## Summary of Items Discussed in 3/2020 APSEC Discussion Forum on 29 September 2020

	Items proposed by Convenors for Discussion	Summary of Discussion and BD's Responses
	Items raised by HKIA	
1.	<b>Open Kitchen in Premises with Internal Staircase</b>	
	As stated in Clause C13.4(e) of the FS Code 2011, a non-combustible	BD advised that Clause C10.1 of the FS Code 2011 was only applicable
	barrier with FRR of not less -/30/- and of not less than 450mm measured	to internal unprotected openings in floors within a fire compartment for
	vertically downwards from the underside of floor should be provided to	sprinkler protected building. Hence, the provision of smoke curtain as
	surround the notional open kitchen area where the open kitchen is in	referred to in Clause C10.1(b) of the FS Code 2011 was considered not
	premises with internal staircase.	acceptable as downward barrier required for open kitchen in premises
		with internal staircase(s) under Clause C13.4(e) of the FS Code 2011.
	We would like to ask if smoke curtain fulfilling the requirements as stated	
	in Clause C10.1(b) and the respective Commentary section of the FS Code	
	2011 be accepted as an alternative arrangement for provision of such	
	downward barrier.	
2.	FRR Requirement for Main Staircase in Single-Family House/Unit	
	In a single-family house/unit, it is not uncommon that the main staircase	Noting that the main staircase connecting the different floors within a
	connecting the floors is a standalone structure with void around. Since	single-family house/unit served as means of escape and element of
	there is no compartment wall enclosing the staircase and that it is a rather	construction akin to a floor, BD advised that it should comply with
	open structure within the premises, we opine that both integrity and	stability, integrity and insulation of FRR requirements under Table C2 of
	insulation requirements are immaterial under such circumstances and	the FS Code 2011.
	hence NOT required for the staircase floor slab. On the other hand,	
	stability requirement to the structural frame, beam or column supporting	

such main staircase is relevant and has to be fulfilled in accordance with	
Table C2 of the FS Code 2011.	
Please advise if our understanding is correct.	
Smoke Outlets	
Referring to item 10 of ADF 2/2015 held on 20 March 2015, BD advised that each smoke outlet should not be more than 30m away from another smoke outlet along the frontage. For large development, it is not practicable to have each and every smoke	HKIA would further supplement sample past cases examples to deliberate the constraints and practicality aspect for BD's consideration.
outlet to be arranged 30m max. apart sequentially and continuously from	
one another along all the building frontages as illustrated in the diagram	
attached to item 10 of ADF 2/2015. Indeed, it is more reasonable to allow	
the smoke outlets be arranged in clusters, and that only the smoke outlets	
in each cluster need to be positioned at not more than 30m apart from one another as per the following diagram (as amonded from the one attached to	
item 10 of ADF 2/2015).	
	such main staircase is relevant and has to be fulfilled in accordance with Table C2 of the FS Code 2011. Please advise if our understanding is correct. FOYER Smoke Outlets Referring to item 10 of ADF 2/2015 held on 20 March 2015, BD advised that each smoke outlet should not be more than 30m away from another smoke outlet along the frontage. For large development, it is not practicable to have each and every smoke outlet to be arranged 30m max. apart sequentially and continuously from one another along all the building frontages as illustrated in the diagram attached to item 10 of ADF 2/2015. Indeed, it is more reasonable to allow the smoke outlets be arranged in clusters, and that only the smoke outlets in each cluster need to be positioned at not more than 30m apart from one another as per the following diagram (as amended from the one attached to item 10 of ADF 2/2015).



4.	Smoke Seal Lobby for Lift Doors at Basement	
	Further to BD's reply to item 12 of ADF 1/2020 held on 10 January 2020, we wish to further clarify if the non-loadbearing lift shaft wall should indeed be required to have an FRR of -/120/120 only, instead of -/240/240, as per clause C9.1(a) of the FS Code 2011. This is also in line with having the lift landing door at basement to be provided with an FRR of -/120/- only as per clause C9.1(c) of the FS Code 2011.	BD advised that HKIA's understanding was correct.
5.	Locking Devices under PNAP APP-37	
	Paragraph 18 of PNAP APP-37 stipulates that relevant information of locking devices for openable sashes / sub-frames of window, window walls and curtain walls should be shown on structural plans for approval, and that proof load test report for the locking devices should also be submitted prior to the application for an occupation permit or submission of Form BA14. It is our understanding that both requirements are NOT applicable for windows or window walls that do not require structural submission for approval pursuant to paragraph 4 of the same PNAP. Please confirm if our understanding is correct.	BD advised that HKIA's understanding was correct. Notwithstanding that structural submission to BD was not required, BD reminded that the AP/RSE should ensure that the design, fabrication and installation of the window and window wall should achieve the required safety standard pursuant to paragraph 6 of PNAP APP-37.
6.	Size of Top-Hung Sash under PNAP APP-37	
	Paragraph 20 of PNAP APP-37 stipulates that " <i>In general, the size of a top-hung sash should not exceed</i> $2.5m^2$ ." Despite the same, we understand that top-hung sash with size larger than $2.5m^2$ is still acceptable	BD advised that HKIA's understanding was correct.

	so long as it can be demonstrated that the adopted hinges are adequate to	
	hold its own weight.	
	Please confirm our understanding is correct.	
7.	PNAP APP-2 - Vertical Shafts at E&M Floor	
	According to item 13 of ADF 1/2017 held on 13 January 2017, vertical shafts at E/M floor in Case B that also serve GFA accountable floors above is GFA accountable.	BD confirmed that relevant responses in ADF 1/2017 and ADF 1/2020 were still pertinent.
	Revised PNAP APP-2 was issued on March 2017, where the phrase "( <i>i.e.</i> , <i>not serving GFA accountable floors above or below</i> )" was removed from paragraph 14. Our interpretation is that the above revisions are merely editorial in nature, and BD's reply/advice given in ADF 1/2017 remains valid, taking heed of BD's reply/advice to item 4 of ADF 1/2020 held on 10 January 2020 as well.	
	Please confirm that our interpretation is correct.	
8.	PNAP APP-29 – Lift & Escalator Installations	
	Paragraph 4(b) of PNAP APP-29 states that the new amended requirements as contained in Appendix B – September 2019 are "applicable to all new building plans or major revision of building plans for development proposals submitted to the BA for approval on or after 1 December 2019."	BD advised that HKIA's understanding was correct.

	Where building plans had been submitted before 1 December 2019 but subsequently disapproved and re-submitted for BA's approval after the said date, we understand that the new amended requirements are NOT applicable to such <b>re-submission</b> of building plans which was prepared on the basis of the initial submission. Otherwise, there may have substantial implication to the initial plans when the new requirements are imposed,	
	Please advise if our understanding is correct.	
9.	<b>Disposition of AC Platform combined with Balcony and/or UP</b>	
	According to item (a) of Appendix B to the Code of Practice on Design for Safety – External Maintenance 2019 (the Code), the AC platform combined with balcony and/or UP should follow the disposition shown in Figures 1, 2 or 3. To allow design flexibility, we would appreciate if BD could consider alternative dispositions such as, without limitation to, those illustrated below:	In general, the disposition of AC platforms other than those shown in Figures 1 to 3 in Appendix B of the Code might be considered provided that the design criteria of AC platforms as stated in Appendix B of the Code were complied with; the provision of natural lighting and ventilation of the adjoining habitable space was not obstructed by the AC outdoor units; and the open side requirements of balcony and utility platform under JPN No.1 and No.2 respectively were complied with.
		The inclined AC platforms as shown in Figure 1 and Figure 2 were considered not acceptable as the length of the 400 mm working space should be not less than that of the AC platform as stated in item (d) of Appendix B of the Code.
		In response to another member's enquiry, BD clarified that AC platform



handling units (AHUs) not exceeding 4% of the total GFA of each floor are rooms (4% of the total GFA of each floor on which they were situated) considered to be reasonable. which would be considered reasonable in the absence of the detailed

It is very common in typical centralised air-conditioning system design that one Primary Air Handling Unit (PAU) will serve multiple AHUs at different floors/areas to provide pre-treated fresh air for the AHUs, whereas one AHU may need to serve more than one floor due to various reasons such as limited floor plate area or efficient plants usage, etc.



Under such circumstances, we consider area of the PAUs/AHUs (i.e. plant rooms of the air-side portion of the centralised AC system) not exceeding 4% of the total GFA of the floors they serve would be considered as

designed layout of the plants.

As regards the sample case put forward by HKIA or other cases deviating from the general requirements stipulated in PNAP APP-42, BD advised that full justifications including the detailed design and plant room layout should be submitted to BD for consideration on a case by case basis. EMSD's advice might be sought in this regard.

	reasonable and be disregarded from GFA calculation.	
	Would BD please confirm the above is acceptable.	
	Items raised by HKIE	
11.	Uplift Resistance of Pile Group of Socketed Steel H-Pile	
	According to Clauses $5.3.3(2)(b)(v)$ & (vi) of Foundation Code 2017, if the piles in a pile group has the same individual tension capacity, checking of rock/soil cone failure of individual pile is not necessary when the group effect has been considered in Clause $5.3.3(2)(b)(iv)$ . When the tension capacities of piles within a group are not the same, checking according to Clause $5.3.3(2)(b)(vi)$ should be followed.	<ul> <li>HKIE would supplement sample cases for BD's further consideration.</li> <li>[Post Meeting Notes: HKIE supplemented sample cases to BD in October 2020. A separate meeting between BD and HKIE representatives to discuss this item was held on 23.11.2020. BD advised HKIE on the following:</li> <li>1 The anchorage resistance of individual socketed steel H-Pile is</li> </ul>
	In this regard, the tensile capacity of a rock-socketed pile has not been categorically defined. It has been interpreted by some BD officers that the tensile capacity be taken as the anchor resistance of the pile, being the lesser of Clause $5.3.3(1)(a)$ and (b). That means the effective weight of the rock/soil in accordance with Figure 5.1 has to be considered for individual pile. If that is so, every rock-socketed pile will have adequate uplift resistance for the uplift load. Then Clauses $5.3.3(2)(b)(v)$ & (vi) will become superfluous.	<ol> <li>The anchorage resistance of individual socketed steel fifther is governed by:         <ul> <li>(a) structural capacity of the structural steel section under tension;</li> <li>(b) bond resistance between grout and structural steel; and</li> <li>(c) bond resistance between grout and rock.</li> </ul> </li> <li>The anchorage resistance would be limited by effective weight of soil mass/rock cone that can be mobilised.</li> </ol>
	It would be meaningful to take the tensile capacity of a pile as the lesser of the resistance derived from the steel section and rock socket – tensile strength of the steel section, bond between pile and grout and bond between grout and rock. So as long as the rock socket depth of every pile	3. In cl. 5.1.6 of the Foundation Code 2017, it stipulated the deemed-to-be satisfied conditions for each pile in a pile foundation in providing anchorage resistance against uplift, overturning and/or buoyancy.

in a group is the same, i.e. with equal tensile resistance, Clause	
5.3.3(2)(b)(v) will then apply, otherwise Clause 5.3.3(2)(b)(vi) will have to	4. For a group of closely-spaced piles subjected to tension, cl. 5.3.3
be followed.	(2)(b)(iv) stated that the overlapping effect should be considered
	when assessing the volume of rock/soil cone to be used for resisting
In the last paragraph of Clause 5.3.3(1)(a), tensile capacity of a pile has	the combined uplift force. In this respect, cl. $5.3.3(2)(b)(v)$ and (vi)
been taken to be related to the compressive capacity derived from shaft	provide guidelines for the assessment under different scenarios.
friction and bond between the pile and the surrounding soil. The last	
sentence of this paragraph should be applied to a single pile not forming a	5. To address the query raised by HKIE, BD suggested amending cl.
pile group. Otherwise, Clauses 5.3.3(2)(b)(v) & (vi) will again become	5.3.3(2)(b)(v) & (vi) as follows:
superfluous.	(v) For a group of piles of same size with same individual
	tension capacity allowable anchorage resistance, checking
Please advise if the above interpretation is correct.	of overlapping effect on rock/soil cone failure of individual
	pile is not necessary when the group effect has been
	considered as stated in (iv) above.

(vi) Where the tension capacities allowable anchorage resistances of piles within a pile group are not the same, checking of overlapping effect on rock/soil cone failure of individual pile is required. The effective weight of the overlapping part of rock cones between piles may be distributed to each pile on a pro-rata basis according to the tension capacities allowable anchorage resistances of the piles.

The suggested amendment would be put forward for discussion in the next meeting of the Technical Committee meeting on the Code of Practice for Foundations.

		HKIE representatives agreed with the explanations and amendments as advised/proposed by BD. BD also presented a sample of typical pile load schedule in which the anchorage resistance of individual piles and pile groups were shown in accordance with the explanation as per the above discussion. HKIE representatives agreed with such presentation Sample of Pile in general. <sup>Load Schedule.pd</sup> ]
12.	<b>Proof Test frequency for Driven Steel H-Pile</b> In accordance with Clauses 5.3.1 and 5.3.2 of the Foundation Code 2017, the bearing capacity of driven steel H-piles and steel H-piles driven to bedrock are derived on the same design principles with respect to structural and geotechnical aspects.	BD advised that driven steel H-piles and steel H-piles driven to bedrock were different recognised types of pile. Hence, their loading performance should be ascertained separately.
	Upon completion, their loading performance will be ascertained by proof loading test with at least 1% of piles. Since both types of foundation piles are installed by the same construction method, i.e. pitched with a hydraulic hammer and final set with a drop hammer, we understand that the numbers of proof loading test are based on total numbers of driven steel H-piles plus steel H-piles driven to bedrock.	
	Would BD please confirm the above.	

13.	<b>BD/MTRCL Liaison Meeting on the Review of PNAP APP-24</b>	
	As discussed in item 7 of ADF 2/2020 held on 29 May 2020, we would like to know the progress of BD/MTRCL Liaison Meeting on the Review of PNAP APP-24. Members would also like to join the discussion to express their views.	BD advised that the working group between BD and MTRC had already held three meetings. It might not be appropriate for HKIE to the join meeting at this juncture. Nevertheless, the draft revised PNAP APP-24 would be submitted to the BSC and APSEC for consultation with the industry in due course.
14.	Implementation of Wind Code 2019	
	As stipulated in BD's circulation letter dated 30 September 2019, grace period for implementation of the new Wind Code will be expired after September 2020. Since Covid-19 pandemic occurred in early 2020, the planned technical seminars/talks for briefing and elaborating the applications of the new Wind Code cannot be conducted by the Industry. The outbreak also affects the proper planning and implementation of GI works for supporting foundation submissions before October 2020.	BD advised that the grace period for adoption of the new Wind Code was extended to expire on 31 March 2021 as stipulated in the circular letter issued on 28 August 2020.
	In this regard, we would like to request the extension of the grace period for mandatory adoption of the new Wind Code for 1 year	
	Item raised by HKIS	
15.	GFA and SC Calculations for Curtain Walls	
	Under paragraph 6(b) of PNAP APP-2, a reinforced concrete dwarf perimeter wall not less than 300mm high measured from the floor level is required for disregarding the curtain wall from GFA and SC calculations.	BD advised that the dwarf wall was not required to be provided at locations across entrance/exit (Scenario A) or at void levels (Scenario B). However, as clarified in ADF 4/2016 (item 15), the curtain wall could be disregarded from GFA and SC calculations except for the part

However, some members reported that they were asked to count the curtain	providing access to outside, flat roof or balcony.
wall for the GFA and SC at some locations where the construction of such	
dwarf perimeter wall are found not practical. Such locations include	
across entrance or exit (Scenario A) & between the void and its external	
enclosure (Scenario B).	
May we seek BD's clarification in this regard and to figure out if the	
concerning curtain wall on the relevant floor could be disregarded from	
GFA and SC calculation (assume all other requirements under PNAP APP	
2 are fulfilled) when such dwarf wall cannot be provided under Scenario A	
& B for practical reason (Please refer to the sketches below for details)	





	Items raised by AAP	
16.	Separation between Use Classifications	
	Clause C7.3 of FS Code 2011 states that:	BD advised that AAP's interpretation was correct.
	"Provided that the fire compartment area limitations in Table C1 are	
	complied with, separation by fire barriers are not required between	
	different occupancies for the following uses:	
	(a) Use Classification 4a; or"	
	Clause C7.4 of FS Code 2011 states that:	
	"Except for shopping arcade in Use Classification 4b, every common	
	internal corridor serving rooms or flats in different occupancies should be	
	separated from such occupancies by fire barriers having an FRR of not less	
	than that of the Use Classification of that floor"	
	Based on the above, we opine that for offices with different occupancies:	
	(a) Separation by fire barriers are not required between different	
	occupancies;	
	(b) The common internal corridor should be separated from the	
	occupancies by fire barriers	
	(Office 1, 2, 3 are of different occupancies)	

	COMMON INTERNAL CORRIDOR	
	PASSENGER LIFTS (NON FIREWAN LIFT) Please advise if our interpretation is correct.	
17.	Design of Protective Barrier of AC Platform combined with Balcony	
	and/or Utility Platform	
	As per item 17(iii) of ADF 5/2019 held on 22 November 2019, BD interpreted the design of protective barrier of AC platform in combined balcony and utility platform. We would like to raise the question whether the short side of the AC platform if not for the purpose of air	BD advised that the issue would be further reviewed in the Technical Committee on the Code of Practice on Design for Safety – External Maintenance.

	intake/exhaust could be changed to solid design, say a full-height solid	[Post Meeting Notes: The matter was discussed at the Technical
	wall.	Committee Meeting of Code of Practice on Design for Safety – External
		Maintenance held on 8.10.2020. It was considered that as different
	FLAT 'A' LIV. RM. BED ROOM 1 BED ROOM 1	designs in intake and exhaust system of AC were available in the market, the screens and protective barriers as appropriate should satisfy the permeability requirements set out in paragraph (g) of Appendix B of the Code. To this end, the proposed solid design is considered not acceptable.]
18.	Exemption of GFA and SC for Covered Areas Underneath Lowest	
	Balcony/Utility Platform	
	A follow-up question on item 9 of 5/2019 ADF held on 22 November 2019.	BD advised that responses to item 9 of ADF 5/2019 was still valid. Pursuant to the JPN Nos. 1 & 2 jointly endorsed by the Buildings Department, Lands Department and Planning Department, only the covered areas underneath the lowest balcony and utility platform might be fully exempted from GFA and SC calculations.



We would like to enquire whether the area underneath the staggered balcony would be GFA exempted. For some of the case officers in BD, they are of the opinion that such area is not exempted since the balcony above is not the "lowest" balcony and hence does not match the exemption criteria stated in the JPN.

Will BD favourably consider the case in view of the followings:

	(a)	The domestic flats at upper floors are usually larger in size than those at lower floors, and thus the size of the balconies at upper floors are bigger than those at the lower floors;	
	(b)	The staggered or more random arrangement of balconies does not increase the building bulk;	
	(c)	It will give more flexibility in the stacking of the balconies and thus more innovative elevation design could be allowed.	
19.	Provis	sion of Building Logo at Building Rooftop	
	It is r buildin locatio	not uncommon to have the building name / logo installed on the ng envelopes at rooftop level, some examples of the possible ons of such logo as shown below.	BD advised that according to section 2 of the Buildings Ordinance, the building name / logo as shown in the diagrams was considered as "signboard" for the purpose of displaying visual image or other information.
	The but Their APP-1 require mainte PNAP	uilding logos can be in the form of letter words, artistic signage, etc. scale and nature are different from "Signboard" as defined in PNAP 126 and thus these building logos at rooftop level should not be red to set back from the roof parapet or curb to maintain a 1.5m wide enance path as stated in paragraph 18 of Appendix B of the said 2.	According to paragraph 18 in Appendix B of PNAP APP-126, no portion of a signboard erected on the roof of a building shall be within a distance of 1.5m from the inside face of the roof parapet or curb. Therefore, a 1.5m setback should be provided for both cases 1 and 2.
	Would consid require	d BD please advise if the aforementioned building name / logo is dered as "Signboard" and if our understanding on the set-back mement is correct.	For Case 3, BD advised that the building logo was considered as "Wall Signboard" and thus paragraph 18 in Appendix B of PNAP APP-126 was not applicable.



	Case 3	
20.	Disposition of Refuge Floor	
	Further to item 13 of ADF 2/2020 held on 29 May 2020, please confirm BI whether the scenario illustrated below is acceptable under FS Code 2011.	3D had no in-principle objection to the proposal.





21.	Escalator Void	
	According to item 1(b) of 3/2015 APSEC Discussion Forum, only the escalator and the undercover space at the lowermost floor shall be accountable for GFA calculation.	BD advised that the gap or void in-between escalators for compliance with the subject CoP may be exempted from GFA calculation upon application.
	For scissor escalators, gap / void is necessary so that minimum clearance between outer edge of the handrail and adjacent escalator pit cladding could be maintained in accordance to clause 1.2.5 Section E Part 4 of CoP ON THE DESIGN AND CONSTRUCTION OF LIFTS AND ESCALATORS.	
	Since such gap / void is not contributing any usable floor space, our understanding such gap / void could be regarded as escalator void and disregarded from GFA calculation, BD please clarify if our understanding is correct.	

	PLAN OF SCISSOR ESCALATORS	
	SECTION OF SCISSOR ESCALATORS	
	AOB Items	
22.	Special Work Arrangement of New Building Divisions (NBDs)	
	(Item raised by BD)	
	While the normal public service had been resumed from 15.9.2020, BD	Members welcomed the continuation of BD's special work arrangement.
	would continue to implement targeted measures to reduce social contact	
	and apply infection control measures. BD reminded that practitioners	Members of HKIE suggested BD to copy the referral emails to GEO to
	might continue to adopt the facilitating measures promulgated by BD on	AP/RSE/RGE to facilitate their follow-up action. BD would consider
	28.9.2020 regarding communication with BD officers, statutory	HKIE's suggestion.
	submissions and site inspections via the Notice to Registered Building	
	Professionals.	[Post Meeting Note: As advised by GEO, they considered copying the
		referral emails to GEO to AP/RSE/RGE did not conform to their

	BD advised that witnessing of pile proof test by HOKLAS accredited	established practice. In view of the current mode of operation which is
	laboratory with video recording would continue to be allowed on a case-by	proven effective, GEO advised the status quo should be maintained. ]
	case basis.	
23.	Minor Amendments to the Plans at BD's Office	
	(Item raised by BD)	
	To facilitate practitioners for case discussions with BD officers and making	Members welcomed BD's facilitating measures and would notify the
	minor amendment to the plans, BD advised that 17 tables had been set up	members of their institutes/association of the arrangements accordingly.
	in the lift lobbies on 7/F, 8/F and 9/F. Prior appointments could be made	
	with BD officers for case discussions and reservation of the meeting table	
	would be made by BD officers. To make the best use of the resources,	
	each booking session would be of 30 minutes. In view of the continued	
	need to reduce social contact, the number of users at each meeting table is	
	limited to 3 (including the BD officer). BD also appealed to practitioners'	
	assistance in conducting case discussions with BD officers via video	
	conference and taking the plans back to their offices for amendment as far	
	as possible.	

Table 1 – Pile Load Schedule

Cause		_
Sam	nı	ρ
Juili	<b>N</b> 1	

	PILE LOAD						Load Combination				Pile Capacity				TENSION CHECKING					Required							
											Surcharg						COMPRE	ESSION	Ultimate	Required							Tension
PILE	CAP	TVDE		DI		Wx (kN)	Wy (kN)	Wu (kN)	Wv (kN)	11/1/ mov/1	e from			D.1.0	D+L+I W	/ D+L+I W			Uplift	Tension	IW1+W2+WpI	D	D <sub>MN</sub> - 0.9Ru + D	(W1+W2+Wp) +	D <sub>MIN</sub> -	D <sub>MIN</sub> + Ra -	Capacity >
MARK	MARK		DL (kN)		LL (kN)					I VV Max.I	adj.	UL (kN)	D+L (kN)	(kN)	max.I	max.I +S	WITHOUT	WITH	Resistance	Capacity	(kN)	(kN)	1.5IWmaxl + - 1.5IWm	xI D <sub>MIN</sub> - 1.5IWmax	IWmaxI + UL	IWmaxI + UL	1/2
	WD U U U			(KIN)		(1)	(2)	(3)	(4)	((()))	Foundatio			(((1))	(kN)	(kN)	VVIND	(LNI)	Ru (kN)	Ra (kN)		(111)	1.1UL (kN) + 1.1UL (	N) + 1.1UL (kN)	(kN)	+ Soil (kN)	Compression
											n, S (kN)						(KIN)	(KIN)									Capacity?
-	~	~	-	*	*	·	*	*	*	*	*	-	*	*		· •	*	*	*	-	*	*	-	* <b>*</b>	Ψ.	*	*
SP1	CP-01	В	1645	1480	436	759	-4855	-409	-5120	5120	102	-100	2081	2183	7201	7303	6100	7625	12200	6100	13730	1380	-6311 4669	7419	-3741	2359	Yes
SP2	CP-01	в	1834	1650	508	927	-3610	236	-4116	4116	102	-101	2342	2444	6458	6560	6100	7625	12200	3050	3980	1549	-4636 6344	-656 *	-2568	482	No
SP3	CP-01	В	2018	1816	582	1097	-4213	931	-2976	4213	102	-101	2600	2702	5575	5677	6100	7625	12200	3050	6980	1715	-4616 6364	2364	-2499	551	No
SP4	CP-01	В	2226	2003	678	1327	404	3100	-762	3100	102	-97	2904	3006	5005	5107	6100	7625	12200	3050	6690	1906	-2755 8225	3935	-1195	1855	No
SP5	CP-01	В	2349	2114	734	1459	2030	3811	623	3811	102	-94	3082	3184	5894	5996	6100	7625	12200	3050	8690	2019	-3708 7272	4982	-1793	1257	No
SP6	CP-01	В	2471	2224	788	1594	3683	3535	2029	3683	102	-91	3260	3362	6942	7044	6100	7625	12200	3050	13730	2134	-3400 7580	10330	-1550	1500	No
SP7	CP-01	В	1678	1510	495	495	-4365	-650	-4447	4447	102	-102	2173	2275	6621	6723	6100	7625	12200	3050	13730	1408	-5274 5706	8456	-3040	10	No
SP8	CP-01	B	1862	1676	567	644	-3114	-32	-3421	3421	102	-103	2429	2531	5851	5953	6100	7625	12200	3050	13730	1573	-3570 7410	10160	-1849	1201	No
SPG	CP-01	B	1990	1791	622	778	-1718	609	-3250	3250	102	-101	2612	2714	4861	4963	6100	7625	12200	3050	13730	1690	-3195 7785	10535	-1560	1490	No
60 0 6010	CR 01	P	2224	2002	721	1010	710	1725	204	1725	102	00	2012	2047	4670	4772	6100	7625	12200	0000	12720	1000	604 10296	12026	170	1450	No
3P10	CP-01	D	2224	2002	721	1010	710	1725	-204	1725	102	-90	2945	3047	4670	4/72	0100	7625	12200		13730	1904	-094 10200	0454	179		INO NI-
SPIT	CP-01	В	2303	2073	761	1118	2236	2366	1103	2366	102	-93	3064	3166	5430	5532	6100	7625	12200	3050	9730	1980	-1579 9401	8151	-386	2664	INO
SP12	CP-01	В	2420	2178	811	1253	3809	5064	2439	5064	102	-89	3231	3333	7040	/142	6100	7625	12200	3050	4890	2089	-5516 5464	-626 ^	-2975	75	No
SP13	CP-01	В	1/27	1555	559	264	-3912	-853	-3838	3912	102	-105	2286	2388	6198	6300	6100	7625	12200	3050	9730	1450	-4429 6551	5301	-2463	587	NO
SP14	CP-01	В	1899	1709	625	395	-2678	-267	-2811	2811	102	-105	2523	2625	5335	5437	6100	7625	12200	3050	9730	1604	-2625 8355	7105	-1208	1842	No
SP15	CP-01	В	2292	2063	794	820	2389	1969	1499	2389	102	-93	3086	3188	5474	5576	6100	7625	12200	3050	9730	1970	-1623 9357	8107	-419	2631	No
SP16	CP-01	В	2418	2177	848	942	3929	2638	2815	3929	102	-88	3266	3368	7194	7296	6100	7625	12200	3050	9730	2088	-3814 7166	5916	-1841	1209	No
SP17	CP-01	В	1803	1623	628	69	-3549	-1029	-3341	3549	102	-107	2431	2533	5980	6082	6100	7625	12200	3050	9730	1516	-3819 7161	<u>5911</u>	-2034	1016	No
SP18	CP-01	В	1920	1728	673	178	-2310	-475	-2289	2310	102	-105	2593	2695	4903	5005	6100	7625	12200	3050	9730	1623	-1854 9126	7876	-688	2362	No
SP19	CP-01	В	2304	2074	832	546	2479	1591	1817	2479	102	-93	3136	3238	5615	5717	6100	7625	12200	3050	9730	1981	-1748 9232	7982	-499	2551	No
SP20	CP-01	в	2434	2190	887	650	3992	2225	3125	3992	102	-88	3321	3423	7313	7415	6100	7625	12200	3050	9730	2103	-3894 7086	5836	-1890	1160	No
SP21	CP-01	В	1740	1566	641	-81	-2985	-1073	-2694	2985	102	-97	2381	2483	5366	5468	6100	7625	12200	3050	9730	1468	-3020 7960	6710	-1517	1533	No
SP22	CP-01	В	1861	1675	687	-1	-1951	-626	-1807	1951	102	-98	2548	2650	4498	4600	6100	7625	12200	3050	9730	1577	-1359 9621	8371	-374	2676	No
SP23	CP-01	В	2138	1924	800	265	2279	1110	1874	2279	102	-85	2938	3040	5216	5318	6100	7625	12200	3050	9730	1839	-1588 9392	8142	-440	2610	No
SP24	CP-01	В	2254	2028	850	336	3625	1643	3057	3625	102	-79	3104	3206	6729	6831	6100	7625	12200	3050	9730	1949	-3497 7483	6233	-1677	1373	No
SP25	CP-01	В	2241	2017	863	48	2283	790	2065	2283	102	-87	3104	3206	5387	5489	6100	7625	12200	3050	9730	1930	-1504 9476	8226	-354	2696	No
SP26	CP-01	В	2355	2119	914	94	3623	1283	3266	3623	102	-80	3269	3371	6892	6994	6100	7625	12200	3050	9730	2040	-3404 7576	6326	-1584	1466	No
SP27	CP-01	B	2120	1908	836	-295	-2962	-1382	-2495	2962	102	-103	2956	3058	5918	6020	6100	7625	12200	3050	9730	1804	-2649 8331	7081	-1158	1892	No
SP28	CP-01	B	2227	2005	878	-262	-1972	-1018	-1608	1972	102	-103	3105	3207	5077	5179	6100	7625	12200	3050	9730	1902	-1067 9913	8663	-71	2979	No
SP20	CP-01	В	2222	2000	016	-150	2202	458	2170	2202	102	-88	3240	33/2	5442	5544	6100	7625	12200	3050	9730	2003	-1309 9671	8421	-200	2850	No
SP20	CR 01	D	2323	2031	066	-133	2512	905	2170	2512	102	-00	2400	2502	6012	7015	6100	7625	12200	2050	9730	2005	2169 7912	6562	-200	1646	No
SP21	CR 01	D	2404	2130	002	275	2020	1521	2401	2020	102	107	2157	2250	6196	6200	6100	7625	12200	2050	9730	1021	-3100 7012	7006	1109	1040	No
0F31	CP 01	B	2200	2020	903	-375	-3029	122	-2481	3028	102	-107	2276	2479	5609	5710	6100	7025	12200	2050	9730	2070	1270 0701	9451	-1100	2006	No
0F32	CF-01	В	2409	2100	307	-304	2000	13Z	2232	2232	102	-90	3570	3470	6074	3710	6100	7025	12200	3050	9730	2079	-1279 9701	6754	104	1700	No
SP33	CP-01	в	2519	2267	1018	-371	3370	515	3437	3437	102	-81	3536	3638	6974	7076	6100	7625	12200	3050	9730	2186	-2979 8001	6751	-1252	1798	NO NI-
SP34	CP-01	в	2300	2070	928	-444	-3120	-1649	-2516	3120	102	-112	3228	3330	6347	6449	6100	7625	12200	3050	9730	1958	-2/33 824/	6997	-1162	1888	INO
SP35	CP-01	В	2369	2132	954	-454	-2127	-1349	-1588	2127	102	-111	3324	3426	5451	5553	6100	7625	12200	3050	9730	2021	-1182 9798	8548	-107	2943	NO
SP36	CP-01	В	2596	2337	1062	-585	3201	145	3467	3467	102	-83	3659	3/61	/126	/228	6100	7625	12200	3050	9730	2253	-2956 8024	6774	-1215	1835	NO
SP37	CP-01	В	2530	2277	1035	-702	1761	-483	2235	2235	102	-96	3565	3667	5800	5902	6100	7625	12200	3050	9730	2181	-1181 9799	8549	-54	2996	No
SP38	CP-01	В	2650	2385	1093	-781	3005	-207	3457	3457	102	-87	3743	3845	7200	7302	6100	7625	12200	3050	9730	2298	-2897 8083	6833	-1160	1890	No
SP39	CP-01	В	2566	2310	1054	-855	1568	-769	2189	2189	102	-102	3620	3722	5809	5911	6100	7625	12200		9730	2208	-1087 9893	8643	19		No
SP40	CP-01	В	2689	2420	1115	-962	2803	-537	3428	3428	102	-92	3804	3906	7232	7334	6100	7625	12200	3050	9730	2328	-2823 8157	6907	-1100	1950	No
SP41	CP-01	В	2287	2058	925	-609	-3604	-2039	-2825	3604	102	-127	3211	3313	6816	6918	6100	7625	12200	3050	9730	1931	-3488 7492	6242	-1673	1377	No
SP42	CP-01	В	2359	2123	954	-674	-2638	-1829	-1872	2638	102	-126	3313	3415	5952	6054	6100	7625	12200	3050	9730	1997	-1974 9006	7756	-642	2408	No
SP43	CP-01	В	2699	2429	1120	-1118	2586	-836	3363	3363	102	-99	3819	3921	7182	7284	6100	7625	12200	3050	9730	2330	-2724 8256	7006	-1033	2017	No
SP44	CP-01	В	2283	2054	919	-661	-3871	-2197	-3027	3871	102	-136	3202	3304	7072	7174	6100	7625	12200	3050	9730	1919	-3901 7079	5829	-1952	1098	No
SP45	CP-01	В	2432	2189	983	-757	-2997	-2063	-2134	2997	102	-135	3415	3517	6412	6514	6100	7625	12200	3050	9730	2053	-2457 8523	7273	-945	2105	No
SP46	CP-01	В	2562	2306	1048	-1095	1116	-1264	1979	1979	102	-120	3610	3712	5589	5691	6100	7625	12200		9730	2185	-796 10184	8934	207		No
SP47	CP-01	В	2690	2421	1113	-1252	2365	-1103	3275	3275	102	-109	3803	3905	7078	7180	6100	7625	12200	3050	9730	2312	-2613 8367	7117	-964	2086	No
SP48	CP-01	В	2189	1970	872	-692	-4044	-2296	-3160	4044	102	-145	3061	3163	7105	7207	6100	7625	12200	3050	4030	1825	-4256 6724	-226 *	-2220	830	No
SP49	CP-01	В	2321	2089	927	-798	-3168	-2174	-2256	3168	102	-149	3248	3350	6416	6518	6100	7625	12200	3050	8730	1940	-2827 8153	5903	-1228	1822	No
SP50	CP-01	В	2560	2304	1049	-1289	2042	-1257	3008	3008	102	-121	3610	3712	6618	6720	6100	7625	12200	3050	9730	2183	-2342 8638	7388	-826	2224	No
SP51	CP-01	B	2402	2161	974	-1309	1703	-1391	2712	2712	102	-132	3375	3477	6087	6189	6100	7625	12200	3050	9730	2029	-2052 8928	7678	-683	2367	No
1 21 21	0.01		02	2.01	1 2/7					12	1 .52			0 11 1	1 0007	0.00	0.00		1 .2200	0000		2020			000		

## \* refer to Table 2

R<sub>u</sub> = the lesser of { (a) structural capacity of structural steel section under tension, (b) bond resistance between grout and structural steel & (c) bond resistance between grout and structural steel & (c) bond resistance between grout and rock } but limited by (W<sub>1</sub>'+W<sub>2</sub>'+W<sub>p</sub>')

W<sub>1</sub>'

is the effective weight of the rock or soil cone; is the effective weight of the soil column above the rock or soil cone; and is the effective self weight of the pile. W<sub>2</sub>'

W<sub>p</sub>'

Checking of anchorage resistance limited by effective weight of soil mass/rock cone (refer Clause 5.3.3 (1)(b) of the Code)

Sample

## Table 2 - Pile Load Schedule (for checking of uplift resistance of pile group)

WIND CASE	PILE GROUP	PILE MARK	NO OF TENSION PILES	Ru (kN) (TOTAL)	IW1+W2+Wpl (kN) (TOTAL)	D <sub>MIN</sub> - 1.5WL + 1.1UL (KN) (TOTAL)	0.9Ru + D <sub>MIN</sub> - 1.5WL + 1.1UL (kN) (TOTAL)	(W1+W2+Wp) + D <sub>MIN</sub> - 1.5WL + 1.1UL (kN) (TOTAL)
Wx(+)	-	-	-	-	-	-	-	-
Wx(-)	-	-	-	-	-	-	-	-
Wy(+)	А	SP47 to SP49	3	36600	22490	-1232	31708	21258
Wy(-)	-	-	-	-	-	-	-	-
Wu(+)	-	-	-	-	-	-	-	-
Wu(-)	В	SP11 to SP12	2	24400	14620	-7093	14867	7527
Wv(+)	С	SP2 to SP5	4	48800	26340	-3696	40224	22644
Wv(-)	-	-	-	-	-	-	-	-

• WL – Refer to corresponding wind case in column (1), (2), (3) or (4) of Table 1

Checking of anchorage resistance limited by effective weight of soil mass/rock cone (refer Clause 5.3.3 (1)(b) and (2)(b) of the Code) with the consideration of the group effect