Calculatio | on Sheet | | jXXX | | 3 | |
| | Consulting | Engineers | Γ | Γ | | 5 | 5 | |
| | | | | | Member/Location | | | |
| Job Title Structure, Structure, Member D | , Member De | - | | u, Strip un | Drg. Made by | Date 31 | /11/2021 | thd |
| | esign - Geo | | u, Suip and | | XX | 21 | /11/2021 | |
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| | | | | | | | | |
| Shear Design for B | ending in I | Plane of Le | ength | | | | | |
| | | | | | | | | |
| Shear force at colum | n 1 base lef | t face, V _{y,1} | $= q_{w,ULS} \cdot B$ | . (L _{com,1} | h ₁ /2) | N/A | | |
| Shear force at colum Shear force at colum | n 1 base rig | int race, v _{y,} | $\frac{2}{2} = F_{col,v,1,ul}$ | $s - q_{w,ULS}$ | B _{com} . (L _{com,} | N/A N/A | | |
| Shear force at colum | n 2 base rig | ht face. $V_{y,3}$ | $\frac{-1}{col,v,2,uls}$ | $- q_{w,0LS} \cdot D_{c}$ | | N/A N/A | | |
| Shear force at critica | l column ba | se face, V _v , | $\frac{4}{\text{ult}} = MAX(V)$ | $V_{v,1}, V_{v,2}, V_v$ | .3, V _{v,4}) | N/A | | |
| Shear force at critica | | | | | | | kN/m | |
| Shear force at 1.0d _{y,} | | | | | | | | |
| Shear force at 1.0d _{y,} | | | | | /B _{com} | N/A | kN/m | |
| Note the above shea | r forces are | for bending | in plane o | f length; | | | | |
| Iltimato choor stress | for bonding | in plana a | flongth y | _()/ /5 | | | N/mm ² | |
| Jltimate shear stress Jltimate shear stress | | | | | o _{com})/(1000 | N/A N/A | iv/inm ⁻ | N/A |
| | | | | | | N/ A | | |
| Design shear stress i | n plane of le | ength, v _{d,v} = | (V _v /B _{com})/(| 1000.d _{v,s}) | | N/A | N/mm ² | |
| Shear capacity enha | | | | | t" and com | | | |
| inenhanced v _c as cl | | | | | | | oport" and | |
| comparing against er | | | | ort" as clau | ıse 3.4.5.8 | | 2 | |
| Area of tensile steel | | nt provided | , A _{s,prov,y,s} | | | | mm ² /m | |
| $p_{w} = 100A_{s,prov,y,s}/(10)$ $v_{c,y} = (0.79/1.25)(\rho_{w})$ | | $10/d^{1/4}$ | 3 · f - 1 | 0. (400/d |) ^{1/4} >0.67 | N/A | % N/mm ² | |
| $r_{c,y} = (0.79/1.25)(p_w)$ | ¹ cu/23) (40 | joyu _{y,s}) , j | _w ~, _{cu} ~4 | 0, (400/u _y | ,s) >0.07 | N/A | 11/11111 | |
| Check v _{d,y} < v _{c,y} for | r no links | | | | | N/A | | |
| | shear capac | ity v _{c,y} .(100 |)0.d _{y,s}) | | | | kN/m | |
| | | | | | | | | |
| Check $v_{c,y} < v_{d,y} < 0$ | | | | | | N/A | 2 | |
| | ominal links | | - | | / | | mm ² /mm/ | m I |
| Concrete | and nomina | | | 0.4 + v _{c,y}). | (1000.0 _{y,s}) | N/A | kN/m | |
| Check v _{d,y} > 0.4 + | v for des | ian links | | | | N/A | | |
| | near links A _s | | 0.(v _{d.v} -v _{c.v}) | /(0.95f _{vv}) i | .e. A _{sv} / S : | - | mm²/mm/ | m |
| | and design | | | | | | kN/m | |
| | | | | | | | | |
| Area provided by all | | etre, A _{sv,prov} | ,у | | | | mm ² /m | |
| Tried A _{sv,prov,y} / S _y va | | | <u> </u> | | | | mm²/mm/ | |
| Design shear resistai | nce for benc | ling in plane | e of length | utilisation | | N/A | | N/A |
| | | | | | | | | |
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| 1 1 N | SULTING | Engineerin | a Calculatio | on Shoot | | Job No. | Sheet No. | | Rev. |
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| | INEERS | | | on Sneet | | jXXX | 5 | 54 | |
| | | | | | | Member/Location | n | | |
| ob Title | Structure. | Member De | esian - Geo | technics Pa | d. Strip and | Drg. | | | |
| | Member De | | - | | | Made by XX | Date 21 | /11/202 | 1 ^{Chd.} |
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| | | | | | | | | | |
| | | | | | | | | | |
| etailing | Requirem | ents | | | | | | | |
| ll dotailir | ng requirem | ents met ? | | | | | N/A | | |
| | | | | | | | | | |
| lax saggi | ng steel rei | nforcement | pitch in pla | ane of width | ו (<3d _{x,s} , < | 750mm) | N/A | mm | N/A |
| | ng steel rei | | | | | | | mm | N/A |
| lax hoggi | ing steel rei | nforcement | pitch in pla | ane of lengt | th (<3d _{y,h} , | <750mm) | N/A | mm | N/A |
| M- | | 0.50 | / A -t 1 | 200 | | | | | |
| Ma | ximum spaci | | % Ast or less ween 0.5% ε | s - 300mm and 1.0% - 2 | 25mm | | | | |
| | | | | ater - 175mr | | | | | |
| | | 1 | | | | | | | |
| ax saggi | ng steel rei | nforcement | pitch in pla | ane of width | <u>י</u> | | N/A | mm | N/A |
| | ng steel rei | | | | | | - | mm | N/A |
| lax hoggi | ing steel rei | nforcement | pitch in pla | ane of leng | th | | N/A | mm | N/A |
| in one-' | | forcoment | nitch in -l- | no of width | (>100 | | B1/5 | | |
| | ng steel rein ng steel rein | | | | - | | - | mm mm | N/A N/A |
| | ng steel reir | | · · · · | - | - | ,. | | mm | N/A |
| | llowance ha | | | _ | | ,. | | | |
| | | | | , | , | | , | | |
| | | | | | | | | | |
| | | | | idth (<= 0. | - | | N/A | % | N/A |
| 6 Max sa | gging reinfo | orcement in | plane of le | ngth (<= 0 | .04.1000.T | com) | N/A | % | N/A N/A |
| 6 Max sa | | orcement in | plane of le | ngth (<= 0 | .04.1000.T | com) | | % | |
| 6 Max sa 6 Max ho | gging reinfo gging reinfo | prcement in prcement in | plane of le plane of le | ngth (<= 0 ength (<= 0 | 0.04.1000.T 0.04.1000.T | com) | N/A N/A | % % | N/A N/A |
| 6 Max sa 6 Max ho agging s | gging reinfo gging reinfo teel reinforo | prcement in prcement in cement dian | plane of le plane of le neter in pla | ngth (<= 0 ngth (<= 0 ne of width | 0.04.1000.T 0.04.1000.T 0.04.1000.T | com) com) 5mm) | N/A N/A N/A | % % mm | N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm | N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| 6 Max sa 6 Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
| Max sa Max ho agging s agging s | gging reinfo gging reinfo del reinforo teel reinforo | prcement in prcement in cement dian cement dian | plane of le plane of le neter in pla neter in pla | ngth (<= 0 ngth (<= 0 ne of width ne of lengt | 0.04.1000.T 0.04.1000.T $h, \phi_{sx} (>=16$ $h, \phi_{sy} (>=1$ | com) com) 5mm) 6mm) | N/A N/A N/A N/A | % % mm mm | N/A N/A N/A N/A |
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| CONS | ULTING | Engineering | n Calculatio | n Shoot | | Job N | lo. | Sheet No | | Rev. |
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| | | | | | | Member/ | Location | | | |
| | | Member De | | | | Dig. Made by | | Doto | | hd |
| Structure, M | lember De | esign - Geot | echnics Pa | d, Strip and | i Raft | IVIAUE Dy | XX | ^{Dale} 2 | L/11/2021 ⁰ | nu. |
| | | datian Din | | | | | | | | |
| Strap Footi | _ | | | aluman is to | a alaga ta l | the eit | a hav | ndom to | | |
| Note that the | • | - | | | | | | | | |
| the employn restrains the | | | - | - | | | | | | |
| differs from | | | | | | | | | | |
| is even more | | | | παι της μιο | χππιζή ΟΓ ΕΓ | | | | e boundary | |
| | | -7 | | | | | | | | |
| Width and le | enath of in | ner footina | Batran a | | | | | 2.00 | 0 m | |
| Length of ou | | | / - suap,2 | | | | | 1.70 | | |
| Length inter | | 17 | | | | | | 3.00 | | |
| Centroid, y _c | | | $(1 + F_{col + 2})$ | | | | | | A m | |
| Width of out | er footing | $B_{\text{strap 1}} = ($ | $(B_{\text{strap }2}, L_{\text{strap }2})$ | an-Vc.Bstran 2 | $^{2})/(y_{c}L_{stran})$ | 1-Lstra | n 1.(L | | A m | |
| Note the stra | | | | | | | | | | |
| Should the r | | | | - | | | | - | | |
| | L _{strap,1} | , , , | ,, | | \frown | | $\overline{\frown}$ | , í | Inner foo | tina to |
| | 4 | → | | | \prec ' | | | 5-0 | be desig | |
| T T | | | | | B _{strap,2} | | | M | Y a conv | entional |
| | 1. | | | | | Ĺ | | \mathcal{Y} | pad footi | ng; |
| | | → Y | : | | | | | | | |
| B _{strap,1} | | | | | | | B _{str} | ap,2 | | |
| | | | | | | | | | | |
| | Column | 1 | L _{strap} | | Column | 12 | L, | Γ | | |
| | | | | \sim | L | <u> </u> | | | | |
| • | | | | | \leq | \square | | | | |
| Note the sub | | - | | - | | - | | | - | |
| designed col | | | footing wit | th the loads | s F _{col,v,2} an | d dime | ensior | ns B _{strap,2,} | t _{1,strap} and | |
| t _{2,strap} define | | | | | | | | | | |
| Thickness be | | / | | | | | | 0.80 | | |
| Thickness of | | | | | er 0.000m |) | | 0.00 | | |
| Thickness of | | | | | | | | | 4 m | |
| Column base | | | | | | I | Rectan | | | |
| Column base | | | _ | ., | ge for Span in | | | | _ | |
| Column 1 ba | | | | | | Edge | • | | 0 mm | |
| Column 1 ba | | | | - | | | | | 0 mm | |
| Note where | | | | | | | | | | |
| <i>base is alwa</i> Depth of bea | | r anu iocale | a in the ce | ntre or the | strap tootii | Ig Б _{st} | rap,1 / | | | |
| Width of bea | | | | | | | | 0.80 0.30 | _ | |
| Note that the | | am muct n | ot bear on | the coil co | mpressible | void f | formo | | | |
| Note that the | e suap be | ann must n | ot bear on | | inpi essible | voiu i | Unne | | ecineu, | |
| Strap Footi | ing Found | dation Rei | nforcemer | \ | | | | | | |
| _ | ing i can | | norecinci | | | | | | | |
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| ┝──┦┛───── | | | | | | ł | | jing in len | | |
| ┝──┸┻╺╸╸ | | H | | | | | Sago | ing in wic | <u>th</u> | |
| Sagging stee | el reinforc | ement dian | neter in wid | lth of outer | footing, ϕ_{s} | x | | 20 | mm | |
| Sagging stee | | | | | = : : : : | | g, p _{sx} | 20 | 0 mm | |
| Sagging stee | | | | | | | | | Amm ² /m | |
| Hogging stee | | | | | | | | 16 | | |
| Hogging stee | | | | , | | | | | 5 | |
| Hogging stee | el area pr | ovided in be | eam, A _{s,prov} | _{,y,h} = n _{hy} .π. | $\phi_{hy}^2/4$ | | | N// | A mm ² | |
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| | SULTING | | | on Sheet | | | | -0 | |
| ENGI | NEERS | Consulting | Engineers | | | jXXX | 5 | 58 | |
| | | | | | | Member/Location | | | |
| Job Title | - | | - | technics Pa | | O ^{Drg.} | 1 | | 1 |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | hd. |
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| Chara Ilada | dia ang sha a ƙ | Circle allow | | - (| | | | | |
| | diameter fo | | - | | | ,2 | None | mm | |
| | f link legs fo | | • | | 2 1 | ~ ^ - | 30 | | |
| | ded by all l diameter fo | | | | | | None 🗸 | mm ² | |
| | f link legs fo | | | | | 1- | 30 | mm | |
| | | | - | | | ting, A _{sv,prov} | | mm ² | |
| | diameter fo | | | | | | | mm | |
| | link legs p | | | | | | | /m | |
| | | | | | | footing, A _{sv} | | mm²/m | |
| | ks for bend | | | | | 31 31 | | mm | |
| | diameter ir | | | | | | 12 🔻 | mm | |
| Number of | links in a d | cross sectio | n in beam, | | | | 2 | | |
| | | | | | | .\phillink,y ² /4.n _{lir} | N/A | mm² | |
| Pitch of lin | ks in beam | , S _y | | | | | 150 | mm | |
| | | | | | | | | | |
| | | | | | | strap - cover | N/A | mm | |
| Effective d | epth to hog | ging steel | in beam, d _y | $h_{r,h} = h_{beam} -$ | $cover_1 - \phi_l$ | _{ink,y} - _{\$hy} /2 | N/A | mm | |
| | | | | | | | | | |
| | steel reinfo | | | | | | | kg/m ³ | |
| [7.850 . (| (A _{s,prov,x,s}) / | 'T _{strap} + 78 | 850 . (A _{s,pro} | _{ov,y,h}) / b _{bea} | h _{beam}]; | No curtailm | ent; No lap | os; Links igi | nored; Dist |
| | | | | | | | | | |
| Strap Foo | ting Foun | dation SLS | 5 Loading | | | | | | |
| CI C vortio | | rd) load fro | m column | 1 and baca | alah (if aug | spended), F | 650 | Lani | |
| | | | | | | spended), F | | | N/A |
| | • | | | | • | ng, F _{under,stra} | | | N/A |
| | soil (above | | | | | | N/A N/A | | |
| | | | | | | otings whe | | - | l |
| | | | - | | | ed soil dens | | | - |
| | | | | | | ng, F _{under.stra} | | | . / 301/ |
| | soil (above | | | | - | | N/A | | |
| | | | | · · · | | otings whe | - | | ting |
| is below gi | round level | and backfil | lled, for con | servatism t | the saturate | ed soil dens | sity is adop | ted, and ρ_{o} | ≈γ _{sat} ; |
| Strap bear | n weight, F | beam,strap = | b _{beam} .h _{beam} . | ρ _c .L _{strap} | | | N/A | kN | |
| | dation SLS | | | | | 17.7 | N/A | | |
| Note F _{strap} | | | | . _{strap} /2 + (F | under,strap,1 | +F _{above} ,soil,1 |).(L _{strap} +h, | /2-L _{strap,1} /2 | 2)] |
| | | _{strap} +h/2-L s | 17 | | | | | | |
| | | | | | | the inner fo | | | the |
| | | | | | | tion beneat | | | |
| | dation SLS | | | | | | N/A | | N/A |
| Note F _{strap} | $_{,v,2} = F_{col,v,}$ | $_1 + F_{col,v,2}$ | + r beam,strap | p + + _{under,st} | rap,1 + F abo | $F_{ve,soil,1} + F_{u}$ | Inder,strap,2 + | - F _{above,soil,2} | - r _{strap,v,1} , |
| | | 1.1.2 | | | | ; F _{strap,v,2} v | | LIIdII F _{col,v,2} | , |
| THIS IS ESS | enually the | sis reaction | i beneath t | ne inner för | oung and n | nust not be | negative; | | |
| Gross worl | kina nressu | re under o | l Iter footing | . 0 | /(R | ap,1 . L _{strap,1}) | N/A | kPa | |
| | king pressu | | | | | | N/A | | |
| 5,035 WUI | | | | / Чw,2 — I stra | ap,v,2 / Ustrap | 0,2 | | Ki u | |
| Strap Foo | ting Foun | dation UI 9 | S Loading | | | | | | |
| | | | | | | | | | |
| ULS vertic | al (downwa | rd) load fro | m column | 1 and base | slab (if sus | spended), F | N/A | kN | |
| | | | | | | spended), F | | | |
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| CON | SULTING | Engineerin | n Calculatio | on Sheet | | Job No. | Sheet No. | | Rev. |
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| Job Title | Structure | Member De | sian - Geol | technics Pa | d Strin and | | | | |
| | | esign - Geol | | | | Made by XX | Date 21 | /11/2021 | hd. |
| | | | | | | | / | / | |
| Strap Foo | ting Foun | dation Rei | nforcemer | nt Design | | | | | |
| | | | | | | | | | |
| Gross UL | S Pressure | | | | | | | | |
| | | | | | | | | | |
| | | vertical (do | | | | | N/A | kN | |
| | | col,v,1,uls .L stra | | | | | | | |
| | | _{ap,v,1,uls} is ca | | | | | | | r the |
| | | outer footin | | | | | | | |
| GIUSS ULS | pressure u | nder outer | rooung, q _{w,} | ULS,1 — 「stra | o,v,1,uls / (D _S | trap,1 • ∟strap, | N/A | кра | |
| Total foun | dation ULS | vertical (do | wnward) lo | ad of inner | footing F | | N/A | ٧N | |
| | | $F_{ol,v,1,uls} + F_{cl}$ | | | | 1111 | | | |
| | | _{ap,v,2,uls} is ca | | | | | will be l | ess than F | rol.v.2.uls |
| | | uls reaction | | | | | | | ,,,_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |
| | | nder inner | | | | - | N/A | kPa | |
| | | | | | | | | | |
| F _{col} , | _{v,1,uls} .r-q _{w,UL} | . _{S,1} .B _{strap,1} .(1 | +h/2) ² /2 | (F _{col,v,2,uls} - | F _{strap,v,2,uls}). | B _{strap,2} /2 | F | R | B /2 |
| | | | | | 1 | | | w,ULS,2.B _{strap} , | 2·D _{strap,2} /2 |
| | | | | | | Shear fo | orce diagra | m | |
| | | V I | F _{strap,v,1,uls} - | Factor 1 min | | Bending m | oment diag | Iram | |
| ibutia E | | | | · col,v,1,uis | | ULS,2.B _{strap,2} . | $B_{atrop 2}/2$ | | |
| ibutid F _{col} | ,v,1,uls ⁻ 9w,ULS | ,1.B _{strap,1} .h/: | <u>د</u> | | <u> </u> | ULS,2° — strap,2° | - strap,2/ - | | |
| Sagaing | Ronding M | oment Des | tian in Pla | ne of Widt | h of Oute | r Eootina | | | |
| Sagging | | | | | | litooting | | | |
| Moment a | column ba | se face, M _x | $= 0_{w \parallel s 1}$ | Letran 1 . [(E | Betran 1-(b or | r D))/21 ² / 2 | N/A | kNm | |
| Moment a | column ba | se face per | metre, M _x / | L _{strap,1} | | _ /// _] // _ | N/A | kNm/m | |
| | | | | | | | | | |
| Concrete r | noment cap | bacity per m | etre, M _{u,x} = | = 0.156f _{cu} .1 | .000.d _{x,s} ² | | N/A | kNm/m | |
| Bending st | ress, [M/bo | $d^2]_x = (M_x/L)$ | _{strap,1}) / [(1 | 000).d _{x,s} ²] | | | N/A | N/mm ² | |
| | | $K_x = [M/bd^2]$ | | | | | N/A | | N/A |
| Lever arm | $, z_{x} = d_{x,s}$. | [0.5 + (0.2)] | .5-K _x /0.9) ^{0.} | ⁵] <= 0.95 | d _{x,s} | | | mm | |
| Area of te | nsion steel | required, A _s | $_{\rm s,x} = (M_{\rm x}/L_{\rm st})$ | _{rap,1}) / [(0.9 | 95f _y).z _x] | | N/A | mm²/m | |
| A | | | | • | | | | 2, | |
| | | einforceme | | 11 11 | ting utilica | tion - A | | mm²/m | |
| Sayying D | | nent in plan | | | ung utilisa | $aon = A_{s,x}$ | N/A | | N/A |
| Requireme | ent to conce | entrate 2/3 | rebar withii | n 1.5d. fre | N/A | < N/A | N/A | | 3.11.3.2 |
| | | D)/2)>3/4(I | | , | | _ N/A mm | | | BS8110 |
| | | above requi | | | | | reflected ir | the | |
| | | ns and as s | | | | | | | |
| | | | | | | | | | |
| - | | ient in plane | | | | | , | % | |
| % Min sag | reinforcem | ent in plan | e of width o | of outer foo | ting utilisat | ion | N/A | | N/A |
| | | | | | | | | | |
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| CON | SUI TINC | Enginoorin | a Calculatio | n Shoot | | Job No. | Sheet No. | | Rev. |
|-------------|-----------------------|--|--|--|-----------------------|------------------------------|------------|-------------------|------|
| | SULTING N E E R S | | | Sheet | | jXXX | 6 | 50 | |
| | | | | | | Member/Location | | | |
| ob Title | Structure | Member De | sian - Geo | technics Pa | d Strin and | | | | |
| | Member De | | | | | Made by XX | Date 21 | /11/2021 | ¢hd. |
| li uccui c, | | | | | | | <u> </u> | / 11/ 2021 | |
| | | | | | | | | | |
| logging | Bending M | oment De | sign in Be | am | | | | | |
| | | | | | | .B _{strap,1}) - h/ | | | |
| loment, M | $I_y = F_{col,v,1,u}$ | _{ils} . r - q _{w,UL} | _{S,1} . B _{strap,1} | . (r+h/2)² , | / 2 | | N/A | kNm | |
| Concrete r | noment cap | acity, M | = 0.156f | bhaam.du h ² | | | N/A | kNm | |
| ending st | ress, [M/bc | $[^{2}]_{v} = M_{v} / [$ | $[b_{\text{beam}}, d_{\text{v},\text{h}}^2]$ | | | | | N/mm ² | |
| | ress ratio, | | | | | | N/A | | N/A |
| ever arm | $, z_{y} = d_{y,h}$. | [0.5 + (0.2)] | 25-K _v /0.9) ⁰ | ^{.5}] <= 0.95 | d _{v,h} | | N/A | mm | |
| rea of ter | nsion steel i | required, A | $_{5,y} = M_y / [($ | [0.95f _y).z _y] | | | N/A | mm ² | |
| rea of to | nsile steel r | ainforcomo | nt provided | Δ. | | | NI / A | mm^2/m | |
| | ending mon | | | | | | N/A N/A | mm²/m | N/A |
| | | | | | | | | | |
| | | | | | _{beam} G250; | >= 0.0013 | | | |
| % Min hog | reinforcem | nent in bear | n utilisatior | ו | | | N/A | | N/A |
| | | | | | | | | | - |
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| | SUI TINC | Engineerin | a Calculatio | n Chaot | | Job No. | Sheet No. | | Rev. |
|-------------------------|---------------------------------------|--|-----------------------------------|-------------------------|---------------------------|---------------------------------------|--------------|-------------------|------|
| ĿŊĠĬ | | Consulting | | JII Sheet | | jXXX | | 61 | |
| | | | | | | Member/Location | | | |
| ob Title | Structure | Member De | esian - Geol | technics Pa | d. Strip and | Drg. | | | |
| | | esign - Geo | - | | | Made by XX | Date 21 | /11/2021 | Chd. |
| in acture, | | Joigh Geo | | | | | | ./ 11/ 2021 | • |
| | | | | | | | | | - |
| | | | | | | | | | |
| Punching | Shear Des | sign | | | | | | | |
| | | | | | | ended), F _{col} | | kN | |
| | | section, A_{c1} | | | r πD²/4 (cir | cular) | | A mm ² | |
| - | - | oth of rebar | • | 1- | | | | A mm | |
| | | einforceme | | 11 1 1 | | | | A mm²/m | |
| | | le steel rein | forcement | provided, A | s,prov,s | | | A mm²/m | |
| $b_{w} = 100A$ | s,prov,s/(1000 | 0.d) | | | | | | A % | |
| $v_{\rm c} = (0.79)$ | /1.25)(ρ _w f _{cu} | ^{1/3} (400 | $(0/d)^{1/4}; \rho_w < 0$ | 3; f _{cu} <40; | (400/d) ^{1/4} > | >0.67 | N/A | N/mm ² | |
| | | | | | | | | | |
| Column B | ase Face F | <u>Perimeter</u> | | | | | | | |
| Shear forc | e at columr | h base face, | . V1 = F | 1 | 1.A _{c1} | | N// | A KN | |
| -ffective c | hear force | $V_{\text{eff},1} = 1.0$ | $\frac{1}{0} \cdot \frac{1}{V}$ | 1,uis Y w,ULS | ,1"' 'Cl | | | A KN | 1 |
| | | $v_{eff,1} - 1.0$ r_1 because | | t effects an | sumed | | IN/ <i>F</i> | | |
| | se face per | | | | | | NI / / | \ mm | 1 |
| | | | | Posta | ngular | Circ | ular N/F | A mm | |
| Internal - | | | | | - | | | | 1 |
| Internal co | | | 26.1 | 2.(b+h) | | $\pi.D$ | | mm | |
| Edge colur | | | 20+ | h or $2h+b$ | - | 3/4(π.D) | | mm | |
| Corner col | | | | (b+h) | | $\pi.D/2$ | N/A | mm | |
| | | | e perimeter | $v_1 = V_{eff,1}$ | / u ₁ d (< 0 | .8f _{cu} ^{0.5} & 5N | N/A | N/mm ² | |
| Jltimate sl | hear stress | utilisation | | | | | N/A | | N/A |
| First Shea | ar Perimet | er: | | | | | | | |
| | | | | | | | | | |
| Shear forc | e 1.5d from | n column ba | ase face, V_2 | $F = F_{col,v,1,uls}$ | - q _{w,ULS,1} .A | A _{c2} | N/A | A kN | |
| | | | | Recta | ngular | Circ | ular | | |
| Internal co | olumn: | | (b+3 | 8d).(h+3d) | N/A | (D+3d) ² | N/A | m ² | |
| Edge colur | mn: (b+1 | .5d).(h+3d |) or (h+1.5 | 5d).(b+3d) | N/A | d).(D+3d) | N/A | m ² | |
| Corner col | umn: | | (b+1.5d) |).(h+1.5d) | N/A | (D+1.5d) ² | N/A | m ² | |
| Effective s | hear force, | $V_{eff,2} = 1.0$ | 0.V ₂ | | | | N/A | A kN | |
| Vote V _{eff,2} | = 1.00 . V | 2 because | no moment | t effects as | sumed; | | | | |
| | ase first per | | | | | | N/A | A mm | 1 |
| | | | | Recta | ngular | Circ | ular , | | |
| Internal co | lumn: | 1 | 2.(| b+h)+12d | - | 4D+12d | 1 | mm | 1 |
| Edge colum | | 2 | 2b+h+6d or | , | - | 3D+6d | - | mm | 1 |
| Corner col | | - | | (b+h)+3d | | 2D+3d | | mm | 1 |
| | | n base first | | · / | , | 00 | | N/mm ² | 1 |
| | | | | | | port" and c | | | |
| | | | | | | calculating | | | |
| Inenhance | | | | | | lause 3.7.7. | | | 1 |
| | | | | | | | | | |
| | | | | | | 1 | NI/A | | ļ |
| | Case v ₂ < | | | | | | N/A | | |
| | Case v ₂ < | No links re | | | | | | | |
| | Case v ₂ < | | | | | | N/A N/A | | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ | | ud | N1/A | | N/A | 2 | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ | | ud v | N/A | >= | | mm ² | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ | | ud v 0.4ud/0.9 | | >= | N/A | mm ² | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)n}{0.95f_y}$ | | | >= | N/A | mm ² | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)n}{0.95f_y}$ | | | >= | N/A | mm ² | |
| | Case v ₂ < | No links re $v_2 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)n}{0.95f_y}$ | | | >= | N/A | mm ² | |

| | | | | | | Job No. | Sheet No. | | Rev. |
|--|--|--|---|---|---|-----------------------|---|-------------------|---------|
| | SULTING | | | on Sheet | | | | _ | |
| ENGI | NEERS | Consulting | Engineers | | | jXXX | 6 | 2 | |
| | | | | | | Member/Location | | | |
| Job Title | Structure, | Member De | esign - Geo | technics Pa | d, Strip ar | 10 ^{Drg.} | | | |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | d Raft | Made by XX | Date 21 | /11/2021 | Chd. |
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| | Case 1.6v | $v_{\rm c} < v_2 < 2.$ | 0ν. | | | | N/A | | |
| | | | | | | | , | | |
| | | $\Sigma A = \sin \alpha$ | $\geq \frac{5(0.7v-10.9v)}{0.95}$ | $-v_{e})ud$ | N/A | >= | N/A | mm ² | |
| | | =-sv- | 0.95 | 5f _{yv} | ,,, | | | | |
| | | Note ΣA | _{sv} sinα > | 0.4ud/0.9 | 5f | | | | |
| | Case $v_2 >$ | | sv5mor / | 0.400.5 | 0/ _{yv} . | | N/A | | |
| | | 2.0v _c | | | | | N/A | | |
| First share | r perimeter | shoar utilia | ation | | | | N/A | | |
| inst snear | r perimeter | | | | | | N/A | | N/A |
| Socard C | hoor Berlin | | | | | | | | |
| Second S | hear Perin | песег | | | | | | | |
| Choor for- | | m column ¹ | l | | | ^ | N1 / A | LAI | |
| Shear forc | ce 2.25d fro | m column t | Jase lace, V | | | | N/A | KIN | |
| . | ļ | | <u> </u> | | ngular | | ular | 2 | |
| Internal co | | | , |).(h+4.5d) | | $(D+4.5d)^2$ | | m ² | |
| | ́т bn+ 2.25d).(| | | | | .(D+4.5d) | | m ² | |
| Corner col | | | (b+2.25d). | (h+2.25d) | N/A |)+2.25d) ² | | m² | _ |
| | shear force, | | | | | | N/A | kN | |
| Note V _{eff,3} | $_{\rm s} = 1.00 \; . \; V$ | ′ ₃ because | no momen | t effects as | sumed; | | | | |
| Column ba | ase second | perimeter, | U ₃ | | | | | mm | |
| | | | | | ngular | Circ | ular | | 1 |
| Internal co | olumn: | | | b+h)+18d | | 4D+18d | | mm | |
| Edge colur | mn: | 2 | b+h+9d or | - 2h+b+9d | N/A | 3D+9d | N/A | mm | |
| Corner col | | | | 0+h)+4.5d | | 2D+4.5d | N/A | mm | |
| Shear stre | es at colum | in base sec | ond perime | ter, $v_3 = V_e$ | _{eff,3} / u ₃ d | | N/A | N/mm ² | |
| | | | [· | | L | | | | |
| | | | | | | | | | |
| | Case $v_3 <$ | ν _c | | | | | N/A | | |
| | | ν _c No links re | quired. | | | | N/A | | |
| | Case v ₃ < | - | | | | | N/A N/A | | |
| | Case v ₃ < | No links re v ₃ < 1.6 v _c | • | | | | | | |
| | Case v ₃ < | No links re v ₃ < 1.6 v _c | • | ud | | >= | N/A | mm ² | |
| | Case v ₃ < | No links re v ₃ < 1.6 v _c | | ud v | N/A | >= | | mm ² | |
| | Case v ₃ < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ | - | | >= | N/A | mm ² | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note ΣA | $\geq \frac{(v - v_c)}{0.95f_y}$ sysin $\alpha > $ | - | | >= | N/A N/A | mm ² | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_c < v_3 < 2$. | $\geq \frac{(v - v_c)}{0.95 f_y}$ sysina > $0v_c$ | 0.4 <i>ud</i> /0.9 | | >= | N/A | mm ² | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_c < v_3 < 2$. | $\geq \frac{(v - v_c)}{0.95 f_y}$ sysina > $0v_c$ | 0.4 <i>ud</i> /0.9 | 5f _{yv} . | | N/A N/A N/A | | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_c < v_3 < 2$. | $\geq \frac{(v - v_c)}{0.95f_y}$ sysin $\alpha > $ | 0.4 <i>ud</i> /0.9 | | >= | N/A N/A | mm ² | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} < 2.$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_{c})}{0.95 f_{y}}$ sv sin $\alpha > 0v_{c}$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ | 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A | | N/A N/A N/A | | |
| | Case v ₃ < Case v _c < Case 1.6v | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ sysina > $0v_c$ | 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A | | N/A N/A N/A N/A | | |
| | Case v ₃ < Case v _c < | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_{c})}{0.95 f_{y}}$ sv sin $\alpha > 0v_{c}$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ | 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A | | N/A N/A N/A | | |
| | Case v ₃ < Case v _c < Case 1.6v Case v ₃ > | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)\pi}{0.95 f_y}$ sysina > $0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ sysina > | 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A | | N/A N/A N/A N/A | | |
| | Case v ₃ < Case v _c < Case 1.6v | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)\pi}{0.95 f_y}$ sysina > $0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ sysina > | 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A | | N/A N/A N/A N/A | | N/A |
| Second sh | Case v ₃ < Case v _c < Case 1.6v Case v ₃ > | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin\alpha$ Note $\Sigma A_{c} < v_3 < 2$. $\Sigma A_{sv} \sin\alpha$ Note $\Sigma A_{sv} \sin\alpha$ Note $\Sigma A_{sv} \sin\alpha$ Let shear ut | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > \frac{0 v_c}{0.95}$ $\geq \frac{5(0.7 v - 0.95)}{0.95}$ svsin $\alpha > \frac{1}{100}$ illisation | 0.4 <i>ud</i> /0.9 - <i>v</i> _c) <i>ud</i> - <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} . N/A 5f _{yv} . | >= | N/A N/A N/A N/A N/A | mm ² | |
| Second sh Note a neg | Case $v_3 <$ Case $v_c <$ Case 1.6v Case 1.6v Case $v_3 >$ | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin\alpha$ Note $\Sigma A_{c} < v_3 < 2$ $\Sigma A_{sv} \sin\alpha$ Note $\Sigma A_{sv} \sin\alpha$ Rec $\tau shear ut$ $\tau stress v_2$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > 0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ svsin $\alpha > 0$ illisation and/or v_3 | 0.4 <i>ud</i> /0.9 - <i>v</i> _e) <i>ud</i> 6 <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} N/A 5f _{yv} | >= | N/A N/A N/A N/A N/A N/A Wrt interna | mm ² | corner) |
| Second sh Note a neg | Case $v_3 <$ Case $v_c <$ Case 1.6v Case 1.6v Case v ₃ > | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$. $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Let shear ut $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > 0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ svsin $\alpha > 0$ illisation and/or v_3 | 0.4 <i>ud</i> /0.9 - <i>v</i> _e) <i>ud</i> 6 <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} N/A 5f _{yv} | >= | N/A N/A N/A N/A N/A N/A Wrt interna | mm ² | corner) |
| Second sh Note a neg | Case $v_3 <$ Case $v_c <$ Case 1.6v Case 1.6v Case $v_3 >$ | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$. $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Let shear ut $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > 0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ svsin $\alpha > 0$ illisation and/or v_3 | 0.4 <i>ud</i> /0.9 - <i>v</i> _e) <i>ud</i> 6 <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} N/A 5f _{yv} | >= | N/A N/A N/A N/A N/A N/A Wrt interna | mm ² | corner) |
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| Second sh Note a neg indicates t | Case $v_3 <$ Case $v_c <$ Case 1.6v Case 1.6v Case v ₃ > | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$. $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Let shear ut $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > 0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ svsin $\alpha > 0$ illisation and/or v_3 | 0.4 <i>ud</i> /0.9 - <i>v</i> _e) <i>ud</i> 6 <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} N/A 5f _{yv} | >= | N/A N/A N/A N/A N/A N/A Wrt interna | mm ² | corner) |
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| Second sh Note a neg indicates t | Case $v_3 <$ Case $v_c <$ Case 1.6v Case 1.6v Case v ₃ > | No links re $v_3 < 1.6v_c$ $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{c} < v_3 < 2$. $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Let shear ut $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ Note $\Sigma A_{sv} \sin \alpha$ $\Sigma A_{sv} \sin \alpha$ | $\geq \frac{(v - v_c)}{0.95 f_y}$ svsin $\alpha > 0v_c$ $\geq \frac{5(0.7v - 0.95)}{0.95}$ svsin $\alpha > 0$ illisation and/or v_3 | 0.4 <i>ud</i> /0.9 - <i>v</i> _e) <i>ud</i> 6 <i>f</i> _{yv} 0.4 <i>ud</i> /0.9 | 5f _{yv} N/A 5f _{yv} | >= | N/A N/A N/A N/A N/A N/A Wrt interna | mm ² | corner) |

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| | | | | | | Member/Location | | | |
| ob Title | | Member De | | | | | 1 | | |
| Structure, | Member De | esign - Geo | technics Pa | d, Strip and | l Raft | Made by XX | Date 21 | /11/2021 | hd. |
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| snear De | sign for Be | | lane of w | | ter Footin | g | | | |
| Shear forc | e at columr | hase face | V = a | | ۰ [(B) ، ، ، | -(h or D))/ | N/A | ٧N | |
| | ce at column | | | | | | | kN/m | |
| | ce at 1.0d _{x,s} | | | , ,, | | . [(B _{stran 1} - | | | |
| | ce at 1.0d _{x,s} | | | | | <u> </u> | | kN/m | |
| | above shear | | | | | outer footin | | | |
| | | | | | | | | | |
| Iltimate s | hear stress | for bending | g in plane o | f width, v _{ult} | ,x=(V _{x,ult} /L | trap,1)/(100 | N/A | N/mm ² | |
| | hear stress | | | | | | N/A | | N/A |
| | | | | | | | | | |
| esign she | ear stress fo | or bending i | in plane of | width, v _{d,x} = | $(V_x/L_{strap,1})$ | /(1000.d _{x,s} | N/A | N/mm ² | |
| Shear cap | pacity enhai | ncement by | [,] calculating | y v _d at d fro | om "suppoi | t" and com | paring aga | | |
| | ed v _c as cla | | | | | | | oport" and | |
| omparing | g against en | hanced v _c | within 2d o | f the "supp | ort" as clau | ıse 3.4.5.8 | BS8110;) | | |
| | nsile steel r | | nt provided | , A _{s,prov,x,s} | | | | mm²/m | |
| $_{w} = 100A$ | s,prov,x,s/(100 | 00.d _{x,s}) | | | | | N/A | | |
| _{c,x} = (0.7 | '9/1.25)(ρ _w f | _{cu} /25) ^{1/3} (40 | $00/d_{x,s})^{1/4};$ | ρ _w <3; f _{cu} <4 | 0; (400/d _x | _{,s}) ^{1/4} >0.67 | N/A | N/mm ² | |
| | | | | | | | | | |
| heck v _{d,} | $x < v_{c,x}$ for | no links | | | | | N/A | | |
| | Concrete s | shear capac | ity v _{c,x} .(100 | 00.d _{x,s}) | | | N/A | kN/m | |
| | | | | | | | | | |
| | $x < v_{d,x} < 0$ | | | | | | N/A | | |
| | Provide no | | | | | | N/A | mm²/mm/ | m |
| | Concrete a | and nominal | l links shea | r capacity (| $0.4 + v_{c,x}$). | $(1000.d_{x,s})$ | N/A | kN/m | |
| | | | | | | | | | |
| Check V _{d,2} | _x > 0.4 + v | | | | //0.0F(.); | | N/A | 2 | |
| | Dura dala ale | | $_{v} / S > 100$ | $0.(V_{d,x}-V_{c,x})$ | /(0.95f _{yv}) I | .e. A _{sv} / S | N/A | mm²/mm/ | m |
| | Provide sh | ear links A _s | ببعمام مناميا | and a site of A | | | | 1 817 | |
| | Provide sh Concrete a | ear links A _s and design l | inks shear | capacity (A | $_{sv,prov,x}/S_{x}).$ | (0.95f _{yv}).d, | N/A | kN/m | |
| | Concrete a | and design l | | | _{sv,prov,x} /S _x). | (0.95f _{yv}).d, | | - | |
| | Concrete a ided by all li | and design l nks per me | | | sv,prov,x/S _x). | (0.95f _{yv}).d, | N/A | mm²/m | |
| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
| ried A _{sv,pr} | Concrete a ided by all li | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | m N/A |
| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
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| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
| ried A _{sv,pr} | Concrete a ided by all li rov,x / S _x val | and design l inks per me ue | etre, A _{sv,prov} | ,x | _{sv,prov,x} /S _x). | | N/A N/A | mm²/m mm²/mm/ | |
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| LIGI | | J | J | [| F | Member/Location | | • | |
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| ob Title | | Member De | | | | Made by XX | Date 31 | /11/2021 | hd |
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| Shear De | sign in Bea | am | | | | | | | |
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| Shear forc | e at columr | 1 base rig | ht centrelir | $e_{I} V_{V,1} = F_{I}$ | | Betran | N/A | kN | |
| Shear forc | e at outer f | ootina riahi | t face. V., a | $= F_{\text{ctrap} \times 1} \dots$ | $c - F_{col,v,1,uls}$ | ,0L5,1 · — strap | N/A | | |
| | ce at columr | | | | | | | | |
| Shear forc | e at columr | n 2 base rig | ht centrelir | $v_{v_4} = q_v$ | $_{N II S 2}$. B_{stran} | $_{2}.B_{\text{stran }2}/2$ | , N/A | | |
| Shear forc | e at critical | location, V | $v = MAX(V_v)$ | $V_{v,1}, V_{v,2}, V_{v,3}$ | $V_{v,4}$ | | N/A | | |
| | | | , <u> </u> | | | | | | |
| Iltimate s | hear stress | in beam, v | ult.v=Vv/(bbe | | 0.8f ^{0.5} & | 5N/mm ²) | N/A | N/mm ² | |
| | hear stress | | | | | | N/A | | N/A |
| | | | | | | | | | |
| | ear stress ir | | | | | | | N/mm ² | |
| | tively, shea | | | | e r calculati | ng v _d at d | | | |
| | g against un | | | | | | | | |
| | g against en | | | | ort as claus | e 3.4.5.8 B | S8110 igno | red;) | |
| rea of ter | nsile steel r | einforceme | nt provided | , A _{s,prov,y,h} | | | N/A | mm ² | |
| lote it is a | assumed the | at A _{s,prov,y,h} | provided v | where critica | al shear for | ce occurs; | | | |
| w = 100A | s,prov,y,h/(bbe | _{eam} .d _{y,h}) | | | | | N/A | % | |
| v _{c,y} = (0.7 | '9/1.25)(ρ _w f | _{cu} /25) ^{1/3} (40 | 00/d _{y,h}) ^{1/4} ; | ρ _w <3; f _{cu} <4 | 0; (400/d _y | _{/,h}) ^{1/4} >0.67 | N/A | N/mm ² | |
| | | | | | | | | | |
| | | for no link | s | | | | N/A | | |
| Check v _{d,} | _y < 0.5v _{c,y} | | | | | | | | |
| Check v _{d,} | | hear capac | | am.d _{y,h}) | | | N/A | kN | |
| | Concrete s | hear capac | ity v _{c,y} .(b _{bea} | | | | | kN | |
| | Concrete s 5v _{c,y} < v _{d,y} | hear capac < 0.4 + v c | ity v _{c,y} .(b _{bea} | inal links | | | N/A | | |
| | Concrete s 5 v_{c,y} < v_{d,y} Provide no | hear capac < 0.4 + v _c minal links | ity v _{c,y} .(b _{bea} , y for nom such that <i>A</i> | inal links A _{sv} / S > 0.4 | | 5f _{yv}) i.e. A _s | N/A N/A | mm²/mm | |
| | Concrete s 5 v_{c,y} < v_{d,y} Provide no | hear capac < 0.4 + v c | ity v _{c,y} .(b _{bea} , y for nom such that <i>A</i> | inal links A _{sv} / S > 0.4 | | | N/A | mm²/mm | |
| Check 0.5 | Concrete s 5 v_{c,y} < v_{d,y} Provide no Concrete a | hear capac < 0.4 + v _c minal links and nominal | ity v _{c,y} .(b _{bea} , _y for nom such that <i>A</i> I links shea | inal links A _{sv} / S > 0.4 | | | N/A N/A N/A | mm²/mm | |
| Check 0.5 | Concrete s 5v _{c,y} < v _{d,y} Provide no Concrete a y > 0.4 + v | hear capac < 0.4 + v _c minal links nd nominal v _{c,v} for des | ity v _{c,y} .(b _{bea} , y for nom such that <i>A</i> I links shea ign links | inal links A _{sv} / S > 0. r capacity (| 0.4 + ν _{c,γ}). | $(b_{beam}d_{y,h})$ | N/A N/A N/A | mm²/mm kN | |
| Check 0.5 | Concrete s 5v _{c,y} < v _{d,y} Provide no Concrete a y > 0.4 + v Provide sh | hear capac < 0.4 + v _c minal links and nominal v _{c,y} for des ear links A _s | ity $v_{c,y}$. (b _{bea} ,y for nom such that A l links shea ign links y / S > b _{bea} | inal links $A_{sv} / S > 0.4$ r capacity ($m(v_{d,y}-v_{c,y})/$ | 0.4 + v _{c,y}). /(0.95f _{yv}) i. | $(b_{beam}d_{y,h})$ e. A _{sv} / S > | N/A N/A N/A N/A N/A | mm²/mm kN mm²/mm | |
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| CON | | | | | | Job No. | Sheet No. | | Rev. |
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| | | Engineering Consulting | | on Sheet | | jXXX | 6 | 5 | |
| | | | 5 | | | Member/Location | - | - | |
| ob Title | Structure | Member De | sian - Geo | technics Pa | d Strin ar | | | | |
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| Detailing | Requirem | ents | | | | | | | |
| All detailin | g requirem | ents met ? | | | | | N/A | | |
| | | | | | | | | | |
| | | | | | | footing (<3c | | mm | N/A |
| lax hoggi | ng steel rei | nforcement | pitch in be | am (<3d _{y,h} | , 50mn</td <td>n)</td> <td>N/A</td> <td>mm</td> <td>N/A</td> | n) | N/A | mm | N/A |
| Max | timum spaci: | ng: 0.5% | % Ast or less | s - 300mm | | | | | |
| | - | | | nd 1.0% - 22 | | | | | |
| | | 1.0% | 6 Ast or gre | ater - 175mm | n | | | | |
| 4000 000 0 | a aka - 1 | | nitele in l | no of white | | fo otin - | в 1 / - | | |
| | - | nforcement nforcement | | | i or outer | looting | | mm mm | N/A N/A |
| lax noggi | | | | | | | | | |
| 1in saggin | g steel rein | forcement | pitch in pla | ne of width | of outer f | ooting (>10 | N/A | mm | N/A |
| | - | forcement | | | | | · · · · · · · · · · · · · · · · · · · | mm | N/A |
| lote an all | lowance ha: | s been mad | e for laps i | n the min p | itch by in | creasing the | criteria by | <i>the bar dia</i> | meter. |
| Sagaina st | eel reinforc | ement dian | neter in nla | ne of width | of outer t | footing, φ _{sx} (| N/A | mm | N/A |
| | | ement dian | | | | | | mm | N/A |
| | | | | | | | | | |
| | | | | | | (<= 0.04.10 | - | | N/A |
| | | orcement in | | 0.04.b _{beam} | .h _{beam}) | | N/A | % | N/A |
| 1in link dia | ameter, _{dun} | ر _ې (>=8mm | ı) | | | | N/A | mm | N/A |
| | | 5d _{y,h} , <=30 | | 1AX(100mn | n,50+12.5 | ōn _{link,y}) | - | mm | N/A |
| A _{sv,prov,y} / (| b _{beam} .S _y) (2 | >0.10% G4 | 60; >0.170 | % G250) | | | N/A | % | N/A |
| lata that | anh cinala | lover of rein | forcoment | accumed f | | in coloulation | a of nitch i | | |
| vole that t | Shiy shgle i | ayer or reir | norcement | assumed it | or Dearns | in calculation | | | |
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| CON | SULTING | Engineerin | n Calculatio | n Sheet | | Job No. | Sheet No. | | Rev. |
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| ENGI | SULTING N E E R S | Consulting | Engineers | in oncer | | jXXX | 6 | 6 | |
| | | | | | | Member/Location | | | |
| ob Title | Structure, | Member De | sian - Geo | technics Pa | d, Strip and | Drg. | | | |
| Structure, | Member De | sian - Geol | echnics Pa | d, Strip and | l Raft | Made by XX | Date 21 | /11/2021 | hd. |
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| CON | SULTING | Engineerin | a Calculatio | on Sheet | | Job No. | Sheet No. | | Rev. |
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| ENGI | NEERS | Consulting | Engineers | in Sheet | | jXXX | 6 | 7 | |
| | | | | | | Member/Location | | | |
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| Job Title | Member De | Member De | tochnice Do | d Strip and | u, Strip and | Made by XX | Date 31 | /11/2021 | hd. |
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| | ineering Calculation Sheet | | | | 58 | |
| ENGINEERS Cons | | | jXXX | C | 08 | |
| | | | Member/Location | | | |
| | nber Design - Geotechnics Pa | | | I | | 1 |
| Structure, Member Design | Geotechnics Pad, Strip an | d Raft | Made by XX | Date 21 | /11/2021 | 3hd. |
| | <u> </u> | | | | | |
| Raft Foundation Dimens | | | | | | |
| | vo-dimensional version of the | | | | | |
| | ap footings. These two-dime effectively be analysed and | | | | | |
| | erted one- or two-way span | - | | | | |
| | | | | | | |
| Width, B _{raft} (<=L _{raft}) | | | | 10.000 | m | N/A |
| Length, L _{raft} (>=B _{raft}) | | | | 10.000 | m | N/A |
| Thickness of foundation, T | raft | | | 1.000 | m | |
| | | | | | | |
| Raft Foundation SLS Lo | ading | | | | | |
| | | | | | | |
| | oad from selected building a | | | 100000 | kN | N/A |
| | is to be included and is the L | | , | | | |
| | rea may for instance refer to | | | | | |
| | oor plate area, as they shoul | | | | | |
| | sing) weight, $F_{above,soil} = B_{raft}$. | | | N/A | - | |
| | the footing is included for en | | - | | | - |
| | backfilled, for conservatism | | | | | ≈γ _{sat} ; |
| Total foundation SLS vertice | cal (downward) load, F _{raft,v} = | = F _{bdarea} + F | above,soil | N/A | kN | |
| | | | | | L-D- | |
| Gross working pressure, q | $W = F_{raft,v} / (B_{raft} \cdot L_{raft})$ | | | N/A | кРа | |
| Deft Foundation (Invest | | | | | | |
| Raft Foundation (Invert | ted) ULS Loading | | | | | |
| SIS vertical (downward) k | oad from selected building a | roa minus r | aft DI E . | N/A | LN. | |
| | oad from selected building a | | | | | |
| | pressure from selected buildi | | | | | |
| | cal (downward) pressure can | - | - | , | | |
| | alysis as the ULS pressure for | | | | | |
| design of the solid or strip | , , | | | | | |
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| ENGI | NEERS | Consulting | Engineers | | | jXXX | 6 | 59 | |
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| ob Title | Structure, | Member De | esign - Geo | technics Pa | d, Strip and | Drg. | | | |
| | | | technics Pa | | | Made by XX | Date 21 | /11/2021 | Shd. |
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| aft Foun | dation Rei | inforceme | nt Design | | | | | | |
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| ENGI | N E E R S | Consulting | Engineers | n Sneet | | jXXX | 7 | 0 | |
| | | | | | | Member/Location | | | |
| lob Title | Structuro | Mombor Do | sign - Coo | technics Pa | d Strin and | | | | |
| | | | | d, Strip and | | Made by XX | Date 71 | /11/2021 | hd. |
| Sti ucture, | | sign - Geo | | u, strip and | | ~ ^^ | 21 | / 11/ 2021 | |
| Standard | Raft Foun | dation Rei | nforceme | nt Details | | | | | |
| | | | | | | | | | |
| | Design reir | nforcement | based on t | he combina | tion of star | ndard multi | column foo | oting, | |
| | standard c | ombined fo | oting and s | tandard str | ap footing | reinforcem | ent details, | | |
| | culminating | g in the sta | ndard reinf | orcement d | etailing of a | a two-dime | nsional inve | erted | |
| | flat, one- c | or two-way | spanning s | lab as the r | aft foundat | ion; | | | |
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| ENGI | NEERS | Consulting | Engineers | in Sheet | | jXXX | 7 | '1 | |
| | | | | | | Member/Location | | | |
| 1. h. Title | Chrustian | Mambar Dr | aian Caal | tachaica Da | | | | | |
| Job Title | Member De | Member De | tochnics Pa | d Strip and | u, Strip and I Poft | Made by XX | Date 71 | /11/2021 | thd. |
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| ENGI | NEERS | Consulting | Engineers | In Sheet | | jXXX | 7 | 2 | |
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| 1.6 Tible | Chrustian | Mambar Dr | aian Caa | tachnica Da | | | | | |
| Job Title | Member De | Member De | tochnics Pa | d Strip and | u, Strip and I Poft | Made by XX | Date 71 | /11/2021 | thd. |
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| lah Titla | Chrusture | Marahan Da | aian Caa | tachnica Da | | | | | |
| Job Title | Member De | Member De | tochnics Pa | d Strip and | u, Strip and I Poft | Made by XX | Date 71 | /11/2021 | thd. |
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| 1. h. Title | Chrusture | Marahan Da | aian Caa | tachnica Da | | | | | |
| Job Title | Member De | Member De | tochnics Pa | d Strip and | u, Strip and I Poft | Made by XX | Date 71 | /11/2021 | thd. |
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| ENGI | NEERS | Consulting | Engineers | in Sheet | | jXXX | 7 | 5 | |
| | | | | | | Member/Location | | | |
| 1. h. Title | Chrustian | Mambar Dr | aian Caa | tachnica Da | | | | | |
| Job Title | Member De | Member De | tochnice Do | d Strip and | u, Strip and | Made by XX | Date 31 | /11/2021 | hd. |
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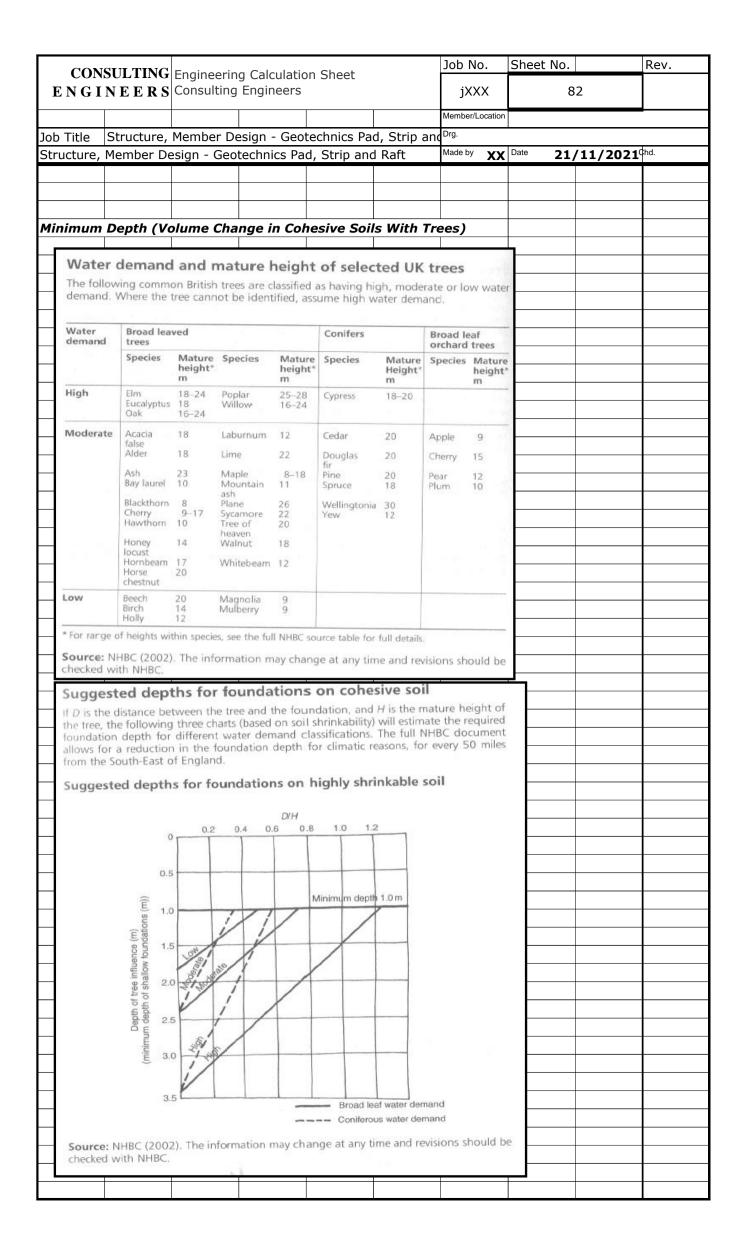
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| Job Title Structure, Member Design - Geotechnics Pad, Strip and Drg. | ENGI | NEERS | Consulting | Engineers | In Sheet | | jXXX | 7 | 8 | |
| Job Title Structure, Member Design - Geotechnics Pad, Strip and Drg. | | | | | | | | | | |
| | 1.6 Title | Chrusture | Marahan Da | aian Caa | tachnica Da | | | | | |
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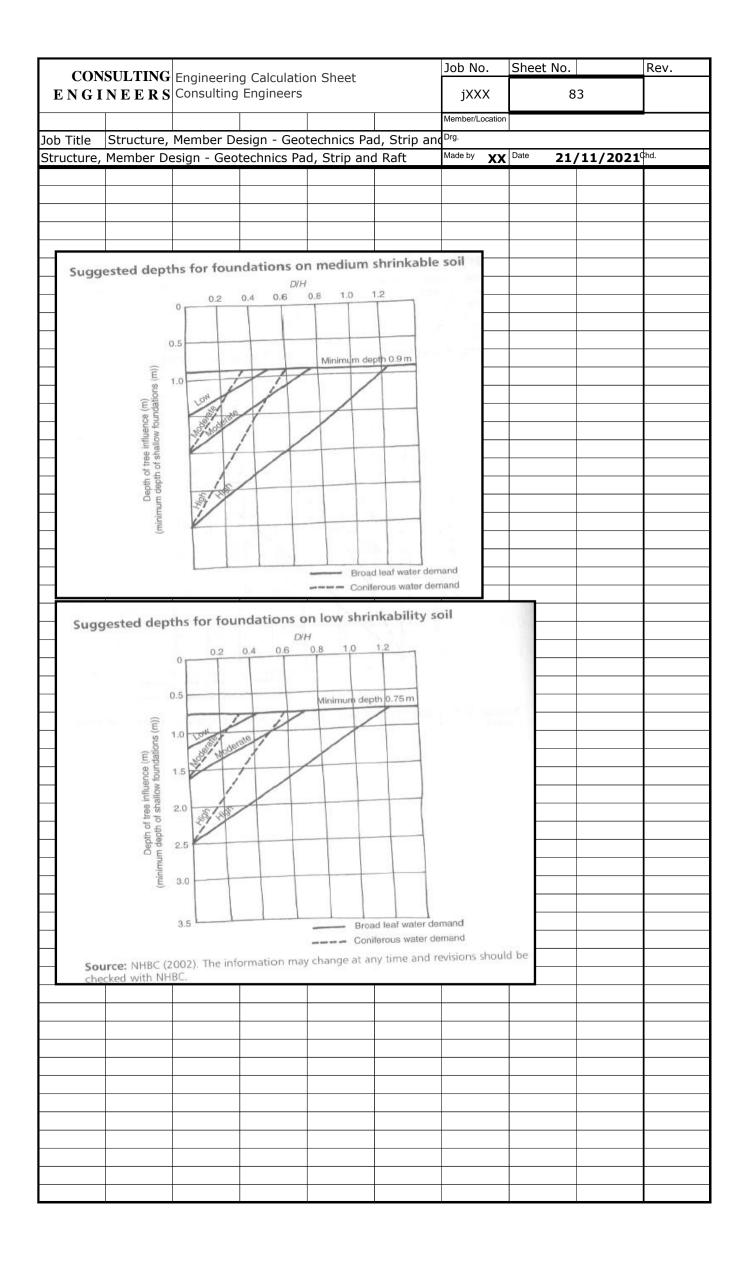
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| Building Regulation | ons Minimur | m Dimensi | ons | | | | | | | | |
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| Minimum Width | | | | | | | | | | | |
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| Table 10 M | inimum wic | th of strip | o foo | otings | | | | | | | |
| | | | | | Tota | load of lo | | earing wa /linear <i>m</i> e | | not more tha | n |
| Type of Ground (including Co | ndition | Field test | | | | 20 30 | | 40 50 | | 60 70 | |
| | ground | Applicable | | | | Minimum v | vidth | of strip fo | ounda | ation (mm) | |
| Rock sa | t inferior to ndstone, limestor firm chalk | Requires at l ne or other med pick for exca | hanic | ally opera | | in each c | ase e | qual to the | e widt | th of wall | |
| II Gravel or Sand Me | edium dense | Requires pic Wooden peg section hard | 50m | m square | in cross | 250 300 | 4 | 400 500 | | 600 650 | |
| III Clay Sti Sandy Clay Sti | | Can be inde | nted s | slightly by | thumb 2 | :50 300 | 4 | 400 500 | | 600 650 | |
| V Clay Fir Sandy Clay Fir | | Thumb make | as imp | pression e | asily 3 | 900 350 | 4 | 150 600 | | 750 850 | |
| Silty sand Lo | 920 929 939 | Can be exca Wooden peg cross section | 50m | m square | in | 100 600 | 1 | | | on soil types V | |
| VI Silt So Clay So Sandy clay So Clay or silt So | ft ft | Finger pushe | əd in ı | up to 10m | m 4 | 150 650 | I | provisio | ns of | ot fall within the this section if seeds 30 kN/m | the |
| Clay Ve Sandy clay Ve | ry soft ry soft ry soft ry soft | Finger easily | push | ned in up t | o 25mm | Re | efer to |) specialist | advi | се | |
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| Stepped Foundation | ons | | | | | | | | | | |
| Diagram 22 Eler foundation | vation of st | epped | | overlap | oundations by twice ess of the | the heig | ght | of the s | step | , by the | |
| See para 2E2d and e | | | | whiche | ever is grea | ater (see | e Di | agram 2 | 22). | , | |
| foundations sho change in level | ould unite at each | | | | nch fill fou | | | | | | |
| | | | | | ce the heig ever is grea | | ер | or 1 me | tre, | F | |
| I L | | • | - 11 | | teps in fou | | ns s | hould n | not I | be of | |
| | | -ls | | greater | height tha | an the t | hick | iness of | | | |
| \vdash | | T | ļĽ | founda | tion (see D | lagram | 22 | | | | |
| minimum overlap L = | twice height of st | ep.or | | | | | | | | | |
| H | thickness of found or 300mm, which | | ┠ | | | | | | | | |
| S should not be great | | | ┣ | | | | | | | | |
| (For trench fill founda minimum overlap L = | twice height of ste | ep. | | | | | | | | | |
| | or 1 metre, which is greater) | ever | | | | | | | | | |
| Piers and Chimney | /S | | | | | | | | | | |
| | | | | - 1. | £ | an ef | 1.0.0 | . h | | a ar d | L |
| Diagram 23 Pi | ers and chi | mneys | | f. chir | foundat nneys sho | | | | | | |
| See para 2E2f | | | | Dia: be | gram 23 a less than t al thickenii | nd the j he valu | proj e o | ection 3 f P whe | Xsł | hould neve | |
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| projection X shou | d not be less tha | an P | | | | | | | | | |
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| Structure, Member De | esign - Geo | technics Pa | d, Str | ip anc | l Raft | Made by | XX | Date | 21 | /11/2021 | Chd. |
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| Minimum Thickness | 5 | | | | | | | | | | |
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| Diagram 24 For | undation d | imensions | \$ | | | | | | | whicheve | r – |
| See para 2E2o | | | | | | | | | | sing Table | |
| | | Nall should be tral on foundat | | | d as an ac | | | | | tions may to strip | be |
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| - | dime | n the appropria ension in Table | 10 | | | | | | | | |
| Trench fill foundation | e may be use | l ae an | | | | | | | | | |
| alternative to strip fo | | ା ପତ୍ର ପା । | | | | | | | | | |
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| — Foundations—Ba | sic Sizing | | | | | | | | | | |
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| Basic Sizing ~ 1 two factors — | he size of | a foundat | ion is | basio | ally depen | ident o | n | | | | |
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| 1. Load being tr 2. Bearing capa | | oil under d | rooos | ed fo | undation. | | | | | | |
| Bearing capacit | | | | | | obtaina | 4 | | | | |
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| Typical Exam | iples ~ | | | | | | | | | | |
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| Job Title Structure | | | | technics Pac d, Strip and | | | Date 21 | /11/2021 | hd. |
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| Minimum | Denth (Fr | ost Heave | in Granul | ar or Cohe | sive Soils |) | | | |
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| Minimu | m depth is | 450mm | to avoid fr | ost heave | , but this | is often e | xceeded d | ue to other | |
| | | | | | | | | | |
| Minimum | Depth (Ve | olume Cha | nge in Col | nesive Soil | s Without | Trees) | | | |
| | undian black | | a a lla a a lu | | ulau aatla | | | | |
| | аррисаріе т | o conesive | solis only | , not gran | ular solis. | | | | |
| For the | re to be no | o influence | from trees | , the follow | ving minin | num dista | nce must | be satisfied | |
| | 2002):- | | | | | | | | |
| | | | | ature heigh 5 x mature | | | | | |
| | | | | mature heig | | | | | |
| | - | | | | | | | | |
| | | | | me change | es due to v | wetting and | d drying of | expandable | |
| | | /s are as fo index (10- | | | | | | | |
| | | icity index | | | | | | | |
| | | <u>y index (>4</u> | | | | · | | | J |
| | | | - Ar. | | | | | | |
| | | | | | h of the found pe of soil, dist | | | ~ | |
| | | | | tree and | water demand | d of the tree. | F | 5 | |
| 5 J. 1 S. | | | | | mand is depe id type of tree | | 20 | · / | |
| | | | | 20m high | n oak tree in h | igh shrinkage | Y | `] | |
| | void frost heav ild be construc | | | · · · · · | from the fac on, the founda | | 1.7= | P | |
| | nm below the | | | | st 2,50m deep | | 71 | | |
| | | 5 | 6 | - | | | | | |
| | | 2 | | 1 T | | | 11 | | |
| | ible soils (clay) be at least | | | | · /////// | | N / V / | | |
| 750mm | deep for clay | Min. 450 mr | n mi j _e t | | High sh | rinkage soils | | | |
| | low potentiał ge and Im wh | ere N | tin. 750 mm | 2. S. R. | close to | mature tree | | | |
| there is | high potentia | | - | S | 1m 2.4 | 3m deep | | | |
| shrinka | ge | | | 6 | T 111-3,4 | smueep | | | |
| | | | | 16 B | + | | | | |
| Figure | 3 13 Den | th of found | lations and | stability (i | nformation | adapted f | | | |
| 2000) | | un or round | auons and | i stability (ii | normation | adapted 1 | | | |
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| | ISULTING | | | | | Job No. | Sheet No. | Rev | |
|-------------------------------|--|---|---------------|--|-----------|---------------------------|-------------------|-----------------------------------|--|
| N G I | NEERS | Consultir | ig Enginee | 15 | 1 | jXXX | 84 | | |
| | | | | | | Member/Location | ו | | |
| itle | | | | eotechnics Pa | | | | | |
| ture, | Member D | esign - Ge | eotechnics | Pad, Strip and | d Raft | | Date 21/1 | 21/11/2021 ^{Chd.} | |
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| | | | | | | | | | |
| ow to | determine | foundatio | n denth (m |) adjacent to t | roos in s | hrinkable soils | | | |
| Speci | | Touridatio | in deptin (in | Maximum r | | Exclusion zon | | ision zone | |
| speci | 62 | | | height (m) | nacure | 1 (m) | 2 (m) | | |
| High | water dema | nd trees | | | | | | | |
| Elm, V | Villow | | | 24 | | 24.0 | 30.0 | | |
| Eucaly | /ptus | | | 18 | | 18.0 | 22.5 | | |
| Hawtl | horn | | | 10 | | 10.0 | 12.5 | | |
| Oak, (| Cypress | | | 20 | | 20.0 | 25.0 | | |
| Poplar | r | | | 28 | | 28.0 | 35.0 | | |
| Mode | arate water (| demand tr | ees | | | | | | |
| Acacia | a, Alder, Monk | œy puzzle, S | pruce | 18 | | 9.0 | 13.5 | | |
| Apple | , Bay laurel, P | lum | | 10 | | 5.0 | 7.5 | | |
| Ash | | | | 23 | | 11.5 | 17.3 | | |
| Beech | , Cedar, Doug | las fir, Larch | n, Pine | 20 | | 10.0 | 15.0 | | |
| Blackt | horn: | | | 8 | | 4.0 | 6.0 | | |
| Cherry | y, Pear, Yew | | | 12 | | 6.0 | 9.0 | | |
| Chest | nut | | | 24 | | 12.0 | 18.0 | | |
| | Sycamore | | | 22 | | 11.0 | 16.5 | | |
| | tain ash | | | 11 | | 5.5 | 8.3 | | |
| Plane | | | | 26 | | 13.0 | 19.5 | | |
| _ | ngtonia | | | 30 | | 15.0 | 22.5 | | |
| | water demai | nd trees | | | | | | - | |
| Birch | | | | 14 | | 2.8 | 7.0 | | |
| Elder | | | | 10 | | 2.0 | 5.0 | | |
| Fig, H | | | | 8 | | 1.6 | 4.0 | | |
| - | Laburnum | | | 12 | | 2.4 | 6.0 | | |
| Hornt | | | | 17 | | 3.4 | 8.5 | | |
| Magn | olia, Mulberry | / | | 9 | | 1.8 | 4.5 | | |
| _ | dation deptl | | | | | | | | |
| Modifi | ied Plasticity | Index | | Volume char potential | nge | Outside exclusi zone 1 | ion Outsi zone | de exclusion 2 | |
| 40% | and greater | | | High | | 1.50 | 1.00 | - | |
| | to less than 4 | 0% | | Medium | | 1.25 | 0.90 | | |
| | to less than 2 | | | Low | | 1.00 | 0.75 | | |
| Note 1 Det 2 Det apj | s termine whet termine the fe propriate excl | her a partic oundation c lusion zone. | lepth from th | of tree is outside he lower part of | the table | | ar soil condition | | |
| | | | | | | | | | |
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| | CON | SULTING | Engineerin | a Calcul | lation Sheet | | Job No. | Sheet No. | | | Rev. | | | | | | | | | | | |
|-----|---|---|---|--|--|---|--|---|-----------------------------|----------------------------|--|--|--|--|--|--|--|--|--|--|--|--|
|] | | | Consulting | | | | jXXX | 8 | 35 | | | | | | | | | | | | | |
| | | | | 5 | | 1 | Member/Location | | | | | | | | | | | | | | | |
| 1.1 | . | Churchter | Manahan Da | | | d Chuin an | | | | | | | | | | | | | | | | |
| | o Title | | | | Geotechnics Pa | | Made by XX | Date 31 | /11/7 | 0001d | hd | | | | | | | | | | | |
| วเ | ucture, | | esign - Geo | | Pad, Strip and | | XX | Z1, | /11/2 | .021 | | | | | | | | | | | | |
| 50 | homo I |) Decian (Co | hesive Soi | ile) | | | | | | | | | | | | | | | | | | |
| 30 | ineme i | | | | | | | | | | | | | | | | | | | | | |
| | $q_{allowable}$ | ≈14.2N | | | | | | | | | | | | | | | | | | | | |
| | | | on day | | | | | | | | | | | | | | | | | | | |
| | | d footing | _ | | | | () () | | | | | | | | | | | | | | | |
| | q _{allowa} | $able = 2C_u$ | Spread foo | oting on | undrained co | ohesive soil | $(\gamma_f = 2.5)$ | | | | | | | | | | | | | | | |
| | a) | Cohesive soil | ls (clays) | | | | | | | | | | | | | | | | | | | |
| | Strip for | oting | $q_{safe} = \frac{5C_n}{F_s O_s S}$ | - | | | | | | | | | | | | | | | | | | |
| | Square | footing | $q_{safe} = \frac{6C_n}{50.5}$ | | | | | | | | | | | | | | | | | | | |
| | - | safe = | ^{4 safe} F.O.S Safe Bearing | , | | | | | | | | | | | | | | | | | | |
| | where q | Cn = | Undrained SI | | | | | | | | | | | | | | | | | | | |
| | | F.O.S. | = Facto | or of Safe | ty (usually taken a | s 3.0) | | | | | | | | | | | | | | | | |
| | 578 | imple for | ndations | on or | hesive soil | | | | | | | | | | | | | | | | | |
| | | - | | | | | ad from 1 | autorio ma | - E-11- | | F | | | | | | | | | | | |
| | | | | | g pressure can te a factor of sa | | | | | | nally | | | | | | | | | | | |
| | adopte | d. | - | | | | | | | | - | | | | | | | | | | | |
| | | | <i>ions</i> . The all | lowable | bearing pressu | re, $q_{\rm b}$ (in kN | l/m ²), is give | en by the ex | pressio | on: | | | | | | | | | | | | |
| | - | = 1.7c | | | | | | | | | | | | | | | | | | | | |
| | whe | - | | | 1 (137 5 | | | | | | - F | | | | | | | | | | | |
| | | | | 0 | h (in kN/m²). | | | | | | F | | | | | | | | | | | |
| | | | ations. The | allowabl | le bearing press | sure, $q_{ m b}$ (in l | xN/m ²), is gi | ven by the | express | sion: | F | | | | | | | | | | | |
| | | $_{\rm b} = 2c$ | | | | | | | | | F | | | | | | | | | | | |
| | whe | | J | | | | | | | | F | | | | | | | | | | | |
| | | | | | | | | | | | c is the undrained shear strength (in kN/m ²). | | | | | | | | | | | |
| | It is important to note that the allowable bearing pressures derived from these expressions are not linked to any particular values of settlement. | | | | | | | | | | | | | | | | | | | | | |
| | linked to any particular values of settlement. | | | | | | | | | | | | | | | | | | | | | |
| | | | urticular val | ues of se | ettlement. | | | - | ssions : | are no | ot | | | | | | | | | | | |
| | | | urticular val | ues of se | wable bearing p ettlement. minimum dept | | | - | ssions : | are no | ut. | | | | | | | | | | | |
| | Found | lations in co | urticular val | ues of se bils at a | ettlement. minimum dept | h of 1m be | ow ground | level | | are no | jt. | | | | | | | | | | | |
| | | lations in co | urticular val | uesofse bilsata | ettlement. minimum dept Cohesive strength | h of 1m be | ow ground | level | | e normally on: sion: | | | | | | | | | | | | |
| | Found | lations in co | urticular val | uesofse bilsata | ettlement. minimum dept | h of 1m be Presumed 10 | ow ground bearing value (k 0) for foundatio | level (N/m2 or kgf/cm in of width | n2 x | are no | ut. | | | | | | | | | | | |
| | Found | lations in co | urticular val | uesofse bilsata | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² | h of 1m be | ow ground | level | n2 x | are no | ut | | | | | | | | | | | |
| | Found Descri Hard b | ption | onhesive so | ues of se bils at a (ys | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² | h of 1m be Presumed 10 | ow ground bearing value (k 0) for foundatio | level (N/m2 or kgf/cm in of width | n2 x 1 | are no | ut | | | | | | | | | | | |
| | Found Descri Hard b | ption | onhesive so | ues of se bils at a (ys | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² x 100) | h of 1m be Presumed 10 | ow ground bearing value (k 0) for foundatio 2m | level KN/m2 or kgf/cm in of width 4rr | n2 x 1 | | ut. | | | | | | | | | | | |
| | Found Descri Hard b (e.g. de Very s | ption ption oulder clays, ha | onhesive so | ues of se bils at a (ys | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² x 100) | h of 1m be Presumed 10 | ow ground bearing value (k 0) for foundatio 2m | level KN/m2 or kgf/cm in of width 4m 40 | n2 x 1 | | ut | | | | | | | | | | | |
| | Found Descri Hard b (e.g. de | ption ption oulder clays, ha | onhesive so ard fissured clay and Gault clays) | ues of se bils at a (ys | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² x 100) >300 | h of 1m be Presumed 10 1m 800 | bearing value (k 0) for foundation 2m 600 | level KN/m2 or kgf/cm in of width 4m 40 | n2 x 1 | | | | | | | | | | | | | |
| | Found Descri Hard b (e.g. de Very s Londor Stiff fis | ption ption coulder clays, ha eeper London a tiff boulder clay n Clay sured clays (e. | art fissured clay and fissured clay and Gault clays) , very stiff 'blue' | ues of se pils at a (ys | ettlement. minimum dept Cohesive strength kN/m² or kgf/cm² x 100) >300 | h of 1m be Presumed 10 1m 800 | bearing value (k 0) for foundation 2m 600 | Ievel N/m2 or kgf/cr on of width 4m 40 150-2 | n2 x n 0 250 | | | | | | | | | | | | | |
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| | Found Description Hard b (e.g. de Very st London Stiff fist brown boulde Firm n depth) weather Soft no | lations in co ption oulder clays, ha eeper London a liff boulder clay n Clay sured clays (e. London clay), s r clay ormally consolid ared 'brown' Lor ormally consolid | art fissured clay and fissured clay and Gault clays) , very stiff 'blue' g. stiff 'blue' and tiff weathered dated clays (at nd lake clays, u ndon clay ated alluvial cla | ues of se pils at a () () () () () () () () () () () () () | ettlement. minimum dept Cohesive strength kN/m ² or kgf/cm ² x 100) > 300 150-300 75-150 40-75 | h of 1m be Presumed 10 1m 800 400-800 200-400 | ow ground bearing value (k 0) for foundatio 2m 600 300-500 150-250 75-100 | level (N/m2 or kgf/cm in of width 401 150-2 75-1 50-7 | n2 x n 0 250 25 | | | | | | | | | | | | | |
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| | CON | SULTING | Engineerin | g Calculatio | n Sheet | | Job No. Sheet No. | | | Rev. | | |
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|] | | | Consulting | | Sheet | | | | 86 | | | |
| | | | | | | | Member/Locatio | n | | 4 | | |
| Jol | o Title | Structure. | Member De | esign - Geot | echnics Pa | d, Strip an | C Drg. | 1 | | | | |
| _ | | | | technics Pad | | | | C Date 2 | 1/11/2021 | Chd. | | |
| | | | | | | | | | | | | |
| Sc | heme D | esign (No | on Cohesiv | e Soils) | | | | | | | | |
| | Sprea | d footing | on grave | | | | | | | | | |
| | - | $_{\rm ole} = 10N$ | | | ad footing | a on dry so | pil ($\gamma_f = 3$) | | | | | |
| | | | | | - | · · | soil ($\gamma_f = 3$) | | | <u> </u> | | |
| | | $_{\rm ole} = 7N$ | | | | | | the water | table | 1 | | |
| | | $owable = q_{al}$ | | 2 | pread tou | ndation at | t or below | the water | lable | | | |
| | Where | N is the S | PT value. | | | | | | | | | |
| | b) (| Cohesionless | soils (sands | and gravels) | | | | | | | | |
| | | safe = | 10 N | | | | | | | | | |
| | Where o | ∃ _{safe} = N | safe bearing | pressure values ("N" blov | we) | | | | | | | |
| | | | | | | | | | | | | |
| | | Foundation | ns in non-co | ohesive soil | s at a mini | mum depti | h of 0.75m | below gro | und level | | | |
| | | | | | | | | | | _ | | |
| | | Description o | of soil | | N-value in | | | ed bearing va | | | | |
| | | | | | penetrat | ion test | | or kgf/cm ² x 1 indation of wid | | | | |
| | | | | | | - F | | | | | | |
| | | | | | | | 1m | 2m | 4m | | | |
| | | Very dense s | ands and grave | əls | >5 | 0 | 600 | 500 | 400 | | | |
| | | Dense sands | and gravals | | 30-4 | 50 | 350-600 | 300-500 | 250-400 | | | |
| | | | | | | | | | | | | |
| | | Medium-den: | se sands and g | ravels | 10-3 | 30 | 150-350 | 100-300 | 100-250 | + | | |
| | | Loose sands | - | | 5-1 | 0 | 50-150 | 50-100 | 50-100 | + | | |
| | | 20000 00100 | and gravalo | | 0- | Ŭ | 00-100 | 00-100 | | | | |
| | | | | pressure is d | efined as th | at causing | 25mm settl | ement und | er the | | | |
| | | foundation | waan. | | | | | | ŀ | | | |
| | | | | in a depth eq its width, the | | | | and the de | pth of the | <u> </u> | | |
| | | | | exceed 25m | | | | hould be ha | alved. | - | | |
| | Chart | 6 | | his haadaa | | | -l-4' ' | | | | | |
| | Chart | for estima | ting allowa | able bearing | g pressure | e for foun | dations in | sands | | - | | |
| | | | e shown as | 6 | | | | | - | | | |
| | belows | s per 300m | m | | | 700 | | | | | | |
| | If the w | /ater table i | s within a d | epth | ଖ . | 600 - | | | | | | |
| | | | of the four | | 250 | | | | | | | |
| | | | he foundat b its width, t | | | 500 - 30 | | | | | | |
| | | | e doubled. | | | 400 - 40 | + | | | | | |
| | lf sottle | monte mu | st not exce | ad 25mm | 8 <u>8</u> | " | $ \setminus $ | T+ | | + | | |
| | | | st not excee aring values | | Allowable pressure - kN/m2 Water tablebelow depth B | 300 - 50 | | ┈┼╌┢ | | 1 | | |
| | be halv | | - | | | 200 - 20 | ╞╌┝╼╕ | | | | | |
| | | | | | Z 3 | | \downarrow | 1-1 | ╧╡╉│ | | | |
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| | | | Consulting | | | Shi Sheet | | jXXX | | 8 | 37 | |
| | | | | | | | | Member/Loca | tion | | | |
| Jo | b Title | Structure. | Member De | esian | - Geo | technics Pa | d, Strip and | | | | | |
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| | F. | | ¥_X | | Y + | $q' = \gamma z$ | • <u>G</u> , | | | | | |
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| | Ouick | estimat | e desian | me | thod | ls for sha | allow fou | undatio | ons | | | |
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| <u> </u> | offer I | winch Ha | ncon | | | | | | | ļ | | |
| <u> </u> | Factor o | of safety aga | inst bearing | capa | acity fa | lure, $\gamma_f = 2$. soil, <i>B</i> is the | 0 to 3.0, q'_o | is the eff | ective | over- is the | | |
| <u> </u> | burden | pressure, γ i n (for the dr | s the unit w ained or un | eight drain | ed case | under cons | ideration) ar | nd N_c , N_c | and / | V_{γ} are | | |
| - | shallow | bearing cap | pacity factor | 5. | | | - | | - | - | | |
| | | | | | | 5- PM | | | | ┣ | | |
| ⊢ | Strip fo | otings: q _{allov} | $_{vable} = \frac{cN_c}{c}$ | $+ q_0'$ | $\frac{v_q + 0}{v}$ | . SYBNY | | | | ⊦ | | |
| | | | | | | | | | | ŀ | | |
| | Pad foo | tings: q _{allow} | $able = \frac{1.3 \text{ cV}}{2}$ | c + (| 7. Ng + | $0.4\gamma BN_{\gamma}$ | | | | ŀ | | |
| | | | | | . 1 | | N and N | are set o | ut he | ow in | | |
| | Approx relation | imate value: | s for the bea | ring | capacit | y factors N _c | , N_q and N_γ | , are set t | ut bei | 000 111 | | |
| | relation | ι το φ. | | | | | | | | | | |
| | | | | | | | * | | | | | |
| | Interna ¢ | l angle of sh | ear | | | g capacity fa | | | N. | | | |
| | | | | | Nc | | N _q 1.0 | | | r).0 | | |
| | 0 | | | | 5.0 6.5 | | 1.5 | | 0 | 0.0 | | |
| | 10 15 | | | | 8.5 11.0 | | 2.5 4.0 | | 1 | .4 | | |
| | 20 25 | | | | 15.5 21.0 | | 6.5 10.5 | | 8 | 3.5 3.0 | | |
| | 30 35 | | | | 30.0 45.0 | | 18.5 34.0 | | | 7.0 | | |
| | 40 | | | | 75.0 | | 65.0 | | 98 | 3.0 | | |
| | * Values | from charts b | by Brinch Hans | sen (1 | 961). | | | | | ŀ | | |
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| ENGI | NEERS | Consulting | Engineers | in Sheet | | jXXX | jXXX 88 | | |
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