IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[2018] SGHC 193

Suit No 717 of 2012

Between

Millenia Pte Ltd (formerly known as Pontiac Marina Pte Ltd)

… *Plaintiff*

And

(1) Dragages Singapore Pte Ltd (formerly known as Dragages et Travaux Publics (Singapore) Pte Ltd)
(2) Builders Shop Pte Ltd
(3) Meinhardt (Singapore) Pte Ltd
(4) Meinhardt Façade Technology (S) Pte Ltd
(5) Arup Singapore Pte Ltd

… *Defendants*

And

Arup Singapore Pte Ltd

… *Third Party*

JUDGMENT

Version No 2: 27 Oct 2020 (22:40 hrs)

[Building and Construction Law] — [Contractors' duties]

[Building and Construction Law] — [Construction torts]

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This judgment is subject to final editorial corrections approved by the court and/or redaction pursuant to the publisher's duty in compliance with the law, for publication in LawNet and/or the Singapore Law Reports.

Millenia Pte Ltd (formerly known as Pontiac Marina Pte Ltd)
v
Dragages Singapore Pte Ltd (formerly known as Dragages et Travaux Publics (Singapore) Pte Ltd) and others (Arup Singapore Pte Ltd, third party)

[2018] SGHC 193

High Court — Suit No 717 of 2012
Quentin Loh J
8–11, 15–17, 21–25, 28–30 April; 19 May; 9–11 September, 18–21 November 2014; 6–8, 11–15, 19 May 2015; 14–16 July; 15–18, 22–23, 29–30 September; 1 October 2015; 29 February; 1–4, 10–12 March; 27–30 June; 8 August 2016; 23–24 February 2017

11 September 2018 Judgment reserved.

Quentin Loh J:

1 Centennial Tower ("the Building"), a 35-storey Grade A office building, stands in the central business district of Singapore. Upon the completion of the Building in 1997, it was considered "the fastest building structure ever built in Singapore".[1] The façade of the Building ("the Façade") was clad in granite stone panels ("the Cladding").

2 On 10 September 2004, some seven years after practical completion of the Building, a stone panel of significant size and weighing over 100kg ("the 1st Panel") fell off the Façade from the 29th storey, and landed near a bus stop

[1] Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 48(d).

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in front of the Building ("the 1st Fall"). In 2006, the owner of the Building commenced a suit against the main contractor and its subcontractor who had installed the Cladding for defects in the Cladding. The parties subsequently settled their dispute by entering into a settlement agreement ("the Settlement Agreement") in 2007.

3 However, on 10 February 2011, a second stone panel ("the 2nd Panel") fell off the Façade from the 25th storey ("the 2nd Fall"). The debris of the 2nd Panel injured two passers-by and caused significant property damage.

4 The owner of the Building now brings this action against the main contractor, its subcontractor, and various engineers who became involved after the 1st Fall for defects in the Cladding. After the commencement of this suit, the owner decided to remove the Cladding and replace the same.

5 Unsurprisingly, the case was hard-fought. 31 witnesses were called, of which 15 were witnesses of fact and 16 were expert witnesses on façade, vibrations, geotechnical engineering, structural dynamics and quantum aspects. Apart from the breadth and depth of the factual disputes, the present proceedings raise legal issues pertaining to the compromise of claims under a settlement agreement and the duty of care in tort in relation to pure economic loss.

6 It was ordered by consent that the trial would be birfurcated, albeit with one issue relating to quantum – whether the owner is entitled to claim the cost of a reclad of the Facade – to be determined at the liability stage of the proceedings.[2] This judgment therefore deals with liability and the issue of whether the owner is entitled to recover the cost of a reclad of the Façade.

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[2] ORC 1215/2014.

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Facts

The parties

7 The plaintiff, Millenia Pte Ltd ("Millenia"), formerly known as Pontiac Marina Pte Ltd, is a Singapore-incorporated company that was, at all material times, the owner of the Building.[3] Lead counsel for Millenia is Mr Davinder Singh SC ("Mr Singh").

8 The first defendant, Dragages Singapore Pte Ltd ("Dragages"), formerly known as Dragages et Travaux Publics (Singapore) Pte Ltd, is a Singapore-incorporated company in the business of designing and constructing high-rise office buildings.[4] Lead counsel for Dragages is Mr Ho Chien Mien ("Mr Ho").

9 The second defendant, Builders Shop Pte Ltd ("Builders Shop"), is a Singapore-incorporated company in the business of installing stone panels on high-rise office buildings.[5] Lead counsel for Builders Shop is Mr Philip Ling.

10 The third defendant, Meinhardt (Singapore) Pte Ltd ("Meinhardt Singapore"), is a Singapore-incorporated company in the business of providing engineering consulting services in, among other things, civil and structural engineering.[6] Meinhardt Singapore were the structural engineers for the Building,[7] although they have not been sued here in that capacity.

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3 Vol 1 BAEIC, AEIC of Foo Say Chiang dated 4 March 2014 at para 5.

4 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 3.

5 Millenia's SOC at para 3; Builders Shop's Defence and Counterclaim (Amendment No 4) ("Builders Shop's Defence and Counterclaim") at para 2.

6 Millenia's SOC at para 4; Meinhardt Singapore's Defence (Amendment No 2) ("Meinhardt Singapore's Defence") at para 2.

7 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 5(e).

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11 The fourth defendant, Meinhardt Façade Technology (S) Pte Ltd ("Meinhardt Façade"), is a Singapore-incorporated company in the business of providing façade engineering services.[8] I shall refer to Meinhardt Singapore and Meinhardt Façade as "the Meinhardt Parties". Lead counsel for the Meinhardt Parties is Mr Philip Jeyaretnam SC ("Mr Jeyaretnam")

12 The fifth defendant and third party, Arup Singapore Pte Ltd ("Arup"), is a Singapore-incorporated company in the business of, *inter alia*, providing engineering consulting services in relation to façades.[9] Mr Adrian Tan and Mr Daniel Chia ("Mr Chia") are lead counsel for Arup.

13 Meinhardt Façade and Arup are two of the largest façade consultants in Singapore.[10]

The Building and the Cladding

14 By a contract dated 4 December 1995, Millenia engaged Dragages to design and build a 35-storey office building located at 3 Temasek Avenue, Singapore 039190 for a sum of S$142,044,590 ("the Contract").[11] The Contract was a heavily modified version of the Joint Contracts Tribunal Standard Form of Building Contract with Contractor's Design (1981), an oft-used standard form design and build contract. It is not in dispute that the entire design and construction obligation, and therefore responsibility and liability, rested on Dragages to design and erect a building that would suit Millenia's requirements and purpose. The design life of the Building was 50 years.[12]

8 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 5.

9 Millenia's SOC at para 6; Arup's Defence and Counterclaim (Amendment No 1) ("Arup's Defence and Counterclaim") at para 2.

10 Transcript, 10 September 2014, pp 35–36.

11 Vol 1 BAEIC, AEIC of Foo Say Chiang dated 4 March 2014 at paras 5 and 13; Vol 12 BAEIC, AEIC of Audrey Perez dated 1 April 2014 at paras 34 and 57.

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15 From a plan view, the Building is an oval-shaped building, much like a generously shaped oval conference table, with truncated straight ends, except that the middle and sides contained indented portions for aesthetic reasons (see the diagram at [357] below).

16 The Façade was clad with a total of approximately 16,277 granite stone panels.[13] A typical panel measured 1.6m (in height), 1m (in width) and 30mm (in thickness), and weighed over 100kg (the largest panels weighed around 140kg).[14] By an agreement dated 11 September 1996, Dragages entered into a domestic subcontract with Builders Shop ("the Sub-contract") to supply brackets and fittings and to install the granite stone panels on the Façade for the sum of S$1,270,000 ("the Sub-contract Works").[15]

17 The Cladding can be divided into what was referred to as "drops". The concept of a drop is based on the operation of the rail-mounted gondola roof hoist or davit, to which a cradle ("the BMU") was attached. The BMU could be positioned at one particular point of the roof and then descend (or ascend) along a vertical column of the Cladding containing granite panels.[16] A vertical column of panels was referred to as a "drop".[17]

18 In these proceedings, the parties generally adopted a numbering system used by Arup which divided the Cladding into 80 drops. Each drop covered 34 levels, and had two rows of four panels per level, except for column drops which

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12 Transcript, 2 March 2016, p 53.

13 Vol 1 BAEIC, AEIC of Foo Say Chiang dated 4 March 2014 at para 12.

14 Transcript, 4 March 2016, pp 87–88.

15 65AB 51262–51510.

16 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, para 1.17.

17 Vol 1 BAEIC, AEIC of Foo Say Chiang dated 4 March 2014 at para 12.

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had one row of four panels per level.[18] Drop 1 started to the right of the Façade above the entrance. The numbering then moved anti-clockwise around the building until Drop 80, which was to the left of Drop 1 as one looked at the Building from the entrance (see the diagram at [357] below).

19 I note that Meinhardt Façade claims it used a different numbering system of "drops" in its inspection of the Cladding in 2007. This is relevant to the issue of whether Meinhardt Façade inspected the whole of the Cladding (excluding eight of the 80 drops) in 2007. I address this at [97]–[101] below.

20 Three main types of bracket systems – types A, B and C brackets – were used on the Cladding.[19] (There were further variants of each type: types A1 and A2, B1–B8 and C1 and C2.) The standard bracket used was a Type B bracket, which was a U-shaped bracket with one side of the 'u' being longer than the other. The following diagram shows the design of a Type B bracket:[20]

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18 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 45 (p 30); Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, Annex 10, para 2.

19 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 35); 66AB 52130, 52131.

20 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 85 (p 47).

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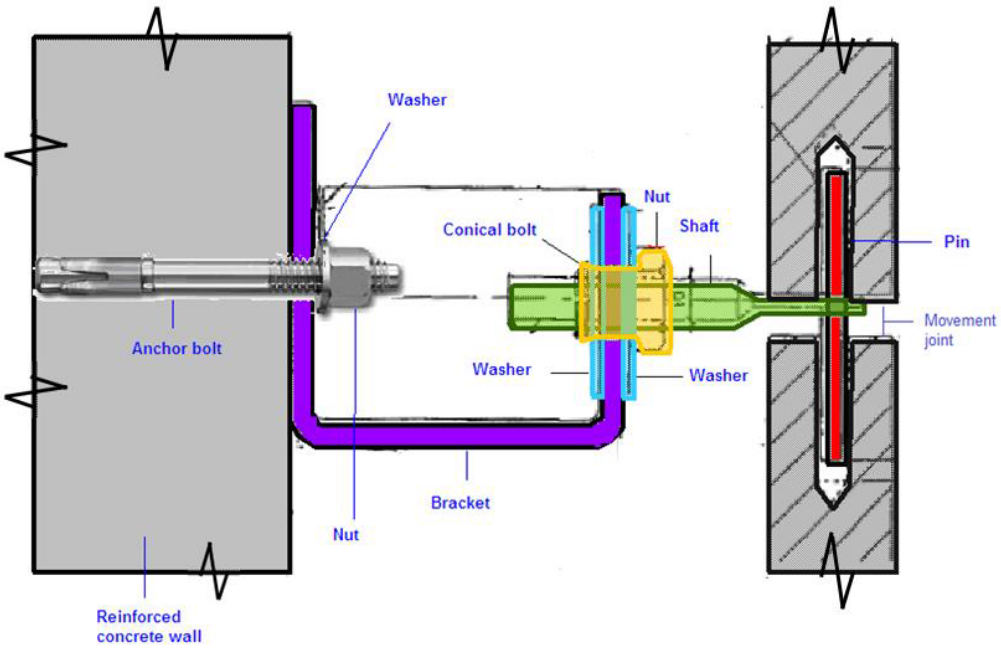

21 For this bracket system, panels were generally installed as follows.[21]

(a) One end, the longer end, of the bracket was attached to the reinforced concrete wall ("the RC wall") of the Building with an anchor bolt, nut and a spring washer. The longer end had a vertical slot cut into it to accommodate site adjustment in the vertical plane. The spring washer prevented the bracket from moving downwards.[22]

(b) A shaft was inserted through the other, shorter end of the bracket, and secured by a conical bolt and nut which were restrained by washers.[23] This end of the bracket had a horizontal slot to accommodate site adjustment along the horizontal plane.

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21 68AB 54341, 54349.

22 68AB 54341, 54348.

23 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 98 (p 51).

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(c) The installation or fixing of the stone panels was generally as follows. A panel would be rested on the shafts of two brackets along its lower edge. It would be secured against lateral movement by a pin through each shaft which protruded into two pre-drilled holes along the lower edge of the panel. This lower panel was put into position and aligned with the shafts along its upper edge. When this was accomplished, a pin was then dropped through each of the holes of those two shafts into pre-drilled holes along the top edge of the panel, thereby securing the top of that panel against lateral movement. The pre-drilled holes along the top edge of the panel contained PVC sleeves to hold the pins more snugly, cutting down excess lateral movement. (By contrast, the holes along the bottom edge of the panel above did not contain PVC sleeves but contained epoxy glue.[24]) After being dropped into the top edge of the panel, the 70mm pins would protrude through the hole in the shaft, thereby providing the anchor points for the next panel to be installed above it. The panel above would then be lowered into position and placed onto the protruding pins on the shafts along its lower edge, and the process would be repeated.

22 A thermal insulation layer (not shown in the diagram above) was installed on the outer face of the RC wall before the Cladding was installed.[25] There was thus an insulation layer between the RC wall and the panels.

23 Each panel was subject to forces owing to dead load and wind load.[26] Dead load refers to the load due to the weight of the panel. Wind load refers to

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24 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 26).

25 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 63.

26 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 80 (p 43).

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the load due to wind impact and changes in air pressure. The bracket system transferred the dead loads and wind loads of the panels back to the RC wall.[27]

24 In general, each panel was to be supported by two brackets and restrained by four pins on opposite edges of the panel.[28] Where a Type B bracket was used, the pins were at the top and bottom edges of the panel. Where a Type A or C bracket was used, the pins were inserted into the sides of panels.[29] This "side fixed system" was used for panels near windows, where it was not easy to fix top pins because the window frames would impede the insertion of top pins.[30]

25 Most of the pins were "full pins", 70mm long and 6mm in diameter, and inserted into 40mm deep pin holes.[31] But there were also half pins which were 40mm long and inserted into a single panel, unlike full pins which spanned two panels.[32]

26 The design specifications provided for movement joints, *ie*, empty space between the panels, of 10mm inclusive of a 4mm shaft (at installation).[33] Thus, the gap between the bottom of the shaft and the panel below was to be 6mm (at installation). Movement joints ensured that the panels were not excessively restrained and could expand and contract without loss of structural integrity.

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27 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 88 (p 48).

28 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 109 (p 27).

29 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (pp 12–13).

30 Transcript, 22 September 2015, pp 107–108.

31 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 12).

32 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 165 (p 75).

33 Joint Expert Report of Façade Experts dated 22 February 2016 at p 4 (S/N 1.4).

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They also prevented panels from weighing on and transferring their loads onto the panels below ("stacking").

Background to the dispute

27 I now set out the key events surrounding this dispute. Insofar as these facts are disputed, the following paragraphs constitute my findings of fact.

Events leading up to the 1st Fall

28 Dragages began the works under the Contract ("the Works") in January 1996.[34]

29 On 19 September 1997, Millenia, Dragages and Builders Shop executed a deed of warranty ("the Deed").[35] In brief, the Deed provided as follows:

(a) By cll 1–3, Dragages and Builders Shop provided warranties to Millenia for the Works and Sub-Contract Works (see [407] below). Clause 5 provided that the warranty period ("the Warranty Period") was 15 years "from the date of the latest Written Statement of Practical Completion" under the Contract ("the Written Statement"). Since the Written Statement was issued on 27 September 1997 (see [30] below), the Warranty Period was 27 September 1997 to 26 September 2012.

(b) Clause 6 of the Deed provided that if the Works or Sub-contract Works were discovered to be damaged or defective, or a breach of the warranties in the Deed were discovered, Millenia would be entitled to issue a notice to Dragages and Builders Shop directing them to effect remedial and replacement work and to make good defects or damage.

34 Millenia's SOC at para 12; Dragages' Defence at para 8.

35 67AB 52921–52927.

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> Under cl 8, if Dragages and/or Builders Shop failed to perform their duties under cl 6, Millenia would be entitled to remedy the defects and Dragages and Builders Shop would be obliged to indemnify Millenia for the expenses it incurred in making good the defects.

30 Millenia subsequently issued the Written Statement certifying that on 27 September 1997, with the exception of items listed in appendices, the Works had been completed.[36] This was the date of practical completion. In due course, tenants moved into and occupied the Building.

The 1st Fall and subsequent events

31 On 10 September 2004 at 4.35pm, the 1st Panel suddenly fell from the 29th storey of the Building.[37] The panel was identified as panel 26 on drop 21.[38] It was one of four panels between the 29th and 30th storey (the panels were numbered from the top). In the course of falling down, the 1st Panel damaged panels 28 and 29 on drop 21. The 1st Panel landed near a bus stop.[39] Fortunately, there was no one in the vicinity and thus no one was injured.

32 By a letter to Millenia dated 13 September 2004, the Building and Construction Authority ("the BCA") stated that "the conditions of the building are likely to be dangerous". The BCA ordered Millenia to engage a professional engineer ("PE") to prepare an investigation report, to be submitted within four weeks, on the cause of the 1st Fall. The report was to include "a detailed assessment of the conditions of the remaining cladding". Millenia was also to

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36 67AB 53005–53012.

37 67AB 53397–53400.

38 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, Annex 11, para 3 (p 771).

39 67AB 53473.

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submit a proposal for rectification works as recommended by the PE within six weeks. I will refer to this order from the BCA as "the 1st BCA Order".[40]

33 Millenia appointed Arup as its PE by a letter dated 27 September 2004 (the "2004 Appointment Letter"),[41] which enclosed Arup's proposal to Millenia (the "2004 Proposal") and a letter of undertaking by Arup (the "2004 Letter of Undertaking"). These three documents formed the contract between Millenia and Arup (the "2004 Contract"). In gist, under the 2004 Contract, Arup agreed to investigate the 1st Fall and the integrity of the Cladding, and to then produce two reports: an interim report to meet the BCA's requirements (see [32] above) and a final report containing inspection results, Arup's assessment of the Façade and advice on remedial works and future action (see [583(b)] below). Arup contracted to perform these services for a fixed fee of $101,000.[42]

(1) Action taken by Dragages after the 1st Fall

34 To fully appreciate the disputes between the parties, it is important to bear in mind certain actions taken by Dragages after the 1st Fall. One person played a leading role in the events that were to unfold: Ms Audrey Perez ("Ms Perez"), the Head of Department, Corporate Quality, Safety, Environment and Maintenance of Dragages.[43] Ms Perez was in charge of, among other things, managing Dragages' legal exposure to claims.[44] Significantly, she admitted that in the immediate aftermath of the 1st Fall, the prospect of Dragages' liability to Millenia crossed her mind, and it also crossed her mind that she should protect Dragages' legal interests, because that was part of her job.[45]

40 67AB 53478–53479.

41 68AB 53901–53927.

42 68AB 53901, 53921.

43 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 1.

44 Transcript, 24 April 2014, pp 134 and 139.

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35 I digress from the narrative to say more about Ms Perez. Her hand is seen in much of what was to follow after the 1st Fall. She was the sole witness of fact called by Dragages – notwithstanding that others, in particular Mr Cillius Adrianto ("Mr Adrianto"), were involved in the events that I recount below, and were still employed by Dragages at the time of the trial.[46] I found Ms Perez to be an intelligent person with powerful powers of persuasion. As will become clear, she wielded a not insignificant influence over Builders Shop and Meinhardt Façade; Ms Perez testified that she had "very good relation[s] with [her] consultant, contractor and any business partners".[47] I note the following in relation to Ms Perez's influence over Builders Shop and Meinhardt Façade:

(a) In relation to Builders Shop, Mr Tan Kay Sing ("Mr Tan"), the managing director of Builders Shop until April 2009,[48] and the project director for the Sub-contract Works,[49] testified that after receiving a letter from Millenia dated 26 October 2004, he left the matter of Millenia's claims against Builders Shop in the hands of Ms Perez.[50] After Millenia sued Dragages and Builders Shop (see [61] below), he also left it to Dragages to (1) decide how to respond to the suit on the basis that Builders Shop would follow Dragages' position and (2) subsequently, to negotiate the Settlement Agreement with Millenia on Builders Shop's behalf.[51] Finally, Mr Tan left the implementation of the Settlement Agreement to Ms Perez in the sense that he complied with

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45 Transcript, 24 April 2014, pp 139–140.

46 Transcript, 24 April 2014, pp 117–118.

47 Transcript, 24 April 2014, p 80.

48 Vol 18 BAEIC, AEIC of Tan Kay Sing dated 26 February 2014 at paras 1–2.

49 Transcript, 18 November 2014, p 28; 65AB 51233, 51234.

50 Transcript, 18 November 2014, pp 76–77.

51 Transcript, 19 November 2014, pp 11–12.

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her instructions.[52] Dragages did not challenge Mr Tan's evidence and I accept it accordingly.

(b) In relation to Meinhardt Façade, Ms Perez became friends, sometime after 2005, with Mr Mathieu Serge Meur ("Mr Meur"), the managing director of Meinhardt Façade (see [59] and [133] below). According to her, in a discussion about the Building, Mr Meur promised to "help her [till] the end" and that "he would not let [her] down".[53]

36 The evidence shows that Ms Perez was willing to mould the truth to protect Dragages' legal interests. I will give but two examples:

(a) In a letter to Millenia dated 28 September 2004 (see [44(a)] below), Ms Perez stated that Maxbond, an adhesive, had been applied to the Façade "*under the supervision* of our PE" [emphasis added]. She admitted at trial that the PE was not in attendance when Maxbond was applied to the Façade; nor did he even know where it had been applied.[54]

(b) In a letter to Millenia dated 16 November 2004, Ms Perez stated that there was "no basis for claiming that [infill panels] were installed in a manner which were in breach of our obligations". Infill panels were panels that were installed out of the usual sequence because they were located at a point of tie back for the hoist used to install the panels. Both the 1st and the 2nd Panels were infill panels. Ms Perez also stated in this letter that the use of epoxy to install infill panels was "part of the method of installing replacement panels".[55] Yet she admitted that she knew, as

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52 Transcript, 19 November 2014, p 27.

53 Transcript, 24 April 2014, p 83.

54 Transcript, 25 April 2014, p 145.

55 69AB 54508–54510.

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of the date of this letter, that (1) the 1st Panel had not been installed in accordance with the design and specifications and (2) epoxy did not form part of the method of installing replacement panels.[56] I therefore find that these two statements made by Ms Perez in this letter were false.

37 I now turn to my assessment of Ms Perez as a witness. I note that English was not her first language:[57] Ms Perez was French,[58] as was Mr Meur. However, Mr Singh tendered three articles which Ms Perez had written on various aspects of construction law which demonstrated her impressive command of the English language.[59] Ms Perez also agreed that she had obtained a graduate certificate in international arbitration from the National University of Singapore, in 2007,[60] and took a module on contract, tort and evidence.[61] It was thus evident that Ms Perez had a strong command of English and various aspects of the law.

38 In this light, I found some of Ms Perez's answers, to say the least, difficult to understand. I will give just two out of many examples:

(a) First, in an email to Millenia dated 12 February 2009, Ms Perez stated that "Meinhardt ha[s] the full liability for the repair works" (see [121(b)] below). When cross-examined by Mr Jeyaretnam on why she had stated this, Ms Perez said that "liability" was "maybe … not the correct word … an overstatement, *knowing better now* what 'liability' means" [emphasis added].[62] The suggestion was that she did not know

56 Transcript, 29 April 2014, pp 11–14.

57 Transcript, 24 April 2014, p 109.

58 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at AP-3 (p 431).

59 P1–P3; Transcript, 25 April 2014, pp 11–17.

60 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at AP-3 (p 431).

61 Transcript, 25 April 2014, p 22.

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at the time of the email what liability meant. Yet by the time of this email in 2009, Ms Perez had obtained her graduate certificate in international arbitration (see [37] above). She must have known what liability meant. Upon cross-examination by Mr Singh, she admitted this.[63] Mr Singh suggested, and I accept, that Ms Perez was seeking to reassure Millenia about the rectification works performed under the Settlement Agreement ("the Rectification Works") by alluding to the potential liability of Meinhardt (Façade) to Millenia.[64] Notably, Ms Perez admitted that this email was not copied to Mr Meur or Mr Ong Ching Pau ("Mr Ong") of Meinhardt Façade and they would not have been aware of this email.[65]

(b) Secondly, when cross-examined about her statement in her letter dated 28 September 2004 that Maxbond was applied to the Façade under the supervision of Dragages' PE (see [36(a)] above), Ms Perez maintained that the statement was true. She claimed there had been "supervision" because the engineer opined on the appropriateness of applying Maxbond to the Façade.[66]

Ms Perez was frequently evasive in her answers and I had to intervene in cross-examination on several occasions to get her answers to the questions on record.[67] Altogether, I did not find her to be a credible witness. I was therefore unable to accept her evidence on most points.

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62 Transcript, 24 April 2014, p 56.

63 Transcript, 19 May 2014, p 19.

64 Transcript, 19 May 2014, p 20.

65 Transcript, 24 April 2014, pp 59–60.

66 Transcript, 25 April 2014, pp 145–146.

67 Transcript, 29 April 2014, p 14; Transcript, 19 May 2014, p 71; Transcript, 9 September 2014, p 34; Transcript, 10 September 2014, p 53.

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39 I now return to the narrative. On 10 September 2004, after the 1st Fall, Dragages contacted Mr Lauw Su Wee ("Mr Lauw") and asked him to inspect the Façade and prepare a report. Mr Lauw was a PE engaged by Dragages who had engineered, verified and certified the bracketing system for the Cladding.[68] It is evident, therefore, that he was not an entirely independent expert. Ms Perez admitted that at the time of the trial, Dragages was continuing to work with Mr Lauw. However, Dragages did not call Mr Lauw as a witness. Nor did it produce correspondence between itself and Mr Lauw in September 2004, although Millenia requested for discovery of such documents.[69]

40 On 11 September 2004, Mr Lauw inspected the elevation from which the 1st Panel had fallen during the afternoon. He then prepared a report issued on 27 September 2004 ("Mr Lauw's Report"),[70] where he stated the following:

(a) First, he noted that the 1st Panel had not been restrained with top pins. Instead, epoxy was used to bond it to the panel above it. This was "an alternative method of securing such panels by stone cladding installers in Singapore". The 1st Fall "was not caused by the deficiency in design or installation of the mechanical supporting system".

(b) Secondly, Mr Lauw stated that the method of installation used for the 1st Panel was also used for other panels that were installed out of sequence, *ie*, for other "infill panels" (see [36(b)] above).

(c) Thirdly, he noted four possible causes of the 1st Fall: prolonged exposure to weathering and turbulence caused by wind, impacts from gondolas used to clean walls and the Façade, vibrations from tremors

68 Transcript, 25 April 2014, pp 31–32.

69 Transcript, 25 April 2014, pp 62 and 81–82.

70 68AB 53928–53965.

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from Sumatra and vibrations from nearby construction activities. Hence, according to Mr Lauw, the cause of the 1st Fall was an external factor or a combination of external factors. There was no suggestion that the 1st Fall was caused by defective workmanship.

41 More specifically, Mr Lauw's Report did not suggest that the primary cause of the 1st Fall was the use of epoxy rather than pins to restrain the 1st Panel. The report did not suggest there was anything inappropriate about this "alternative method of securing [stone] panels" (see [40(a)] above). Mr Stuart Clarke of Arup ("Mr Clarke") opined that as a PE, Mr Lauw should have come to the same conclusion as Arup: the main cause of the 1st Fall was the use of epoxy, instead of pins, to restrain the 1st Panel (see [47(b)] below). *The parties do not dispute this in these proceedings* (see [48] below). Mr Clarke's evidence, which I accept, was that Mr Lauw's Report was "drafted from the perspective of laying blame elsewhere".[71] Notably, Ms Perez stated that she had discussions with Mr Lauw after he inspected the Façade and before he produced his report.[72] It is evident why Dragages did not call Mr Lauw even though it put his report into the evidence. His report was indefensible on almost all counts.

42 On 12 September 2004, Dragages agreed to carry out an inspection of the Façade, which began on that date and concluded on 22 September 2004.[73] Dragages engaged Mr David Rodrigues ("Mr Rodrigues"), a "specialist granite installer", who reported directly to Ms Perez, to perform the inspection.[74] Ms Perez instructed Mr Rodrigues to apply Maxbond (see [36(a)] above) to "any stone or anything in the granite fixing that [looked] suspicious or that [required]

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71 Transcript, 11 May 2015, pp 3–4.

72 Transcript, 25 April 2014, p 61.

73 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at paras 160(1) and 162.

74 Transcript, 25 April 2014, pp 99–101.

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further investigation".[75] Ms Perez asserted during cross-examination that the purpose of the inspection was not to identify defects in the Cladding, but to ensure the Façade would be safe in the short term to allow a thorough investigation of the Cladding to be performed.[76] She therefore instructed Mr Rodrigues to apply Maxbond as a temporary fixing.

43 The application of Maxbond to the Cladding is a point of controversy. Millenia claims it did not know of or agree to the application of Maxbond, and that Dragages applied Maxbond to cover up defects in the Cladding.[77] Dragages denies this, alleging that Millenia agreed to the use of Maxbond, and that it was applied for the sole purpose of ensuring the safety of the Façade.[78] I have my suspicions about the application of Maxbond in view of the following points:

(a) First, I find that Maxbond had the effect of hampering the identification of defects in the Cladding.

(b) Secondly, I do not accept Ms Perez's account of the purpose of the inspection (see [42] above). I find, based on the minutes of a meeting on 16 September 2004, that Millenia had requested, and Dragages had agreed to, an inspection that would identify defects in the Cladding.[79]

(c) Thirdly, Mr Rodrigues did not take any notes or photographs during his inspection of the Cladding.[80] I find this strange. A panel had fallen off the Building. Mr Rodrigues was applying Maxbond to panels

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75 Transcript, 25 April 2014, p 135.

76 Transcript, 25 April 2014, pp 127–128 and 134.

77 Millenia's closing submissions at paras 38–39.

78 Dragages' reply submissions at para 85.

79 67AB 53574–53575; Transcript, 25 April 2014, pp 132–133.

80 Transcript, 25 April 2014, p 100.

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> he considered presented a safety risk. In the circumstances, it would have been logical to note down, at least, the panels to which Maxbond was applied. Ms Perez could not satisfactorily explain why this was not done. She initially said that Mr Rodrigues had no time to take notes: he was required to inspect the 80 drops within a very short time.[81] Mr Singh then brought Ms Perez to her letter to Millenia dated 28 September 2004, where she gave a different explanation why Dragages did not have records of panels to which Maxbond was applied, *viz*, Millenia had not asked for such records.[82] Ms Perez could not explain this discrepancy.

These points clearly raise questions about why Maxbond was applied to the Façade. If I had to make a finding, I would find that Dragages applied Maxbond to make it very difficult to identify defects in the Cladding without first removing the Maxbond.

44 I note further that Ms Perez did not tell the whole truth, in two respects, in her letter to Millenia dated 28 September 2004:

> (a) Ms Perez stated in this letter that Maxbond was applied "under the supervision of our PE". This was untrue (see [36(a)] above).
>
> (b) Ms Perez also stated that Dragages found all of the stone panels on the Façade to be "firmly secured without risk of dislodging".[83] This statement gives the impression that Dragages did not find any panels that were at risk of falling, whereas the truth was that there were some panels that presented a safety risk thus necessitating the application of Maxbond. I brought this to Ms Perez's attention during the trial. She

81 Transcript, 25 April 2014, p 128.

82 68AB 54079–54080; Transcript, 29 April 2014, pp 116–118.

83 68AB 54079.

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admitted that she understood the difference between what she conveyed and what Dragages in fact discovered in the inspection of the Façade.[84]

45 The picture which emerges is this, and I so find. In September 2004, after inspecting the Façade, Dragages was less than candid with Millenia about the state of the Cladding. Dragages took this approach out of concern of its potential liability to Millenia. As I have noted, Ms Perez agreed that she had Dragages' potential liability to Millenia in mind after the 1st Fall occurred (see [34] above).

(2) Arup's 2004 Reports

46 In 2004, Arup issued two reports on the Cladding (the "1st 2004 Report" and the "2nd 2004 Report" respectively and the "2004 Reports" collectively).

(A) ARUP'S 1ST 2004 REPORT

47 On 28 October 2004, Arup issued the 1st 2004 Report.[85] Arup made the following observations regarding the 1st Panel and the 1st Fall:

(a) The 1st Panel was an infill panel (see [36(b)] above).

(b) Critically, the 1st Panel did not have pins fixed into its top edge. From inspection, it appeared that the 1st Panel was placed on the lower brackets with pins used to provide the lateral support but the top pins, which were crucial to restrain the panel from rotating or moving forwards and falling off, were not installed. Instead, a half pin had been welded to the shaft and used to restrain the panel above, while epoxy resin was used to bond the top of the 1st Panel to the brackets supporting

84 Transcript, 25 April 2014, pp 157–158.

85 68AB 54341–54357.

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the panel above. This method of restraining the panel was, according to Arup, "wholly inappropriate".[86] The epoxy had come cleanly away from the top edge of the 1st Panel. This could have been due to:

(i) the panel's lower brackets moving downwards over time;

(ii) repeated thermal expansion and contraction; and

(iii) vibrations from the nearby Mass Rapid Transit ("MRT") construction site. (In this regard, I note that when the 1st Fall occurred, the Circle Line works for Promenade Station ("the Circle Line Works") were in progress. The Circle Line Works took place from around 2003 to 2008.[87])

Of these factors, the most likely cause of the failure of the epoxy was factor (i).[88] Nonetheless, according to Arup, regardless of what was "the deciding or catalytic factor", the 1st Fall would not have occurred if the panel had been properly installed and/or restrained.

(c) Arup also observed that the lower bracket pins of the 1st Panel were "bent outwards due to a prying action of a rotating panel about its bottom edge".[89] Arup noted that once the bond between the epoxy and the stone had failed, the 1st Panel would have been in a state of unstable equilibrium and could have rotated inwards or outwards. Arup concluded that the lower pins had been bent outwards as the 1st Panel rotated outwards before falling from the Cladding.

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86 68AB 54341, 54347.

87 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 670.

88 68AB 54341, 54344.

89 68AB 54341, 54353.

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48 The parties do not dispute the conclusions in Arup's 1st 2004 Report, *ie*, that the critical reason why the 1st Panel fell was that it was not installed with two top pins.[90] According to Mr Peter Lalas ("Mr Lalas"), *Dragages'* façade expert, the method used to install the 1st Panel was "outrageous and not acceptable".[91] I could not agree more.

49 The key recommendation proposed in Arup's 1st 2004 Report was the rectification of all the infill panels. The basis of this recommendation was the hypothesis that all infill panels had been installed without their top pins like the 1st Panel. Arup arrived at this hypothesis in the following way. Arup noted that the "as built details and calculations provided that the design was signed off without the provision of details for [infill] panels to be installed."[92] In other words, Arup could not find, within the documentation provided, any strategy or method statement for dealing with infill panels. Arup then observed that based on the documentation it had reviewed, it would not have been possible to install infill panels with top pins. This was because when an infill panel was installed, the panel and bracket above the panel would already have been installed. It would thus have been impossible to drop a pin into the top of the infill panel, in accordance with the usual method of installing panels (see [21(c)] above).

50 I pause here to note that Dragages challenges Arup's hypothesis that all infill panels were installed without top pins. According to Dragages, apart from the 1st Panel, infill panels were installed with top pins using a "drop-pin" method.[93] This involved inserting full pins into the lower pin holes of the panel

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90 Dragages' reply submissions at para 53; Meinhardt Façade's closing submissions at para 563.

91 Transcript, 28 June 2016, p 57.

92 68AB 54341, 68AB 54344.

93 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 73.

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above the infill panel, which had been specially drilled twice as deep as was typical to accommodate the insertion of the full pins within the pin holes. The full pins were then held within the specially drilled deeper pin holes with masking tape. Once the infill panel was set in position, the masking tape was removed and the pins would drop into the top pin holes of the infill panel. Having considered the evidence, I accept Dragages' submission. The key reason is that *no other panel was found installed without top pins over the course of several inspections of the Cladding*. I elaborate on this at [388] below. The hypothesis advanced in Arup's 1st 2004 Report was thus incorrect. However, Arup could hardly be blamed for this for two reasons. First, the 1st Panel was not secured by two top pins as required by the design and, as noted above, Arup had not found documentation, drawings or method statements for the securing of infill panels. Secondly, the theory that infill panels were installed without top pins was advanced in Mr Lauw's Report, *ie*, the report by the PE who had engineered, verified and certified the brackets (see [39] above), which was issued on 27 September 2004, *ie*, before Arup's 1st 2004 Report (see [40(b)] above). I note that during the trial, I was not shown any documentation, drawings or method statements issued during the construction of the Building dealing with infill panels or Dragages' "drop-pin" method.

51 Apart from its observations in relation to the 1st Panel and infill panels, Arup also made the following points regarding the Cladding:[94]

(a) Arup noted that the joint widths between stone panels varied tremendously throughout the Façade. Arup was concerned that this was a sign that the spring washers that were supposed to provide friction between the brackets and the RC wall were not serving their intended purpose, thus allowing brackets to slide downwards (see [21(a)] above).

94 68AB 54341, 54353–54355.

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(b) Arup recorded its observations of deviations from the design of the Building. These included the use of galvanised or standard mild steel washers instead of stainless steel washers, brackets being installed at 90 or 180 degrees to their intended orientation, foreign objects in joints, the spalling of panels, hairline cracks and the loosening of shafts.

(c) Arup noted that repairs had been performed to some panels, by attaching the corners of some panels with epoxy to other panels. Arup assumed that this had been brought to the attention of Millenia's consultants and that the repairs were approved. However, Arup had not seen any evidence to confirm this.

(d) Arup observed that hard metal spacers installed between panels had transmitted (dead) load from some panels to other panels, causing the stone of the latter panels to fracture and spall. The spalling was "a serious issue when located at the position of the pins", because it reduced the capacity of the stone to withstand the necessary applied loads. Further, there were instances where the inside surface of the panel had spalled or had been chipped at the position of the pin. Arup noted that this was a serious issue because if the stone behind the pin was not intact, the panel would not be able to withstand suction loads adequately. If, therefore, a lateral force acted on the panel outwards from the Building, the affected pin or pins may not have been able to restrain the panel from falling off the Façade. If only one top pin was so affected, then there would only be one top pin providing that important restraint.

(e) Arup also noted the following:

(i) visible hairline cracks on some stone panels;

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(ii) some nuts that should have been securing shafts had become loose, thus allowing some panels at these locations to move outwards; and

(iii) the PVC sleeves to be inserted into the holes along the top edge of panels had been omitted in several instances. Consequently, certain panels rattled and felt loose.

(f) Arup also noted that many brackets they observed relied on "post-drilled anchors" rather than "cast-in anchors". In other words, holes had been drilled into the RC wall on site to accommodate the anchor bolts. Arup hypothesised that the expected tolerance of the cast-in sockets for fixing the anchor bolts had not been achieved. Holes had therefore been drilled into the RC wall for the anchor bolts.[95]

(g) Arup noted that the design of the bracketing system was in general "well above average" and "sophisticated".[96]

52 Arup's 1st 2004 Report also mentioned vibration readings taken by the Land Transport Authority ("the LTA") from instruments placed in the Building. As I have noted, the Circle Line Works to Promenade Station were in progress at the time of the 1st Fall (see [47(b)(iii)] above). Arup stated that further analysis would have to be done once further data from the LTA was provided. Arup also noted anecdotal reports from building occupants that they could feel vibrations from the adjacent excavation works.

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95 68AB 54341, 54349.

96 68AB 54341, 54344, 54349.

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53 Arup's 1st 2004 Report was sent to Dragages. In her letter to Millenia dated 16 November 2004, Ms Perez made the two statements noted above which I have found were false (see [36(b)] above).

(B) ARUP'S 2ND 2004 REPORT

54 On 28 December 2004, Arup issued its 2nd 2004 Report. The report was based on eight drops which it inspected,[97] *viz*, drops 17, 21, 38, 46, 57, 61, 78 and 80 ("the 8 Drops").[98] Arup stated that "the installed stone cladding system is of a high quality in terms of materials and design"; however, the onsite implementation of the system was not in complete agreement with the design.[99] The issues arising from the deviation from the design ranged in severity from insignificant to critical and there were a range of rectification procedures that Arup recommended. Arup listed 17 items for rectification of differing severity (16 of these items were "noted deviations from the design condition", and the remaining item pertained to the application of Maxbond):

(a) Five were of high severity: local spalling of stone panels at pin locations, loosening of shafts, brackets where a welded strap or stiffener connecting the U-shaped portion of the bracket (not shown in the diagram at [20] above) had broken, stacking of stones, and issues regarding the configuration of fixings to stone (it was unclear whether some pins were restraining some panels: see [55(a)] below).

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97 69AB 54885–55171.

98 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, Annex 11, para 4 (pp 771–772).

99 69AB 54885, 54889.

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(b) One was of low to high severity: namely, hairline cracks in stones. Arup recommended a full investigation to establish the integrity of the stone panels.

(c) Three were of medium severity: incorrect washers at conical bolts (some of which were beginning to corrode), certain repairs to stone panels (Arup noted that certain panels had to be replaced) and the application of Maxbond to the panels.

(d) Two were of medium to low severity: brackets that were incorrectly installed and built up stone sections to be replaced.

(e) Five were of low severity: spacers in joints, missing PVC sleeves, fungal growth on panels, staining of panels and debris at flashing.

55 In Arup's 2nd 2004 Report, apart from the observations made in its 1st 2004 Report (see [51] above), Arup noted the presence of brackets with broken straps and stacking of panels and two further matters:

(a) First, some fixings had pins running between panels that did not connect to the shaft and therefore did not appear to have lateral restraints from the RC wall. Epoxy was covering the end of the shafts at these locations so Arup could not ascertain if there were actually pins at these locations or if there was only epoxy providing lateral restraint.[100]

(b) Secondly, Dragages had, in the course of their inspection after the 1st Fall, applied Maxbond to panels that were reportedly of concern (see [42] above). Arup did not know the reason for this but stated that

[100] 69AB 54885, 54897.

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> Maxbond would not be acceptable without further justification if it were meant to be a permanent remedy. Arup noted that Maxbond was "best used as a filler and not for adhesion".[101] Arup noted in particular that Maxbond had been applied to a panel with a crack or chip near a pin.[102] Arup observed that this "in engineering terms is not considered to be a proper and permanent solution to the mechanical defects".

56 Arup also observed that "it was not unreasonable to suggest that the remaining parts of the [Building] also have issues similar to the issues [noted in the 2nd 2004 Report]", and that "[t]he possibility of other issues can also not be ruled out within these un-inspected zones".[103]

57 Another aspect bears mention. Arup's 2nd 2004 Report made no mention of the vibrations from the Circle Line Works. Similarly, in a subsequent report by Arup including rectification proposals for infill panels dated January 2005,[104] no reference was made to vibrations. Mr Chin Tze Kiang ("Mr Chin"), one of Arup's witnesses, explained this as follows:[105]

> (a) After Arup raised the issue of vibrations in the 1st 2004 Report, Millenia requested the LTA to provide records of vibrations. Arup then reviewed the records and concluded that there was little evidence of any vibrations exceeding the threshold beyond which damage would have been caused to the Building. Arup concluded that vibrations were "not

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101 69AB 54885, 54897.

102 69AB 54930–54931

103 69AB 54901.

104 70AB 55621–55637.

105 Transcript, 14 July 2015, pp 50–55.

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an issue": it was "too highly improbable" that vibrations were a cause of the 1st Fall.

(b) Mr Chin added that after inspecting the Building, Arup inspected Millenia Tower. Millenia Tower is located very close to the Building and was also constructed by Dragages, using the *same type of granite and the same fixings*.[106] *Arup found no defects on Millenia Tower* and noted that the quality of the works to Millenia Tower were "far better". Arup therefore concluded that vibrations did not cause the defects.

These two pieces of evidence – the vibration records and the absence of defects on Millenia Tower – are of critical importance to the issue of the cause of the defects. I elaborate on these points below (see [336]–[350] below).

(3) The engagement of Meinhardt Façade in 2005

58 In January 2005, Millenia sent Arup's 2nd 2004 Report to Dragages, and Dragages subsequently sent the report to Builders Shop.[107]

59 In early 2005, Builders Shop contacted Mr Meur of Meinhardt Façade, apprised him of the events surrounding the 1st Fall, and indicated that it wished to appoint Meinhardt Façade to review and respond to Arup's 2004 Reports.[108] Builders Shop engaged Meinhardt Façade in April 2005.[109] Sometime thereafter, Mr Meur met Ms Perez for the first time.[110] Subsequently, they became friends.

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106 Transcript, 23 April 2014, p 71; Transcript, 14 July 2015, p 54; Transcript, 16 September 2015, p 8.

107 70AB 55770–56000.

108 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 2.

109 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 7–8.

110 Transcript, 7 May 2015, p 114.

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60 Meinhardt Façade produced two method statements pursuant to its engagement by Builders Shop:[111]

(a) The first method statement was for the replacement of the 1st Panel and the two panels damaged during the 1st Fall (see [31] above). This was subsequently approved, and the 1st Panel and two damaged panels were replaced on or around 20 August 2005.[112]

(b) The second method statement pertained to various issues raised by Arup in its 2004 Reports, including rusting washers, spacers between joints, spalling of panels, cracks on panels, and the stacking of panels.

(4) The commencement of Suit 480 and subsequent events

61 Unsurprisingly, disputes arose between Millenia, Dragages and Builders Shop over the state of the Façade, whether there were defects in the first place, and even if so, whose responsibility it was to rectify them. The parties sought to resolve their disputes amicably and began to negotiate a settlement agreement from around September 2005.[113] However, the parties were unable to resolve their disputes at this stage. On 27 July 2006, Millenia commenced proceedings against Dragages and Builders Shop in Suit No 480 of 2006 ("Suit 480").[114] In Suit 480, Millenia alleged that Dragages and Builders Shop had breached the warranties in the Deed, and sought specific performance of the Deed (and in the alternative, damages to be assessed) and a mandatory injunction for Dragages and Builders Shop to carry out rectification works to the Cladding.

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111 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 18; 71AB 56086–56122; 71AB56525–56538.

112 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 266.

113 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 267.

114 72AB 57340–57358.

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62 In December 2006, Millenia engaged Arup to conduct a non-destructive inspection of approximately 48 to 55 drops of the Building.[115] By 30 March 2007, Arup had inspected a total of 20 drops: drops 22–36 and 41–45.[116]

63 In December 2006, Millenia also engaged Earth Arts Pte Ltd ("Earth Arts") to re-inspect the 8 Drops and to perform temporary restraining works to panels that Earth Arts assessed to be at a high risk of failing.[117] In total, Earth Arts performed restraining works to a total of 46 panels.[118]

Events surrounding the Settlement Agreement

(1) Events leading up to the Settlement Agreement

64 In early 2007, Ms Perez informed Mr Meur that Millenia, Dragages and Builders Shop had agreed on the terms of a settlement agreement. According to Mr Meur, he understood from his discussion with Ms Perez that as part of the Settlement Agreement, Meinhardt Façade was to do the following:[119]

(a) First, Meinhardt Façade was to inspect the Façade, excluding the 8 Drops that Arup had inspected in 2004 (see [54] above). Specifically, the Inspection would cover drops 1–16, 22–37, 41–56 and 62–77.

(b) Secondly, Meinhardt Façade was to prepare a report summarising its findings and proposing rectification methods for the defects it found. Additionally, Meinhardt Façade was to advise on any

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115 Vol 24 BAEIC, AEIC of Chin Tze Kiang dated 28 February 2014 at para 103; 72AB 57471–57484.

116 73AB 57994–57998.

117 Vol 24 BAEIC, AEIC of Chin Tze Kiang dated 28 February 2014 at paras 105 and 108; 72AB 57456.

118 74AB 58481–58598.

119 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 29–30.

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area of the Façade which represented a significant safety risk and to outline temporary measures that would make the Façade safe.

Importantly, an inspection of the Rectification Works was not part of the scope of works outlined by Ms Perez.

65 I pause here to note why Meinhardt Façade came to have a role under the Settlement Agreement. According to Ms Perez, she considered that Arup had behaved in an "irrational and utterly irresponsible" manner in its dealings with Dragages after the 1st Fall.[120] She desired a settlement of the disputes in Suit 480, and was agreeable, to that end, to Dragages rectifying defects in the Cladding. But she was concerned that Arup, as Millenia's consultant, would be the sole judge of "technical matters", *ie*, what the defects were and how they were to be rectified.[121] She wanted a third party to play a "counterbalancing" role vis-à-vis Arup, "to keep the reasonableness going".[122] The reason for Ms Perez's appointment of Meinhardt Façade was that she had dealt with Meinhardt Façade, and Mr Meur in particular, since 2005 and was thus comfortable with Meinhardt Façade. As we shall see below, she also wielded considerable influence over Mr Meur.

66 Meinhardt Façade then prepared a fee proposal dated 20 April 2007 for the works that Dragages had requested ("the April 2007 Proposal").[123] I note the following two pertinent aspects of the April 2007 Proposal:

(a) Meinhardt Façade proposed two options. The first involved an inspection of 30% of the Façade. The second involved an inspection of

120 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 335.

121 Transcript, 24 April 2014, p 65.

122 Transcript, 24 April 2014, p 67.

123 73AB 58021–58027.

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the entire Façade excluding the 8 Drops, and would be adopted if the 30% inspection did not yield enough information. Notably, Meinhardt Façade stated that the full inspection would take around four months to complete. The same four-month timeline was repeated in the proposal that was eventually accepted (see [67] below).

(b) Meinhardt Façade quoted a fee of $95,000 for the first option (*ie*, on the basis that a 30% inspection would be conducted) and a fee of $212,000 for the second option (*ie*, on the basis that a full inspection of the Façade excluding the 8 Drops would be conducted).

67 However, after discussions between Mr Meur and Ms Perez, Meinhardt Façade prepared a revised fee proposal dated 1 June 2007 ("the June 2007 Proposal").[124] This proposal provided for "experienced manpower supplied by Dragages" to inspect the Cladding after a "training period" by Meinhardt Façade. Meinhardt Façade quoted the same fee of $95,000 for the first option involving a 30% inspection of the Façade (see [66(b)] above). Yet the fee quoted for the second option (a full inspection excluding the 8 Drops) under the revised proposal fell sharply from $212,000 to $112,000. The June 2007 Proposal also indicated that the full inspection would take four months. *Importantly, the scope of works did not include an inspection of the Rectification Works.*

68 Mr Meur claimed that the "main reason" for this revised proposal was "efficiency", because the Meinhardt Façade team at the time was small and the rectification works had to be completed quickly.[125] I do not accept this claim for two reasons. First, as things transpired, only *two* Builders Shop employees

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124 73AB 58030-58036.

125 Transcript, 6 May 2015, pp 68–69.

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carried out the inspection of the Façade (see [94] below). Secondly, Meinhardt Façade had initially proposed that it would do the inspection by itself.

69 I find that the key reason for the revised proposal was the desire on the part of Dragages to cut costs. Mr Meur admitted that this was "definitely a consideration".[126] During oral submissions, Mr Jeyaretnam candidly accepted that the revision in the proposals was "obviously … a cost issue".[127]

70 Dragages and Builders Shop accepted the June 2007 Proposal. Builders Shop thereafter engaged Meinhardt Façade and paid for the works Meinhardt Façade performed under the June 2007 Proposal.[128] It is not clear exactly when Builders Shop engaged Meinhardt Façade. However, Ms Perez accepted during cross-examination that it had "more or less [been] explored and agreed" by 7 August 2007 (see [71] below) that workers from Builders Shop would inspect the Façade. She further admitted that neither Dragages nor Builders Shop informed Millenia of this during the negotiations leading up to the Settlement Agreement and upon execution of that agreement.[129]

71 On 7 August 2007, one week before the Settlement Agreement was executed, Dragages and Builders Shop executed a deed of settlement ("the Settlement Deed").[130] The Settlement Deed annexed a draft of the Settlement Agreement. Under cl 3.2, the parties agreed to use best efforts to limit Builders Shop's costs arising from the performance of its obligations under the Settlement Agreement to a sum not exceeding $200,000. Clause 3.3 provided

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126 Transcript, 8 May 2015, p 31.

127 Transcript, 24 February 2017, p 59.

128 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 35 and 37.

129 Transcript, 30 April 2014, pp 36–37.

130 73AB 58063–58069.

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that in the event the costs were between $200,000 and $250,000, Builders Shop and Dragages would share in those costs; and in the event that the costs exceeded $250,000, a dispute resolution mechanism that the Settlement Deed provided for would apply.

(2) The Settlement Agreement

72 On 14 August 2007, Millenia, Dragages and Builders Shop entered into the Settlement Agreement.[131] The provisions of the Settlement Agreement are of fundamental importance in these proceedings. I now turn to these provisions.

73 The Settlement Agreement began with several recitals setting out details pertaining to the parties thereto, the Building, the Contract and the Deed. It then referred to the 1st Fall, Arup's 2004 Reports and the fact that Dragages had proposed rectification methods to remedy defects identified by Arup.

74 There then followed the following recitals, which are significant because they are a window to the immediate context of the Settlement Agreement:

> G. Disputes and differences arose between [Millenia] and Dragages and Builders Shop in relation to the Parties' rights and liabilities in connection with the [1st Fall], the defects highlighted in Arup's Reports and the methods of rectification to remedy the defects. As a consequence thereof, [Millenia], by a Writ of Summons filed in the High Court of Singapore on 27 July 2006, commenced Suit No. 480 of 2006/F against Dragages and Builders Shop ("Suit").
>
> H. The Parties are now desirous of *fully and finally settling the rights and liabilities arising out of the [1st Fall], [Suit 480], Arup's Reports and the methods of rectification to remedy the defects* and to set out in this settlement agreement … the scope and method of works required to *make good, replace and/or rectify the defects in the [Cladding*] and the apportionment of the costs of

131 73AB 58076–58400; 74AB 58401–58598.

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> carrying out such works and all other costs incurred, on the following terms.
>
> [emphasis added]

These recitals make clear that the parties entered into the Settlement Agreement to *fully and finally settle their disputes concerning the 1st Fall, Suit 480, Arup's 2004 Reports and the rectification methods to remedy the defects*. The parties shared the common intention that their disputes would be resolved through the rectification of all the defects in the Cladding. To this end, they sought to set out in the Settlement Agreement the works required to rectify the defects and how the costs of such works would be shared.

75 I now turn to the clauses of the Settlement Agreement. In essence, the Settlement Agreement provided for three phases of works which I shall call "the Inspection Phase", "the Rectification Phase" and the "Confirmation Phase".

(A) THE INSPECTION PHASE

76 First, cl 1 provided as follows:

> Dragages and Builders Shop shall appoint ***Meinhardt (Singapore) Pte Ltd ("Meinhardt")*** to carry out ***a full inspection of the entire façade*** of [the Building] (with Meinhardt and Arup at liberty to discuss and agree on the extent of such inspection) *to identify a list of defects in the [Cladding]* (the "Identified Defects"), and *to propose, by way of a written report, the method(s) of rectification to be adopted to remedy the Identified Defects* ("the Rectification Works Method Statement"). For the avoidance of doubt, the Rectification Works Method Statement shall not cover areas already dealt with in [Arup's 2004 Reports] … [emphasis added in italics and bold italics]

In short, cl 1 provided for Dragages and Builders Shop to appoint "Meinhardt" to conduct a *full inspection of the entire Façade*, *excluding the "areas already dealt with in [Arup's 2004 Reports]", that is, the 8 Drops*, to identify defects in the Cladding, prepare a list of defects, and then propose rectification methods

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for them ("the Rectification Works Method Statement"). On first reading, cl 1 might appear to require an inspection of the entire Façade *including the 8 Drops*. But critically, *Millenia does not dispute that cl 1 did not require an inspection of the 8 Drops*. Mr Singh made this clear during his opening statement,[132] and Ms Chee Tiong Choo ("Ms Chee"), Millenia's Senior Vice President (Legal),[133] who was involved in preparing the Settlement Agreement,[134] confirmed this during the trial.[135] I therefore proceed on that basis in my analysis below.

77 Two points are pertinent here:

(a) The Settlement Agreement defined "Meinhardt" as Meinhardt Singapore. Ms Perez claimed that this was an error: according to her, the parties to the Settlement Agreement had intended to refer to Meinhardt Façade.[136] But Ms Chee, who as noted above was involved in preparing the Settlement Agreement, denied that there was an error.[137] This dispute feeds into the issue of whether Meinhardt Singapore carried out the roles that the Settlement Agreement envisioned it would perform, or whether the roles were performed by Meinhardt Façade on its own account. This issue is central to Millenia's claims against Meinhardt Singapore. I discuss this at [499]–[506] below. In discussing the Settlement Agreement, I will use its terminology by referring to the Meinhardt party as "Meinhardt".

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132 Transcript, 8 April 2014, p 90; Transcript, 9 April 2014, p 25.

133 Vol 8 BAEIC, AEIC of Chee Tiong Choo dated 4 March 2014 at para 3.

134 Transcript, 10 April 2014, p 82.

135 Transcript, 15 April 2015, p 62.

136 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 356.

137 Transcript, 10 April 2014, pp 84–85.

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(b) Irrespective of whether the Settlement Agreement was meant to refer to Meinhardt Singapore or Meinhardt Façade, it plainly envisioned that a Meinhardt party would inspect the Façade. It did not contemplate that the inspection would be carried out by Builders Shop. This is obvious because Builders Shop had installed the Cladding, and was therefore by no means, given the allegations of defective work, a party whom Millenia would have trusted to prepare an objective and complete record of the defects. In this regard, the Settlement Agreement departed significantly from the June 2007 Proposal under which Builders Shop was to conduct the inspection. As I have noted, Ms Perez admitted that Dragages, Builders Shop and Meinhardt Façade had "more or less … agreed" on the June 2007 Proposal before or at the time the Settlement Deed was executed, on 7 August 2007. *However*, *this was not disclosed to Millenia* (see [70] above). It was clearly disingenuous for Ms Perez to sign the Settlement Agreement having agreed on a different scope of work with Meinhardt Façade. The evidence of Mr Foo Say Chiang (Mr Foo"), the Senior Vice President, Property Management of Marina Properties Private Limited ("MPPL"), a subsidiary of Millenia that provides maintenance and property management services,[138] which I accept, was that he only learnt that Builders Shop had carried out the inspection *after the present suit was commenced*.[139]

78 I now turn to cl 10 of the Settlement Agreement, which dealt with what were called "Schedule C Defects". Clause 10 stated that Schedule C Defects were "possible defects" that Earth Arts and Arup had identified "which in Earth Arts' and Arup's opinion require urgent attention". These were defects that

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138 Vol 1 BAEIC, AEIC of Foo Say Chiang dated 4 March 2014 at para 3.

139 Transcript, 22 April 2014, p 62.

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Earth Arts and Arup identified in their inspections of the Façade beginning in December 2006 (see [62]–[63] above). These defects were cracks across panels and around pins.[140] Clause 10 provided that in Meinhardt's inspection of the Façade under cl 1, Meinhardt was to inspect the Schedule C Defects in priority and to propose measures as Meinhardt deemed necessary.

79 Clause 2 provided for Millenia to appoint Arup as its consultant for the purpose of reviewing and commenting on the Rectification Works Method Statement. Arup was entitled to raise reasonable queries or seek clarifications on the Rectification Works Method Statement, which Meinhardt was required to respond to, to Arup's reasonable satisfaction. Under cl 3, once Meinhardt had addressed Arup's queries and clarifications to Arup's reasonable satisfaction, the parties would be deemed to have accepted and agreed to be bound by the matters contained in the Rectification Works Method Statement.

80 Clause 4 provided that approvals, confirmations and consents by Arup "in connection with and/or for the purposes of this Agreement shall be deemed to bind [Millenia]". Importantly, however, cl 5 provided as follows:

> ***For the avoidance of doubt***, any approvals, confirmations, consents, endorsements or the like in relation to the Rectification Works Method Statement and/or the Rectification Method for Schedule A Defects … and/or their implementation (completed or otherwise) by [Millenia] and/or Arup ***shall not discharge, reduce and/or modify Meinhardt's****, Dragages' and Builders Shop's* ***responsibility and liability for***:
>
> a. The adequacy and integrity of the [Cladding];
>
> b. The adequacy of the Rectification Works Method Statement and/or the Rectification Method for Schedule A Defects …; and
>
> c. Complying with any statutory requirements.

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140 74AB 58415; 74AB 58480.

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> *Neither [Millenia] nor Arup assume any liability to Meinhardt, Dragages or Builders Shop in relation to [Millenia's] and/or Arup's comments on the Rectification Works Method Statement and/or the Rectification Method for Schedule A Defects … and/or their implementation (completed or otherwise).*
>
> [emphasis added in italics and bold italics]

I make the following points about cl 5, which has two parts:

(a) The second part of cl 5 provided that Millenia and Arup would not assume liability to Meinhardt, Dragages or Builders Shop for their comments on, *inter alia*, the Rectification Works Method Statement and/or its implementation. I find that cl 5 reflects the parties' intention to exclude the liability of Millenia and Arup in tort for these matters.

(b) By contrast to the second part of cl 5, the first part envisioned and sought to preserve the liability of Dragages, Builders Shop *and, critically, Meinhardt* for, *inter alia*, the adequacy and integrity of the Cladding. It is clear that the reference to Meinhardt here was a reference to the Meinhardt party who inspected the Cladding and proposed the Rectification Works Method Statement. The liability contemplated was plainly liability to Millenia. The Settlement Agreement did not provide for Millenia to contract with Meinhardt. Hence the liability of Meinhardt that the first part of cl 5 sought to preserve must have been Meinhardt's liability in tort. This point is vital to Meinhardt Façade's submission that it did not owe Millenia a duty of care in tort (see [543]–[544] below).

(B) THE RECTIFICATION PHASE

81 Clause 6 provided for Dragages and Builders Shop to rectify:

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(a) the defects Meinhardt identified in its inspection of the Façade ("the Identified Defects") and the Schedule C Defects (see [78] above), in accordance with the Rectification Works Method Statement; and

(b) "Schedule A Defects": these were defects identified in Arup's 2004 Reports which were agreed between the parties, and were to be rectified in accordance with rectification methods Meinhardt was to propose. Arup was entitled to raise reasonable queries and clarifications concerning these rectification methods, to which Meinhardt was obliged to respond to Arup's reasonable satisfaction, upon which the rectification methods would bind the parties.

Significantly, *it is undisputed, and I so find, that the 2nd Panel was not identified as a panel with a defect in either Schedule A or Schedule C to the Settlement Agreement*.

82 Clause 12 set out the standard for the Rectification Works:

> In carrying out the Rectification Works, Dragages and Builders Shop shall ensure that all ***such works shall be carried out in a good workmanlike manner***, *comply and/or conform with all necessary engineering standards and/or the technical and performance specifications prescribed in the Contract*, and that the aesthetic and visual appearance of the entire façade of Centennial Tower (including to but not limited to the colour matching of stones adjacent to each other) shall be maintained. Further, Dragages and Builders Shop shall ensure that ***all such works shall be of a permanent nature***. [emphasis added in italics and bold italics]

In brief, the Rectification Works were required to be performed in a "good workmanlike manner", to be in compliance with the specifications in the Contract, and to be of a "permanent nature".

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83 Clause 13 provided for the terms and conditions of the Deed to apply to the Rectification Works for the remainder of the warranty period:

> Dragages and Builders Shop agree to carry out the Rectification Works, *on the same terms and conditions as those set out at paragraphs 1 to 3 of the [Deed] for the remainder of the Warranty Period as defined therein …* and *accepts and acknowledges that the warranties provided and covenants undertaken by Dragages and Builders Shop shall equally apply to the Rectification Works as if the same were set out in this Agreement. …*
>
> For the avoidance of doubt, *nothing herein shall be construed as extending in any way whatsoever, the remainder of the Warranty Period under the [Deed] and/or Dragages' and Builders Shop's obligations and liabilities under the [Deed] and/or any limitation period(s) at law in respect of the Identified Defects, the Schedule A Defects, the Schedule B Defects and the areas unaffected by the Rectification Works.*
>
> [emphasis added]

84 Clause 14 provided that Dragages and Builders Shop would do all things reasonably necessary to ensure the Rectification Works were carried out and completed in accordance with statutory provisions and regulations.

(C) THE CONFIRMATION PHASE

85 The third phase of works was the Confirmation Phase. The key provision is cl 11 of the Settlement Agreement, which states:

> Meinhardt *shall carry out the necessary inspection(s) to [the Cladding]* upon Dragages' and Builders Shop's written notification that they have completed the Rectification Works *to ensure that the Rectification Works comply in all respects with the Rectification Works Method Statement, the Rectification Method for Schedule A Defects and the requirements prescribed at Clauses 12 and 14 below*. Upon Meinhardt's Inspection and approval of the Rectification Works in accordance with this clause, ***Meinhardt shall provide [Millenia] with a written confirmation of such approval***. Arup *shall be* ***entitled*** *to inspect the Rectification Works to satisfy itself that the Rectification Works have been carried out in accordance with the terms of [the Settlement Agreement]*, and ***the Rectification Works shall be deemed completed upon Arup's written***

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> ***confirmation of the same***. [emphasis added in italics and bold italics]

In short, in the Confirmation Phase:

(a) Dragages and Builders Shop would first provide a written notification that the Rectification Works were completed.

(b) Meinhardt would then inspect the Cladding to ensure the Rectification Works complied with, *inter alia*, the Rectification Works Method Statement and cll 12 and 14 of the Settlement Agreement.

(c) Subsequently, Meinhardt would provide Millenia with a written confirmation of its approval of the Rectification Works.

(d) Arup would thereafter be entitled to inspect the Rectification Works to satisfy itself that they were in accordance with the Settlement Agreement. The Rectification Works would be deemed completed upon Arup's written confirmation of the same.

86 I now set out other pertinent provisions of the Settlement Agreement.

(D) OTHER PERTINENT PROVISIONS OF THE SETTLEMENT AGREEMENT

87 First, cll 25 and 26 provided for the effect of the Settlement Agreement on Suit 480 and the rights and obligations of the parties. These provisions are relevant to the issue of whether some of Millenia's claims against Dragages and Builders Shop have been compromised. I discuss them at [445]–[446] below.

88 Secondly, cll 2 and 16 of the Settlement Agreement provided that Arup was Millenia's consultant. Clause 19 of the Settlement Agreement provided that Meinhardt was Dragages' consultant.

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89 Thirdly, cll 17 and 18 provided for the costs of the Rectification Works and other incidental costs to be apportioned between the parties. Under cl 18, Millenia was to make a contribution of $70,000 in two payments of $35,000; the second $35,000 payment was to be made within 14 days after Meinhardt issued its written confirmation under cl 11 (see [85(c)] above).

90 Fourthly, cl 34 provided that in the event disputes between the parties to the Settlement Agreement arose, they would first be resolved by meeting(s) between the chief executive officer/managing director/equivalent of the parties.

(3) The engagement of Arup in 2007

91 By a letter dated 14 August 2007 (the "2007 Appointment Letter"),[141] Millenia appointed Arup as its consultant to advise it on the Rectification Works. Under the 2007 Appointment Letter, Arup agreed to review the proposed rectification methods (during the Inspection Phase), to hold meetings with Millenia and Dragages concerning the progress of the Rectification Works (during the Rectification Phase), and to inspect the Rectification Works (during the Confirmation Phase), albeit cl 6 provided that "it is not expected that [Arup's] specialist inspectors will review the entire façade".[142] I note two further points about the 2007 Appointment Letter:

(a) First, cl 7 stated that in providing its services, Arup would "exercise the degree of skill, care and diligence normally exercised by consulting engineers in similar circumstances".

(b) Secondly, the agreement stipulated a fixed fee of S$40,000.

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141 73AB 58073–58075.

142 73AB 58073, 58074.

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The Inspection Phase

92 As I have noted (see [70] above), Meinhardt Façade was engaged by Builders Shop on the terms of the June 2007 Proposal.

93 On 28 August 2007, Mr Meur sent a letter to Dragages which enclosed a drawing describing Meinhardt Façade's intended investigation methodology. The drawing reflected four zones – Zones A to D – which Meinhardt Façade proposed to inspect and eight zones – Zones 1 to 8 – which had been inspected previously (the 8 Drops). Mr Meur stated that Zones A to D would each require "approximately 16 drops to complete".[143] Dragages and Meinhardt Façade then agreed to start the inspection, which I shall refer to as "the 2007 Inspection".

94 Meinhardt Façade divided Zones A to D into 45 "drops".[144] Mr Ong of Meinhardt Facade, a senior engineer and façade consultant, spent about one week inspecting five of these "drops".[145] Mr Ong then trained two employees of Builders Shop, Mr Liew Wai Chan and Mr Zhang Jun Jian, to inspect the rest of Zones A to D.[146] These workers were the "experienced manpower" supplied by Dragages under the terms of the June 2007 Proposal (see [67] above). Mr Ong asked the two workers about their background and they told him that they worked in construction and had experience with stone. But Mr Ong did not make any further inquiries. He assumed that the workers were qualified because they were the workers who had been supplied.[147] When questioned on this point, Mr Meur confirmed that Meinhardt Façade did not check whether the workers had experience in façade inspections.[148]

143 74AB 58607–58608.

144 74AB 58882, 58884; Transcript, 20 November 2014, p 84.

145 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at paras 1 and 10.

146 1AB 451; Transcript, 20 November 2014, p 42.

147 Transcript, 20 November 2014, pp 107–108.

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95 Mr Ong trained the Builders Shop workers by taking them to the Façade in the BMU, informing them of the defects he had seen, showing them drawings or mark ups from his inspection, teaching them how to note defects, and showing them how to use a borescope.[149] A borescope is a fibre-optic device that was inserted into the joints between the panels for brackets and their components to be inspected and photographed.[150] Importantly, it could only be used if it could be inserted into the joints; yet some joints were too narrow to permit insertion of the borescope (see [681(a)] below).) I find that the training was not extensive. As I note below, the entire inspection took about one month (see [96] below). According to Mr Ong, he met one of the workers on the Friday of the first week, *ie*, the week that he inspected five drops (see [94] above), and met the other worker on Monday. The workers began their inspection on Tuesday.[151] They were provided with inspection worksheets which they filled in during the inspection.[152] The workers also took photographs of panels they inspected.

96 The entire inspection, including Mr Ong's inspection, lasted about one month, from 4 September to 6 October 2007.[153]

97 It is disputed whether the entire Façade excluding the 8 Drops was inspected in the 2007 Inspection. The evidence was as follows:

(a) The evidence of Mr Peter Hartog ("Mr Hartog"), Arup's façade expert, was that the 2007 Inspection only covered 45 of the 80 drops:

148 Transcript, 8 May 2015, pp 27–28.

149 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 13.

150 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 46(b) (p 30).

151 Transcript, 20 November 2014, p 106.

152 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 15.

153 74AB 58882, 58883.

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drops 6–17 (Zone D), 22–32 (Zone A), 46–56 (Zone B) and 62–72 (Zone C).[154] His evidence seems to have been based on a layout plan in the report by Meinhardt Façade dated 24 December 2007 ("Meinhardt's 2007 Report"), which suggests that only 45 drops were inspected.[155] It is not in dispute that drops 6–16, 22–32, 46–56 and 62–72 were inspected. Mr Hartog added, and I find, that drop 17 was also inspected.

(b) However, Meinhardt Façade submits that one drop under its numbering system did not equate to one drop under Arup's system, and that the layout plan was not meant to accurately represent all of the drops that were inspected. Meinhardt Façade claims that the inspection sheets from the 2007 Inspection and investigation statistics from its report dated 20 March 2008 ("Meinhardt's 2008 Report") show that the entire Façade except the 8 Drops was inspected during the 2007 Inspection.[156]

98 Having considered the evidence, I do not accept that only 45 of the 80 drops were inspected during the 2007 Inspection. First, the investigation statistics indicate, and I find, that a total of 13,484 panels (3384 panels in Zone A, 3495 panels in Zone B, 3227 panels in Zone C and 3378 panels in Zone D) were inspected.[157] If Mr Hartog was correct, only 56% of the Cladding (45 out of 80 drops) was inspected. This would amount to around 9156 panels (based on the total number of 16,277 panels on the Cladding: see [16] above), far less than the 13,484 panels which were inspected. Secondly, the inspection sheets show that many of Meinhardt Façade's drops had three or four horizontally adjacent panels: in other words, they were larger than the drops under Arup's

154 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, Annex 11, para 6 (pp 772–773).

155 74AB 58882, 58884.

156 Meinhardt Façade's reply submissions at para 140.

157 75AB 59744, 59813; Transcript, 21 November 2014, p 56.

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classification which were generally two panels wide (see [18] above).[158] This indicates that the 45 "drops" inspected during the 2007 Inspection covered a greater area than 45 drops under Arup's numbering system.

99 However, it does not appear that 72 drops (or 90% of the Cladding) were inspected either. A total of 13,484 panels were inspected, which amounts to about 83% of the panels (based on the total figure of 16,277 panels).

100 Mr Meur stated that he understood from Ms Perez that the inspection was to cover 64 drops: drops 1–16, 22–37, 41–56 and 62–77 (see [64(a)] above). Dragages and Builders Shop do not dispute that the 2007 Inspection was only to cover these drops. I thus find that the 2007 Inspection was to cover drops 1–16, 22–37, 41–56 and 62–77.

101 If the 2007 Inspection covered 65 out of 80 drops – the 64 drops noted above as well as drop 17 (see [97(a)] above) – it would have covered around 81% of the Cladding. This percentage roughly accords with the investigation statistics which indicate that 83% of the Cladding was inspected (see [99] above). Moreover, Dragages and Builders Shop do not claim that Meinhardt Façade did not fulfil its scope of works. I thus find that drops 1–16, 22–37, 41–56, 62–77, as well as drop 17 (see [97(a)] above), were inspected during the 2007 Inspection, *ie*, a total of 65 drops.

102 I note the following two points:

(a) First, as things transpired, two of the 8 Drops were covered in the inspection (drops 17 and 46) (see [54] above). Notably however,

158 Transcript, 20 November 2014, pp 89–90; 4.1–4.2 DBD.

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Drop 80, from which the 2nd Panel fell (see [150] below), was not inspected.

(b) Secondly, the inspection took just over a month whereas it had been contemplated in both the April 2007 Proposal and the June 2007 Proposal that a full inspection would take four months. This raises questions over the thoroughness of the inspection that was performed.

103 Returning now to the chronology of events, on 24 December 2007, Meinhardt Façade issued Meinhardt's 2007 Report.[159] This set out remedial proposals relating to observations about glue, pins, cracks, foreign objects, gaps between panels, shaky panels and brackets.

104 Arup provided comments on Meinhardt's 2007 Report by a revised letter dated 29 January 2008.[160] In its letter, Arup noted the following points:

(a) Meinhardt's 2007 Report did not mention infill panels. Arup sought "a list for the locations and the conditions of these panels". (Arup was proceeding on the basis that all infill panels had been installed in the same way as the 1st Panel, *ie*, without top pins but with the use of epoxy to bond the panel to the panel above: see [49] above).

(b) In relation to cracked panels, which Arup considered required "immediate attention", Arup sought "full details on the findings and justification of the integrity of these panels".

(c) The report did not propose a clear strategy to deal with stacking.

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159 74AB 58882–58920.

160 74AB 59197–59198.

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(d) Arup expressed concerns regarding the proposed use of structural silicone as a rectification method.

Additionally, Arup proposed that the parties hold a technical meeting to clarify and follow up on the outstanding issues. Arup and Meinhardt Façade attended this meeting on 14 February 2008. During this meeting, Meinhardt Façade "highlighted that the location of … infill panels have been identified" but added that it would consult with Dragages before revising Meinhardt's 2007 Report to include details regarding infill panels.[161]

105 On 20 March 2008, Meinhardt Façade issued Meinhardt's 2008 Report.[162] I note the following points about Meinhardt's 2008 Report:

(a) First, the report stated that about 40% of the panels inspected had at least one observed defect.[163]

(b) Secondly, and notably, a table in the report indicates that there were (potential) issues with the pins securing 192 panels: there were 61 cases of "3-pins insertion", 118 cases of "2-pins insertion" and nine cases of "1-pin insertion".[164] This table was only referred to once during the trial, during Mr Chia's re-examination of Mr Chin.[165] On first sight, the table suggests that a total of 61 panels were found to be secured by three pins, 118 panels secured by two pins and nine panels secured by one pin. This impression is bolstered by a section in the report stating:[166]

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161 75AB 59524-59526.

162 75AB 59744–59912.

163 75AB 59744, 59814.

164 75AB 59744, 59813.

165 Transcript, 16 July 2015, pp 77–82.

166 75AB 59744, 59814.

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> **PIN** (P) – particular attention shall be focus[ed] on zone B, since this region [has] the highest recorded issues with the pin (*158 panels affected, of which 54 panels are with 3-pin insertion, 96 panels are with 2-pin insertion and 8 panels are with only 1-pin embedment*). Thorough check should be conducted to ***those panels which are only [restrained] by 1-pin only***. [emphasis added in italics and bold italics]

But it is reasonably clear, and I find, that the initial impression produced by this table cannot be correct. It is undisputed that a panel would only have been adequately restrained if it was secured by at least *three* pins (see [246] below). Therefore, if there were 118 panels secured by two pins and nine panels secured by one pin, many if not all of these panels would have fallen off the Façade. Millenia and Arup would have been extremely alarmed, and significant follow-up work would have been carried out immediately after they learnt of this finding. But this did not occur. The comments in another section of the report reveal why. The comments indicate that these 192 panels were panels that *may* not have been properly restrained by four pins, not panels that *in fact* were not properly restrained by four pins. These 192 panels comprised (1) panels with less than four pins inserted into the stone, (2) panels with four pins inserted into the stone, but with at least one pin possibly not attached to a shaft, (3) panels with pins inserted shallowly into the stone and (4) panels where the shafts showed signs of corrosion.[167] Notwithstanding this, such an observation should have set off alarm bells.

106 Arup provided further comments on Meinhardt's 2008 Report by a letter dated 18 April 2008.[168] Arup noted, among other things, that the location of infill panels had not been identified in Meinhardt's 2008 Report, and stated that any

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167 75AB 59744, 59819–59820.

168 76AB 60725–60727.

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panel with less than four (functioning) restraining pins needed to be reinstated to its original four-pin configuration, notwithstanding calculations indicating a three-pin configuration was structurally safe. Arup also raised issues about the remedial methods and reiterated its concerns about use of structural silicone.

107 On 25 April 2008, Mr Ong sent an email to Mr Adrianto, copying Ms Perez and Mr Meur, seeking Dragages' assistance in locating the infill panels.[169] Later that day, Ms Perez replied rather disingenuously stating, among other things, that "the location [of the infill panels] will be provided in [detail] during the rectification works. There is no need to give an exact layout now".[170]

108 On 28 April 2008, Mr Meur sent an email to Ms Perez containing Meinhardt Façade's proposed replies to Arup's letter dated 18 April 2008. On 29 April 2008, Ms Perez replied to this email stating:[171]

> … *Please note that* ***there is no list of in-fill panels and it is quite impossible today to list them exactly as they are installed in the same way as other panels*** … *There is no way to differentiate them.* [emphasis added in italics and bold italics]

It appears that *this was the first time that Dragages informed any of the other parties to this suit that there was no list of infill panels*, and I so find.

109 Meinhardt Façade replied to Arup's comments on Meinhardt's 2008 Report in a letter dated 2 May 2008 stating, among other things, that the issue of infill panels "has been settled [and] resolved previously between [Dragages] [and] [Millenia] … there is [no] such tracking list record [of infill panels]".[172] The statement that the issue of infill panels had been resolved was not true.

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169 77AB 61242–61243.

170 77AB 61240–61241.

171 77AB 61238.

172 77AB 61250–61255.

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110 Arup then provided additional comments on Meinhardt's 2008 Report on 5 May 2008,[173] reiterating that panels with less than four functioning pins had to be reinstated to the original four-pin configuration. Meinhardt Façade replied to these comments on 22 May 2008.[174] Notably, in its reply, Meinhardt Façade finally accepted that panels with less than four functioning pins would be reinstated to their original four-pin configuration.

111 In the interim, Arup sent a letter to Millenia dated 8 May 2008 ("the 8 May 2008 letter") stating that the rectification proposals were "acceptable and have sufficiently addressed most of the issues raised apart from the structural silicone method".[175] Arup recommended that the Rectification Works proceed while matters relating to the structural silicone method were put on hold.

112 On 12 May 2008, Mr Foo sent an email to Ms Perez stating that Millenia had no objections to Dragages proceeding with the Rectification Works using the methodologies accepted by Arup, other than structural silicone.[176]

The Rectification Phase

113 The Rectification Works began in June 2008.[177] The Rectification Works were, at any one time, carried out by two Builders Shop workers, albeit it was not the same two workers who carried out all of the Rectification Works.[178] The Builders Shop workers worked under the supervision of a supervisor, Mr Md

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173 77AB 61478–61581.

174 78AB 62175–62183.

175 78AB 61961–61962.

176 78AB 62023.

177 Vol 18 BAEIC, AEIC of Md Shah Alam Md Sultan Ahmed dated 26 February 2014 at para 6.

178 Transcript, 20 November 2014, p 44.

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Shah Alam Md Sultan Ahmed ("Mr Shah Alam"). While the Rectification Works were being carried out, Mr Ong would inspect the works. When he was not satisfied with the workmanship, he would direct the workers to improve the works and re-inspect the works thereafter.[179] Apart from Mr Ong, Mr Adrianto also supervised, but did not inspect, the Rectification Works.[180]

114 During the Rectification Works, Mr Ong inspected every single stone panel *that was rectified by Builders Shop* on all of the 80 Drops.[181] It is thus not in dispute, and I find, that Meinhardt Façade inspected *some* panels on drop 80, the drop from which the 2nd Panel fell, during the Rectification Phase. But the parties dispute whether Mr Ong inspected the *2nd Panel itself* during the Rectification Phase. I now set out the relevant evidence on this point.

115 During the trial, Mr Chia brought Mr Shah Alam to a marked-up layout of the façade.[182] This was a final report which Dragages prepared, based on Builders Shop's records of the Rectification Works, which ostensibly showed the panels to which Builders Shop had performed works and the nature of those works ("the Final Progress Report"). Drop 80 was described as Corner C6 in this document. Mr Shah Alam admitted that, according to the Final Progress Report, dead load rods were inserted in the gaps between panels 41 and 42, and panels 42 and 43, and a twisted rod was embedded at the top of panel 42.[183] Panel 42 was the 2nd Panel. During the trial, Mr Ong admitted that if

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179 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 39.

180 Vol 18 BAEIC, AEIC of Md Shah Alam Md Sultan Ahmed dated 26 February 2014 at para 21.

181 Transcript, 21 November 2014, p 73.

182 5D-2.

183 Transcript, 19 November 2014, p 118.

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rectification works had been performed to the 2nd Panel, he would have inspected the 2nd Panel.[184]

116 However, Mr Ong then testified that rectification works were *not* carried out to or near the 2nd Panel: the Final Progress Report was inaccurate. He explained that when he inspected the location from which the 2nd Panel fell on 13 February 2011 (see [154] below), he did not see evidence of any rectification works. He referred me to a photograph which indicated the same.[185] Mr Ong also stated that he did not find any dead load rods or twisted rods in the debris of the 2nd Panel when he inspected the debris (see [382(c)] below).[186] Mr Ong's evidence here was corroborated by photographs, and I accepted it accordingly. Moreover, I note the following points concerning the Final Progress Report:

(a) First, as Mr Jeyaretnam noted, the Final Progress Report was inconsistent with an earlier report prepared by Dragages, a weekly report that appears to have been prepared soon after the Rectification Works to drop 80 were completed ("the Weekly Progress Report).[187] The Weekly Progress Report showed that no works were performed to panel 42.

(b) Secondly, Mr Jeyaretnam also pointed out that the Final Progress Report indicated that there was a long crack on panel 40 of drop 80 that was rectified by "stitches" (see [136] below). Yet Arup did not find any crack or stitches on panel 40 when it inspected it after the 2nd Fall: the photograph of panel 40 showed that there were no cracks or stitches.[188]

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184 Transcript, 21 November 2014, pp 72–73.

185 Transcript, 21 November 2014, pp 74–77; 4.5 DBD 2821–2833, 2827 (Image 3).

186 Transcript, 6 May 2015, pp 45–47.

187 1D-2; Transcript, 24 February 2017, pp 81–82.

188 5D-2 33506; 3rd and 4th Defendants' Bundle of Documents for Oral Closing, p 44.

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117 Further, as I have noted, the 2nd Panel was not identified as a panel with a Schedule A or a Schedule C Defect (see [81] above). Again, Meinhardt Façade did not inspect drop 80 during the Inspection Phase (see [102(a)] above) and thus would not have identified the 2nd Panel as requiring rectification. In short, the evidence indicates that the need for the 2nd Panel to be rectified was not brought to Meinhardt Façade's attention. This supports the conclusion that no rectification works were carried out to the 2nd Panel.

118 I accordingly find that the Final Progress Report contained inaccuracies. More specifically, I find that no rectification works were performed to the 2nd Panel. Mr Ong's evidence was that during the Rectification Phase, he inspected panels *that had been rectified* (see [114] above). I therefore find that Meinhardt Façade did not specifically inspect the 2nd Panel during the Rectification Phase.

119 In late 2008, the works for the construction of the Downtown Line Promenade Station ("the Downtown Line Works") commenced.[189]

120 On 12 February 2009, Mr Vincent Chua ("Mr Chua") of MPPL, an engineer who was Mr Foo's subordinate,[190] sent an email about the Rectification Works to Ms Perez.[191] Mr Chua, who does not seem to have been familiar with the Settlement Agreement, asked Ms Perez, *inter alia*, the following:

(a) whether Meinhardt (Façade) required approval from Pontiac or MPPL in respect of the rectification methods; and

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189 Vol 15 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at AP-49 (p 2743).

190 Transcript, 22 April 2014, p 130.

191 80AB 63582.

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(b) whether MPPL, as Millenia's representative, was able to request for mock-up samples showing the rectification methods.

121 In her reply later that day, Ms Perez stated the following: [192]

(a) In reply to the query noted in [120(a)] above, she stated: "No. [Millenia] or MPPL do not need to approve the methods … *It is Meinhardt that recommend, review and approve repair methods*" [emphasis added]. This was misleading. Ms Perez knew the Settlement Agreement provided for Arup to approve the Rectification Works Method Statement. Tellingly, when cross-examined on this, she could only say: "… he asked a general question, I gave a general answer. If he needed more clarifications, I am sure that he would have asked …".[193]

(b) In reply to the query noted in [120(b)] above, Ms Perez stated, *inter alia*, that "[only] *Meinhardt has the full liability for the repair works*, including recommendations, material approval, supervision, review and approval of works, inspections, [aesthetics], etc" [emphasis added]. As I have noted, Ms Perez sought to resile from this in her testimony, stating that "liability" was "maybe … not the correct word to use … an overstatement, knowing better now what liability means". For the reasons given above, I find Ms Perez's evidence difficult to accept. I find that Ms Perez was seeking to reassure Millenia about the Rectification Works by misleadingly alluding to the potential liability of Meinhardt (Façade) for the same (see [38(a)] above).

122 On 26 August 2009, a representative of MPPL wrote to Mr Adrianto to inquire whether Arup could inspect the Rectification Works, stating that Arup

192 80AB 63851–63852.

193 Transcript, 19 May 2014, p 14.

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would require about a week to do so.[194] Mr Adrianto replied to reject this request, stating that the works needed to be completed without interruption.[195] Thus, Arup was not able to inspect the Rectification Works while they were in progress.

123 The Rectification Works were completed in October 2009.[196] I note that there is some dispute over whether structural silicone was used during the Rectification Works. As I have noted, Arup did not accept the use of structural silicone (see [111] above). I accept Mr Ong's evidence that structural silicone was not used during the Rectification Works.[197] Notably, Mr Foo also testified that, to the best of his knowledge, structural silicone was not used.[198] Mr Ong explained that structural silicone may have been confused with a different kind of silicone sealant, which was used on the Cladding as a weather seal.

The Confirmation Phase

124 In June 2009, Builders Shop told Meinhardt Façade about the need for a completion certificate from the latter in respect of the Rectification Works.[199] According to Mr Meur, this was the first time it was made known to Meinhardt Façade that such a certificate was required under the Settlement Agreement. Meinhardt Façade did not have a practice of issuing such certificates. Mr Meur checked the June 2007 Proposal and realised that inspection of the Rectification Works and issuance of a completion certificate was not part of Meinhardt

194 82AB 64829.

195 82AB 64829.

196 Vol 18 BAEIC, AEIC of Md Shah Alam Md Sultan Ahmed dated 26 February 2014 at para 6.

197 Transcript, 20 November 2014, pp 36–39.

198 Transcript, 16 April 2014, p 55.

199 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 43.

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Façade's scope of works. I accept Mr Meur's evidence on this score and find that Meinhardt Façade knew, as of June 2009, that it was not contractually required to issue a completion certificate.[200]

125 In November 2009, Dragages requested Meinhardt Façade to issue a certificate to certify that the Rectification Works were completed in accordance with the Rectification Works Method Statement.[201] Mr Ong prepared a draft of this certificate and sent it to Mr Adrianto for review.[202] Ms Perez agreed that Dragages was "involved in giving some pointers for [the] drafting" of the certificate.[203]

126 On 17 December 2009, Meinhardt Façade issued the certificate ("the 17 December 2009 Certificate"). It was addressed to Builders Shop and Dragages and stated that, "*to the best of our knowledge*, the ***enhancement works*** … to the external perimeter of the [Cladding] has been completed in accordance with the approved method of statement" [emphasis added in italics and bold italics].[204] I note that the qualification "to the best of our knowledge" is unusual: it is not a phrase commonly found in certificates issued by construction professionals. Ms Perez admitted that she had never seen the qualification "to the best of our knowledge" in all her time as an engineer dealing with building contracts.[205]

127 On 18 December 2009, Ms Perez sent a letter to Millenia that enclosed the 17 December 2009 Certificate stating that it "certifies the completion of the

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200 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 64–65.

201 Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 44.

202 82AB 65106–65107.

203 Transcript, 19 May 2014, p 34.

204 82AB 65106–65109.

205 Transcript, 19 May 2014, p 70.

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works as per the Settlement Agreement".[206] The letter further sought payment of $35,000 from Millenia pursuant to cl 18 of the Settlement Agreement.

128 On 25 January 2010, Arup began to inspect the Rectification Works.[207]

129 On 5 February 2010, Millenia sent an email to Dragages highlighting two aspects of the 17 December 2009 Certificate.[208] First, it did not confirm that "Meinhardt" had inspected and satisfied itself that the Rectification Works were completed in accordance with cl 11 of the Settlement Agreement. (Millenia did not distinguish between Meinhardt Singapore and Meinhardt Façade here.) Secondly, the letter was not addressed to Millenia as required under cl 11.

130 On 10 February 2010, the following events transpired pertaining to the completion certificate issued by Meinhardt Façade.

(a) Mr Adrianto emailed Mr Ong to request that, "[as] a matter of paperwork", Mr Ong reissue the completion certificate, with the same content, but with the certificate addressed to Millenia.[209]

(b) Mr Ong replied that he would discuss this with Mr Meur "as business wise & contractual wise we are engaged by [Builders Shop]".[210] During the trial, Mr Ong testified that he did not think that changing the name of the addressee was just "a matter of paperwork". He knew there would be implications if the certificate was addressed to Millenia.[211]

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206 82AB 65113–65116.

207 83AB 66149, 66153.

208 82AB 65221.

209 82AB 65245.

210 82AB 65246.

211 Transcript, 20 November 2014, pp 140–141.

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(c) Ms Perez responded to Mr Ong's email, copying Mr Meur, stating that the revised certificate was "a wording matter" that "doesn't add anything to your scope and/or obligations to [Builders Shop/Dragages/Millenia]".[212] She explained that the revised certificate would allow Dragages to get Millenia to release a payment to Dragages. As I have noted, under cl 18 of the Settlement Agreement, Millenia was required to make a second payment of $35,000 to Dragages upon Meinhardt's issuance of its written confirmation under cl 11 (see [89] above).

(d) Mr Meur then approved the issuance of a revised version of the certificate addressed to Millenia. During the trial, Mr Meur agreed that he knew Mr Ong was concerned that changing the name of the addressee would give rise to an assumption of responsibility to the party to whom the certificate was addressed. He maintained, however, that he did not think that addressing the certificate to Millenia would have changed the liability of Meinhardt Façade.[213] He therefore approved the issuance of the revised certificate addressed to Millenia. However, I do not accept Mr Meur's evidence on this point for the following reasons:

(i) First, it was inconsistent with his evidence in his affidavit of evidence-in-chief ("AEIC"). Mr Meur did not depose that he approved the revised certificate because he did not think it would affect Meinhardt Façade's liability. He stated that he did so because "discussions had been dragging on for several months, and the change of addressee did not affect our assessment regarding the [Façade] and the [Rectification Works]".[214]

212 82AB 65246.

213 Transcript, 7 May 2015, pp 129–130.

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(ii) Secondly, I find it very difficult to accept that Mr Meur believed that addressing the certificate to Millenia would not have affected Meinhardt Façade's liability. Mr Meur admitted that as of February 2010, he had been practising (as an engineer) for about 11 years.[215] He also agreed that he knew what a completion certificate signified and that the owner would rely on the certificate.[216] Further, Mr Ong had directly raised the issue of Meinhardt Façade's potential liability to Millenia to Mr Meur's attention.

For these reasons, I do not accept that Mr Meur approved the issuance of a revised certificate addressed to Millenia on the basis that it would not affect Meinhardt Façade's liability. I find that he knew that it would do so. I further find based on his evidence in his AEIC that nonetheless, he approved the issuance of the revised certificate because (1) he wanted to expedite the process to please Ms Perez and Dragages and (2) he was satisfied that the Rectification Works were carried out properly. In short: *Mr Meur knew that by issuing the letter to Millenia, Meinhardt Façade was incurring a potential liability to Millenia. Still, he issued the letter because he believed the Rectification Works were carried out properly, and therefore liability to Millenia would never arise.*

(e) After obtaining approval from Mr Meur, Mr Ong sent a revised version of the certificate, which was addressed to Millenia and copied to Dragages and Builders Shop ("the 10 February 2010 Certificate"), to Mr Adrianto.[217] Ms Perez replied to this email stating:[218]

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214 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 70.

215 Transcript, 7 May 2015, p 131.

216 Transcript, 7 May 2015, p 112.

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> *Thank you very much! That's efficient!!*
>
> Let's see what [Millenia] comes up with now. *They never showed any cooperation but this time, they have [not] much cards left to throw on the table. I handle!*
>
> [emphasis added]

Mr Adrianto subsequently forwarded the 10 February 2010 Certificate to Millenia.[219]

131 On 17 February 2010, Millenia emailed Mr Adrianto pointing out that the 10 February 2010 Certificate did not contain the necessary confirmation as the phrase "to the best of our knowledge" was used.[220]

132 On 22 February 2010, Ms Perez responded stating that the 10 February 2010 Certificate was "perfectly in line" with the Settlement Agreement but that she would ask for it to be reworded in line with Millenia's suggestions.

133 On 22 February 2010, Ms Perez also sent an email to Mr Meur. This email illuminates the approach Ms Perez was taking at the time and in particular her dealings with Mr Meur:[221]

> Hi Mathieu,
>
> I sent you in Bcc the response to Pontiac so that you would know about their ways of delaying the payment. …
>
> I have thought about this and I believe that whatever the wording that I offer them, they are going to nitpick about the comma, turn of phrase, about the possible interpretation of some terms … [in] short, we are entering a fourth dimension

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217 82AB 65257–65262.

218 82AB 65268.

219 82AB 65280.

220 82AB 65280.

221 P5; 82AB 65311.

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> knowing that it's once again the lawyers who are handling the case. …
>
> *With my email below, I hope they will realise that they are ridiculous in their attempt to delay payment by using the terms of the certificate as an excuse …* They can always try! ***Too bad, they ran into Audrey, Miss 'never give up'!!*** …
>
> …
>
> ***By all means, Pontiac or not, we're going to have a Raffles Grill really soon!!*** *March or at the latest April!! I'm going to find out when, and I'll get in touch with you, 2 Centralians in action!!*
>
> [emphasis added in italics and bold italics]

When shown this email, Mr Meur admitted that he was on friendly terms with Ms Perez. He explained that the reference to "Centralians" was a reference to the engineering university that he had attended: a colleague of Ms Perez, with whom he had lunches with Ms Perez, went to the same university.[222]

134 On 5 March 2010, Millenia replied to Ms Perez's email and suggested how the 10 February 2010 Certificate could be reformulated.[223] Ms Perez replied to indicate that she was not agreeable with the proposed reformulation as it made reference to the Settlement Agreement which "Meinhardt are not privy to".[224]

135 On 25 March 2010, Arup issued a report on the Rectification Works (the "1st 2010 Report").[225] Importantly, the cover page stated that the report "is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party".[226] The report was based on a "representative inspection" of eight drops from 25 to 27 January and 1 to 3

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222 Transcript, 7 May 2015, p 140–141.

223 83AB 65602.

224 83AB 65777.

225 83AB 66149–66321.

226 83AB 66149, 66150.

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March 2010. According to Mr Hartog, these were drops 17, 21, 57, 61 and 78 and three other drops which do not correspond to any of the 80 drops.[227] Mr Yang's evidence, however, which I accept, is that the three other drops were drops 1 (called "Drop 7" in Arup's 1st 2010 Report), 30 (called "Drop 2" in the report) and 49 (called "Drop 3" in the report). Importantly, Arup did not inspect drop 80 (the drop from which the 2nd Panel fell: see [150] below).

136 Arup's 1st 2010 Report stated as follows:

> **2.1 General Quality Control and Workmanship**
>
> From the inspections, *the general quality and workmanship of the repair work were found to be acceptable except for the crucial issue highlighted in Section 2.2 below*. Most of the issues highlighted from our full investigation done previously have been satisfactorily carried out. …
>
> **2.2 Stone with hairline fracture**
>
> There are two types of issues observed from stone panels with hairline cracks on them:
>
> 1. Hairline cracks on stone but *without any evidence of remedial works being carried out*.
>
> 2. Hairline cracks on stone *with restraints installed within the crack lines*.
>
> According to the Method Statement, there are only two remedial methods to be applied to such defects depending on the severity of the crack. Should the crack significant and through the thickness or across the entire panel, these should be reinstated with a new panel. If the cracks are localized to the pin locations, then they should be installed with additional SS support pins. These were carried out in some locations but not in others.
>
> With regards to item number 2 above, *this method of repair has never been discussed or approved in the method statement and thus not acceptable*.
>
> **3 Summary and Recommendation**
>
> From the findings of our representative inspections, ***it appears that the remedial works were inadequately done. The***

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227 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, Annex 11, para 9 (p 771).

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> ***issue of the cracked stones were not addressed sufficient [sic] and it is a potential safety issue***. The integrity of any cracked stone is questionable and will be difficult to determine regardless of the additional restraints added. This was previously agreed and included as part of the method statement agreed by all parties. *In addition, it is also very disturbing to discover a totally new method of repair* (item 2 in Section 2.2) which was neither brought up nor discussed previously. This method is not acceptable and thus all stone with this repair method should be rejected. …
>
> [emphasis added in italics and bold italics]

The "totally new method of repair" referred to in Section 3 of Arup's 1st 2010 Report is known as "stitching". I will refer to this method of repair used on the Cladding as "the Stitching Procedure".

137 Dragages claims that the words in Section 2.1 of Arup's 1st 2010 Report (see [136] above) satisfied the requirement under the Settlement Agreement for Arup to provide written confirmation that the Rectification Works were carried out in accordance with the Settlement Agreement (see [85(d)] above).[228] I do not accept this submission. First, Section 2.1 itself states an exception, characterised as "crucial", in Section 2.2. Secondly, in Section 3, Arup clearly stated that the Rectification Works were "inadequately done", the issue of cracked panels was not sufficiently addressed and was a potential safety issue and the Stitching Procedure, an unapproved rectification method, was used on the Cladding. I therefore find that Arup's 1st 2010 Report did not amount, in full or in part, to a written confirmation in accordance with cl 11 of the Settlement Agreement.

138 On 12 April 2010, Meinhardt Façade issued a reply to Arup's 1st 2010 Report ("Meinhardt's April 2010 Reply") stating as follows:[229]

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228 Dragages' closing submissions at para 616.

229 84AB 66706–66711.

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(a) From Meinhardt Façade's inspection, the hairline cracks did not "go across and through the stone thickness".

(b) In terms of hairline cracks on stone without evidence of remedial works, a new method involving dead load rods was used to restrain some panels. Under this method, a rod was drilled into the RC wall at one end and inserted into the stone panel at the other end. Such works were aesthetically clean and had therefore probably escaped detection by Arup. Also, some panels with minor cracks were not rectified.

(c) In terms of cracks with restraints installed within the crack lines, the rectification methods had to be adjusted to deal with site issues such as tenant complaints about noise and vibrations due to drilling in carrying out the rectification methods. The Stitching Procedure was "a common industry practice", and was therefore not covered in earlier reports. Further, the application of the Stitching Procedure had been combined with the installation of wind load restraints and/or dead load rods where necessary.

I do not accept that the Stitching Procedure was employed for the sole reason of accommodating tenant complaints (see [(c)] above). Mr James Phillip Mann ("Mr Mann"), one of Meinhardt Façade's façade experts, noted that his client had advised that the Stitching Procedure "was developed on site in response to the decision not to use structural silicone … along with *the decision to minimize the number of cracked panels that would need replacement*" [emphasis added].[230] I find that one important reason, if not the principal reason, why the Stitching Procedure was used on the Façade was to cut costs.

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230 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 52).

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139 On 24 May 2010, after re-inspecting a drop it inspected in preparing the 1st 2010 Report, Arup issued a second report (the "2nd 2010 Report").[231] The 2nd 2010 Report stated that Arup had not observed that restraints had been added to the stitched panels as averred in Meinhardt's April 2010 Reply.

140 On 15 June 2010, Ms Perez sent an email to Millenia stating:[232]

> … *I am giving instruction to Cillius and Meinhardt to strictly stop responding to you and any of [Arup's] queries* (we are responding to their queries so far, no matter how unreasonable these are, indeed) *until [Millenia] make full payment of the monies due to [Dragages] as per settlement agreement.*
>
> Please inform your management forthwith that *it is very likely that we will start action in Court soon against [Millenia] for breach of Contract*, for their failure to fulfill their contractual obligations under the settlement agreement, read, payment of balance amount to [Dragages] once the rectification works completion certificate is issued by Meinhardt.
>
> Failing to pay is in absolute breach of our agreement … and *I will make sure that it is well known that [Millenia] are not keeping to your word on this.*
>
> …
>
> [emphasis added]

By this email, Ms Perez informed Millenia that she was instructing Mr Adrianto and Meinhardt (Façade) not to respond to queries by Millenia or Arup until Millenia made full payment of monies (allegedly) due to Dragages under (cl 18 of) the Settlement Agreement. Ms Perez threatened legal proceedings regarding the same. She also threatened to create bad publicity about Millenia.[233]

141 On 28 June 2010, Mr Foo sent a letter to Dragages stating as follows:[234]

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231 84AB 66782–66800.

232 84AB 66837.

233 84AB 66840.

234 84AB 66843–66844.

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(a) The 10 February 2010 Certificate was not in accordance with cl 11 of the Settlement Agreement for three reasons:

(i) it was issued by Meinhardt Façade and not by Meinhardt Singapore;

(ii) it referred to "enhancement works" and not "rectification works" as defined under the Settlement Agreement; and

(iii) it did not contain a confirmation that the Rectification Works complied with cll 12 and 14 of the Settlement Agreement.

(b) However, Millenia was prepared to pay a sum of $37,450 to Dragages upon written confirmation from Meinhardt Singapore that the 10 February 2010 Certificate was issued pursuant to and in compliance with cl 11. Nonetheless, this was not be construed as an acceptance by Millenia or Arup that the Rectification Works had been completed.

142 In July 2010, Ms Perez informed Mr Meur of Millenia's concerns as set out in [141(a)(i)] and [141(a)(iii)] above.[235]

143 Mr Meur then approached Dr Juneid Qureshi ("Dr Qureshi"), Meinhardt Singapore's Group Design Director of Structural Engineering.[236] He explained that there was a dispute regarding the Façade and that one of the parties had engaged Meinhardt Façade, and asked for a letter to explain that, in the Meinhardt Group, façade engineering was Meinhardt Façade's and not Meinhardt Singapore's expertise.[237] Dr Qureshi agreed to do so, and issued a

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235 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 75 and 79.

236 Vol 19 BAEIC, AEIC of Juneid Qureshi dated 24 February 2014 at para 1.

237 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at paras 77.

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letter dated 19 July 2010 for Meinhardt Singapore ("the 19 July 2010 Letter") stating as follows:[238]

> **TO WHOM IT MAY CONCERN**
>
> This is to confirm that [Meinhardt Singapore] and [Meinhardt Façade] are both subsidiaries of Meinhardt Group International.
>
> The areas of expertise of [Meinhardt Singapore] are Civil, Structure [*sic*], Mechanical and Electrical Engineering.
>
> All matters related to façade engineering are undertaken by [Meinhardt Façade].
>
> For any further information or enquiry, please do not hesitate to contact our Mr Mathieu [Meur] …

144 Mr Meur also obtained a copy of the Settlement Agreement from Ms Perez. I find that this was the first time Meinhardt Façade saw the Settlement Agreement. Mr Meur confirmed during the trial that he read the Settlement Agreement, and in particular cll 11, 12 and 14. He also confirmed that he knew Millenia would only pay Dragages (the second $35,000 payment under cl 18) upon receiving the written confirmation from Meinhardt under cl 11.[239] He then re-issued the certificate by a letter to Millenia dated 20 July 2010 copied to Dragages and Builders Shop ("the 20 July 2010 Certificate"). This states:[240]

> **NOTIFICATION OF RECTIFICATION WORK COMPLETION TO CENTENNIAL TOWER, SINGAPORE**
>
> We would like to confirm that, to the best of our knowledge, the rectification works carried out by Builder's Shop Pte Ltd (from September 2007 - October 2009) to the external perimeter of the Centennial Tower stone cladding (3 Temasek Avenue Centennial Tower, Singapore 39190), has been completed in accordance with the approved method of statement and in accordance with clauses 12 and 14 of the settlement agreement between [Millenia] and [Dragages] and [Builders Shop].

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238 84AB 66976.

239 Transcript, 7 May 2015, pp 157–162.

240 84AB 66981–66982.

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145 On 20 July 2010, Ms Perez sent a letter to Millenia enclosing the 19 July 2010 Letter and the 20 July 2010 Certificate,[241] stating that the enclosures "thoroughly address all your concerns accordingly" and requesting that Millenia release the payment under cl 18(b) of the Settlement Agreement.

146 On 6 August 2010, Millenia sent a letter ("the 6 August 2010 Letter") to Dragages enclosing a cheque for the sum of $37,450. The letter states:[242]

> 2. Notwithstanding our request for [Meinhardt Singapore] to issue a written confirmation to us stating that the letter dated 10 February 2010 is issued by [Meinhardt Façade] pursuant to and in compliance with [cl 11] of the [Settlement Agreement], we note that this has not been done. Accordingly, ***our position remains that [Meinhardt Singapore] has not provided written confirmation of its approval of the Rectification Works in accordance with [cl 11] of the [Settlement Agreement]*** and hence, our obligation to pay the sum of S$35,000 pursuant to [cl 18(b)] of the [Settlement Agreement] has not arisen.
>
> 3. Nevertheless, *to break the deadlock between the parties* ***and strictly on a without prejudice basis***, we enclose our cheque for the sum of S$37,450 being payment of our contribution towards the Total Costs under [cl 17(a)] of the [Settlement Agreement], $37,450. Kindly acknowledge receipt of the same.
>
> 4. Given that we have made full payment of the monies due to you under the SA, moving forward, we expect that you and/or your consultant (i.e. [Meinhardt Singapore] and/or Meinhardt Façade) will fully co-operate with and render all assistance to us and/or our consultant, [Arup], to ensure that the Rectification Works fully comply with the terms of the [Settlement Agreement].
>
> 5. For the avoidance of doubt, our payment of the said sum of S$37,450 ***shall not be construed as an acceptance either by us or our consultant, Arup, that the written confirmation issued by Meinhardt Façade complies with [cl 11] of the [Settlement Agreement] or that the Rectification Works have been completed in accordance with the terms of the [Settlement Agreement].*** …
>
> [emphasis added in italics and bold italics]

241 84AB 66977–66982.

242 84AB 66987–66988.

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I make the following points about the 6 August 2010 Letter. It is clear that the 20 July 2010 Certificate was not in complete compliance with the requirements of cl 11 of the Settlement Agreement. It contained the phrase "to the best of our knowledge", which Millenia had objected to (see [131] above). However, it appears that after being threatened by Ms Perez (see [140] above), Millenia decided to yield to Dragages' demands for payment. But Millenia sought to protect its position. It did this by making clear that it was paying out on a without-prejudice basis, and *without accepting that Meinhardt had issued the necessary written confirmation under cl 11 of the Settlement Agreement*. As we shall see, the unequivocal statements to this effect in the 6 August 2010 Letter are important. This is because they undercut the argument that the 20 July 2010 Certificate caused Millenia to suffer the losses it is claiming for in this action. I elaborate on this point at [535(a)] and [575(c)] below.

147 On 7 September 2010, Arup and Meinhardt Façade conducted a joint inspection of the Cladding. Arup then sent an email to Millenia stating that, upon the inspection, it was confirmed that the additional restraining pins were not installed in cases where panels with cracks had been stitched.[243]

148 On 28 September 2010, Meinhardt Façade issued a report ("Meinhardt's September 2010 Reply").[244] This stated that dead load rods were not installed to secure all panels with hairline cracks, but were used on a case by case basis. Arup did not accept this. On 11 October 2010, Arup sent an email to Millenia on Meinhardt's September 2010 Reply to reiterate its recommendation that all cracked panels be replaced or restrained with dead load pins.[245]

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243 84AB 67036.

244 84AB 67117–67128.

245 84AB 67180.

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149 It does not seem that there was any further development thereafter in the discussions between Arup and Meinhardt Façade on the Rectification Works. The dispute regarding the cracked panels was not resolved. Arup did not ultimately issue written confirmation that the Rectification Works were carried out in compliance with the Settlement Agreement (see [85(d)] above). Notably, although Dragages submits that Arup did issue such confirmation (see [137] above), Ms Perez, its sole factual witness, accepted that (1) Arup did *not* do so and (2) the Rectification Works were thus not deemed completed under the terms of the Settlement Agreement, and I so find.[246]

The 2nd Fall and subsequent events

150 On 10 February 2011 at 8.43pm, the 2nd Panel fell from the 25th storey of the Building.[247] The panel fell from drop 80,[248] a drop that Arup had inspected in 2004 (see [54] above). As the 2nd Panel fell, it hit another panel (panel 81) on the 15th storey. The 2nd Panel landed on a concrete canopy one floor about the ground floor and broke into many fragments upon impact.[249] Some of the fragments spread onto the ground floor. Two passers-by were injured by the debris of the 2nd Panel, and significant property damage was caused.

151 On 11 February 2011, the BCA issued a second order to Millenia ("the 2nd BCA Order").[250] The BCA ordered Millenia to immediately appoint a PE to assess the structural integrity and stability of the Cladding, and to immediately take precautionary measures to obviate any danger. In addition, the BCA

246 Transcript, 19 May 2014, pp 151–152.

247 85AB 67300–67301.

248 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, Annex 11, para 2 (p 771).

249 Transcript, 28 June 2016, p 112; Transcript, 14 July 2015, p 174.

250 85AB 67304–67306.

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ordered Millenia to submit an investigation report prepared by the PE, which was to recommend plans for rectification works, and to subsequently perform the works recommended by the PE and approved by the BCA. The 2nd BCA Order concluded by stating that the BCA "may direct a closure of the building subject to the conditions of the building".

152 On or about 11 February 2011, Millenia engaged Arup as its PE.[251] Arup then began to inspect the Cladding. I will refer to this inspection as "the 100% Inspection". In doing so, Arup followed a protocol ("the Aurecon Protocol") developed by Mr Yang Li ("Mr Yang"), Millenia's façade expert in this case.[252] The Aurecon Protocol required Arup to record observations of various items listed therein. Notably, two of Arup's witnesses, Mr Derrick Yap Chong Yeow ("Mr Yap") and Mr Chin, testified, and I find, that in inspecting the Cladding, Arup was, in general, simply recording observations in accordance with the Aurecon Protocol. Arup did not perform the further *evaluative* task of assessing whether its observations amounted to defects,[253] with one exception: in identifying some panels to be in immediate danger of falling in the near future, Arup assessed those panels to be defective.[254] Having recorded its observations, Arup prepared reports which it sent to Millenia ("the 100% Inspection Reports").[255] Arup also created spreadsheets ("the 100% Inspection Spreadsheets"). There were 20 of such spreadsheets, each of which identified the panels on which one category of observation was found.[256]

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251 85AB 67310–67311; 99AB 78923–78959.

252 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at paras 11 and 30; 87AB 69518–69527.

253 Transcript, 19 May 2015, p 25; Transcript, 15 July 2015, pp 100–111.

254 Transcript, 19 May 2015, p 56; Transcript, 15 July 2015, p 123.

255 Vols 27–31 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at para 34 and DY-17 (pp 584–3257).

256 Vols 27–31 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at

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153 On or around 11 February 2011, Millenia engaged Cementone (S) Pte Ltd ("Cementone") to carry out restraining works on the panels which Arup identified were in immediate danger of falling.

154 On 13 February 2011, Mr Ong inspected the location from which the 2nd Panel had fallen in the presence of an Arup representative.[257]

155 On 25 February 2011, Arup issued a report ("Arup's 2011 Report").[258] In brief, Arup stated the following:

(a) The 2nd Panel was an infill panel which, similar to the 1st Panel, had been installed without pins fixed into its top edge.[259] Arup noted one difference: the panel above the 1st Panel had been restrained with a half pin welded to the shaft. However, Arup did not find such a half pin restraining the panel above the 2nd Panel.[260]

(b) Arup noted that while the original drawings for the Works did not include a detail for the installation of infill panels, there was a sketch of the detail in construction stage documentation. However, Arup had not found evidence that this intended method of installing infill panels had been adopted on site. Arup reiterated that it would not have been possible for infill panels to be installed with top pins (see [49] above).[261]

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paras 48 and 59 and DY-37 (pp 3852–3872); 103AB 81756–81776.

257 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at paras 439 and 445; 4.5 DBD 2821–2833.

258 85AB 67799–67833.

259 85AB 67799, 67803.

260 85AB 67799, 67813.

261 85AB 67799, 67811.

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(c) Arup noted that, as was the case with the 1st Panel (see [47(c)] above), the lower bracket pins of the 2nd Panel, which were still in place, had "bent outwards due to a prying action of a rotating panel about its bottom edge".[262] In other words, the lower pins had been bent as the 2nd Panel rotated outwards before falling from the Cladding. This evidence is of vital importance because, as I explain at [399]–[401] below, it indicates what the cause of the 2nd Fall was.

(d) Arup recommended the rectification of all infill panels, and a full 100% inspection of all the panels on the Building.

156 On or around 8 August 2012, Arup issued a letter to Pontiac Land Pte Ltd ("the 8 August 2012 Letter").[263] This letter is important in relation to the issue of whether Millenia is entitled to claim the cost of a reclad of the Façade:

(a) Arup first noted that it had found "16 typical defects", three of which were "critical", in its inspection of the Cladding. I note that most of these 16 defects appear to be reflected in the 16 categories of defects identified in Arup's 100% Inspection Reports (see [230] below), but the 16 types of defects noted in this letter do not correspond exactly with the 16 categories of defects noted below. The three critical defects were:

(i) cracks through the face and/or across the thickness of panels;

(ii) panels with two or more defective pins; and

(iii) spalling around pins areas "causing the effective number of pins to be 2 or less on the panel".

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262 85AB 67799, 67815.

263 102AB 81432–81435.

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(b) The letter then stated:

> Whilst immediate rectification works are being carried out to address the critical defects (first three noted above), *there still remains a concern on the long term structural integrity of the facade based on the remaining defects that have been observed*.
>
> Corrosion to the fixings whilst not an immediate cause of concern *will be a long term cause of concern as the corrosion will continue to occur and could potentially result in the failure of the fixing. This defect is difficult to rectify without removing the stone panel to access the anchorages behind*. Although in isolated cases it is possible to support one stone panel by taking support from its neighbours where there are multiple stones defective bracket must be replaced.
>
> Similar to this defect, ***there are several other defects that will need to be rectified to prevent the occurrence of potential failure in the long term***.
>
> [emphasis added in italics and bold italics]

(c) The letter then set out "three basic strategies available for the repair of the façade". Arup noted the following in relation to the first strategy, which was called "Piecemeal repair of the existing façade":

> After the various defects have been identified a contractor would need to be appointed to recondition the facade. … Whilst some [repairs] would be cosmetic *many others will require drilling additional supports into the supporting concrete walls behind, or the removal of stones, to either access anchorages as noted above or to repair the rear of the panels. In addition some cracked panels will need to be replaced, and it is anticipated that other panels may be damaged beyond repair during handling and dismantling*. The result is likely to be a ***long duration process*** and although the facade will be stabilised *there may be an* ***inconsistent appearance*** *due to the patchwork of new and old stone panels*. [emphasis added in italics and bold italics]

(d) Arup then set out two strategies, "Total replacement of the stone cladding with cladding" and "Total replacement of the stone cladding

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and glazing with an overcladding curtain wall". The difference between them was that the first involved retaining the existing glazing.

(e) Arup stated that, "[from] the assessment above, we believe that *it would be prudent to strip the entire façade and reclad, either option 2 or 3*" [emphasis added]. Arup also noted that a reclad would provide an opportunity to improve the Façade with, *eg*, improved thermal performance, improved durability and an improved building image.

(f) Arup then proposed to carry out a study to review the options for the Façade, and stated the following:

> We believe that *without carrying out a complete replacement of the façade*, ***there will always remain a potential risk of future façade failures if deterioration of the associated fixings or defects continues to occur***. [emphasis added in italics and bold italics]

In short, in the 8 August 2012 Letter, *Arup recommended that Millenia reclad the Façade*. I accept that Arup noted in this letter that a reclad would provide Millenia with an opportunity to improve the Façade. Yet reading the letter as a whole, it is clear, and I find, that the recommendation to reclad was made for three reasons: (1) *safety* (to eliminate the risk of future failures of the Façade); (2) *speed* (to ensure safety risks were addressed swiftly) and (3) *aesthetics* (to avoid the prospect that rectification works would make the Façade unsightly).

157 During cross-examination of Ms Chee, Mr Ho relied on the 8 August 2012 Letter to suggest that Millenia had decided to reclad the Façade in bad faith. According to Mr Ho, Millenia's motive for recladding the Façade was to better it: there were no genuine safety concerns justifying a reclad of the entire Façade.[264] Mr Singh objected to this line of cross-examination, on the basis that

[264] Transcript, 10 April 2014, pp 143, 146 and 161–162.

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Dragages did not plead that Millenia was opportunistic in recladding the Façade and Millenia had thus not brought forward evidence to refute this allegation.[265] Mr Singh emphasised that the 8 August 2012 Letter was disclosed in discovery (on 10 June 2013); yet Dragages had not amended its pleadings to allege bad faith by Millenia.[266] I agreed with Mr Singh, and indicated to Mr Ho that while it was open to Dragages to challenge the need for a reclad, the suggestion that Millenia was opportunistic in recladding the Façade was not part of its case.[267]

158 In any event, Ms Chee testified that the decision to reclad was made purely on safety reasons,[268] and I accept her evidence. Millenia submits that it decided to reclad the Façade based on Arup's advice.[269] I note that Ms Chee did not expressly testify that Millenia relied on Arup's advice to reclad the Façade. But it is difficult to conceive that Millenia did not do so given that (1) Arup was Millenia's consultant, (2) Arup recommended a reclad for safety reasons and (3) Millenia decided to reclad the Façade on safety grounds. I thus find that Millenia relied on Arup's advice in deciding to reclad the Façade.

159 On 28 August 2012, Millenia commenced this action against Dragages, Builders Shop and Meinhardt Singapore.[270] After Meinhardt Singapore filed its defence, Millenia added Meinhardt Façade as a defendant to the suit.[271]

160 On or about 10 October 2012, Arup completed its inspection of the Cladding.[272]

265 Transcript, 10 April 2014, pp 143, 156–157 and 163–164.

266 Transcript, 10 April 2014, pp 157–158 and 167.

267 Transcript, 10 April 2014, p 166.

268 Transcript, 10 April 2014, p 149.

269 Millenia's reply submissions at para 542.

270 Writ of summons dated 28 August 2013.

271 Writ of summons (Amendment No 1) dated 16 November 2012.

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161 On or about 15 November 2012, Cementone completed its restraining works.[273] According to the 100% Inspection Reports, *630* panels which were in immediate danger of falling were restrained. Arup informed the BCA of this by an email dated 7 December 2012.[274]

162 By a letter to Arup dated 27 November 2012 ("the 27 November 2012 Letter"), the BCA requested Arup to clarify the following matters:[275]

(a) the nature and number of temporarily restrained panels;

(b) whether follow-up action was recommended for the defective panels which had not been restrained; and

(c) "the safety of the building façade with panels which are both restrained and not restrained *in the short term (for the next 1 year)*" [emphasis added]. In other words, the BCA *sought clarification on the safety of the Façade within the next one year*.

163 On 4 December 2012, Mr Yap drafted a reply to the 27 November 2012 Letter ("the 4 December 2012 Draft") stating, *inter alia*, the following:[276]

(a) the restraints were "constructed of materials that are intended to give a service life in excess of two years";

(b) it was "Millenia's intent to carry out a replacement of the entire stone cladding …"; and

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272 102AB 81314.

273 102AB 81592.

274 103AB 81747–81748.

275 103AB 81707.

276 103AB 81730–81731.

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(c) Arup's opinion was that the Façade "with panels both restrained and not restrained and in their original condition *are safe and not in immediate danger of falling*" [emphasis added]. It is important to note, however, that in stating this opinion, Arup was replying to a query about the safety of the Façade in the immediate future (see [162(c)] above). The statement in the 4 December 2012 Draft that the Façade was "safe" must be read in this context: I do not understand it to be a statement that the Façade was safe for its design life. This could not have been what Arup meant given their earlier advice in the 8 August 2012 Letter.

164 On 7 December 2012, however, after a discussion with Ms Chee, Mr Yap prepared a revised draft of the reply to the BCA ("the 7 December 2012 Letter"),[277] which he sent to the BCA later that day after making a minor edit which is inconsequential.[278] The 7 December 2012 Letter differed from the earlier draft in the following ways:

(a) first, the sentence referred to at [163(a)] above was deleted;

(b) secondly, the sentence referred to at [163(b)] above was deleted and replaced with the following: "We will not comment on the follow up action of the panels which have not been restrained since Millenia is considering carrying out a replacement of the stone façade"; and

(c) thirdly, the words "safe and" were deleted from the sentence referred to at [163(c)] above, such that the sentence states that "panels both restrained and not restrained and in their original condition *are not in immediate danger of falling*" [emphasis added].

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277 103AB 81736–81738.

278 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at para 58; 103AB 81739–81746.

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165 During oral submissions, Mr Ho submitted that (1) Millenia decided to reclad the Building in late 2012 and (2) this decision was not made for safety reasons. Mr Ho also submitted that Millenia suggested the changes reflected in the 7 December 2012 Letter because Millenia "didn't want anything that could be issued, that could be used against them later to say that they replaced it under certain circumstances".[279] I do not accept this submission:

(a) First, I do not accept that Millenia decided to reclad the Façade to improve it rather than on the basis that it was unsafe. As I have noted, Dragages did not plead this claim and I have found that Millenia decided to reclad the Façade for safety reasons (see [157]–[158] above). It is important to note that if the decision to reclad was made in late 2012, as Mr Ho submitted, it was taken after the 8 August 2012 Letter where Arup recommended a reclad for safety reasons (see [156] above).

(b) Secondly, I also do not accept Dragages' allegations regarding Ms Chee's motives for the changes she (may have) suggested to the 4 December 2012 Draft. Importantly, as Mr Singh noted, Mr Ho did not ask Ms Chee questions about the 7 December 2012 Letter. In particular, Mr Ho did not suggest that Ms Chee had caused Arup to change the wording for Millenia's purposes.[280] In the circumstances, I do not accept that Mr Ho is entitled to raise this allegation against Ms Chee in submissions. Further, as I have explained (see [163(c)] above), I do not understand Arup to have been stating in the 4 December 2012 Draft anything more than that the Façade was safe in the short term. Any suggestion that Millenia suppressed an unequivocal statement by Arup that the Façade was safe is therefore without force.

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279 Transcript, 23 February 2017, pp 87–88.

280 Transcript, 24 February 2017, pp 205–206.

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166 On 6 December 2012, Dragages began third-party proceedings against Arup.[281] Builders Shop, Meinhardt Singapore and Meinhardt Façade followed suit and joined Arup as a third party.[282] Subsequently, on 18 October 2013, Millenia added Arup as a defendant to this action.[283]

167 In or around March 2014, Millenia started the tender process for the reclad of the Façade ("the Reclad"). Millenia's solicitors informed the court and the defendants of this during a pre-trial conference ("PTC") on 5 March 2014, and offered the defendants an opportunity to inspect the Cladding before the Reclad began.[284] It should be noted that this opportunity was not taken up by the other parties.

168 On or about 22 May 2015, Millenia began works to declad and reclad the Façade.[285] Mr Yang prepared a report on, *inter alia*, the state of the Façade behind the stone panels ("the Reclad Report").

The parties' cases

Millenia's statement of claim

169 Millenia's case is that the defendants breached their contractual and/or tortious duties owed to Millenia and thereby caused it loss and damage.

170 Millenia's case is that Dragages and Builders Shop breached:

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281 Dragages' third party notice dated 6 December 2012.

282 Builders Shop's third party notice dated 8 February 2013; Meinhardt Singapore and Meinhardt Façade's third party notice dated 14 March 2013.

283 Writ of summons (Amendment No 2) dated 18 October 2013.

284 Notes of Evidence, 5 March 2014, p 2.

285 AEIC of Yang Li dated 1 October 2015 at para 3.

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(a) the Deed and/or their duties of care in tort, in performing the Works and/or the Sub-contract Works;

(b) the Deed, because the Cladding was not free of defects and deteriorated or failed within 15 years from the date of practical completion, and the Building was not fit for its purpose;

(c) the Settlement Agreement and/or their duties of care in tort, in undertaking the Rectification Works; and

(d) the Settlement Agreement, by appointing Meinhardt Façade to undertake Meinhardt Singapore's roles under the Settlement Agreement and failing to ensure that Meinhardt Singapore performed those roles.[286]

Additionally, Millenia claims that Dragages breached the Contract and/or its duty of care in tort in performing the Works.[287]

171 Millenia's case is that the Meinhardt Parties breached their duties of care in tort to Millenia in the following ways:

(a) failing to fully inspect the Cladding with due care, in particular:

(i) failing to identify (1) panels resting on shafts that failed to sufficiently protrude beyond the conical bolts, *ie*, they were too short and (2) panels restrained by brackets which were not perpendicular to the RC wall;

(ii) failing to identify all panels with temporary spacers, nuts and washers or rods between them; and

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286 Millenia's SOC at paras 71–73, 75 and 80.

287 Millenia's SOC at para 71.

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(iii) failing to identify all panels that were shaky because the holes into which the pins were inserted were too large;

(b) approving the rectification works performed using the Stitching Procedure;

(c) failing to propose remedial and/or rectification works to ensure that the Building would be fit for its purpose; and

(d) making negligent representations that the Rectification Works carried out by Dragages and Builders Shop complied with rectification methods proposed by the Meinhardt Parties, were of a permanent nature and were carried out in a good workmanlike manner pursuant to, among other things, cl 12 of the Settlement Agreement.[288]

Notably, Millenia avers that Meinhardt Singapore was engaged to perform the Meinhardt's roles under the Settlement Agreement, and Meinhardt Singapore carried out those roles by its agent or nominee, Meinhardt Façade.[289] This is a crucial plank of Millenia's case against Meinhardt Singapore.

172 Millenia's case is that Arup breached:

(a) Arup's 2004 Appointment Letter and/or its duty of care in tort:

(i) by failing to advise Millenia to

(A) undertake proper and/or adequate maintenance of the Building, and/or

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288 Millenia's SOC at paras 74 and paras 76–79.

289 Millenia's SOC at paras 50–51.

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(B) implement proper and/or adequate safety and/or risk management measures to guard against adverse effects to the Building caused by deep underground works in the vicinity; and

(ii) by failing to properly identify defects in the 8 Drops;

(b) Arup's 2007 Appointment Letter and/or its duty of care in tort:

(i) by negligently providing written confirmation that the defects in the Cladding were rectified satisfactorily; and

(ii) by failing to ensure that the Building would be fit for its purpose upon the completion of the Rectification Works.[290]

173 Millenia claims that the defendants' breaches of their duties to Millenia caused the Cladding to contain serious and substantial defects.[291] Consequently, stone panels were (at risk of) cracking, chipping and/or becoming "shaky", and so in danger of falling off the Cladding. Therefore, the Cladding or a substantial part thereof was structurally unsafe and in need of rectification/replacement; and the Building was no longer fit for its purpose.

174 Millenia avers that the defendants' breaches of their duties caused it to suffer loss. Broadly, the loss which Millenia pleads falls within two categories. First, the loss which allegedly resulted from the 2nd Fall. Secondly, the loss of rectifying or replacing the Cladding, which loss allegedly resulted from the Cladding being structurally unsafe. Millenia seeks an indemnity from Dragages, Builders Shop and Arup against all loss and damage suffered by Millenia; and damages, interests and costs on an indemnity basis from the defendants.[292]

290 Millenia's SOC at paras 81–83.

291 Millenia's SOC at paras 84–85.

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175 Importantly, in its closing submissions, Millenia states that *it is not pursuing a claim for the cost of rectifying or replacing the Cladding from the Meinhardt Parties or Arup*. This is subject to a caveat. In respect of the Meinhardt Parties, Millenia submits that if it has lost remedies against Dragages or Builders Shop due to the negligence of the Meinhardt Parties, it is entitled to recover the full sum it claims in this suit from the Meinhardt Parties. In respect of Arup, Millenia submits that if it has lost remedies against Dragages, Builders Shop and the Meinhardt Parties due to Arup's negligence, it is entitled to recover the full sum it claims in this suit from Arup.[293] In oral submissions, Mr Singh confirmed that this was Millenia's position, stating the following:[294]

> In the circumstances, as far as Meinhardt (Singapore) and Meinhardt Façade are concerned, *our claim is for damages* ***consequent or as a result of and flowing from the [2nd Fall].*** As we said in our opening statement, to the extent that *any of our claims against Dragages and Builders Shop have been compromised because of Meinhardt's conduct, then we claim damages against them for that as well.*
>
> …
>
> Insofar as Arup is concerned, likewise, *our claim is for damages* ***resulting from the [2nd Fall]*** *and also if any of our claims against Dragages and Builders Shop have been compromised then, to that extent, damages.*
>
> [emphasis added in italics and bold italics]

Millenia's claims against the Meinhardt Parties and Arup fall to be considered in this light.

The defendants' defences to Millenia's statement of claim and Builders Shop's and Arup's counterclaims against Millenia

176 Dragages and Builders Shop mount broadly similar defences:

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292 Millenia's SOC at paras 74 and paras 88(1)–(2).

293 Millenia's closing submissions at para 877.

294 Transcript, 23 February 2017, pp 76 and 79.

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(a) First, they deny that they breached their contractual duties or duties of care in tort (which duties of care are denied).[295] Moreover, they aver that Millenia is estopped from alleging the breach at [170(d)] above; Builders Shop also claims that Millenia waived any requirement that Meinhardt Singapore was to perform its roles under the Settlement Agreement instead of Meinhardt Façade.[296] Builders Shop also avers that Millenia is estopped from alleging that it did not perform the Rectification Works, and waived any duty for it to rectify any defects.[297]

(b) Secondly, Dragages and Builders Shop aver that, even if they breached their duties, these breaches did not cause any defects in the Cladding nor cause Millenia to suffer any loss.[298]

(c) Thirdly, they claim that, even if Millenia had otherwise valid causes of action against them for breaching their contractual duties and duties of care in tort, their causes of action in relation to the defects were compromised by and/or merged into the Settlement Agreement.[299]

(d) Fourthly, they plead that any cause of action under the Contract (against Dragages) and for negligent performance of the Works and/or the Sub-Contract Works (against them both) is time-barred under the Limitation Act (Cap 163, 1996 Rev Ed) ("Limitation Act").[300]

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295 Dragages' Defence at paras 37B, 38A, 46D, 47, 51 and 57; Builders Shop's Defence and Counterclaim at paras 20, 34 and 37(a)–(g), (j)–(k) and (p).

296 Dragages' Defence at para 32; Builders Shop's Defence and Counterclaim at para 37(p).

297 Builders Shop's Defence and Counterclaim at paras 37(g) and 37(m).

298 Dragages' Defence at paras 46A to 46B and 58 to 59; Builders Shop's Defence and Counterclaim at paras 31(a), 31(c) and 37(h).

299 Dragages' Defence at paras 46E and 48; Builders Shop's Defence and Counterclaim at paras 31(b), 34A and 37(i).

300 Dragages' Defence at paras 46F and 48A; Builders Shop's Defence and Counterclaim

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177 Builders Shop also brings a counterclaim against Millenia. This is conditioned on a finding that Builders Shop did not complete the Rectification Works, and was responsible for the defects relied upon by Millenia. On that premise, Builders Shop avers that Millenia breached the Settlement Agreement by failing to highlight that the Rectification Works were incomplete and, on the contrary, confirming that the Rectification Works were complete. Builder Shop seeks a declaration that Millenia is liable to fully indemnify it for the costs of completing the Rectification Works and/or rectifying the defects.[301]

178 The Meinhardt Parties deny that they owed any duty of care in tort to Millenia.[302] In particular, Meinhardt Singapore denies that it was engaged to perform the roles assigned to Meinhardt under the Settlement Agreement. According to Meinhardt Singapore, it did not owe any duty of care to Millenia because it was not involved in any inspection of the Façade and did not request Meinhardt Façade to do anything on its behalf.[303]

179 Meinhardt Façade further avers that, even if it owed such duties to Millenia, it did not breach them.[304] Additionally, the Meinhardt Parties aver that, even if they breached duties to Millenia, they are only liable for the costs of re-inspecting the Cladding which they (allegedly) inspected, and not for any relief claimed by Millenia.[305]

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at para 35.

301 Builders Shop's Defence and Counterclaim at para 40.

302 Meinhardt Singapore's Defence at paras 41 and 43–44; Meinhardt Façade's Defence (Amendment No 2) ("Meinhardt Façade's Defence") at para 15(a)–(b), 18(a), 28(a), 28A, and 29(a).

303 Meinhardt Singapore's Defence at paras 24–25, 27, 41 and 44.

304 Meinhardt Façade's Defence at paras 26(a), 28(b) and 29(b).

305 Meinhardt Singapore's Defence at paras 49–52; Meinhardt Façade's Defence at paras 33–36A.

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180 Arup's defence is that it did not owe some of the duties which Millenia contended for;[306] moreover, it did not breach any duty to Millenia;[307] and any such breach did not cause Millenia any loss.[308] Millenia's claims under Arup's 2004 and 2007 Appointment Letters are also time-barred and subject to limitation of liability clauses.[309]

181 Arup counterclaims for two declarations or orders, interest and costs on an indemnity basis.[310] First, it seeks a declaration or order that Millenia's claims against it are time-barred, an abuse of process and should be struck out. Secondly, it seeks a declaration or order that Millenia, at all times, indemnify it against all loss arising from the proceedings and the third party action. In this regard, Arup expressly pleads cl 2 of the 2007 Appointment Letter and states that it will rely on the terms of, among other things, the 2007 Appointment Letter for their full effect at trial.[311] Arup also claims that Millenia breached an implied term of Arup's 2007 Appointment Letter that it would fully communicate Arup's concerns about the Rectification Works to the other defendants, thereby causing the latter parties to initiate third party proceedings against Arup.[312]

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306 Arup's Defence and Counterclaim at paras 18–22, 38–41, 56–58.

307 Arup's Defence and Counterclaim at paras 56 and 60.

308 Arup's Defence and Counterclaim at para 61.

309 Arup's Defence and Counterclaim at paras 13–14 and 34–35.

310 Arup's Defence and Counterclaim at para 72.

311 Arup's Defence and Counterclaim at paras 67–68.

312 Arup's Defence and Counterclaim at paras 71–72.

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Millenia's replies to the defences and defences to Builders Shop's and Arup's counterclaims

182 In response to Dragages' and Builders Shop's defences, Millenia avers that it relied on them to carry out their duties under the Settlement Agreement (and, in respect of Dragages, its duties under the Contract).[313] Millenia denies that its claims arising out of the 1st Fall and the defects subject to the Settlement Agreement had been compromised by and/or merged into, or settled under, the Settlement Agreement, such that Dragages and Builders Shop are not liable in respect of those claims.[314] Millenia also denies that its claims are time-barred.[315]

183 Millenia did not reply to the Meinhardt Parties' defences.

184 In response to Arup's defence, Millenia denies that its claims against Arup are time-barred or subject to the limitation of liability clauses which Arup invokes.[316] Millenia avers that, even if the limitation of liability and time-bar clauses which Arup invokes were incorporated into the 2004 and 2007 Appointment Letters, they breach the Unfair Contract Terms Act (Cap 396, 1994 Rev Ed) ("UCTA") and thus Arup cannot rely on them.[317]

185 Millenia's defence to Builders Shop's counterclaim is that it does not disclose a cause of action; it also did not breach the Settlement Agreement.[318]

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313 Millenia's Reply (Amendment No 2) to Dragages' Defence ("Millenia's Reply to Dragages") at paras 2A and paras 15–16; Millenia's Reply and Defence (Amendment No 2) to Builders Shop's Defence and Counterclaim ("Millenia's Reply to Builders Shop and Defence to Counterclaim") at para 7(a).

314 Millenia's Reply to Dragages at paras 10–11; Millenia's Reply to Builders Shop and Defence to Counterclaim at paras 5 and 11A(a)–(b).

315 Millenia's Reply to Dragages at paras 19–20; Millenia's Reply to Builders Shop and Defence to Counterclaim at para 11A(c).

316 Millenia's Reply to Arup's Defence and Counterclaim at paras 3, 4(a)–(e), and 5.

317 Millenia's Reply to Arup's Defence and Counterclaim at paras 4(f), 16 and 17(a).

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186 Millenia's defence to Arup's counterclaim is that:

(a) it does not disclose a cause of action;

(b) the indemnity clause which Arup invokes does not apply or falls afoul of the UCTA;

(c) in any event, Millenia had no duty to communicate Arup's concerns about the Rectification Works to the other defendants; and

(d) even if Millenia had such a duty, it fulfilled it.[319]

Dragages, Builders Shop and the Meinhardt Parties' statements of claim against Arup

187 Dragages' case against Arup has two prongs:

(a) First, Arup breached its duties in contract and/or tort to Millenia by failing to undertake and/or advise Millenia to undertake proper maintenance of the Building and failing to implement and/or advise Millenia to implement proper safety and/or risk management measures in respect of adverse effects to the Building caused by deep underground works near the Building. These breaches caused the 2nd Fall and the alleged defects.[320]

(b) Secondly, even if Dragages is liable to Millenia for the 2nd Fall and the alleged defects, Arup contributed to these consequences by negligently accepting the Rectification Works as satisfactory and in

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318 Millenia's Reply to Builders Shop and Defence to Counterclaim at paras 15–18.

319 Millenia's Reply to Arup's Defence and Counterclaim at paras 28–37.

320 Dragages' Statement of Claim (Amendment No 2) ("Dragages' SOC") at paras 6 and 17–21.

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accordance with the Settlement Agreement, in breach of its contractual duty or its duty of care in tort.[321]

In the event that Dragages is held to be liable to Millenia, Dragages claims a contribution from Arup in respect of the partial amounts due from it to Millenia (including costs) and its costs in this suit and the third party proceedings.[322]

188 Builders Shop broadly adopts Dragages' case against Arup.[323] It also avers that, if it is liable to Millenia, Arup breached its duty of care in tort to Builders Shop and/or committed negligent misrepresentation, by confirming that the Rectification Works were completed, and failing to inform and/or warn Builders Shop that its works were inadequate or defective.[324] Builders Shop seeks damages for Arup's breach of its duty of care, contribution for its liability (if any) to Millenia and its costs in this suit and the third party proceedings.[325]

189 The Meinhardt Parties' case against Arup is as follows:

(a) First, Arup breached its duties in contract and/or tort to Millenia by failing to properly identify defects in the 8 Drops, properly satisfy itself that Meinhardt's 2008 Report was adequate, properly satisfy itself that the Rectification Works were carried out correctly, and/or by committing the breaches pleaded by Millenia against Arup. Due to these breaches, Arup is wholly responsible for the 2nd Fall and the alleged defects in the Cladding.[326]

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321 Dragages' SOC at para 22.

322 Dragages' SOC at paras 7 and 23.

323 Builders Shop's Statement of Claim (Amendment No 2) ("Builders Shop's SOC") at paras 2–3 and 22–25.

324 Builders Shop's SOC at paras 26–31.

325 Builders Shop's SOC at para 32.

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(b) Secondly, even if the Meinhardt Parties negligently caused the 2nd Fall and the alleged defects, Arup's breaches (see [(a)] above) wholly caused or contributed to Millenia's loss and damage.[327]

In the event that the Meinhardt Parties are held liable to Millenia, they seek an indemnity or, in the alternative, a contribution from Arup, in respect of, *inter alia*, sums due from them to Millenia (including costs) and their costs in this suit and the third party proceedings.[328]

Arup's defences to Dragages, Builders Shop and the Meinhardt Parties' statements of claim

190 Arup's defences to Dragages' and Builders Shop's claims are as follows:

(a) first, it did not breach its duties to Millenia; and

(b) secondly, in respect of Builders Shop's case, it did not owe a duty of care to the latter;[329] moreover, it did not give written confirmation that the Rectification Works were satisfactorily carried out.[330]

191 Arup's defence to the Meinhardt Parties' case is that it did not breach its duties to Millenia; moreover, even if it did, its breaches did not cause the 2nd Fall or the alleged defects in the Cladding.[331]

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326 The Meinhardt Parties' Statement of Claim (Amendment No 1) ("The Meinhardt Parties' SOC") at paras 28–29.

327 The Meinhardt Parties' SOC at para 30.

328 The Meinhardt Parties' SOC at para 31(1)–(3).

329 Arup's Defence to Builders Shop's SOC at paras 47B–49.

330 Arup's Defence to Builders Shop's SOC at paras 47–47A and 49.

331 Arup's Defence to The Meinhardt Parties' SOC ("Arup's Defence to The Meinhardt Parties' SOC") at paras 35–36.

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192 Moreover, Arup alleges that Arup's 2004 and 2007 Appointment Letters were subject to time-bar, limitation of liability, and net contribution clauses and required Millenia to indemnify Arup for claims against it.[332]

Dragages, Builders Shop and the Meinhardt Parties' replies to Arup's defences

193 Dragages denies that the clauses and requirement contended for by Arup (see [192] above) were part of Arup's 2004 and 2007 Appointment Letters; further, even if they were, they fell afoul of the UCTA.[333] Dragages further avers that Arup provided written confirmation that the Rectification Works were completed; and, further, had an implied duty not to unreasonably refuse or fail to issue such confirmation, the breach of which had the consequence of the Rectification Works being deemed to be completed and properly carried out.[334]

194 The other replies to Arup's defences are brief. Builders Shop states that it did not know of Arup's 2004 and 2007 Appointment Letters and would rely on their terms, meaning and effect at trial.[335] The Meinhardt Parties aver that, as they were not party to Arup's 2007 Appointment Letter, the clauses therein did not apply to their claims against Arup.[336]

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332 Arup's Defence to Dragages' SOC at paras 13 and 20; Arup's Defence to Builders Shop's SOC at paras 13 and 20; Arup's Defence to The Meinhardt Parties' SOC at paras 10 and 17.

333 Dragages' Reply to Arup's Defence to Dragages' SOC (Amendment No 1) ("Dragages' Reply") at paras 6–8 and 13.

334 Dragages' Reply at paras 21–23.

335 Builders Shop's Reply to Arup's Defence (Amendment No 1) ("Builders Shop's Reply") at paras 7–8.

336 The Meinhardt Parties' Reply to Arup's Defence (Amendment No 1) ("The Meinhardt Parties' Reply") at para 6.

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The issues

195 Millenia's case is that the defendants' breaches of their duties caused (1) the 2nd Fall and (2) serious and substantial defects in the Cladding, by virtue of which the Cladding was structurally unsafe.

196 No one disputes, nor can it be disputed, that the 2nd Fall occurred. Yet, it was at least initially disputed whether the Cladding contained serious and substantial defects that affected its safety and structural integrity, before the Façade was reclad; and the nature and extent of those defects are disputed. The cause of the 2nd Fall and the alleged defects is also disputed. There are therefore two overarching issues which have to be determined.

(a) First, did the Cladding contain serious and substantial defects which rendered it structurally unsafe, before the Façade was reclad; and if so, what was the nature and extent of the defects ("the Defects Issue")?

(b) Secondly, what caused:

(i) the 2nd Fall; and

(ii) if the answer to [(a)] is in the affirmative, the defects in the Cladding ("the Causation Issue")?

197 In respect of Millenia's claims against Dragages and Builders Shop, the following issues fall to be determined:

(a) First, what duties did Dragages and Builders Shop owe to Millenia in contract and in tort?

(b) Secondly, did Dragages and Builders Shop breach these duties?

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(c) Thirdly, did any breaches by Dragages and Builders Shop of their duties to Millenia cause the latter to suffer loss?

(d) Fourthly, if Millenia has otherwise valid causes of action against Dragages and Builders Shop, are any of these compromised by and/or merged into the Settlement Agreement?

(e) Fifthly, if Millenia has otherwise valid causes of action against Dragages and Builders Shop, are any of these time-barred?

198 In relation to Millenia's claims against the Meinhardt Parties, the following issues fall to be determined:

(a) First, did Meinhardt Singapore carry out the roles assigned to Meinhardt under the Settlement Agreement?

(b) Secondly, did the Meinhardt Parties owe any duty of care to Millenia in tort?

(c) Thirdly, did the Meinhardt Parties breach any such duties?

(d) Fourthly, did any such breach cause Millenia to suffer loss?

199 Millenia's claim against Arup raises the following issues:

(a) First, did Arup breach any duty to Millenia?

(b) Secondly, did any such breach caused Millenia to suffer loss?

(c) Thirdly, are Millenia's claims against Arup time-barred or subject to limitation of liability clauses?

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200 In respect of the counterclaims against Millenia, the key issue is whether they disclose any cause of action against Millenia and whether, even if they do, Millenia breached the duties alleged by Builders Shop and Arup.

201 In relation to the third party actions against Arup, the following issues fall to be determined:

(a) First, did Arup breach the duties to Millenia which Dragages, Builders Shop and the Meinhardt Parties alleged?

(b) Secondly, did any such breach cause the 2nd Fall or the alleged defects in the Cladding?

(c) Thirdly, do the time-bar, limitation of liability and net contribution clauses which Arup relies on apply?

202 Finally, a central issue is whether if the defendants are liable to Millenia, Millenia is entitled to recover the costs of the reclad of the Façade ("the Reclad Issue").

203 I shall now examine these issues in turn.

The Defects Issue

204 The first issue is whether the Cladding contained serious and substantial defects which rendered it unsafe, before the Façade was reclad; and if so, what was the nature and extent of the defects. Before delving into the evidence, I address two preliminary issues which arise from the parties' submissions: the nature of the evidence on the defects and the credibility of the façade experts.

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Preliminary issues

The nature of the evidence

205 The evidence on the defects consists primarily of:

(a) the photographs of panels and comments in the 100% Inspection Reports and the evidence of the façade experts regarding the same;

(b) the expert reports of the defendants' façade experts based on their inspections of representative sections of the Cladding; and

(c) the Reclad Report and the supplementary reports prepared by the defendants' façade experts on the Reclad Report.

Reference was also made to the 100% Spreadsheets and two other spreadsheets prepared by Millenia ("the 68% Spreadsheet" and "the 66% Spreadsheets"), reports by Earth Arts, Arup and Meinhardt Façade of their inspections of the Façade and records by Cementone of the panels it restrained after the 2nd Fall.

206 During the trial, there was much controversy over the evidence on the defects, some of which has found its way into the parties' submissions. I will therefore express my views on the relevant points.

(1) The 100% Inspection Reports and the 100% Spreadsheets

207 As noted at [152] above, Arup did not assess the panels noted in the 100% Inspection Reports and the 100% Inspection Spreadsheets to be defective (with the exception of panels that Arup assessed to be in danger of falling in the near future). Rather, Arup made observations in accordance with the Aurecon Protocol and left it to Mr Yang to assess whether its observations were observations of defects. Dragages submits that Millenia therefore cannot rely

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on the 100% Inspection Reports and the 100% Inspection Spreadsheets as evidence of defects without more, because what was recorded therein was not assessed by Arup to be defects.[337] According to Dragages, this means that "[t]he cornerstone of [Millenia's] case is missing".

208 In my view, it is important to distinguish two different questions:

(a) First, is there evidence that each and every panel recorded in the 100% Inspection Reports and the 100% Inspection Spreadsheets had the (alleged) defects recorded therein? The answer is plainly no. Millenia did not seek to establish that each and every panel recorded by Arup had the (alleged) defects Arup observed. On the contrary, as I note below, Millenia adduced the 66% Spreadsheets during the trial, which reflected Mr Yang's view (see [215] below) that Arup's records were both over-inclusive (some panels did not have the alleged defects Arup observed) and under-inclusive (some panels had defects which Arup did not record). (To be clear, I note that Mr Singh emphasised that the 66% Spreadsheets were not being adduced as evidence and I did not admit the 66% Spreadsheets as evidence.[338] I therefore do not treat the 66% Spreadsheets as evidence. This has implications: see [217] below.)

(b) Secondly, is there evidence that some (alleged) defects recorded by Arup were defects? The answer is clearly yes. The 100% Inspection Reports and the 100% Inspection Spreadsheets do not stand alone. Over 14 days of witness conferencing, the façade experts gave detailed evidence on the contents of the 100% Inspection Reports and assessed many stone panels to be defective. There was thus ample expert

337 Dragages' closing submissions at para 58.

338 Transcript, 2 March 2016, p 187; Transcript, 3 March 2016, pp 45–46.

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evidence on the observations recorded by Arup; and critically, ample evidence that many panels Arup observed were defective.

Ultimately, I do not consider it material that Arup did not generally assess the observations it recorded to be defects. It was not incumbent on Millenia to prove that each and every observation noted by Arup was a defect. What Millenia had to show was that there were serious and substantial defects that rendered the Cladding unsafe. Expert evidence to that end was adduced at trial.

209 I note, however, that there are limitations with the evidence in the 100% Inspection Reports. A number of photographs that Mr Yang showed me during the trial were unclear: they did not disclose the extent or nature of the alleged defect. However, I was generally able to form a view on the nature and prevalence of the alleged defect in question. I relied not only on the 100% Inspection Reports, but on the expert evidence of the defendants' façade experts which was based on their inspections of portions of the Cladding (see [205(b)] above). I went through hundreds of photographs and, where available, accompanying documents and evidence.

(2) The Reclad Report

210 The Reclad Report was prepared based on photographs taken during the Reclad, which began on 22 May 2015 (see [168] above). Millenia applied for the Reclad Report to be admitted into the evidence, before the witness conferencing of the façade experts. In its submissions, Dragages emphasises that the Reclad Report was filed on 21 September 2015, after the factual witnesses and most of the other experts had given evidence.[339] I note, however,

[339] Dragages' closing submissions at para 10.

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that at the very latest, the possibility that the Reclad Report might be introduced into evidence was raised during the trial on 22 April 2014.[340]

211 Dragages objected to the admission of the Reclad Report. After hearing the parties, I allowed Millenia's application for the Reclad Report to be admitted into the evidence for two main reasons.[341] First, I was satisfied that the evidence in the Reclad Report was credible and very relevant to the issues to be determined in this trial, in particular the Defects Issue and the Reclad Issue. Secondly, I considered that no prejudice would be caused to the defendants through the admission of the Reclad Report that could not be remedied by costs orders. I was fortified in these views in the course of the trial. It became apparent that the photographs in the Reclad Report ("the Reclad Photographs") showed many defects that had been hidden before the Reclad, such as corroding washers securing type A brackets, which Arup and Meinhardt Façade did not observe in their inspections of the Façade, and improperly embedded anchor bolts and brackets (see [681(b)] below). The Reclad Report was therefore very useful. Further, I observed that the defendants' façade experts were well able to meet the evidence in the Reclad Report in their supplementary reports and during the witness conferencing. It was thus evident that the defendants did not suffer any prejudice through the admission of the Reclad Report that could not be remedied by appropriate orders on costs.

212 In their supplementary reports, the defendants' façade experts noted that the decladding works may have damaged the panels and bracketing systems.[342] I bore this in mind in assessing the Reclad Photographs and Mr Yang's evidence

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340 Transcript, 22 April 2014, pp 47–48.

341 Transcript, 30 September 2015, pp 2–3.

342 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 34 (p 15); AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 32.5 (p 44).

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on the same. I note, however, that at the PTC on 5 March 2014, Millenia stated that it was proceeding with the tender for the Reclad and offered the defendants an opportunity to inspect the Cladding before the Reclad began (see [167] above). On 22 April 2014, Millenia stated that it would be looking into preparing the Reclad Report (see [210] above). The defendants thus knew (1) that the Façade was going to be reclad and (2) that a report would be prepared based on what was observed during that process. Any concerns over the nature of the decladding works may have been avoided or alleviated if the defendants had requested to observe the decladding works. No such request was made.

(3) The 68% Spreadsheet and the 66% Spreadsheets

213 The 68% Spreadsheet refers to a spreadsheet adduced by Millenia.[343] This spreadsheet depicts all the panels from levels 3 to 35 of the Building and reflects Mr Yang's view on which panels were defective. The panels in the 68% Spreadsheet are coloured green, red and purple.[344] Mr Yang's evidence was that he reviewed all of the panels in the 100% Inspection Reports and came to the view, on that basis, that 66% of the panels from levels 3 to 35 of the Building were defective.[345] I note, however, that Mr Yang did not inspect the Façade but relied on photographs and documents in the 100% Inspection Reports in arriving at this view. The panels that Mr Yang assessed to be defective based on the 100% Inspection Reports were the red panels in the 68% Spreadsheet. Mr Yang then assessed an additional 2% of the panels from levels 3 to 35 of the Building to be defective based on the Reclad Photographs. These were the purple panels in the 68% Spreadsheet.[346] The red and purple panels thus constituted 68% of

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343 Millenia's further and better particulars (Amendment No 2) dated 2 February 2016 at p 20.

344 Transcript, 4 March 2016, p 2.

345 Transcript, 29 February 2016, pp 150–152; Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 281 (amended) (p 112).

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the panels from levels 3 to 35 of the Building. Mr Yang assessed these panels to be defective. The remaining panels, which were not defective, are coloured green in the 68% Spreadsheet. There were 14,180 panels from levels 3 to 35 of the Building.[347] 68% of 14,180 panels would amount to around 9,642 panels.

214 The 68% Spreadsheet does not show the individual defect(s) that the red or purple panels had. In relation to the individual defects in the 100% Inspection Reports, on which basis Mr Yang assessed 66% of the panels from levels 3 to 35 of the Building to be defective, Millenia relies on the 66% Spreadsheets.

215 The 66% Spreadsheets consist of one summary spreadsheet and 21 other spreadsheets.[348] Each of the 21 spreadsheets concern one specific type of alleged defect, and purport to show which panels had that particular alleged defect. The panels are shaded in four colours: green (the panel did not have the alleged defect), blue (Arup observed that the panel had the alleged defect, but Mr Yang assessed that it did not), pink (Arup did not observe that the panel had the alleged defect, but Mr Yang assessed that it did) and red (Arup observed that the panel had the alleged defect, and Mr Yang assessed that it was defective).

216 The 100% Spreadsheets and the 66% Spreadsheets do not identify the same defects on the same panels: the blue and pink panels reflect where Arup and Mr Yang disagreed. I had a number of concerns in this regard:

(a) First, in further and better particulars, Millenia stated that its case on the location of the defects was based on, amongst other things, the 100% Spreadsheets.[349] Mr Singh made clear that Millenia would not be

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346 Transcript, 4 March 2016, p 2.

347 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 281 (amended) (p 112).

348 P-15; Millenia's closing submissions at Annex A (pp 410–433).

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amending its pleadings to rely on the 66% Spreadsheets rather than the 100% Spreadsheets.[350] The 66% Spreadsheets therefore did not sit well with Millenia's pleaded case on the location of the defects.

(b) Secondly, in his first expert report, Mr Yang took the view that about 75% of the Cladding was defective (see [220(a)] below). When Mr Yang took the stand, he amended his report to state that based on the 100% Inspection Reports alone, *ie*, not accounting for the additional 2% of allegedly defective panels he found based on the Reclad Photographs, approximately 66% of the Cladding was defective (see [213] above). But it was only when the 66% Spreadsheets were introduced on 2 March 2016, during the witness conferencing of the façade experts, that I learnt that Mr Yang's view was not just that Arup had recorded observations that were not defects (hence the drop from 75% to a lower figure), but that Arup had failed to record some defects. The 66% Spreadsheets reflected not just blue panels, but pink panels as well. The defendants submitted that their experts would not have had an adequate opportunity to consider and evaluate the pink panels if the 66% Spreadsheets were admitted as evidence. I considered that this submission had some force.

Eventually, I dealt with the 66% Spreadsheets in the following way. Mr Singh confirmed that he was not relying on the 66% Spreadsheets as new evidence (see [208(a)] above),[351] and I allowed Mr Yang to refer to them on that basis with one important caveat.[352] I made clear that I did not wish to hear Mr Yang

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349 Millenia's further and better particulars (Amendment No 2) dated 2 February 2016 at para 2.2(a) (Builders Shop); Millenia's further and better particulars dated 18 February 2013 (the Meinhardt Parties).

350 Transcript, 2 March 2016, p 197.

351 Transcript, 2 March 2016, p 197.

352 Transcript, 3 March 2016, pp 45–46.

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in relation to pink panels.[353] Counsel agreed that this was a sensible way forward and the trial proceeded accordingly.

217 I make a final point regarding the 66% Spreadsheets. They show the basis of Mr Yang's evidence that 66% of the panels from level 3 to 35 were defective (based on the 100% Inspection Reports). Because the 66% figure was partially based on the pink panels, and I did not admit evidence regarding the pink panels into the evidence, I do not accept Mr Yang's evidence that the 100% Inspection Reports show that 66% of the Cladding was defective. I accept Dragages' submission that at most, only the red panels in the 66% Spreadsheets, as opposed to the pink panels, could be considered defective.[354] Dragages further submits, and I accept, that there were 4,481 red panels (31.6% of the 14,180 panels on levels 3 to 35 of the Building). The pink panels formed the remaining 34.4% of the 14,180 panels (around 4,878 panels) which Mr Yang assessed to be defective based on the 100% Inspection Reports.

The façade experts

218 I now come to my assessment of the credibility of the façade experts. The evidence on the defects was complex and complicated. Unfortunately, the façade experts could not reach a consensus on many issues. I therefore had to choose between competing opinions on many points.

219 Of all the experts, I found Mr Hartog the most objective and credible although I do not accept his evidence on every point. I also found the evidence of Mr Mann and Mr Hugh Keithly ("Mr Keithly"), the façade experts engaged by the Meinhardt Parties, generally credible, though I had to caution Mr Keithly

353 Transcript, 3 March 2016, pp 34–37.

354 Dragages' closing submissions at para 124.

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on one occasion not to advocate his client's case.[355] I found Mr Mann's report useful as it was based on his inspection of 28 drops, about 36% of the Cladding.[356] I bore in mind, however, that Mr Mann did not inspect the whole Façade and that his inspection was carried out relatively swiftly, over 17 days.[357]

220 I now turn to Mr Yang. The defendants strenuously attack his credibility. The following points are not in dispute:

(a) Mr Yang filed his first expert report on 15 January 2014. In this report, he opined that around 75% of the Cladding was defective.[358]

(b) However, when Mr Yang stated this opinion in January 2014, he had not reviewed all the photographs in the 100% Inspection Reports. He had only reviewed around 10% or 20% of the photographs therein.[359] He based his opinion on these photographs, and on a table prepared by Arup which he received from Millenia's solicitors.[360] That table was a table of the observations recorded by Arup when Arup had inspected only about 25% of the Façade,[361] stating that 76.6% of the panels inspected had defects of various types.[362]

221 In my view, Mr Yang should have been more careful in giving evidence in his first report. However, he explained that he did not have sufficient time to

355 Transcript, 2 March 2016, p 44.

356 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 22).

357 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 22).

358 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, original para 281 (p 112).

359 Transcript, 29 February 2016, p 85.

360 Transcript, 29 February 2016, pp 94–95.

361 1AB 19; Transcript, 10 March 2016, p 27.

362 1AB 19; Transcript, 10 March 2016, pp 25–26.

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review all of the evidence in the 100% Inspection Reports before he filed his report, because it was due one or two months after he received all of the information he required from Arup.[363] He had focused on the causes of the 2nd Fall and the cracks on the Façade in his first report.[364] While he stated that 75% of the Cladding was defective, he had qualified this claim by stating that this figure was based on information obtained from Arup.[365] He only came to understand the importance of the number of defects when the 75% figure was challenged during the expert conclave of the quantity surveyors in May 2014.[366] He then reviewed all the photographs in the 100% Inspection Reports and came to the view that they showed that 66% of the panels from levels 3 to 35 of the Building were defective (see [213] above).

222 After carefully considering Mr Yang's explanation, his evidence over the course of 14 days of witness conferencing, and his demeanour, I came to the view that he was not a dishonest witness. Significantly, this was the first time that Mr Yang had served as an expert witness and I considered his evidence and his conduct in that light.[367] However, I struggled to follow his evidence on certain points and treated his evidence with some care. I also note that Mr Yang, unlike Mr Mann and Mr Lalas, did not conduct a personal inspection of the Cladding but primarily relied on photographs in forming his opinions on the defects (see [213] above). I bore this in mind in assessing Mr Yang's evidence.

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363 Transcript, 29 February 2016, p 109.

364 Transcript, 29 February 2016, p 120.

365 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 78(l) (p 41).

366 Transcript, 29 February 2016, p 120.

367 Transcript, 29 February 2016, pp 108–109.

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223 I now come to the credibility of Mr Lalas. I found Mr Lalas to be the least credible façade expert. I had to caution him more than once to be careful in giving evidence.[368] I note three especially disquieting aspects of his evidence:

(a) First, there was an unfortunate episode where Mr Lalas showed me a bracket which he claimed was used on the Building.[369] Mr Hartog examined the bracket quietly and carefully, and then said that he doubted it came from the Building because on close examination, there were no signs of scratches or cement or epoxy on the bracket. All the other façade experts then examined the bracket and agreed. Mr Lalas was then queried. He said, rather abashedly, that Ms Perez had given him the bracket and said it was from the Building and he had accepted her claim.[370] I examined the bracket and it was obvious that there were no nicks or scratches and its surface was shiny. I find that the bracket was not used on the Building.

(b) Secondly, Mr Lalas stated in his report that although Earth Arts inspected the Façade, "the reports [of that inspection] are Arup reports including Arup headings and logos".[371] Under cross-examination, Mr Lalas admitted that he was so advised by Dragages (probably by Ms Perez) and had never seen the relevant reports before. Upon being shown them, he admitted that his statement was wrong: the reports were issued by Earth Arts, not by Arup. He agreed that he had been "*asked to put*

368 Transcript, 1 March 2016, p 180; Transcript, 3 March 2016, p 58.

369 Transcript, 3 March 2016, pp 53–65.

370 Transcript, 3 March 2016, p 62.

371 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 205 (p 49).

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this into an expert affidavit to be placed before the court, and [did not] even verify whether [the] statement [was] correct" [emphasis added].[372]

(c) Thirdly, certain paragraphs of Mr Lalas' report contain star (*) markings.[373] Mr Lalas explained that he had intended to substitute the markings with cross-references to correspondence to support the points he was making, some of which were allegations against Arup.[374] However, he could not find the references. Mr Lalas agreed that in the circumstances, he should have edited the text of his report to remove the points that he could not find references for. However, he did not do so.[375]

Apart from all this, there was the same limitation noted above in relation to Mr Mann's report, namely, that Mr Lalas did not inspect the entire Façade. He only inspected 10 drops, *ie*, 12.5% of the Cladding.[376]

My findings on the Defects Issue

224 I find that the Cladding contained serious and substantial defects which rendered it structurally unsafe, before the Façade was reclad. The defendants do not seriously dispute this. Dragages accepts that the Façade was unsafe until the Reclad "because of the presence of a number of panels [with] significant cracks".[377] Dragages claims that the Façade was safe when the Rectification Works were completed in October 2009, but then became unsafe due to external

372 Transcript, 27 June 2016, pp 156–157.

373 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, paras 205, 206 and 208 (pp 49–50 and 52).

374 Transcript, 28 June 2016, p 20.

375 Transcript, 28 June 2016, p 21.

376 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 49 (p 18).

377 Dragages' reply submissions at para 735.

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factors for which it cannot be held liable.[378] Similarly, Meinhardt Façade acknowledges that the Façade contained defects. However, it claims that the defects were construction defects caused by Dragages and Builders Shop, *ie*, the parties who constructed the Building, for which it cannot be held liable.[379]

225 My reasons for my finding at [224] above are as follows:

(a) First, all of the façade experts ultimately did not dispute that the Façade was unsafe before the Reclad. Mr Yang and Mr Hartog gave clear evidence that the Façade was unsafe.[380] During the trial, Mr Lalas eventually agreed that the Façade was unsafe before the Reclad because "there [were] a number of panels that [were] unsafe".[381] Similarly, during the trial, Mr Mann and Mr Keithly accepted that there were panels that were unsafe and needed to be rectified.

(b) Secondly, in the course of its inspection of the Façade after the 2nd Fall, Arup found 630 panels at risk of falling in the near future (see [161] above). I thus find that after the 2nd Fall, there were a substantial number of panels in risk of falling in the near future. The evidence of Mr Chin and Mr Yang, which I accept, was that most of these were panels with cracks (which had not been adequately rectified).[382]

(c) Thirdly, while Mr Lalas disputed many of the alleged defects raised by Millenia, his evidence was that around 250 panels on the Façade posed safety issues before the Façade was reclad.[383] Further, Mr

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378 Dragages' reply submissions at para 737(1)–(2).

379 Meinhardt Façade's closing submissions at paras 11 and 550.

380 Joint Expert Report of Façade Experts dated 22 February 2016 at p 63 (S/N 12.7).

381 Transcript, 29 June 2016, p 130.

382 Transcript, 15 July 2015, p 138; Transcript, 12 March 2016, p 111.

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> Lalas concluded that approximately 160 panels were so defective that they could not simply be rectified but had to be replaced entirely. These 160 panels were panels with cracks.[384]
>
> (d) Fourthly, I find that:
>
> (i) most of the types of observations recorded by Arup in the 100% Inspection Reports, some of which the defendants denied were defects, were in fact defects;
>
> (ii) several defects gave rise to safety risks; and
>
> (iii) there were many cases of these defects, *ie*, defects giving rise to safety risks on the Cladding.
>
> I shall now expand on my finding at [(d)] above with detailed findings on the individual defects alleged by Millenia. Since the parties dispute the definition of a defect, I will first clarify the definition of a defect.

The definition of a defect

226 Dragages claims a defect did not arise in every case where there was a departure from contractual specifications. Rather, a departure from contractual specifications had to compromise the safety and structural integrity of the Façade and its fitness for purpose to amount to a defect.[385] I do not agree. What exactly is a construction defect is something on which there can be considerable disagreement. It can mean a great many different things depending on the context in which it is discussed or examined. It can range from the adequacy or

383 Dragages' closing submissions at para 1099; AEIC of Peter Lalas dated 29 January 2016 at PL-1, paras 382–383 (p 143).

384 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, paras 576 and 579 (pp 111–112); Transcript, 29 June 2016, pp 129–130.

385 Dragages' closing submissions at paras 336 and 500–501.

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otherwise of complex foundations or structural integrity of parts of a building, to aesthetic considerations of form, design or intent down to the nuisance of a squeaking wooden floorboard or the uneven staining of doorframes. Generally, defects can be grouped into design deficiencies, material deficiencies, specification problems or workmanship deficiencies: see Jeremy Glover, "Liability for Defects in Construction Contracts – who pays and how much?" (2008) <https://www.fenwickelliott.com/sites/default/files/Liability for Defects in Construction Contracts.pdf> (accessed 6 September 2018) at para 3. In my judgment, the concept of a defect is correctly defined in the following passage from Nicholas Dennys QC and Robert Clay, *Hudson's Building and Engineering Contracts* (Sweet & Maxwell, 13th Ed, 2015) at para 4-071:

> Defective work is work which *fails to comply with the requirements of the contract and so is a breach of contract.* For large construction or engineering contracts, this will mean work which *does not conform to express descriptions or requirements*, including any drawings or specifications, *together with any implied terms as to its quality, workmanship, performance or design*. [emphasis added]

In other words, a defect obtains in every case where work does not comply with contractual requirements. It is important to distinguish two types of defects:

227 First, there were specific contractual requirements for some matters, *eg*, the size of pin holes (see [297] below). In relation to these matters, it sufficed for Millenia to prove a departure from the specifications to establish a defect. Millenia contends, however, that each alleged defect created or contributed to a safety risk either individually or in combination with others. The defendants challenged Millenia's arguments. I will give my findings on these points below.

228 Secondly, in relation to matters such as the minimum embedment depth of anchor bolts (see [279] below), I was not shown any specifications, drawings

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or product literature that stated what the contractual requirements were. Whether these alleged defects are defects turns on whether more general contractual requirements – *eg*, reasonable care and diligence in designing and installing the Cladding and ensuring the Building was fit for its purpose – were satisfied. It is thus necessary to examine whether these alleged defects gave rise to safety risks, for that is relevant to whether the general contractual requirements were fulfilled. To this extent, I accept Dragages' submission that whether certain alleged defects amounted to defects depends on whether they gave rise to safety risks (see [226] above). In my judgment, where Millenia sought to establish that an alleged defect was a defect because it led to safety concerns, Millenia had to prove real, non-speculative safety risks. It was not necessary for Millenia to prove that these risks were very serious or immediate. But the risks had to be real risks grounded in evidence.

229 I will thus approach the alleged defects in the following general manner:

(a) I first consider if the alleged defects involved breaches of specific contractual requirements. If so, they amounted to defects.

(b) I then examine whether the alleged defects created or contributed to safety risks.

(c) If there were any real safety risks, I then consider whether these were adequately addressed by the Rectification Works.

I now turn to the alleged defects.

The alleged defects

230 The 100% Spreadsheets identified 16 categories of alleged defects:[386]

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S/N	Description	Number of panels
1	Pins set into holes which were too large	240
2	Pins not welded or welded improperly on the shafts	1284
	(a) Pins that have become disengaged from the shaft and slipped deeper into the holes in the panels	1020
	(b) Pins that have slipped downwards and become exposed	264
3	Anchor bolts were excessively or insufficiently embedded into the reinforced concrete walls	19
	(a) Anchor bolts with more than two or three threads exposed	17
	(b) Anchor bolts with no threads exposed	2
4	Corroding anchor bolts, nuts and/or washer	632
5	Brackets not attached perpendicular to concrete wall, *ie*, wrong orientation of the brackets	701
6	Shafts not long enough to completely engage with the conical bolts	805
7	Corroding washers securing the shafts	882
8	Panels where nuts or washers were mounted onto the shafts	757
9	(a) Temporary spacers between panels	1734
	(b) Rods between panels	228
10	Stone panels with narrow and/or no movement joints	517

386 103AB 81756.

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11	Stitching with hairline cracks	81
12	Stitching across panels	1756
13	Panels with hairline cracks	588
14	Panels with chips: (a) at pin areas (b) at panel edges	1178 968 210
15	Panels which are shaky	240
16	Panels in danger of falling in the near future and that have been temporarily restrained	630

Further, in the Reclad Report, Mr Yang identified a 17th category of alleged defects, *ie*, pins of insufficient embedment depth.[387] I shall refer to each of these 17 categories of alleged defects as "DT1", "DT2" etc. Apart from DT1–DT17, Millenia also raised three alleged design defects in its closing submissions and I will consider them below.

231 I have referred to DT16 at [225(b)] above, and will not consider it separately below. Mr Chin's evidence, which I accept, was that DT16 refers to panels that were adjudged, on the basis that they had one or more of the alleged defects noted in DT1 to DT15, to be in danger of falling in the near future.[388]

(1) Overview of the alleged defects

232 The two defects which had the most direct connection to the safety and structural integrity of the Façade were certain cracks on panels (certain cases of DT13) and cracks/chips at pin areas (DT14a). Dragages accepts that certain

387 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 39).

388 Transcript, 15 July 2015, p 130.

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cracks – cracks which spanned across the face of the panel and cut through the thickness of the stone – and cracks/chips at pin areas undermined the safety and structural integrity of the Façade,[389] and I so find (I elaborate below). I note that DT13 and DT14a were the Schedule C Defects identified by Earth Arts and Arup as requiring urgent attention (see [78] above) and were identified by Arup as critical in the 8 August 2012 Letter (see [156(a)(i)] and [156(a)(iii)] above). I will consider DT13 and DT14 before turning to the other alleged defects.

233 In relation to the other alleged defects, Millenia's case appears to be that, in general, they gave rise to a safety risk because they led to a risk that DT13 and DT14a would eventuate. Millenia argues that many of the alleged defects gave rise to a risk of stacking, *ie*, a risk that the load borne by one panel would be transferred to another panel (see [26] above), which in turn gave rise to a risk that cracks on panels and cracks/chips at pin areas would form. This is because, according to Mr Yang, stacking would cause stress to build up on the panels. When the concentration of stress on the panels exceeded their flexural strength, cracks across panels and cracks/chips at pin areas would arise.[390] Mr Mann agreed that cracks would form on panels where the load on panels exceeded their flexural strength: he explained that this was the cause of the long cracks and full-width cracks he observed (see [240(b)] below). Mr Hartog agreed that stacking would cause cracks/chips at pin areas.[391] I thus find that stacking would cause cracks on panels and cracks/chips at pin areas of the panels.

234 However, the evidence was that the brackets were strong enough to take the weight of two panels. Stacking would thus only present a clear and present safety risk where more than two panels were stacked together ("multiple

389 Dragages' closing submissions at para 1095.

390 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 273 (p 109).

391 Transcript, 29 June 2016, pp 50–51.

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stacking").[392] I accept this evidence. However, in my judgment, so long as an alleged defect gave rise to a real risk of stacking, it gave rise to a real safety risk because, in combination with other defects, on the same and/or adjacent panels, multiple stacking or the risk of the same might arise over the design life of the Building, which was 50 years (see [14] above). My view here is consistent with the rectification proposals agreed upon between Meinhardt Facade and Arup. To take one example, after observing that nuts and washers stuck between panels could give rise to stacking, Meinhardt Façade recommended that all such objects be removed, without limiting this proposal to cases where multiple stacking might arise (see [259] below).[393] Meinhardt Façade clearly considered that a risk of stacking, without more, was a safety risk requiring remediation.

235 I will now address the alleged defects in the following order:

(a) I will first discuss DT13 and DT14 (see [232] above).

(b) I will then address the alleged defects that Millenia claims gave rise to a risk of stacking. The alleged defect which most directly gave rise to a risk of stacking is DT10. The other alleged defects which Millenia claims gave rise to a risk of stacking involve:

(i) components installed between panels (DT8 and DT9);

(ii) corroding components (DT4 and DT7); and

(iii) improperly installed components (DT3, DT5 and DT6).

(c) I then turn to the alleged defects which Millenia claims gave rise to a risk of cracks/chips forming at pin holes: DT1 and DT15, DT2 and

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392 Transcript, 29 February 2016, p 132; Transcript, 3 March 2016, pp 147–148; Joint Expert Report of Façade Experts dated 22 February 2016 at pp 27–28 (S/N 6.8).

393 75AB 59744, 59822–59823.

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DT17 (albeit in respect of DT2, although Millenia claimed DT2 would cause cracks/chips to form at pin holes, the primary safety risk brought to my attention was of pins disengaging from pin holes: see [306] below).

(d) Finally, I deal with two miscellaneous groups of alleged defects:

(i) DT11 and DT12, which pertain to "stitching"; and

(ii) the alleged design defects raised by Millenia.

(2) DT13: Panels with cracks

236 DT13 refers to panels with cracks. There is some dispute over what the contractual specifications required:[394]

(a) Mr Yang and Mr Hartog claimed that the panels were to be free of all cracks. They relied on the stonework specifications, cl 3.3.5 of which provided for the stone panels to be "free from … fissures, cracks … spalls … or other defects which would impair the strength, durability and *appearance* of the Work" [emphasis added], and cl 6.2.1 of which provided for the stone to be "free from cracks … of any kind".[395]

(b) Mr Mann and Mr Lalas observed that stone contains micro-cracks, and it would thus be impossible to supply stone which was free of all cracks. They opined that the panels were only required to be free from cracks that impaired their structural integrity for their intended use.

394 Transcript, 11 March 2016, pp 131–134.

395 59AB 47166, 47168, 47177.

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I accept that a stone panel would not have been defective merely because it had micro-cracks. Such cracks may well be inherent in granite. But provided the granite in question possesses the required characteristics (like hardness on the Mohs scale) and passes the requisite compressive, flexural, tensile and other tests, it is a suitable material with which to clad buildings. Many buildings in Singapore have granite cladding and do not have panels that fall off them. However, I find on the basis of the provisions cited by Mr Yang and Mr Hartog that all perceptible cracks impairing the appearance of panels were defects. Therefore, what Mr Mann described as short and moderate cracks, which were perceptible, as well as the long and full-width cracks he described, amounted to defects (see [240(a)]–[240(b)] below).

237 I now turn to consider whether panels with cracks presented a safety risk. I first make findings regarding panels with cracks spanning across the face of the panel and cutting through the thickness of the stone (see [232] above):

(a) The façade experts agreed,[396] and I find, that such panels were unsafe: they were in danger of falling off the Façade.

(b) I find that there were some such panels which were not rectified and only restrained by Cementone after the 2nd Fall. For example, the photographs of panel 38-05-119 show a crack across the face of the panel and through the thickness of the stone.[397] No rectification works were performed to this panel, which was restrained by Cementone.[398]

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396 Transcript, 11 March 2016, pp 138–139.

397 AEIC of Yang Li dated 1 October 2015 at LY-03 (pp 171–172); 27AB 20891; Transcript, 11 March 2016, pp 112–120.

398 Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (p 285).

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(c) I also find that such panels were not rendered safe for the rest of the design life of the Building even after Cementone's works:

(i) I find, based on the evidence of Mr Yang and Mr Keithly, that Cementone only installed temporary wind-load restraints and not permanent dead load restraints, to restrain the panels.[399]

(ii) I find that dead load restraints were necessary to rectify panels with full-width cracks. In this regard, I note that the rectification method Mr Lalas proposed for this defect was the insertion of four dead load rods through the panel.[400]

Further, even if Cementone's restraints were able to serve as dead load restraints, I find that they would not have rendered panels to which they were applied safe for the design life of the Building. Mr Yap opined that the restraints had a service life of around five to ten years.[401] Cementone completed its restraining works in 2012 (see [161] above). At that time, there was about 35 years left in the design life of the Building.

238 I was also shown panels with cracks across the full width or height of the panels ("full-width cracks"), but it was unclear whether the cracks were through the thickness of the stone. Several such panels presented safety risks that were not addressed during the Rectification Works. Four examples of this are as follows:

(a) Panel 8-28-30-R: There was a crack across the middle of this panel.[402] A single stitch was applied to the crack, on the right side of the

399 Transcript, 11 March 2016, pp 139–141.

400 Transcript, 11 March 2016, p 141.

401 Transcript, 15 May 2015, p 27.

402 16AB 12576, 12578; Transcript, 10 March 2016, pp 143–144.

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panel. Mr Yang's evidence was that most probably, there had only been a (small) crack on the right side of the panel at the time of the Rectification Works, which explained why only one stitch had been applied there, but the crack had then propagated across the face of the panel, despite the stitch. Mr Keithly agreed with Mr Yang.[403] This indicates that the Stitching Procedure did not effectively stabilise cracks, a point I return to at [319] below. Cementone applied four restraining pins and three stitches to this panel.[404] Mr Yang and Mr Hartog agreed that, without Cementone's works, the panel was unsafe; Mr Lalas and Mr Keithly acknowledged that it was "possibly unsafe".[405]

(b) Panel 24-26-38-R: I was shown a photograph which reveals that there was a crack across the face of this panel,[406] albeit the crack was stitched and four restraining pins were inserted into the panel. Mr Lalas stated that the stitches and the pins amounted to "an adequate repair".[407] Mr Chia then pointed out that the four pins had been installed by Cementone: the panel had only been stitched during the Rectification Works.[408] Mr Lalas admitted that there "may [have] be[en] a concern" if the "the dead load rods [were] not there".[409]

(c) Panels 1-27-31-R and 1-28-27-L: The photographs show cracks across the face of these panels.[410] Four restraining pins were also inserted

403 Transcript, 10 March 2016, p 147.

404 Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (p 104); Transcript, 10 March 2016, p 180.

405 Transcript, 10 March 2016, p 181.

406 21AB 16551; Transcript, 10 March 2016, p 158.

407 Transcript, 10 March 2016, p 162.

408 Transcript, 10 March 2016, p 168; Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (p 208).

409 Transcript, 10 March 2016, p 171.

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into each panel. However, these were only inserted by Cementone after the 2nd Fall:[411] the panels were not rectified during the Rectification Works. When asked about panel 1-28-27-L, Mr Lalas agreed that there was a "possibility" that it was unsafe without the restraining pins.[412]

I find that these panels were unsafe until they were restrained by Cementone, and even then, they were not made safe for the design life of the Building (see [237(c)] above). More generally, in view of the evidence on these four panels, I find that panels with full-width cracks which were not rectified were unsafe.

239 Apart from panels with full-width cracks, there were other panels with less extensive cracks which presented safety risks. Two examples of this are as follows:

(a) Panel 38-05-120: This panel had several vertical cracks, one of which was close to the top right pin of the panel.[413] It does not appear that the panel was rectified in any way. Mr Lalas stated that this panel was "a candidate for replacement", and Mr Mann, Mr Keithly and Mr Hartog agreed that the cracks were of concern.[414]

(b) Panel 38-07-114: There were cracks near the left edge of this panel extending from the middle of the panel to the top and the right.[415]

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410 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, Annex 10, paras 50–51.

411 Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (pp 60–61).

412 Transcript, 10 March 2016, p 174.

413 27AB 20892; Transcript, 11 March 2016, pp 174–175.

414 Transcript, 11 March 2016, pp 176–180.

415 27AB 20889; Transcript, 11 March 2016, p 169.

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The façade experts agreed that the panel should be monitored.[416] Again, this panel was not rectified during the Rectification Works.

240 I now turn to Mr Mann's evidence on the cracks. Mr Mann divided the cracks into four groups: short, moderate, long and full-width cracks.[417]

(a) *Short and moderate cracks*: According to Mr Mann, short cracks (across less than 30% of the face of a panel) and moderate cracks (across between 30% and 60% of the face of a panel) were most likely "pre-installation" cracks that formed while the granite was in the quarry.[418] Except for cracks at pins (DT14a), short cracks were stable and did not pose a "significant safety risk".[419] I note that Mr Mann's report is silent on whether moderate cracks posed a safety risk.

(b) *Long and full-width cracks*: Long cracks were cracks across between 60% and 90% of the face of a panel. According to Mr Mann, long cracks, unlike short and moderate cracks, were not pre-installation cracks. Rather, they arose from the same source as full-width cracks: flexural failure, arising where the load on the panel exceeded the stone's flexural strength.[420] Mr Mann's evidence in this regard was in accordance with Mr Yang's (see [233] above). On the evidence, it seems more likely than not that further flexural failure would have caused long cracks to propagate into full-width cracks. I therefore find that panels with long cracks also presented a real safety risk.

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416 Transcript, 11 March 2016, pp 169–171.

417 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 63).

418 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (pp 54–55).

419 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 69).

420 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 58).

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241 How many cracked panels were unsafe? It is difficult on the evidence to arrive at an exact number. However, I note the following points:

(a) First, Mr Lalas opined that there were around 160 cracked panels that were not only unsafe, but were so unsafe that they could not be rectified but had to be replaced entirely (see [225(c)] above).

(b) Secondly, as noted above, Arup recorded 588 instances of DT13 (see [230] above). Mr Mann inspected 221 of these panels and found that 26% of the panels he inspected (57 panels) had full-width cracks, and another 5% (11 panels) had long cracks.[421] In other words, almost a third (31%) of the cracked panels inspected by Mr Mann had full-width cracks or long-width cracks, which presented a safety risk (see [238] and [240(b)] above).

Bearing in mind this evidence, I find that there were at least around 200 panels with long or full-width cracks and which were thus unsafe. A substantial number of these panels were not rectified during the Rectification Works and were only restrained by Cementone after the 2nd Fall (see [238] above).

(3) DT14: Panels with cracks/chips at pin areas and panel edges

242 DT14 refers to cracks/chips at pin areas (DT14a) and chips at panel edges (DT14b).

243 I turn first to DT14b. The specifications provided that the panels were to be free from chipped edges.[422] I thus find that panels with chips at panel edges were defective. However, I find that chips at panel edges did not give rise to any

421 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 63).

422 59AB 47177.

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real safety risk. Mr Yang admitted that he did not have evidence of a chip at a panel edge that might have propagated into a full-width crack or given rise to any safety risk.[423] The façade experts ultimately agreed that DT14b was simply an aesthetic issue that did not give rise to a safety risk.[424]

244 I turn now to DT14a. I make the following findings:

(a) I find that there were many cases of DT14a. Mr Mann inspected 285 of the 968 panels which Arup claimed had DT14a and found that around 92% of the 285 panels had a crack/chip at a pin area.[425]

(b) More specifically, I find that there were many cases of DT14a where the crack/chip was on the back of the panel. These cases of DT14a presented a safety risk (see [245] below). Mr Mann and Mr Keithly considered 12 cases of DT14a in reviewing the Reclad Report, and noted that eight of these were on the back of the panel.[426] They opined that such cracks/chips may have been caused by the decladding works. But they were careful to observe that this only applied to some of the cracks or chips.[427] I find that some cracks or chips at pins areas on the back of panels arose before the decladding works.

245 All of the façade experts agreed, and I find, that cracks or chips at pin areas on the back of panels gave rise to a safety risk.[428] If a crack or chip formed

423 Transcript, 11 March 2016, p 211.

424 Transcript, 12 March 2016, p 18.

425 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (pp 70–71).

426 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 29.2 (p 39).

427 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at paras 29.4 and 32.9 (pp 39 and 44).

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around a pin on the back of the panel, the pin might not adequately restrain the panel and there was thus a risk that the panel would fall out.

246 I note that the defendants' façade experts emphasised that even if one of the pins restraining a panel had failed, the panel would have been adequately restrained by the remaining three pins.[429] Mr Keithly relied on a calculation in Meinhardt's 2008 Report which indicated that a panel restrained by three pins would have been structurally safe.[430] I accept that a panel would not have been in immediate danger of falling if one of the pins restraining it had failed. However, I do not accept that a panel had to be in immediate danger of falling for a safety risk to arise, because the design life of the Building was 50 years (see [14] above). The point is similar to the one concerning the risk of stacking (see [234] above). Where one pin on a panel was compromised, one of the four points of restraint for the panel was lost. This would have been especially so if that pin was a top pin. The two bottom pins and their shafts (and their brackets) supported the weight of the panel. The two top pins did not support the weight of the panel. Rather, they restrained the panel from falling inwards or outwards and the two bottom pins on their own, as shown by the two panels that fell off the Building, were unable to restrain the panel. I therefore find that the loss of one pin, especially a top pin, would have given rise to a safety risk. Notably, Meinhardt's 2008 Report did not provide for panels with less than four pins to be rectified such that they had four pins. However, after correspondence with Arup, Meinhardt Façade agreed that the panels should be rectified to their original four-pin configuration (see [110] above). This suggests that Meinhardt Façade considered that it was a safety risk for any panel to have less than four functioning pins. This is the view I have reached.

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428 Transcript, 11 March 2016, pp 182–183.

429 Transcript, 23 September 2015, p 56; Transcript, 12 March 2016, pp 29–31.

430 75AB 59744, 59843.

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247 I find that not all cases of DT14a where the crack/chip was on the back of the panel were rectified during the Rectification Works. Two examples of this are as follows:

(a) Panel 17-22-51: Mr Yang, Mr Hartog and Mr Keithly agreed that there was a chip around the top left pin on the back of this panel.[431] This was not rectified during the Rectification Works.

(b) Panel 69-25-44L: There was also a chip around the top left pin on the back of this panel, which was also not rectified during the Rectification Works.[432] Mr Lalas, Mr Keithly and Mr Hartog agreed that this should have been rectified soon after the photograph was taken.[433]

(4) DT10: Stone panels with narrow and/or no movement joints

248 DT10 refers to panels which were found to have narrow or no movement joints between them. What is at issue here is not the gap between the panels *per se*, which was designed to be 10mm (at installation), but the gap between the bottom of the shaft, which was 4mm thick, and the panel below, which gap was to be 6mm (see [26] above). This gap was the "movement joint" for the purpose of DT10; I will hereinafter refer to this gap as the "movement joint".

249 It appears that under Mr Yang's direction – Arup carried out the 100% Inspection following the Aurecon Protocol developed by Mr Yang (see [152] above) – Arup recorded every movement joint less than 4mm as an instance of DT10.[434] Notably, Arup did not distinguish between cases of no movement

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431 20AB 15263; Transcript, 3 March 2016, pp 152–156 and p 161.

432 38AB 29824–29825; Transcript, 12 March 2016, pp 21–27.

433 Transcript, 12 March 2016, pp 25–27.

434 Transcript, 3 March 2016, p 163.

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joints and cases of narrow movement joints. Thus, some cases of DT10 were cases of no movement joints; others were cases of narrow movement joints.

250 As I have noted, the specifications provided for the movement joint to be 6mm (see [26] and [248] above). However, the evidence of Mr Mann and Mr Keithly was that the contractual specifications allowed for 2.3mm fabrication tolerance in the size of the panels; and thus, a movement joint of 3.7mm at installation would have accorded with contractual specifications.[435] Mr Yang did not challenge this evidence. I accordingly find that movement joints of less than 3.7mm *at installation* would have amounted to defective work.

251 Yet the evidence of DT10 was not obtained at the time of installation but from 2011, when Arup began the 100% Inspection. Between the installation of the panels, and the date of inspection of the movement joints, the movement joints would have reduced; and critically, this would have been in accordance with the design. The evidence of Mr Lalas, Mr Keithly and Mr Hartog, which I accept, was that movement joints are designed bearing in mind that the joints would be reduced by several factors after installation.[436] Mr Yang accepted this: this is why he only deemed movement joints of less than 4mm to be defective (see [249] above), although the design provided for movement joints to be 6mm at installation.

252 Mr Lalas' evidence, which I accept, was that two factors, beam creep and column creep, would have occurred after installation and reduced the joints, albeit these factors would have ceased to have effect two years after the construction of the Building.[437] Nonetheless, he testified that beam creep and

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435 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 47); Transcript, 3 March 2016, pp 179–180; 65AB 51489.

436 Transcript, 22 September 2015, pp 132–134; Transcript, 3 March 2016, pp 174–184.

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column creep would only have reduced the movement joints to a very limited extent. He said beam creep would have been "very, very small". Column creep would have been about 1mm per floor; since there were four panels and thus four movement joints per floor; I find that column creep would have been about 0.25mm per movement joint. On this basis, it seems safe to conclude that any movement joint found in 2011 and thereafter to be less than around 3mm would not have accorded with contractual specifications: the joint would not have been 3.7mm when the panels were installed. I therefore find that movement joints which were found to be less than 3mm in 2011 and thereafter were defects.

253 I now make the following findings:

(a) I find that there were numerous cases of movement joints which were found to be less than 3mm in 2011.

(b) I further find that there were many cases in which there was no movement joint between two panels at all.

(c) I also find that there were cases where there were no movement joints between (at least) three adjacent panels. Dragages accepts that there were 12 such cases and that these "posed a genuine concern" (these defects were not rectified during the Rectification Works).[438]

254 The safety risk posed by DT10 was that of stacking. I first discuss the cases referred to at [253(b)] and [253(c)] above.

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437 Transcript, 22 September 2015, p 132.

438 Dragages' reply submissions at para 549.

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(a) The cases noted in [253(c)] above posed a real risk of multiple stacking, and therefore a clear and present safety risk (see [234] above).

(b) The cases noted in [253(b)] above posed a real risk of stacking, and thus a real safety risk (see [234] above).

255 I now address whether any safety risk was posed by narrow movement joints which were found to be of less than 3mm (see [253(a)] above).

(a) Mr Yang testified that various factors acting together – slippage of brackets or shafts, differential settlement of columns, building sway, thermal expansion of panels and the absorption of moisture by panels – could have eliminated a movement joint of less than 4mm.[439] This is relevant because if true, narrow movement joints of less than 4mm would have been unsafe, in view of the risk that they could have been eliminated altogether and thus given rise to stacking.

(b) I accept that slippage, due to, *eg*, insufficiently embedded anchor bolts (see [281(a)] below) may have reduced movement joints. But I do not accept that the other factors that Mr Yang relied on would have materially reduced movement joints. Mr Lalas, Mr Keithly and Mr Hartog agreed that these factors would not eliminate a movement joint of 4mm.[440] Differential settlement would have been insignificant at the material time; and Mr Lalas and Mr Mann performed calculations showing that building sway, thermal expansion and absorption of moisture would have reduced movement joints by less than 1mm. Mr Yang did not accept this, but he did not provide me with calculations of

439 Transcript, 3 March 2016, pp 170–173.

440 Transcript, 3 March 2016, pp 174–184.

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> his own or any material in support of his position. It thus seems safe to conclude, and I find, that leaving slippage aside, there was no real safety risk associated with any movement joint of more than 1mm. I therefore find that cases of DT10 involving movement joints of more than 1mm did not pose a real safety risk.

256 I find that not all instances of DT10 which presented a safety risk were rectified. Dragages accepts this (see [253(c)] above).

(5) DT8: Panels where nuts or washers were mounted onto shafts

257 Nuts or washers were mounted onto the shafts supporting some panels, to ensure that the panels and the movement joints appeared to be aligned.[441] In other words, these objects were positioned on top of the shafts (instead of in the movement joints). Arup recorded the panels where it observed nuts or washers on top of shafts as cases of DT8.

258 Millenia submits that the mounting of nuts or washers onto shafts eliminated movement joints between panels.[442] I do not agree. I find that the mounting of nuts or washers onto shafts did not eliminate, or even narrow, movement joints. As Mr Mann noted, nuts or washers were placed on top of the shafts and therefore could not reduce the movement joint, the gap between the bottom of the shaft and the panel below (see [248] above).[443] Mr Yang suggested that placing a nut or washer on a shaft might move the shaft lower, bringing it into contact with the panel below;[444] but there was scant evidence of this.

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441 Transcript, 3 March 2016, p 139.

442 Millenia's closing submissions at paras 308 and 311.

443 Transcript, 3 March 2016, p 145.

444 Transcript, 3 March 2016, p 147.

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259 However, Mr Mann's evidence, which I accept, was that nuts or washers might lead to stacking – the transfer of load from upper to lower panels – *where the shaft was installed in contact with the panel below*.[445] If the shaft below was not in contact with the upper panel, and a nut or washer was mounted onto the shaft and came into contact with the upper panel, the load of the upper panel might transfer down through the nut or washer onto the shaft and thus to the lower panel. I find on this basis that the mounting of nuts or washers onto shafts, in cases where the shaft was installed in contact with the panel below, gave rise to a risk of stacking and, for that reason, posed a real safety risk. I note that the issue of nuts and washers in movement joints was identified in Arup's 1st 2004 Report (see [51(d)] above). It was also highlighted in Meinhardt's 2008 Report, where the following was stated:[446]

> Washer, nut or any other hard metal objects stuck in between the stone panels should be taken out. *This is to avoid excessive dead load transfer from panel stacking* to the dead load bracket of the lower stacked panel. [emphasis added]

Moreover, at trial, all the experts agreed that the nuts and washers should have been removed because of the risk that the load of the upper panel would not be transferred onto the shaft but onto (the bracket supporting) the panel below.[447] In view of this real safety risk, I find that the mounting of nuts or washers onto shafts installed in contact with the panel below was defective work. Notably, Mr Mann and Mr Keithly "agree[d] categorically" that DT8 was a defect.[448]

260 I find that there were cases where nuts and washers were mounted onto shafts in contact with the panel below, thus giving rise to a risk of stacking. In

445 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 42).

446 75AB 59744, 59823.

447 Transcript, 4 March 2016, pp 85–86.

448 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 32.9 (p 44).

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their review of the Reclad Report, Mr Mann and Mr Keithly found 26 cases of DT8; in 16 cases, there appeared to be contact between the upper and lower panels through the shaft and the nut or washer (and hence a risk of stacking).[449] Further, there were two sets of panels that may have reflected multiple stacking, panels 52-32-12-L to 53-32-14-L and panels 53-31-17-L to 53-31-19-L.[450]

261 I now consider whether cases of DT8 were rectified. I was shown one case of stacking arising from the mounting of a washer onto a shaft which was rectified, through the insertion of four dead load rods into the affected panel.[451] But I find that not every case of stacking arising from the mounting of nuts or washers on shafts was rectified. In their supplementary report, Mr Mann and Mr Keithly observed that further rectification work might have been necessary to address instances of DT8 which led to stacking.[452]

(6) DT9: Temporary spacers and rods between panels

262 DT9 refers to silicone-based setting blocks (DT9a) and dead load rods (DT9b) that were inserted between the panels during the Rectification Works.

263 Millenia submits that temporary spacers or rods were used to create movement joints between stone panels. However, they were not removed and thus there were no or narrow movement joints between the panels.[453] DT9 therefore gave rise to stacking or a risk of stacking.

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449 Transcript, 3 March 2016, pp 142–145; AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at paras 32.21 and 32.26 (p 46).

450 Joint Expert Report of Façade Experts dated 22 February 2016 at pp 27–28 (S/N 6.8).

451 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 42); 104AB 83081; Transcript, 3 March 2016, pp 148–150.

452 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at paras 26.3.2 and 32.26 (pp 37 and 46).

453 Millenia's closing submissions at para 317.

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(A) DT9A: SILICONE SETTING BLOCKS

264 I first address DT9a. The defendants' principal submission on DT9a is that the insertion of setting blocks was an agreed rectification method, and thus could not amount to a defect.[454] I find that the insertion of setting blocks was an agreed rectification method. It was identified as a remedial proposal in Meinhardt's 2008 Report.[455] The purpose of inserting the setting blocks was to ensure that when nuts, washers or other foreign objects between panels were removed, the panels above, which may have been supported by the objects, did not bed or sag (in the terminology used in Meinhardt's 2008 Report). Arup accepted the use of setting blocks as a rectification method in the 8 May 2008 letter (see [111] above). I therefore find that the mere insertion of setting blocks did not amount to defective work.

265 However, Meinhardt's 2008 Report provided that the insertion of setting blocks was "allowed for one to one panel stacking only".[456] In other words, they were not to be used across more than two vertically adjacent panels in a row. However, in his inspection of the Cladding, Mr Mann found a total of *126* cases where setting blocks were used "in groups of up to *twelve* vertically-adjacent panels" [emphasis added].[457] I therefore find that there were many cases where setting blocks were not installed in line with the agreed rectification measures: these were cases of defective work.

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454 Dragages' closing submissions at paras 235–237; Meinhardt Façade's closing submissions at paras 504–505.

455 75AB 59744, 59823.

456 75AB 59744, 59823.

457 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 44); AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 13.4 (p 15).

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266 Moreover, and more fundamentally, Meinhardt's 2008 Report did not state that the setting blocks were to be permanently installed on the Façade. According to Mr Yang, the failure to remove the setting blocks resulted in no or narrow movement joints, *ie*, a risk of stacking.[458] Importantly, Mr Keithly accepted that the retention of setting blocks between the panels gave rise to a risk of stacking. He testified that setting blocks that might have given rise to multiple stacking should have been removed after some time: according to him, "there was just *one last step not followed through to come back and knock these things out*" [emphasis added].[459]

267 Dragages contends, however, relying on Mr Lalas' evidence, that the setting blocks would stop transferring load after they had settled.[460] However, Mr Lalas ultimately accepted during the trial that a setting block in contact with an upper and a lower panel could transfer load from the former to the latter if the upper panel was not resting on the shaft intended to support it.[461] The rest of the experts agreed.[462] I therefore find that the continued presence of setting blocks gave rise to a risk of stacking at least in cases where there was no movement joint (*ie*, where the setting block was in contact with an upper and a lower stone panel), and thus a real safety risk. I note Mr Mann's evidence that the setting blocks he inspected did not exhibit any sign of deformation indicating load transfer.[463] However, I cannot discount the safety risk presented by setting blocks because apart from Mr Hartog, all the experts (including Mr Mann) agreed that a setting block that was transferring load might not exhibit

458 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 217 (p 95).

459 Transcript, 3 March 2016, pp 234–235.

460 Dragages' closing submissions at para 246.

461 Transcript, 4 March 2016, p 104.

462 Transcript, 4 March 2016, pp 105–108.

463 Transcript, 3 March 2016, p 232.

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bulging or any other form of deformation.[464] Mr Mann explained that this was because the setting blocks were made of a reasonably stiff rubber.[465]

268 I now consider whether instances of DT9a was rectified. Mr Mann noted that in *some* cases of DT9a, dead-load rods were installed to mitigate the risk of stacking.[466] I find that some cases of DT9a were rectified, but others were not.

(B) DT9B: DEAD LOAD RODS

269 I now address DT9b. The defendants contend that instances of DT9b could not amount to defects because the use of dead load rods was an agreed rectification method.[467] As Mr Mann noted,[468] Meinhardt's 2008 Report did not list dead load rods as a rectification method. However, the use of dead load rods was explained in Meinhardt's April 2010 Reply (see [138(b)] above). Arup did not challenge this rectification method; on the contrary, Arup subsequently recommended that panels with cracks be replaced or restrained with dead load pins (see [148] above). I therefore find that Arup approved the use of dead load rods as a rectification method; and I further find that the presence of dead load rods on the Cladding did not, without more, amount to a defect.

270 Millenia contends, however, that the use of dead load rods narrowed or eliminated movement joints and thus gave rise to stacking or a risk of stacking (see [263] above). I do not agree. Stacking, as I use the term in this judgment, refers to the transfer of load between panels (see [26] above). Mr Yang admitted,

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464 Transcript, 4 March 2016, pp 105–108.

465 Transcript, 4 March 2016, p 105.

466 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 44).

467 Dragages' closing submissions at paras 250–251; Meinhardt Façade's closing submissions at paras 506–507.

468 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 45).

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and I find, that dead load rods were tied back to the RC wall and their function was to take the weight of the panels above the rods (if necessary).[469] In other words, if the brackets supporting the panel above were overloaded or defective, the rods would take up the load of the panel.[470] Therefore, even if dead load rods eliminated movement joints, I find that there would have been no transfer of load from the upper panel to the lower panel, *ie*, no stacking, because the load of the upper panel would have been taken up by the dead load rods. For this reason, I find that the use of dead load rods did not give rise to a risk of stacking, and thereby a safety risk, by narrowing or eliminating movement joints.

271 I now turn to DT4 and DT7, the alleged defects involving rusty components which Millenia claims gave rise to a risk of stacking.

(7) DT4 and DT7: Rusty components

272 DT4 refers to anchor bolts, nuts and/or washers used to secure brackets to the RC wall. DT7 refers to washers used to secure the shafts. Although DT4 and DT7 were described as "corroding" components in Arup's 100% Inspection Spreadsheets, Mr Yap, who prepared these spreadsheets, testified that the word "rusty" would have been more appropriate as not all of the components noted by Arup were corroding.[471] Hence, I refer to DT4 and DT7 as rusty components.

273 I make the following findings:

(a) I find that the contractual specifications required the components to be made out of AISI Type 316 stainless steel. This was undisputed.[472]

469 Transcript, 10 March 2016, pp 57.

470 Transcript, 4 March 2016, pp 128–129.

471 Transcript, 19 May 2015, p 43.

472 Joint Expert Report of Façade Experts dated 22 February 2016 at p 10 (S/N 2.2).

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(b) I find, based on Mr Yang and Mr Mann's evidence, that the bracket components would not have been rusty if they had been made of AISI Type 316 stainless steel.[473]

(c) I find that there were many rusty anchor bolts, nuts and washers on the Façade.[474] Mr Lalas opined, based on a review of the photographs in the 100% Inspection Reports, that there were 260 cases of DT4 and 268 cases of DT7.[475] I therefore find that there were *at least* 260 cases of DT4 and 268 cases of DT7. The 100% Spreadsheets indicate that these defects were distributed over the Façade, although there were clusters of these defects on certain drops: drops 17–18, 20–21, 38, 40 and 46–50.[476]

(d) I find that there were cases of significant or severe corrosion. Mr Yang showed me a photograph of a corroded nut at panel 37-34-6-L, which Mr Mann and Mr Keithly agreed was significantly or severely corroded.[477] There was also a severely corroded anchor bolt, nut and washer at panel 38-21-55,[478] and severely corroded washers and nuts at panels 24-34-6-L and 24-33-7-L.[479]

Given my findings above, I find that DT4 and DT7 were defects, and there were numerous instances of these defects distributed over the Façade.

473 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 146 (p 69); Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 32).

474 Joint Expert Report of Façade Experts dated 22 February 2016 at pp 23 and 26 (S/Ns 6.4 and 6.7).

475 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 387 (p 144), pp 493 and 496.

476 Vol 31 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-37 (pp 3858 and 3861).

477 26AB 20432 and AEIC of Yang Li dated 1 October 2015 at LY-03 (p 2832); Transcript, 2 March 2016, pp 39–40 and 52.

478 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 3725).

479 AEIC of Yang Li dated 1 October 2015 at LY-03 (pp 647 and 649).

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274 I now consider whether DT4 and DT7 gave rise to a real safety risk. Millenia claims that rusty components would not have been able to secure brackets (DT4) and shafts (DT7),[480] which would have slipped downwards and thus led to stacking. However, the defendants submit as follows:[481]

(a) Millenia's case that rusty components would cause brackets or shafts to slip downwards is weak. Mr Mann inspected 36% of the panels of the Façade;[482] and upon review of these panels, not a single instance of DT4 coincided with an instance of DT10.[483]

(b) Mr Lalas performed calculations that indicated that the bracket components, if made out of mild steel, would "perform adequately for their expected life of around 50 years".[484]

(c) Rusty components were rectified: corrosion inhibitors and cold galvanising paint were applied to the same, in accordance with the proposal in Meinhardt's 2008 Report.[485] Further, brackets with rusty components could be rectified with dead load rods and twisted rods.[486]

275 I find that DT4 and DT7 gave rise to a real safety risk, *viz*, that rusty components would not have been able to hold brackets or shafts securely, though I am unable to find that the risk was severe or immediate:

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480 Millenia's closing submissions at paras 329 and 336; Millenia's reply submissions at para 243.

481 Dragages' closing submissions at paras 177–193; Meinhardt Façade's closing submissions at paras 430–439.

482 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 22).

483 Transcript, 2 March 2016, pp 51–52.

484 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 153 (p 55).

485 75AB 59744, 59826; Transcript, 2 March 2016, p 47.

486 Transcript, 2 March 2016, pp 56–57

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(a) First, the very fact that remedial proposals were proposed and implemented shows that DT4 and DT7 gave rise to a real safety risk. While no cases of DT4 corresponded with cases of DT10 on the panels Mr Mann inspected, it suffices that DT4 gave rise to a risk of stacking. In my view, the risk of stacking cannot be discounted on the basis that it had not been realised at the time of Mr Mann's inspection. As I have emphasised earlier, the design life of the Building was 50 years (see [14], [234] and [246] above). At the time of Mr Mann's inspection, less than 20 years had elapsed since the Building was completed.

(b) Secondly, Mr Yang's evidence was that Mr Lalas' calculations were not accurate because they did not account for bimetallic corrosion. Mr Yang referred me to the British Standard 8298:1994, the applicable code of practice for the design, installation and maintenance of stone cladding ("the British Standard").[487] This indicates that stainless steel components should not be used in contact with components made of mild steel, and only with zinc components under dry conditions. Mr Yang showed me photographs of components made of galvanised steel, *ie*, mild steel coated with zinc,[488] in contact with stainless steel brackets.[489] He said that there would be water at some of these regions; and they would corrode much faster than at the rate Mr Lalas postulated.[490] In response, Mr Lalas did not dispute Mr Yang's evidence except to claim that the relevant components would be dry "most of the time" and so less bimetallic corrosion would occur.[491] I find that there

487 AEIC of Yang Li dated 28 September 2015 at para 23 and LY-04 (pp 57–58).

488 Transcript, 2 March 2016, p 70.

489 AEIC of Yang Li dated 1 October 2015 at LY-03 (pp 647 and 649).

490 Transcript, 2 March 2016, p 77.

491 Transcript, 2 March 2016, p 78.

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would have been bimetallic corrosion; and it was thus not safe to rely on Mr Lalas' evidence that the components would "perform adequately" for "around 50 years" (see [274(b)] above).

(c) Thirdly, the specifications clearly required the components to be made out of stainless steel. There must have been a reason for this. I find that the reason was that if stainless steel were not used, components would rust and this would give rise to a safety risk (of stacking).

276 I also find that while some rusty components were rectified, others were not as (1) they could not be detected until the Façade was reclad (see [681(b)(i)] below),[492] or (2) it was not possible to apply corrosion inhibitors to some areas.[493]

277 I now turn to DT3, DT5 and DT6. These were components that Millenia claims were improperly installed, thus giving rise to a safety risk.

(8) DT3: Insufficiently or excessively embedded anchor bolts

278 DT3 pertains to anchor bolts that were used to attach brackets to the RC wall (see the diagram at [20] above). Millenia submits that some anchor bolts were insufficiently or excessively embedded in the RC wall. There was thus a lack of engagement between the anchor bolt and the nut. The bracket was therefore in danger of becoming loose and slipping downwards, reducing or eliminating movement joints.[494] Hence, DT3 gave rise to a risk of stacking.

279 It does not appear that there were specifications for the minimum embedment depth of anchor bolts. Mr Yang was not aware of such a drawing.[495]

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492 AEIC of Yang Li dated 28 September 2015 at para 17 (pp 12–14 and pp 17–18); AEIC of Yang Li dated 1 October 2015 at LY-03 (p 3728); Transcript, 2 March 2016, p 63.

493 Transcript, 2 March 2016, p 66.

494 Millenia's closing submissions at paras 246 and 252;

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I was shown one drawing which indicated that the minimum embedment depth of a Trubolt stud anchor was 50mm. However, this was not a design document but a drawing regarding proposed rectification methods after the 1st Fall.[496]

280 The issue is thus whether the anchor bolts were installed in a way that gave rise to a real safety risk; and consequently, were defective. In this regard, Millenia relies on British and Australian standards to contend that the anchor bolts were excessively or insufficiently embedded in the RC wall. All the façade experts agreed that the British and Australian standards were good practice.[497] However, Dragages argues that the mere departure from international standards did not render a panel unsafe, and emphasises that Mr Yang did not produce calculations to prove that the embedment of the bolts created a safety risk.[498]

281 Ultimately, this disagreement is moot given the evidence at trial that some anchor bolts were simply not safely embedded into the RC wall. I found several examples of insufficiently and excessively embedded anchor bolts, but it will suffice to refer to one example each where the experts agreed:

(a) DT3a (insufficient embedment): I was shown a photograph of an anchor bolt protruding some way out of the RC wall at an angle (panel 27-35-1-R).[499] Mr Lalas and Mr Keithly admitted that this was "not best practice".[500] Mr Lalas agreed that he had safety in mind when he spoke

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495 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 141 fn 28 (p 68).

496 1AB 585; Transcript, 2 March 2016, pp 101–102.

497 Joint Expert Report of Façade Experts dated 22 February 2016 at Appendix A, p 2 (S/N 1.4.1).

498 Dragages' reply submissions at paras 499–500.

499 AEIC of Yang Li dated 1 October 2015 at LY-03 (pp 16 and 1123).

500 Transcript, 1 March 2016, pp 164–165.

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of "best practice".[501] Mr Hartog also said that he would be concerned about the anchor bolt.[502] I find that this bolt was not safely installed: it was insufficiently embedded into the RC wall, and there was thus a risk of the bracket slipping downwards. Significantly, the photograph indicated that the risk had materialised: it showed a scratch mark which Mr Yang and Mr Keithly agreed showed the bracket had slipped.[503] I find on the basis of their evidence that the bracket in question did slip down.

(b) DT3b (excessive embedment): Mr Yang showed me a photograph of an anchor bolt that was barely engaged, if at all, with the nut because it was embedded very far into the RC wall (panel 37-33-7-R).[504] Mr Lalas agreed that he would not accept workmanship of this nature, as did Mr Mann.[505] I thus find that this anchor bolt was not safely installed because it was excessively embedded into the RC wall.

Two other panels with improperly embedded anchor bolts were panel 38-34-3-R and panel 22-35-02-R.[506] I find that some anchor bolts were installed in an unsafe and thus defective way, and thereby gave rise to a real risk of stacking, albeit this defect was not widespread (Arup found 17 instances of DT3a and 2 instances of DT3b: see [230] above).

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501 Transcript, 1 March 2016, p 200.

502 Transcript, 2 March 2016, pp 34–35.

503 Transcript, 1 March 2016, pp 163 and 165.

504 AEIC of Yang Li dated 1 October 2015 at LY-03 (pp 17 and 2847).

505 Transcript, 1 March 2016, pp 180–181.

506 Panel 38-34-3-R: AEIC of Yang Li dated 1 October 2015 at LY-03 (p 3550) and Transcript, 1 March 2016, pp 165–166; Panel 22-35-02-R: AEIC of Yang Li dated 1 October 2015 at LY-03 (p 276) and Transcript, 1 March 2016, pp 207–212.

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282 I also find that at least some cases of DT3 were not rectified: Meinhardt Façade did not propose remedial measures for this defect.[507] While Dragages submits that the panel referred to at [281(b)] above was rectified by means of a twisted rod,[508] I note that twisted rods were proposed as a remedial method only for panels requiring wind load restraint, *eg*, shaky panels and/or panels with cracks at the pins (see [322(a)] below).[509] It therefore does not appear that this defect was rectified.

(9) DT5: Brackets not attached perpendicular to the RC wall

283 DT5 concerns brackets that were not attached perpendicular to the RC wall, but were installed in other orientations.

284 Having reviewed the design documents,[510] I find that they provided for the brackets to be attached perpendicular to the RC wall. Therefore, brackets that were not attached perpendicular to the RC wall were defective.

285 I find that there were numerous instances of DT5 across the Façade:

(a) Mr Lalas opined, based on a review of the photographs in the 100% Inspection Reports, that there were 141 cases of DT5. I therefore find that there were *at least* 141 cases of DT5.[511]

(b) Mr Mann inspected 239 brackets. He observed that Arup's figure of 701 affected panels (see [230] above) may have been inflated because

507 Meinhardt Façade's reply submissions at para 240.

508 Dragages' closing submissions at para 170.

509 75AB 59744, 59869.

510 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 136 (p 66) and Annex 2, Tab 3 (pp 200–216); 66AB 52130–52146.

511 AEIC of Peter Lalas dated 29 January 2016 at PL-1, p 494.

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the design for type A and type C brackets (see [24] above) provided for them to be oriented at 90 degrees and 180 degrees respectively to type B brackets.[512] For this reason, according to Mr Mann, brackets that were recorded as instances of DT5 could in fact have been properly installed type A or type C brackets.[513] Nonetheless, out of the 239 brackets which he inspected, 87 were not installed at 0, 90 or 180 degrees. Mr Mann concluded that these "could therefore be considered misaligned to some degree".[514] I find that these 87 brackets were cases of DT5.

286 I find, however, that DT5 did not give rise to a real safety risk. Millenia argues that DT5 gave rise to a risk of stacking in two ways.[515]

(a) First, brackets that were not attached perpendicular to the RC wall could not hold their shafts securely in position. The shafts were thus in danger of becoming loose.

(b) Secondly, brackets that exhibited DT5 were unable to withstand their current load and would deflect downwards.

In either case, the shafts of the brackets would almost touch or touch the panel below,[516] thus narrowing or eliminating the movement joints.[517]

287 I do not accept these contentions for the following reasons:

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512 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 36).

513 Transcript, 2 March 2016, pp 120–121.

514 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 36).

515 Millenia's closing submissions at paras 206–208.

516 Transcript, 2 March 2016, p 111.

517 Millenia's closing submissions at para 208.

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(a) First, in relation to [286(a)], I find it difficult to understand why the shafts in brackets that were not attached perpendicular to the RC wall were in danger of becoming loose. Mr Mann's evidence, which I accept, was that each shaft was "held in place in position by the conical bolt which is independent of the bracket orientation".[518] In other words, it was the conical bolt, not the orientation of the bracket, which determined whether the shaft was held securely in position.

(b) Secondly, in relation to [286(b)], the evidence of Mr Mann and Mr Keithly was that a bracket's orientation did not affect its ability to support a stone panel. On the contrary, as a (type B) bracket was rotated towards 90 degrees of its intended orientation, its ability to withstand dead load and wind load would increase.[519] Mr Mann and Mr Keithly relied in this regard on a calculation by Meinhardt in its reply of 22 May 2008 to comments made by Arup on Meinhardt's 2008 Report (see [106] above).[520] During the trial, I asked Mr Keithly why, if that calculation were correct, the brackets were not designed to be installed in a rotated orientation.[521] Mr Keithly explained that the design accounted for ease of installation and hence did not provide for the brackets to be installed in a rotated orientation because it would be more difficult to install the brackets that way. Mr Hartog agreed with the evidence of Mr Mann and Mr Keithly, adding that if a bracket was installed at 180 degrees of its intended orientation, it would have the same ability to withstand load as if it were installed in the intended orientation.[522] Mr Lalas also agreed

518 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 37).

519 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 23.5 (p 35); Transcript, 2 March 2016, pp 122–125.

520 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at Appendix I (pp 132–141); 78AB 62175–62183.

521 Transcript, 2 March 2016, p 123.

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that a rotated bracket did not give rise to a safety issue.[523] I thus find that the orientation of a bracket did not affect its ability to withstand dead load and wind load. While Millenia relied on Arup's 2nd 2004 Report and an earlier calculation by Meinhardt in 2005 to contend that brackets that were incorrectly oriented were less able to support stone panels,[524] I do not place much weight on this evidence for the following reasons:

(i) First, while Arup's 2nd 2004 Report stated that brackets that were incorrectly oriented might not have "adequate strength for the predicted load", this view was stated to be subject to other calculations or test results.[525] Moreover, in any event, as noted at [(b)] above, Mr Hartog, Arup's expert, did not endorse the view expressed in Arup's 2nd 2004 Report at trial.

(ii) Secondly, Meinhardt's calculation in 2005 also indicated that rotated brackets had adequate strength to carry their loads, albeit they were allegedly less strong.[526] Therefore, Meinhardt's calculation in 2005 does not strongly support Millenia's case that rotated brackets would give rise to a real safety risk.

288 In summary, I find that DT5 was a defect but that it did not give rise to a real risk of stacking (and thus a real safety risk).

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522 Transcript, 2 March 2016, pp 126–127.

523 Transcript, 2 March 2016, p 116.

524 Millenia's closing submissions at paras 207–208.

525 69AB 54885, 54895.

526 71AB 56480, 56483.

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(10) DT6: Short shafts

289 DT6 refers to "shafts not long enough to completely engage with the conical bolts". The evidence indicates, and I find, that the yardstick adopted in assessing instances of DT6 was whether the shaft protruded a certain distance (not specified) out of the back of the conical bolts. Some recorded instances of DT6 were shafts that did not protrude out of the back of the conical bolts at all; others were shafts that only protruded beyond the conical bolts a short distance.

290 Millenia submits that the design drawings required the shafts to protrude out of the back of the conical bolts.[527] Having reviewed the relevant drawings,[528] I agree. Dragages claims the drawings for different brackets showed different lengths of shaft protruding past the conical bolts.[529] Dragages further submits that the design provided for shafts to be adjusted in and out, so that the granite panels could be aligned notwithstanding variances in depth in the RC wall.[530] Whilst I can accept Dragages' submissions here, all of the design drawings showed some level of protrusion of the shaft out of the back of the conical bolts. During the trial, Mr Lalas noted one reason for such a design: if the shafts were installed in this way, one would know that they were fully engaged with the conical bolts.[531] This explains why the design had this feature notwithstanding that it did not enhance the extent to which the shaft was held securely by the conical bolt (see [292(a)] below). In sum, I find that the design drawings

527 Millenia's closing submissions at paras 279–280.

528 66AB 52130–52146.

529 Dragages' reply submissions at para 528.

530 Dragages' closing submissions at para 210; Transcript, 2 March 2016, pp 162–163.

531 Transcript, 2 March 2016, p 152.

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provided for the shafts to protrude out of the back of the conical bolts. Therefore, any shaft that did not protrude out of the back of its conical bolt was defective.

291 I find that there were several cases of shafts that did not protrude out of the back of the conical bolts or hardly did so. Mr Yang showed me several photographs which illustrated this,[532] *eg*, the shafts at panels 38-3-133, 64-26-37, and 1-35-05-L.[533] Further, Mr Mann and Mr Keithly found, in reviewing 13 photographs of alleged instances of DT6 in the Reclad Report, four instances of shafts that did not protrude past the back of the conical bolt.[534]

292 Millenia contends that DT6 gave rise to a safety risk because where the shafts were not of the appropriate lengths, they were loose or in danger of becoming loose.[535] The shafts would tilt or be in danger of tilting down; and this would give rise to a risk of stacking. However, I find that Millenia has not proved on the balance of probabilities that where a shaft did not protrude out of the back of the conical bolt, this gave rise to a risk of stacking:

(a) All of the defendant's experts agreed that, to the extent that a shaft protruded beyond the back of the conical bolt, this did nothing in and of itself to enhance the extent to which the shaft was held securely by the conical bolt.[536] There was a "friction grip connection" between the shaft and the conical bolt, the strength of which "[did] not depend upon the area of the surfaces in contact".[537] Rather, the strength of the

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532 Transcript, 2 March 2016, pp 150–152.

533 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 4053, photo 3); 36AB 28082 (left pin) and 13AB 9817.

534 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 24.4 (p 36).

535 Millenia's closing submissions at paras 277 and 284–285.

536 Transcript, 2 March 2016, pp 152–157.

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connection depended on the torque that had been applied to the conical bolt when it was installed, which would determine the strength of the grip applied by the compression of the conical bolt on the shaft.

(b) Nevertheless, leaving the amount of torque to one side, all of the experts, including Mr Yang, agreed that there had to be at least 10mm of engagement between the shaft and the conical bolt,[538] which was 20mm in depth.[539] I therefore accept that, to the extent that there were shafts that did not engage with at least 10mm of the conical bolt, a real risk of stacking would have arisen because the shafts would have been loose. However, Millenia has not furnished sufficient evidence that there were any such shafts. I am unable to find on the basis of the photographs and the other evidence that shafts that did not protrude out of the back of the conical bolts did not engage with at least 10mm of the conical bolt. I am therefore unable to find that there were shafts which were not adequately engaged with the conical bolts, and were thus loose or in danger of becoming loose, thereby giving rise to a real risk of stacking.

293 In sum, I find that some cases of DT6, *ie*, those cases where the shafts did not protrude out of the back of conical bolts, were defects. However, there is insufficient evidence for me to find that they gave rise to a real risk of stacking (and thus posed a real safety risk).

294 I now turn to a separate group of alleged defects. Millenia's case is that these defects gave rise to a safety risk not because they led to a risk of stacking, but because they led to an independent risk that chips would form at pin holes.

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537 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 24.4 (p 36).

538 Transcript, 2 March 2016, pp 163–164.

539 Transcript, 2 March 2016, pp 152 and 154.

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(11) DT1 and DT15: Oversized pin holes and shaky panels

295 DT1 refers to oversized pin holes in the panels. DT15 refers to shaky panels.

296 The 100% Spreadsheets for DT1 and DT15 highlight exactly the same panels.[540] Mr Yap, who compiled the 100% Spreadsheets,[541] explained that DT1 and DT15 were "doubled up".[542] I glean from this that in collating the 100% Spreadsheets, Arup deemed every panel which it identified to be shaky (DT15) to have oversized pin holes (DT1). I pause to note that it is not clear why Arup deemed every case of DT15 to be a case of DT1. First, it is also possible, given my conclusions regarding the 2nd Panel, that some panels were shaky due to undersized pins (see [402(e)] below). Second, the Aurecon Protocol provided that in assessing whether panels were in danger of falling in the near future due to insufficient embedment of pins, Arup's inspectors were to shake the panels.[543] In other words, shakiness was identified as a symptom of panels with insufficiently embedded pins, a different defect from DT1. One possibility is that only extremely shaky panels would have been indicative of panels with pins of insufficient embedment depth (in danger of falling in the near future), and Arup did not find such panels (I note that Mr Mann did not find panels of severe shakiness: see [300] below). But the evidence is unclear in this regard. What is clear is that Arup deemed every case of DT15 to be a case of DT1, and I so find. I will therefore deal with DT1 and DT15 together. For brevity, I will simply refer to DT1 and not DT15 below.

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540 Vol 31 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-37 (pp 3853 and 3871).

541 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at paras 1 and 59.

542 Transcript, 19 May 2015, p 36.

543 87AB 69518, 69525; Transcript, 30 June 2016, pp 54–56.

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297 It is undisputed that the contractual specifications were for the pin holes to be 8mm in diameter, with a tolerance of +/-0.75mm.[544] Consequently, any pin hole with a diameter of more than 8.75mm would have amounted to a defect.

298 I find that there were many cases of pin holes exceeding 8.75mm, on the Cladding. I note that Arup did not measure the diameter of the allegedly oversized holes.[545] Nor did Mr Yang. However, the evidence was as follows:

(a) Mr Mann measured the pin holes on 81 of the 240 panels Arup identified as cases of DT1. He found 27 holes exceeding 8.75mm in diameter, with 13 exceeding 9mm in diameter; the largest pin hole was 10mm in diameter. He opined that extrapolating from this sample, about 80 panels might have been affected by DT1, and I so find.[546]

(b) Mr Yang testified that one could discern an oversized hole from photographs, because a hole of 8mm would be "very close to the pin".[547] Although some photographs Mr Yang showed me did not clearly show oversized pin holes, a photograph of panel 14-20-61 indicates that there was an oversized pin hole on this panel.[548]

I therefore find that there were numerous cases of DT1. I note that the pin holes were supposed to be drilled in the factory, and Mr Yang accepted that most of these factory-drilled pin holes would have been of the correct size. However, he explained, and I find, that some pin holes were drilled on site.[549] According to

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544 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 26).

545 Transcript, 29 February 2016, pp 227–228.

546 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (pp 26–27).

547 Transcript, 29 February 2016, p 228.

548 19AB 14554; Transcript, 29 February 2016, p 179.

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Mr Yang, site drilling had been done because there were "cast-in socket locations that [were] not in the right place", and the workers accommodated this by drilling some pin holes on site. On balance, I accept Mr Yang's evidence on this.

299 I now turn to the issue of whether DT1 created or contributed to a real safety risk. Millenia submits that oversized pin holes would result in the pins, which were 6mm in diameter (see [25] above), being loose or in danger of becoming loose. The panel would be shaky; it would rattle backwards and forwards. This would cause chips at the pin areas.[550] However, Dragages and Meinhardt Façade contend that oversized pin holes would not have resulted in the pins being loose or in danger of becoming loose for the following reasons:[551]

(a) The diameter of holes could have been wider at the surface due to chipping or cracks when the holes were drilled. If the rest of the hole was not oversized, the pin would have fitted securely in the hole.

(b) The design provided for the pin holes (along the top edge of the panels) to be fitted with PVC sleeves that would have filled the gap between the pins and the holes.

300 I find that oversized pin holes caused some pins to become loose. I accept that some pin holes may only have been oversized at the surface; and some may have contained PVC sleeves that filled the gap between the pin and the hole. However, Mr Mann examined 83 of the 240 panels Arup claimed were

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549 Transcript, 29 February 2016, pp 192–193.

550 Millenia's closing submissions at paras 218, 222 and 226; Transcript, 29 February 2016, p 182.

551 Dragages' closing submissions at paras 136–140; Meinhardt Façade's closing submissions at paras 347–355.

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shaky for shakiness.[552] He found 46 of these panels (55%) to be not shaky, but 23 panels (28%) exhibited minor shakiness ("a slight rattle") and 14 panels (17%) exhibited moderate shakiness ("a knocking"). According to Mr Mann, there were no panels which were severely shaky. Mr Mann deposed that the moderate shakiness of panels "may be attributed to oversized pin holes …".[553]

301 Further, I accept Mr Yang's evidence that where pins were loose in their pin holes, and the panels were consequently shaky, this led to a risk that chips would form near the pin holes. Mr Yang explained that chips would form due to continuous rattling of the panel backwards and forwards.[554] His explanation was consistent with Meinhardt's 2008 Report, which stated that a "[rattling] panel might be subjected to undue stress if it were allowed to rattle too often" and proposed that structural silicone be applied to address shaky panels.[555] Mr Yang's explanation was also consistent with Mr Hartog's comment that shaky panels were defective because there was "a potentially dangerous shortcoming in the load path and stone-fixing contact areas [in other words, the pin areas] of the intended design".[556] Mr Hartog expanded on this during the trial by noting that oversized pin holes could lead to half-moon or half circular cracks forming around pin holes, *ie*, DT14a.[557] I accept the evidence of Mr Yang and Mr Hartog.

302 I find that not all instances of DT1 were rectified during the Rectification Works. Mr Mann inspected the panels after the Rectification Works and found

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552 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 73).

553 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 73); Transcript, 12 March 2016, p 81.

554 Transcript, 29 February 2016, p 182.

555 75AB 59744, 59825.

556 Joint Expert Report of Façade Experts dated 22 February 2016 at p 41 (S/N 8.6).

557 Transcript, 29 February 2016, pp 186–188.

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shaky panels. It follows that not all instances of DT1, which defect manifested itself in shaky panels, were rectified during the Rectification Works.

(12) DT2: Half pins not welded or welded improperly

303 DT2 pertains to half pins (see [25] above). The parties agree that there were half pins that were not welded.[558] They disagree on:

(a) whether the contractual specifications provided for half pins to be welded to the shaft; and

(b) whether the lack of welding gave rise to safety issues, by causing some half pins to be loose or in danger of becoming loose.[559]

304 In relation to [303(a)], all of the façade experts except Mr Yang said that welding was not a requirement of the original design.[560] Mr Yang relied on an as-built drawing in support of his view that half pins were to be welded to the shaft.[561] However, that drawing was stated to be for "Soffit to 3rd Storey";[562] and Mr Yang eventually agreed that it was for a "non-typical area".[563] Mr Yang later referred to another drawing, but the evidence was that this drawing only applied to three panels that were reinstated after the 1st Fall.[564] Having reviewed other as-built drawings that the defendants highlighted,[565] I find that there was no

558 Joint Expert Report of Façade Experts dated 22 February 2016 at Appendix A, p 1 (S/N 1.1.1).

559 Millenia's closing submissions at paras 227–230.

560 Joint Expert Report of Façade Experts dated 22 February 2016 at p 21 (S/N 6.2).

561 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 165 (p 75) and Tab 13 (p 596); 66AB 52220.

562 66AB 52206.

563 Transcript, 22 September 2015, p 145.

564 Transcript, 1 March 2016, pp 24–25.

565 64AB 50910, 50985; 66AB 52130, 52131.

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specific contractual requirement for half pins to be welded to the shaft. Whether there should have been such a requirement is another matter (see [309]–[311] below).

305 Whether DT2 was a defect therefore turns on whether it gave rise to a real safety risk. During the trial, I was shown photographs of both vertical and horizontal half pins, *ie*, pins inserted into the top and bottom edges of panels and pins inserted into the sides of panels. I note at this point that the instances of DT2 reflected in the 100% Spreadsheets were instances of vertical half pins slipping downwards, not horizontal half pins slipping sideways. Nonetheless, the evidence on horizontal half pins was extensively discussed by the façade experts during the trial. I am satisfied that the parties will not be prejudiced by the admission of this evidence. I will therefore consider this evidence as well.

306 The primary safety risk highlighted in relation to vertical pins inserted into the bottom edge of panels, and horizontal half pins, was the risk that the pin would slip out of its hole and thus fail to restrain the panel. The primary safety risk highlighted into relation to vertical pins inserted into the top edge of panels was the risk that the pin would slip downwards and fail to engage with the shaft.

307 I shall first discuss the vertical half pins, beginning with DT2b (half pins inserted up into panels, which slipped down and became exposed). There was evidence of DT2b.[566] However, all the experts agreed that half pins exhibiting DT2b would not have completely disengaged from the panels they were inserted into, because there was a stone panel below the half pin. Even if the pin disengaged to the extent that it came to rest on the panel below, it would still have been sufficiently engaged in the upper panel.[567] Millenia submits, however,

566 21AB 16792–16793; Transcript, 11 March 2016, pp 109–112.

567 Transcript, 1 March 2016, pp 149–153.

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that in cases of DT2b, the panel might have rattled giving rise to chips around pins.[568] But I accept Mr Lalas' evidence that this would not have occured.[569] Mr Lalas explained that the dead load of the panel would have been resting on the shaft to which the pin was attached, and thus the friction at the pin hole would have been enormous, impeding the pin from rattling. I thus find that cases of DT2b did not give rise to a real safety risk. Hence, DT2b was not a defect.

308 I now come to DT2a (half pins inserted down into panels, which slipped deeper into the pin holes and were thus not fully engaged with the shaft). The experts agreed there were cases of vertical half pins, inserted down into panels, which were not fully engaged with their shafts. In respect of some pins, it was not clear whether the pin had slipped or was simply installed in the way shown in the photograph.[570] But there were examples of pins that would only have been engaged with the shaft, if at all, very minimally. One example is the top right pin of panel 53-33-08, which Mr Yang, Mr Lalas, Mr Keithly and Mr Mann agreed did not protrude out of the shaft at all (indicating that there was minimal engagement, if any, between the pin and the shaft).[571] The photographs in the Reclad Report of panel 24-33-08-L also show a half pin that was minimally engaged, if at all, with the shaft.[572] If the pins were installed in this way, with such scant (if any) engagement with the shaft, this would have been extremely shoddy workmanship. The multiple defects found on the Facade is evidence of shoddy workmanship. Whether the pins were installed in this way, or whether these pins subsequently slipped downwards, points to the same conclusion of

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568 Millenia's closing submissions at para 234(c).

569 Transcript, 1 March 2016, p 159.

570 29AB 22472; Transcript, 1 March 2016, pp 73–75.

571 31AB 24789 and Transcript, 1 March 2016, pp 78–80.

572 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 14).

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poor to shoddy workmanship. On balance, however, it seems more likely that the pins were not installed in this way; I find that they slipped downwards.

309 Further, I find that DT2a led to a real safety risk. Mr Lalas conceded that if there was even one panel where a half pin could slip downwards, that would not be safe.[573] The question is then whether DT2a was therefore a defect, *ie*, whether the general contractual requirements were breached in virtue of this safety risk (see [228] above). I do not accept Mr Lalas' evidence that welding was not "practical and safe from an engineering standpoint": I fail to understand this.[574] In view of the real safety risk due to the lack of welding, I find that DT2a (the fact that vertical half pins inserted down into panels were not welded to their shafts) was a defect.

310 I now turn to horizontal half pins. I find that there were horizontal half pins that had disengaged or were very close to disengaging from their shafts, such as a half pin on panel 55-05-123-R.[575] (It appears that this occurred because some panels moved sideways; the experts agreed there was evidence of such movement.[576]) I find this gave rise to a real safety risk as there would be one less pin restraining the panel if the pin disengaged (see [246] above). I therefore find that the lack of welding of horizontal half pins was a defect because it gave rise to a real safety risk.

311 In summary, the lack of welding of half pins was a defect in respect of vertical pins inserted down into panels (DT2a) and horizontal half pins inserted

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573 Transcript, 1 March 2016, p 83.

574 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 135 (p 39).

575 33AB 25963; Transcript, 11 March 2016, pp 91–96.

576 Transcript, 1 March 2016, pp 31–33; Transcript, 11 March 2016, pp 81–82 and 89.

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into the sides of panels. This was a design defect because the design did not provide for welding.

(13) DT17: Pins of insufficient embedment depth

312 DT17 refers to full pins of insufficient embedment depth. Notably, the 100% Spreadsheets do not include "pins of insufficient embedment depth" as a category of defects (see [230] above). The reason for this omission is unclear. The Aurecon Protocol required Arup to record panels with pins of insufficient embedment depth.[577] Arup did so: the 100% Inspection Reports contain photographs captioned "Insufficient embedment of pin" or words to that effect (according to Dragages, there are photographs of 295 such panels).[578] Further, the table prepared by Arup after its inspection of 25% of the Façade (see [220(b)] above) contains a category described as "Insufficient embedment of pins", indicating that there were 71 affected panels.[579] Yet this category of defects was not reflected in the 100% Spreadsheets. DT17 was only introduced in the Reclad Report. According to Mr Yang, DT17 only covered pins whose insufficient embedment was not previously observable.[580] Pins found to be embedded less than 12mm into the panels were counted as cases of DT17.[581]

313 The design provided for the full pins, of 70mm in length, to be embedded 30mm in the upper and lower stone panels, with a movement joint of 10mm.[582] The Reclad Report contained several photographs of full pins that Mr Lalas

577 87AB 69518, 69522.

578 Transcript, 30 June 2016, pp 58–60.

579 1AB 19.

580 AEIC of Yang Li dated 28 September 2015 at para 20.

581 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 39).

582 Joint Expert Report of Façade Experts dated 22 February 2016 at Appendix A, p 22 (S/N 1.17.1).

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admitted were embedded only around 6–8mm into their respective stone panels.[583] I thus find that there were several cases of full pins of insufficient embedment depth and that this was defective work, which was not rectified during the Rectification Works.

314 I now consider whether DT17 gave rise to a real safety risk. Two safety risks were identified. First, the risk of cracks forming around the relevant pins (DT14a). Second, the risk of the pins disengaging from the panel.

(a) *The risk of cracks forming around the pins*: Mr Yang claimed that where pins were insufficiently embedded into panels, cracks might form around the pins.[584] Mr Lalas disagreed. He claimed that he had performed calculations that showed that even if the embedment depth of the pin was 1–2mm, the stress in the granite at the pin would have been "acceptably low".[585] The calculations supporting this opinion are not set out in Mr Lalas' expert report and it is unclear what assumptions they were based on. Having reviewed the relevant drawings, it appears to me that one consideration may well explain Mr Yang's position. If a pin was embedded, say, 5mm into the pin hole, and the PVC sleeve into which the pin was to be embedded was too short, or had moved downwards, there may have been no PVC sleeve around the pin. The pins were 6mm in diameter (see [25] above); the pin holes were to be 8mm in diameter (see [297] above); and the PVC sleeve was 1mm thick.[586] The pin may thus have begun to rattle in the hole, leading to cracks around the pins.

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583 AEIC of Peter Lalas dated 29 January 2016 at PL-1, paras 279–282 (pp 117–120).

584 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 39).

585 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 276 (p 115).

586 1AB 619; Transcript, 12 March 2016, p 60.

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I therefore find that if there was no PVC sleeve around an insufficiently embedded pin, this may have led to cracks forming around the pin.

(b) *The risk of pins disengaging from the panels*: Mr Lalas accepted that a pin had to be sufficiently engaged into a panel so that it would not "pop out" due to, for example, building movements. He claimed that an embedment of 3mm would have been adequate.[587] I do not accept this. The British Standard, the applicable code of practice (see [275(b)] above), provided for pins to be embedded to a depth of at least 20mm.[588] Mr Lalas' figure of 3mm was far less than the 20mm stipulated by the British Standard and the 30mm provided for under the specifications. I therefore do not accept the 3mm figure postulated by Mr Lalas. However, there was insufficient evidence for me to make a finding on the precise embedment depth which, if not achieved, would have given rise to a risk of the pin disengaging from the panel.

315 I now turn to DT11 and DT12, both of which were described in the 100% Spreadsheets as involving "stitching".

(14) DT11: Stitching within a panel

316 DT11 refers to the Stitching Procedure, which was used with the aim of stabilising cracks on panels. It involved cutting a slot across cracks and inserting steel plates into the slot which were fixed in place using an epoxy glue.[589] I note that the Stitching Procedure was performed using metal plates and not pins.

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587 AEIC of Peter Lalas dated 29 January 2016 at PL-1, para 519 (p 178).

588 AEIC of Yang Li dated 28 September 2015 at para 23 and LY-04 (p 59).

589 84AB 67117, 67120; Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 52).

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317 It is undisputed, and I find, that the Stitching Procedure was not an agreed rectification method. Yet it was used on the Façade. I have found that one important reason why it was used was to cut costs (see [138] above).[590]

318 Millenia submits that the Stitching Procedure was not a proper rectification method: panels to which the Stitching Procedure was applied remained defective.[591] In other words, Millenia's case is not that the Stitching Procedure itself gave rise to an independent safety risk, but that it did not mitigate the safety risk that arose due to cracks on panels.

319 Mr Yang and Mr Hartog agreed that the Stitching Procedure was not an appropriate method for rectifying cracks.[592] Mr Lalas and Mr Keithly did not dispute, and I find, that the Stitching Procedure was not an appropriate remedial method when used alone for cracks across the face of a panel or for cracks near pins.[593] Yet Mr Lalas claimed that the Stitching Procedure was an adequate remedial method for small cracks.[594] I do not accept this evidence. I find that the Stitching Procedure was not an appropriate rectification method even for small cracks. As I have noted, there was one panel (8-28-30-R), where the Stitching Procedure was applied to what was initially a small crack on the right side of the panel (see [238(a)] above). However, the stitch failed to prevent the crack from propagating to the left and across the panel. In other words, the Stitching Procedure failed to serve its purpose of stabilising the crack. Mr Hartog opined that the Stitching Procedure, applied to this panel, was a "highly unsatisfactory repair" creating an "unacceptable risk that the stone would fold".[595]

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590 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 52).

591 Millenia's closing submissions at para 367.

592 Joint Expert Report of Façade Experts dated 22 February 2016 at p 46 (S/N 9.4).

593 Transcript, 27 June 2016, pp 7–8

594 Transcript, 27 June 2016, p 13.

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320 Mr Hartog explained that the Stitching Procedure was not a "common industry practice", as Mr Lalas, Mr Mann and Mr Keithly claimed.[596] He explained that conventional stitching repairs involve the use of rods akin to staples, *ie*, with perpendicular return ends that mechanically anchor or pin the stitch, and which have indented or threaded surfaces, which increase their mechanical attachment to epoxy.[597] By contrast, the Stitching Procedure was carried out with straight and smooth rods, which relied disproportionately on the chemical bond between the epoxy and the steel. Mr Lalas, Mr Mann and Mr Keithly all agreed with Mr Hartog that good practice was to use a helical, twisted, indented or even a threaded rod, rather than a smooth-sided rod.[598] This would provide, in addition to the chemical bond, a "mechanical interlock". Mr Hartog further explained that, with a smooth rod, where the epoxy began to fail in adhesion, as Mr Hartog found,[599] the stitch would loosen. The crack would thus begin to open up. I accept Mr Hartog's explanation of why the Stitching Procedure was not an appropriate rectification method for any form of cracking within panels.

321 I also find that there were numerous cases of cracks that were only stitched and not rectified through other means during the Rectification Works. One example was the crack on panel 24-26-38-R; restraining pins were only added to this panel by Cementone after the 2nd Fall (see [238(b)] above).[600]

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595 16AB 12576, 16AB 12578, 104AB 82952; Transcript, 10 March 2016, pp 143–147; Transcript, 29 June 2016, pp 5–11.

596 Joint Expert Report of Façade Experts dated 22 February 2016 at p 45 (S/N 9.3).

597 Vol 31 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, paras 5.71–5.74 (pp 84–91).

598 Transcript, 10 March 2016, pp 154–155.

599 Transcript, 10 March 2016, p 162.

600 21AB 16551, Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (p 208) and Transcript, 10 March 2016, pp 167–168; 17AB 13057, Vol 22 BAEIC, AEIC of Henry Lee dated 19 February 2014 at HL-2 (p 110) and Transcript, 10 March 2016,

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(15) DT12: Stitching across panels

322 DT12 does not refer to the Stitching Procedure. Rather, it refers to the installation of pins or plates across the joint between two panels.[601] During the trial, Mr Yang admitted that DT12 refers to two different remedial measures: the twisted rod and the dead load plate rectification methods.[602] Twisted rods and dead load plates were different from dead load rods (DT9b):

(a) A twisted rod was a rod that was installed at one end into the RC wall and had, at the other end, a hole through which a pin was inserted to connect two adjacent panels. This was used to rectify panels with cracks around the pins and/or shaky panels, *ie*, as a wind load restraint.[603]

(b) A dead load plate was a metal plate that was inserted into slots cut into two adjacent panels to transfer the dead load of one panel to the brackets of another panel. This was used to address stacking, by transferring the dead load of panels that were stacking on panels below to the brackets of horizontally adjacent panels.[604]

Both of these rectification methods were set out in Meinhardt's 2008 Report, and were approved by Arup in the 8 May 2008 letter (see [111] above). I therefore find that instances of DT12 did not amount to a defect.

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pp 179–180.

601 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 261 (p 106); Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 391 (p 81).

602 Transcript, 10 March 2016, pp 216–217.

603 75AB 59744, 59867–59875 (Appendix 8).

604 75AB 59744, 59856–59861 (Appendix 6).

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323 Millenia contends, however, that DT12 gave rise to a safety risk because it caused (dead) loads acting on panels to be transferred to adjacent panels.[605]

(a) I find that the twisted rod rectification method did not give rise to this safety risk. The evidence of Mr Keithly, which I accept, was that twisted rods had no capacity to transfer dead load.[606] I thus find that this remedial measure, which Mr Yang claimed accounted for about 90% of the cases of DT12,[607] did not give rise to a safety risk.

(b) In relation to the dead load plate rectification method, the very point of this remedial method was to transfer dead load between panels (see [322(b)] above). Importantly, the dead load plate rectification method was approved by Arup. I am therefore unable to find that the use of this remedial method in itself gave rise to a safety risk. I accept that a safety risk may have arisen if this remedial method was implemented in an inappropriate way. But there was no evidence of this.

324 I will now address three alleged design defects, which do not feature in the 100% Spreadsheets, but which Millenia has raised in closing submissions.

(16) The alleged design defects

325 First, Millenia claims that the design of the bracket system was defective because it provided for the bracket to be secured by a frictional grip, *ie*, torque was applied to the anchor bolt or nut to secure the bracket to the RC wall.[608] I do not accept this submission for two reasons.

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605 Millenia's closing submissions at para 378.

606 Transcript, 10 March 2016, p 200.

607 Transcript, 10 March 2016, p 207.

608 Millenia's closing submissions at paras 196–201.

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(a) First, Mr Yang's view was that this design was defective because it was very dependent on on-site installation workmanship.[609] However, I do not accept that the design was defective for this reason. As Mr Lalas, Mr Keithly and Mr Hartog explained, every design depends on workmanship to be properly implemented.[610] In particular, in relation to bolted connections, Mr Lalas noted that every bolted joint depends on proper workmanship. A designer would rely on proper training of workmen and quality control to implement the design.

(b) Secondly, the defendants' façade experts agreed that bracketing systems that involved torqueing of bolts and nuts were very common in 1995 to 1997, when the Building was designed.[611]

326 Secondly, Millenia claims that the design of the bracket system was defective because it only provided for the brackets to be attached to the RC wall by one fixing, rather than two fixings, which would have ensured the brackets were attached perpendicular to the RC wall.[612] Millenia makes this submission in connection with its arguments on DT5. Essentially, Millenia claims that the design was defective because it failed to prevent cases of DT5 from arising. I do not agree. The basis of this submission that the design was defective is that where brackets were not attached perpendicular to the RC wall, a safety risk would arise. That is why, on Millenia's case, the design was defective. But I have found at [288] above that DT5 did not give rise to any such risk. I therefore do not accept that the design was defective because it allegedly gave rise to the risk that brackets would not be attached perpendicular to the RC wall.

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609 Joint Expert Report of Façade Experts dated 22 February 2016 at p 7 (S/N 1.6).

610 Transcript, 23 September 2015, pp 43–44.

611 Transcript, 23 September 2015, pp 48–50.

612 Millenia's closing submissions at para 202.

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327 Thirdly, Millenia claims that the design was defective because it failed to provide for impact on the Façade from the BMU and the use of the installation gondola (which was used to install the panels and the windows on the Building).[613] I do not accept this submission for the following reasons:

(a) First, the project specifications did not provide for the Façade to be resistant to impact from the BMU or the installation gondola.[614]

(b) Secondly, Mr Yang accepted that the BMU was designed to be used with restraining lanyards and that the BMU would not have caused any damage to the Façade if those lanyards had been used properly.[615] I also accept Mr Lalas' evidence that the installation gondola would not have caused damage to the Façade if it had been used properly.[616]

328 In sum, I find that Millenia has not established that the three alleged design defects were defects. However, the fact that the design did not provide for certain half pins to be welded was a design defect (see [311] above).

Conclusion

329 For all the above reasons, I find that the Cladding contained serious and substantial defects which rendered it structurally unsafe, before the Façade was reclad. I now turn to the Causation Issue.

The Causation Issue

330 The Causation Issue comprises two sub-issues (see [196(b)] above):

613 Millenia's closing submissions at para 213.

614 Joint Expert Report of Façade Experts dated 22 February 2016 at pp 1–2 (S/N 1.1 and 1.2).

615 Transcript, 22 September 2015, p 40.

616 Joint Expert Report of Façade Experts dated 22 February 2016 at pp 2–3 (S/N 1.2).

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(a) First, what caused the 2nd Fall?

(b) Secondly, what caused the defects in the Cladding?

I will first address what caused the defects in the Cladding.

The cause of the defects

331 The cause of some defects is patently clear, because the cause is clear from the very nature of the defect. Having considered the evidence, I make the following findings:

(a) I find that poor to bad workmanship in the installation of the Cladding caused many of the defects I have discussed above. These include DT1 (oversized pin holes), DT3 (insufficiently or excessively embedded anchor bolts), DT5 (brackets not attached perpendicular to the RC wall), DT6 (short shafts) and DT8 (the mounting of nuts or washers onto shafts).

(b) I find that the use of defective materials (non-AISI Type 316 stainless steel) caused DT4 and DT7 (rusty components).

(c) I find that deviation from the agreed rectification method caused instances of DT9a (improper insertion of silicone setting blocks).

332 In relation to DT10 (narrow or no movement joints between panels), I find that the primary cause of many instances of this defect was improper installation. Mr Hartog's evidence, which I accept, was that vibrations could only have narrowed movement joints by, at most, 1 or 2mm.[617] Dragages did not suggest any other external factor which could have caused the narrowing of

617 Transcript, 29 June 2016, p 53.

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movement joints between panels. The natural conclusion is that the primary cause of the numerous instances of DT10 (see [253(a)] above) was that the panels were not installed with the required movement joints, and I so find.

Dragages' hypotheses on the cause of cracks and chips on panels

333 However, Dragages submits that certain defects – in particular, DT13 (cracks on panels) and DT14a (cracks/chips at pin areas) – arose because of external factors.[618] (DT13 and DT14a were the only defects Dragages accepted undermined the safety and structural integrity of the Façade: see [232] above.) The principal theory that Dragages advances is that vibrations from the Circle Line Works and the Downtown Line Works (collectively, "the MRT Works") caused these defects ("the Vibrations Thesis"). Dragages also submits that improper use of the BMU ("the BMU Thesis") and Millenia's alleged failure to properly maintain the Building ("the Lack of Maintenance Thesis") caused some of the defects. I now examine each of these hypotheses in turn.

(1) The Vibrations Thesis

334 Dragages claims that vibrations generated by the MRT Works caused cracks and chips on the panels. Dragages emphasises that these works were carried out in the vicinity of the Building for many years. The simplest explanation for the defects is that they were caused by these works.[619]

335 Having carefully considered the evidence, I find that vibrations were not the primary cause of cracks and chips on panels. I find that vibrations were at most a minor contributory cause (if at all) of such cracks and chips. I have arrived at this conclusion for the following reasons.

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618 Dragages' reply submissions at paras 798 and 800.

619 Dragages' closing submissions at para 825.

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336 First, I find that if vibrations were the primary cause of defects such as cracks and chips on panels, similar defects would have been found on Millenia Tower, an office building located near the Building, for two reasons:

(a) First, Millenia Tower was also constructed by Dragages, using the *same type of granite and the same fixings*.[620] Millenia Tower was completed while the Building was being constructed: the parties had in fact intended this with a view to achieving cost savings, by reducing the costs of mobilisation and demobilisation respectively.[621]

(b) Secondly, Millenia Tower is also located near Promenade Station. Millenia Tower was thus also in close proximity to the MRT Works. The following diagram (from the report of Dr Andrew Robert Pickles ("Dr Pickles"), Dragages' geotechnical engineering expert) shows the location of Millenia Tower and the Building in relation to Promenade Station:[622]

620 Transcript, 23 April 2014, p 71; Transcript, 14 July 2015, p 54; Transcript, 16 September 2015, p 8.

621 Transcript, 16 September 2015, pp 7–8; Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 48(c).

622 Vol 17 BAEIC, AEIC of Andrew Robert Pickles dated 15 January 2014 at ADP-1 (p 56).

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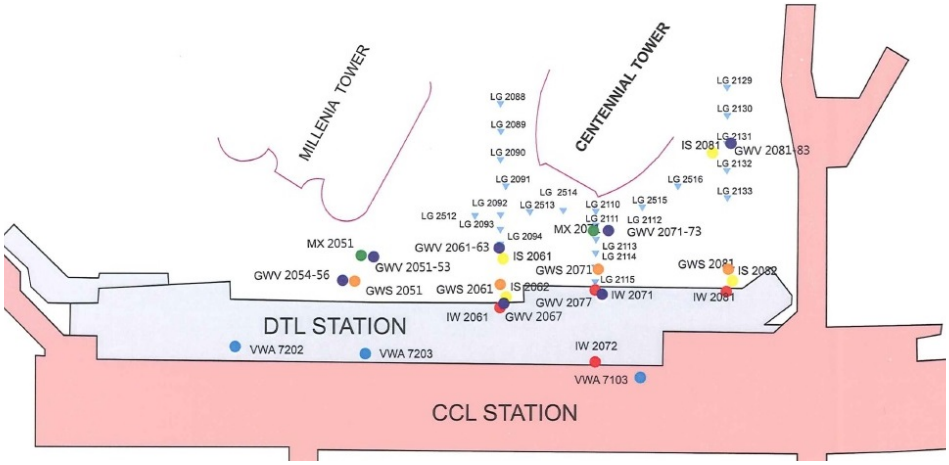

337 However, *the defects found on the Building were not found,* ***not even to some extent****, on Millenia Tower*.[623] Given that the same granite and fixings were used on both buildings, this indicates that vibrations from the MRT Works were not the primary or main cause of the defects in the Building. As I have noted (see [57(b)] above), this very point was made by Mr Chin of Arup, who added that upon inspecting Millenia Tower, Arup came to the view that the quality of the works at Millenia Tower was "far better". Although Mr Chin was called as a witness of fact, the absence of damage on Millenia Tower was also raised in the witness conferencing of the façade experts. Apart from the point raised by Mr Keithly which I discuss at [338] below, the façade experts did not dispute that the lack of damage on Millenia Tower was relevant to the cause of the defects. On the contrary, Mr Hartog expressly said that "the condition of other buildings in the vicinity" was relevant.[624]

338 I note, however, that Dragages submits that certain key works occurred much closer to the Building than to Millenia Tower. In relation to the Circle Line Works, Dragages emphasises that the piling works at one of the Circle Line

623 Transcript, 14 July 2015, p 54; Transcript, 23 April 2014, pp 71–72.

624 Transcript, 29 June 2016, p 43.

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entrances to Promenade Station, Entrance 5/5A, were conducted about 1m away from the basement wall of the Building.[625] As for the Downtown Line Works, Dragages claims that the breaking of a diaphragm wall during these works occurred closer to the Building than to Millenia Tower.[626] In support of these submissions, Dragages relies on the evidence of its vibrations expert, Mr Ho Wai Lun Wilson ("Mr Wilson Ho"), that proximity to the source of vibrations affects the impact of vibrations. Dragages also relies on a statement by Mr Keithly during the expert conferencing of the façade experts that "an inverse square law" would apply in this regard. Mr Keithly opined that if Millenia Tower was twice the distance away from the source of vibrations as the Building, then "it may have a quarter of the effect due to vibrations".[627]

339 There are several difficulties with these submissions:

(a) First, these submissions do not assist Dragages in relation to the cause of the Defects. *It is not Dragages' case that the specific works it refers to caused cracks and chips on panels generally. Rather, Dragages submits that these works caused the 1st Fall and the 2nd Fall*.[628] Dragages' position is that it was vibrations generated from the MRT Works *in general* that caused certain defects on the Cladding. But as I have explained, this submission is undercut by the fact that no damage was observed on Millenia Tower, a building which was also located near the MRT Works and had the same granite and fixings.

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625 Dragages' closing submissions at para 838; Dragages' reply submissions at para 361.

626 Dragages' reply submissions at para 361.

627 Transcript, 29 June 2016, p 54.

628 Dragages' reply submissions at para 368; Dragages' closing submissions at para 836.

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(b) Secondly, there is no objective evidence that these construction activities caused vibrations exceeding the threshold beyond which damage would have been caused to the Building. I expand on this below.

(c) Thirdly, while some works may have been performed closer to the Building, it is evident from the diagram above (from Dr Pickles' report), and I find, that other MRT Works would have taken place close to Millenia Tower. Yet no defects were found on Millenia Tower.

(d) Fourthly, while I accept that proximity to the source of vibrations would affect the impact of vibrations, I do not accept the inverse square law that Mr Keithly posited. None of the vibration experts referred to such a rule, and none of the other façade experts agreed with Mr Keithly, who did not refer to this rule in his expert report. Nor was Mr Keithly's opinion supported by any literature or calculations or consideration of the kind of soil carrying the vibrations. In fairness, Mr Keithly qualified his opinion by stating that he was not a vibrations expert.[629]

340 For completeness, I note that Dragages submits that Millenia Tower and the Building may have been built on different kinds of soil, and such differences in soil composition may have affected the transmission of vibrations, therefore explaining why no defects were found on Millenia Tower.[630] I do not accept this submission for two reasons. First, this point was not raised during the trial as a possible reason why no defects were observed on Millenia Tower although defects were found on the Building. Secondly, there was scant evidence that the two buildings were built on soil of varying compositions.

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629 Transcript, 29 June 2016, p 54.

630 Dragages' reply submissions at para 365.

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341 I now come to the second main reason why I do not accept the Vibrations Thesis. The objective evidence, in the form of data from vibration meters, indicates that the Building was not subject to vibrations exceeding the threshold beyond which damage would have been caused to the Building.

342 I first identify the applicable vibration threshold. It was undisputed that this was to be found in the German standard, DIN 4150: Part 3 (1999) ("the DIN Standard"),[631] which appears to have been adopted by the BCA and the LTA.[632] The DIN Standard set out vibration thresholds based on the type of vibration and the nature of the building. Notably, the DIN Standard stated that exceeding the thresholds did not necessarily lead to damage; investigations were only necessary if the thresholds were *significantly* exceeded.[633] I note in this regard that the DIN Standard is more stringent, that is, it stipulates lower vibration thresholds, than certain British standards that Millenia's vibration expert, Assoc Prof Er Dr Tan Teng Hooi ("Assoc Prof Tan"), referred to.[634]

343 The vibration, structural dynamics and geotechnical engineering experts called by Millenia and Dragages (the other parties did not call such experts) did not agree on the applicable vibration threshold. They disagreed on two points.

344 First, the experts did not agree on whether the threshold for short-term vibration or long-term vibration should apply. The DIN Standard defined short-term vibration as vibration "which does not occur often enough to cause structural fatigue and which does not produce resonance in the structure being evaluated".[635] Millenia's experts claimed that there was no evidence that

631 Joint Expert Report on Vibrations at p 4 (S/N 2.7).

632 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at paras 48–49.

633 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1 (p 124).

634 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at para 48.

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structural fatigue or resonance had occurred in relation to the Building, and thus the thresholds for short-term vibrations were appropriate. Dragages' experts emphasised, however, that the works near the Building had taken place over a few years. The standard for long-term vibrations was thus appropriate because it was "practically impossible to control that resonance didn't occur on [the Building]".[636] I accept the evidence of Dragages' experts here. I find that the appropriate threshold is found in Table 3 of the DIN Standard ("Table 3"), which set out thresholds for long-term vibrations.

345 Secondly, Table 3 contains three "Lines" setting out vibration thresholds for three types of structure: (1) "Buildings used for commercial purposes, industrial buildings, and buildings of similar design", (2) "Dwellings and buildings of similar design and/or occupancy", and (3) "Structures that, because of their particular sensitivity to vibration, cannot be classified under lines 1 and 2 and are of great intrinsic value (e.g. listed buildings under preservation order)".[637] The threshold for buildings falling under Line 1 is a peak particle velocity ("PPV") of 10 mm/s. The threshold for buildings falling under Line 3 is a PPV of 2.5 mm/s. (PPV is the measurement that is used to determine whether vibrations will cause damage to a building.[638])

346 Millenia's experts contended that Line 1 applies to the Building because it is "a reinforced concrete high-rise commercial building".[639] However, Dragages' experts distinguished between the reinforced concrete structure of

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635 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1 (p 123).

636 Joint Expert Report on Vibrations at p 10 (S/N 3.3).

637 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1 (p 127).

638 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at para 29.

639 Joint Expert Report on Vibrations at p 6 (S/N 2.15).

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the Building, which they claimed fell under Line 1, and the Cladding, which they claimed fell under Line 3, on the basis that the Cladding was of "particular sensitivity to vibrations", within the terms of Line 3, because the granite panels composing the Cladding contain inherent micro-cracks.[640] I prefer the evidence of Millenia's experts here. As Assoc Prof Tan observed, Table 3 does not distinguish between a building and its components.[641] I agree with Assoc Prof Tan that Line 3 of Table 3 applies to old buildings or buildings of historic value, including listed buildings under preservation orders, not commercial buildings such as the Building.[642] I therefore find that the Building falls under Line 1 of Table 3 and the appropriate vibration threshold is thus a PPV of 10 mm/s.

347 Having identified the applicable vibration threshold, I now turn to the evidence regarding the vibrations to which the Building was subject. There were (1) records of vibrations detected on the Building and (2) records of vibrations detected in Promenade Station. I now set out this evidence:

(a) *The Building:* Vibration monitoring sensors were installed in the Building during the Circle Line Works and the Downtown Line Works.

(i) During the Circle Line Works, sensors were installed on the ground floor, third floor and ninth floor of the Building. The data is limited. The Circle Line works took place over five years, and a total of 25 days of data was collected (15 days of data from the ninth floor, six days of data from the third floor and four days of data from the ground floor),[643] between 27 July 2004 and 16

640 Joint Expert Report on Vibrations at pp 6–7 (S/N 2.15, 2.17 and 2.18).

641 Transcript, 15 September 2015, p 72.

642 Transcript, 15 September 2015, p 93.

643 Joint Expert Report on Vibrations at p 2 (S/N 1.4); Transcript, 15 September 2015, p 55.

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August 2004.[644] *Notably, however, according to a letter from the LTA, works were being conducted near the Building when this data was collected: namely, "installation of bored pile casing, casting for bore pile and extraction of bore pile casing at the hoarded area between [the Building] and the realigned Temasek Avenue".* These works took place from 27 July to 10 August 2004.[645] The data, however, showed only one reading exceeding the threshold of 10mm/s, a vibration of 16.8 mm/s recorded on the ninth storey on 4 August 2004. There was some dispute over whether this reading could be trusted, because it occurred seconds before a reading that was expressly noted to be invalid for being caused by the touching of the instrument.[646] But even if the reading were accurate, I accept Assoc Prof Tan's evidence that the vibration, being of a PPV of less than 20 mm/s, would not have given rise to damage, let alone structural damage: vibrations exceeding the thresholds in the DIN Standard do not necessarily lead to damage (see [342] above).[647] In sum, while I acknowledge that the data from the time of the Circle Line Works is limited, the 25 days of data do not indicate that the Building experienced vibrations that would have caused damage to the Cladding. *This is despite the fact that this data was collected when works were being carried out near the Building*.

(ii) During the Downtown Line Works, one vibration meter was installed in the basement of Centennial Tower from August

644 69AB 54689–54698.

645 69AB 54688.

646 Transcript, 15 September 2015, pp 166–167 and p 172.

647 Transcript, 15 September 2015, p 168.

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2009 to 12 June 2010.[648] It was calibrated to capture vibrations exceeding a PPV of 1 mm/s, and only recorded one reading exceeding this threshold, measured at 1.03 mm/s on 10 August 2009.[649] It should be noted that this reading was even lower than the threshold of 2.5mm/s for buildings falling under Line 3 of Table 3, which Dragages claims is the appropriate threshold. Thus, the data from the time of the Downtime Line Works also does not indicate that the Building was subject to vibrations that would have caused damage to the Cladding.

(b) *Promenade Station*: During the Downtown Line Works, four vibration meters were installed in Promenade Station. The four meters were all within 50 to 100 metres from the Building. They were calibrated to record vibrations exceeding a PPV of 1.5 mm/s. Importantly, *none of the meters registered any reading between June 2010 and 28 February 2011*. This indicates that during this period, the vibrations at Promenade Station, which were much closer to the site of the Downtown Line Works than the Building, were far lower than the applicable threshold of 10 mm/s (see [346] above).[650] Dragages' experts challenged this evidence. Mr Wilson Ho, Dragages' vibrations expert, claimed that he did not understand why the meters did not register any reading, given their proximity to the Downtown Line Works. He suspected that the meters did not work or the data had been lost.[651] Dr Pickles went further,

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648 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1, para 56; 86AB 68047–68056.

649 Joint Expert Report on Vibrations at para 1.4 (p 1); Vol 17 BAEIC, AEIC of Ho Wai Lun, Wilson dated 15 January 2014 at WH-1 (p 16).

650 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1, para 57.

651 Transcript, 18 September 2015, p 126.

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> opining that the records were modified.[652] However, these claims are speculative. It is undisputed that the data was recorded by an independent third party, Tritech Engineering & Testing Singapore Pte Ltd ("Tritech").[653] Tritech had sent its results to the LTA, who sent the results to the parties upon being requested to do so. In my view, it was incumbent on Dragages to call the relevant witnesses if it intended to challenge the data. Dragages did not call any witness from the LTA or Tritech. In the premises, I do not accept Dragages' challenges to the objective evidence. I find on the basis of the data that the vibrations in Promenade Station between June 2010 and 28 February 2011 did not exceed a PPV of 1.5 mm/s. The vibrations were thus not only lower than the threshold of 10 mm/s which I have found to be applicable, but also lower than the threshold of 2.5mm/s which Dragages claimed was applicable.

348 The data from the vibration meters thus indicates that the Building was not subject to vibrations, due to the MRT Works, exceeding the threshold beyond which damage would have been caused to the Building, and I so find.

349 I now turn to address the evidence of Mr Wilson Ho that the Building was subject to vibrations that exceeded the applicable vibration threshold. The lynchpin of Mr Wilson Ho's evidence was a Finite Element Analysis ("FEA") model which he prepared to simulate vibrations that would have been generated by various works. Mr Wilson Ho produced this "to quantify the vibration impact on [the Building] arising from the construction activities in the vicinity".[654]

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652 Transcript, 18 September 2015, p 137.

653 Transcript, 18 September 2015, p 138.

654 Vol 17 BAEIC, AEIC of Ho Wai Lun, Wilson dated 15 January 2014 at WH-1 (p 18).

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However, I do not accept that the FEA model accurately quantifies the impact the vibrations from the MRT Works had on the Building, for three reasons.

(a) First, Mr Wilson Ho admitted that before preparing the FEA Model, he was "certain that the vibrations from the [Circle Line Works and the Downtown Line Works] would have [affected] the panels' structural integrity".[655] He then prepared the FEA Model "on the basis of that certainty that [he] felt". This admission severely undermined the value of the FEA Model, because it indicated that the exercise had been conducted to establish a conclusion that was assumed from the outset.

(b) Secondly, Mr Wilson Ho admitted that, in preparing the FEA Model, he had just assumed that certain construction activities had occurred, before proceeding to simulate the vibrations the Building may have sustained due to those activities.[656] However, it transpired during the trial that there was little basis for these assumptions:

(i) First, the FEA Model simulated the vibrations that the Building would have been experienced due to the tunnel boring machine ("the TBM") hitting the diaphragm wall on or before 10 February 2011, the date of the 2nd Fall.[657] Yet Mr Wilson Ho conceded that he had no idea whether the TBM had in fact hit the diaphragm wall around 10 February 2011 at all.[658] The objective evidence, in the form of the tunnel boring records of the LTA, indicated that the TBM only reached the diaphragm wall on 14 February 2011, *four days after the 2nd Fall*

655 Transcript, 16 September 2015, p 108.

656 Transcript, 16 September 2015, pp 106–107.

657 Vol 17 BAEIC, AEIC of Ho Wai Lun, Wilson dated 15 January 2014 at WH-1 (p 78).

658 Transcript, 17 September 2015, p 33.

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occurred.[659] In this light, the simulation of the vibrations that would have resulted if the TBM had hit the diaphragm wall was simply not relevant. After the location of the TBM on 10 February 2011 emerged during the trial, Dr Pickles said that the TBM may have had to cut through bored piles that were part of the Circle Line Works and that this may have caused vibrations.[660] However, Dr Peter Mitchell ("Dr Mitchell"), Millenia's geotechnical engineering expert, disagreed. He observed that the cutter of the TBM had gone past the last of the bored piles by 10 February 2011; and in any case, the bored piles were separately cut (with compensation piles erected) because the engineers knew that the TBM would be going through the piles.[661] I accept Dr Mitchell's evidence, which was supported by a paper in Dr Pickles' report.[662] For all these reasons, there is no evidence that the TBM generated any vibrations on around 10 February 2011 that caused the 2nd Fall.

(ii) Secondly, the FEA Model also simulated vibrations that would have been generated due to sheet and bored piling works on or before 10 February 2011.[663] However, Dr Pickles agreed with Dr Mitchell that there was no evidence of bored piling work being carried out at the time of the 2nd Fall. The simulation of the vibrations that would have resulted due to bored piling works was therefore not relevant.

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659 Transcript, 17 September 2015, pp 24–32.

660 Transcript, 17 September 2015, p 38.

661 Transcript, 17 September 2015, pp 48–52.

662 Vol 17 BAEIC, AEIC of Andrew Robert Pickles dated 15 January 2014 at ADP-1 (pp 233–243).

663 Vol 17 BAEIC, AEIC of Ho Wai Lun, Wilson dated 15 January 2014 at WH-1 (p 78).

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(c) Thirdly, the results of the FEA model did not make sense. I accept the evidence of Prof James Mark William Brownjohn ("Prof Brownjohn"), Millenia's expert on structural dynamics, who noted that if the results were correct, the drop hammer impact and TBM impact would have generated vibrations at the Building equivalent to those produced by a powerful earthquake.[664]

350 In sum, there is no objective evidence that the Building was subject to vibrations that caused damage to the Cladding. Further, in my view, little weight should be accorded to the subjective evidence that Dragages relied on. Dragages cited reports made by tenants of the Building regarding vibrations that they felt in the Building.[665] However, I do not consider that these reports are relevant. As I pointed out during the trial, human perception is inherently subjective and thus not a reliable metric for assessing the vibrations that occurred.[666] In this regard, I accept the evidence of Assoc Prof Tan that the threshold of human perception of vibration is in the range of a PPV of 0.15 mm/s to 0.3 mm/s,[667] which is far less than the 10 mm/s threshold which applies to the Building (see [346] above). The mere fact that tenants complained of vibrations does not mean that the Building was subject to any vibrations that could have caused it damage.

351 I now come to the third reason why I do not accept that vibrations were the primary cause of DT13 or DT14a. It was unclear why or how vibrations would cause cracks or chips on panels for the following reasons.

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664 Vol 11 BAEIC, AEIC of James Mark William Brownjohn dated 18 March 2014 at JMWB-1, paras 134 and 144; Transcript, 17 September 2015, pp 11–12.

665 Dragages' closing submissions at paras 882–891.

666 Transcript, 16 September 2015, p 158.

667 Vol 11 BAEIC, AEIC of Er Dr Tan Teng Hooi dated 15 January 2014 at TTH-1, para 52.

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352 In relation to DT13, Dragages claims that granite is especially sensitive to vibrations because the stone contains inherent micro-cracks.[668] Dragages contends that the MRT works would have repeatedly transmitted vibrations to the Building and thus caused "cyclic loading". This would have resulted in the growth or propagation of the micro-cracks that are inherent in granite.[669] Apart from citing the evidence of Dr Pickles to this effect,[670] its geotechnical expert, Dragages relies on the evidence of Mr Mann who agreed that cyclic loading could have caused the growth of inherent cracks in the granite.[671]

353 However, Mr Hartog did not accept the hypothesis that cyclic loading due to vibrations could have led to the growth of cracks in the panels. He stated that he was not aware of technical papers or articles where, leaving speculation aside, it was demonstrated that cyclic loading through long-term vibrations would cause micro-cracks in granite to grow.[672] Importantly, Mr Lalas, Dragages' own expert, conceded that he could "find no references regarding how building vibrations affect traditional fix granite cladding".[673] Furthermore, Mr Mann's evidence on this point was in fact rather qualified: he opined that there was "a possibility that if … cracks do undergo some form of [cyclic] loading … it is possible those cracks could grow".[674] Prof Brownjohn also rejected the theory that fatigue by cyclic loading would have led to damage to the Façade.[675] I prefer the evidence of Mr Hartog and Prof Brownjohn. I

668 Dragages' closing submissions at para 827.

669 Dragages' reply submissions at paras 325–329 and 1047–1050.

670 Transcript, 18 September 2015, pp 10–12.

671 Transcript, 29 June 2016, pp 55–57.

672 Transcript, 23 September 2015, pp 80–81.

673 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 485 (p 97).

674 Transcript, 29 June 2016, pp 56–57.

675 Transcript, 15 September 2015, p 168.

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therefore do not accept Dragages' theory regarding how and why vibrations caused (the growth of) cracks in the panels.

354 In relation to DT14a (cracks or chips near pin areas), Mr Hartog's evidence, which I accept, was that vibrations could not have been the (primary) cause of this defect. He opined that DT14a "almost certainly [had] something to do with load concentrations around the pins", noting that this would arise from, among other things, stacking (see [233] above).[676] (To be clear, Mr Hartog also appeared to accept, and I have found, that shaky panels would give rise to a risk of cracks or chips forming near pin holes: see [301] above.) Vibrations could have caused stacking and thus DT14a only if the joint was within 1 or 2mm of being completely closed (see [332] above).[677] Hence, vibrations could not have been the direct or primary cause of DT14a.

355 Finally, I address two pieces of evidence that might, on first sight, be thought to support the Vibrations Thesis. First, Mr Lalas' expert report includes three tables that ostensibly show the results of three inspections of ten panels on drop 1: Arup's representative inspection in early 2010 prior to the 1st 2010 Report (see [135] above), the inspection by Arup during the 100% Inspection, and Mr Lalas' inspection of the Façade in 2013.[678] According to Mr Lalas, when Arup inspected the panels in early 2010, Arup found that the panels had no or little damage. However, many more cracks had manifested themselves on the panels by the time of the 100% Inspection. Mr Lalas stated that the best explanation for this discrepancy was that the cracks had formed on the panels

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676 Transcript, 29 June 2016, pp 49–51.

677 Transcript, 29 June 2016, p 53.

678 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1 (p 251).

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between 2010 and the inspection of drop 1 during the 100% Inspection. The most likely cause of this was vibrations from the MRT Works.[679]

356 I do not accord much weight to the tables for the following reasons:

(a) First, even if the three tables were wholly accurate, there was an explanation why the results of Arup's inspection in early 2010 differed from the results of the 100% Inspection. Mr Chin explained that when Arup inspected the Cladding in early 2010, it did so with the purpose of ascertaining "whether, in general, [the panels] are okay … are safe".[680] But during the 100% Inspection, Arup "knew … we were going into litigation, so our task … [was to] *record down every single thing that was there*, give it to the experts" [emphasis added].[681] In other words, the later inspection was performed with a higher degree of scrutiny than the earlier one. It is therefore unsurprising that Arup recorded more defects during the 100% Inspection than during the inspection in early 2010.

(b) Secondly, in any event, I was unable to accord much weight to the tables for separate reasons. The tables were based on a very limited sample of ten panels on a single drop, drop 1. Further, the tables were not prepared by Mr Lalas but were provided to him by Dragages.[682]

357 Secondly, according to Mr Mann, he found a concentration of panels with full-width cracks on drops closer to Promenade Station.[683] He illustrated

679 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, Annex 10, para 35.

680 Transcript, 15 July 2015, p 27.

681 Transcript, 15 July 2015, p 118–119.

682 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, Annex 10, para 33.

683 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 63).

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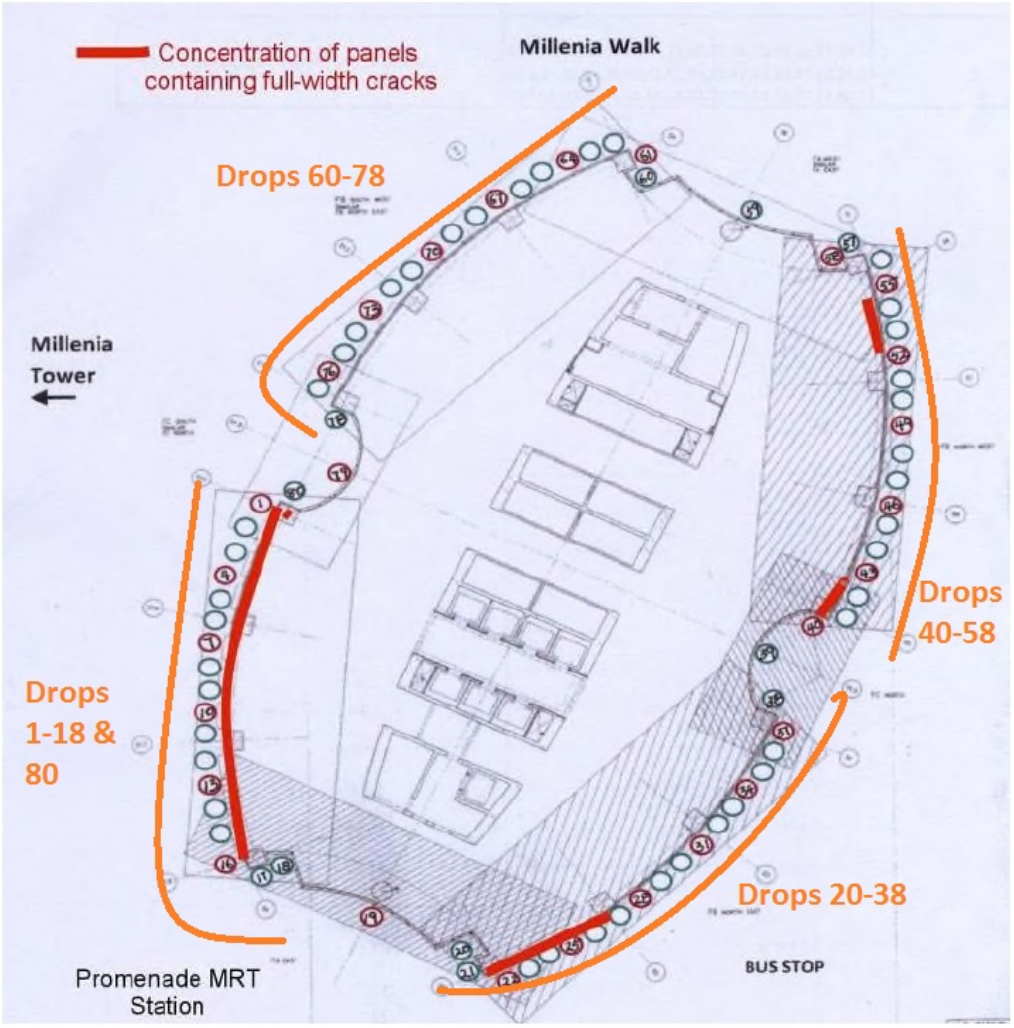
this point with the following diagram (to which I have added lines and text indicating the drop numbers in orange):[684]



This diagram indicates that the panels with full-width cracks were clustered on drops 1–16 and, to a lesser extent, on drops 22–26, which were located in closer proximity to Promenade Station than the other drops, while panels with full-width cracks were also found on drops 41–42 and 53–54. On first sight, this

684 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 75).

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might appear to indicate that vibrations from the MRT Works caused, at least, full-width cracks to form on (some of) the panels.

358 However, in assessing Mr Mann's evidence, *it is critical to bear in mind that he did not inspect the whole Façade* (see [219] above). He inspected 28 drops. *13* of these were from the bottom left section of 19 drops (drops 1–18 and 80) shown in the diagram above (Mr Mann inspected all these drops except drops 1, 4, 7, 10, 13 and 16).[685] By contrast, he only inspected five drops in the top left section (drops 62, 65, 68, 72 and 75) and six drops in the top right section (drops 41, 45, 48, 53, 54 and 57). It is thus unsurprising that most of the panels with full-width cracks which Mr Mann observed were clustered in the bottom left section of drops shown in the diagram above. I do not consider that it is safe to conclude, on the basis of Mr Mann's evidence, that panels with full-width cracks were in fact concentrated on drops closer to Promenade Station. I would add that the spreadsheet which covers DT13, *ie*, the cracked panels, in the 100% Spreadsheets indicates that the cases of DT13 were distributed relatively evenly over the entire Façade.[686] This undercuts the theory that panels with cracks were concentrated on the drops closer to Promenade Station.

359 For all the above reasons, I do not accept that vibrations caused cracks and chips on panels. I therefore do not accept the Vibrations Thesis.

(2) The BMU Thesis

360 Dragages contends that the BMU may have been used improperly, either by being used in windy conditions, contrary to its design, or by being operated without the use of lanyard restraints that were intended to limit the swaying and

685 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 22).

686 Vol 31 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-37 (p 3868).

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swinging of the BMU. Consequently, the BMU may have struck panels on the Façade with significant force and thereby caused cracks on panels.[687]

361 The façade experts agreed that one panel (panel 1-25-42-R), which had cracks emanating from a single point, had probably been damaged by an external impact.[688] Mr Hartog and Mr Lalas stated that the damage was probably due to a BMU impact,[689] and Mr Yang agreed that this was possible.[690] I find on this basis that a BMU impact caused cracks on this particular panel. However, I am unable to find when this occurred; in particular, whether it took place before the 2nd Fall or during the Rectification Works (see [362(a)] below).

362 Apart from this single panel, however, I do not accept the BMU Thesis for the following reasons:

(a) First, Ms Cheong Fong Yin, the housekeeping manager in charge of the cleaning and maintenance of the Building,[691] testified that she had never received a report about a BMU damaging the Façade.[692] I accept her evidence.

(b) Secondly, the BMU Thesis is premised on the BMU having been used improperly. However, Mr Lalas acknowledged that he had not seen any documented evidence that the BMU had been used improperly.[693]

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687 Dragages' closing submissions at paras 1001–1003.

688 Transcript, 10 March 2016, pp 128–143; 13AB 10090.

689 Vol 31 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, para 6.19; Transcript, 10 March 2016, p 130.

690 Transcript, 10 March 2016, pp 142–143.

691 Vol 8 BAEIC, AEIC of Cheong Fong Yin dated 4 March 2014 at para 4.

692 Transcript, 23 April 2014, p 167.

693 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 504 (p 100).

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Dragages submits based on photographs that the BMU was used without the lanyard restraints on four instances, between May and July 2011.[694] However, I note that these alleged instances of improper use of the BMU all occurred after the 2nd Fall. There is scant evidence that the BMU was used improperly before the 2nd Fall.

(3) The Lack of Maintenance Thesis

363 Dragages submits that Millenia failed to undertake proper and regular maintenance of the Building, and that this contributed to the defects.[695] I do not accept the Lack of Maintenance Thesis. Significantly, both Mr Mann and Mr Keithly expressly stated that lack of maintenance was not a primary cause of any of the alleged defects.[696] Mr Mann's evidence was that lack of maintenance would lead to the accumulation of grime and the growth of algae and ferns.[697] Similarly, the "indications of lack of maintenance" which Mr Lalas referred to were, among other things, the growth of ferns and mould on granite.[698] These effects do not have any relation to the defects discussed above. I therefore do not accept that lack of maintenance contributed to the defects.

364 In summary, for the above reasons, I do not accept Dragages' hypotheses as to the cause of cracks and chips on the panels.

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694 Dragages' closing submissions at para 1005.

695 Dragages' closing submissions at para 1019.

696 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 75); Vol 21 BAEIC, AEIC of Hugh Keithly dated 24 February 2014 at HK-2 (p 31).

697 Vol 21 BAEIC, AEIC of James Phillip Mann dated 24 February 2014 at JPM-2 (p 75).

698 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 525 (p 104).

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My further findings

365 However, what then was the cause of these defects (and of other defects whose cause may not be patently clear)?

366 At this point, I address a recurring refrain in Dragages' submissions. Dragages submits that Millenia has not fulfilled its legal burden of proof on the cause of the defects because, Dragages claims, Millenia has not raised a positive case why the defects arose, and thus cannot hold Dragages liable for them.[699]

367 To begin with, with respect, this submission is difficult to understand in respect of the defects noted at [331] above whose causes are evident.

368 Moreover, the submission is also difficult to accept in respect of defects that could have been caused by multiple factors, such as cracks and chips on panels. If these defects were not caused by external factors such as vibrations, what was their cause? The answer is evident, especially in the light of the fact that many defects were caused by improper installation of the Cladding, and others by the use of defective materials and deviations from agreed rectification methods (see [331] above). The defects were caused by defective work: in particular, improper installation of the Cladding. Notably, this was the conclusion that Arup arrived at after inspecting Millenia Tower and observing that the defects on the Cladding were not found there; Mr Chin observed that the quality of the works to Millenia Tower was "far better" (see [57(b)] above). I note in this regard that the Building was built very quickly (see [1] above). It appears, and if necessary, I find, from the numerous defects, that corners were cut; some of the workmanship was simply poor or bad. The very fact that the 1st Panel was installed without its top pins, and held in place by epoxy, was an

699 Dragages' closing submissions at para 401.

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instance, on any view, of reckless and dangerous installation of a very heavy stone panel that was a very significant public safety hazard. There can be no other view of this kind of reckless workmanship.

369 The analysis in the preceding paragraph involves applying a principle of elimination in determining the cause of the defects. In this regard, Millenia cites *Anti-Corrosion Pte Ltd v Berger Paints Singapore Pte Ltd and another appeal* [2012] 1 SLR 427 ("*Anti-Corrosion*").[700] In that case, the plaintiff claimed that discolouration of paint had been caused by latent defects in the paint, which was manufactured by the defendant. The Court of Appeal agreed with the plaintiff, on the basis that the evidence adduced by the plaintiff had eliminated two other possible causes of discolouration and accordingly, defects in the paint was the probable cause of the discolouration: see *Anti-Corrosion* at [36], [37] and [42].

370 Dragages submits, however, that *Anti-Corrosion* is distinguishable. In *Anti-Corrosion*, the parties agreed that there were only three possible causes of discolouration: see *Anti-Corrosion* at [28]. Dragages claims that a plaintiff can only prove causation by elimination if it eliminates "*all other* possible causes of damage and not just the examples of other causes raised by [the defendant]".[701]

371 With respect, I do not agree with this submission. Millenia's burden is to prove causation on a balance of probabilities. In my judgment, there are only a limited number of likely causes of the defects on the Cladding. *It is no surprise that Dragages advanced a case theory that pinned the cause of the defects on foreign or external causes. Without any such theory, one natural conclusion would have been that the defects were caused by defective work.* But once the foreign or external causes raised by Dragages have been eliminated, the only

700 Millenia's closing submissions at para 502.

701 Dragages' reply submissions at para 230.

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likely hypothesis that remains is that the defects were caused by defective work, in particular defective installation of the Cladding, and I so find.

The cause of the 2nd Fall

The parties' submissions

372 The parties make the following submissions on the cause of the 2nd Fall:

(a) Millenia submits that the 2nd Panel fell either because (1) it was not restrained by top pins ("the No Top Pins Thesis") or (2) cracks had formed across the 2nd Panel or around the pins as a result of stacking ("the Stacking Thesis").[702]

(b) Dragages claims that vibrations generated by the MRT Works were the likely cause of the 2nd Fall ("the Vibrations Thesis").[703] Further, Dragages contends that it is likely that improper use of the BMU may have caused an impact to the 2nd Panel which contributed to the 2nd Fall ("the BMU Thesis"). Dragages also submits that Millenia's alleged failure to properly maintain the Façade ("the Lack of Maintenance Thesis") contributed to the 2nd Fall.[704]

(c) Meinhardt Façade submits that the No Top Pins Thesis and the Stacking Thesis are incorrect and that the BMU Thesis may be correct.[705]

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702 Millenia's reply submissions at paras 70–75.

703 Dragages' closing submissions at para 825.

704 Dragages' closing submissions at paras 1012 and 1019.

705 Meinhardt Façade's closing submissions at paras 573–585.

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(d) Arup submits that the Vibrations Thesis and the BMU Thesis are not correct.[706]

373 Importantly, although the parties advanced competing theses regarding the cause of the 2nd Fall, there was ultimately some convergence between the evidence of Mr Yang, Mr Lalas and Mr Hartog. I will discuss this evidence and state my findings after discussing the hypotheses regarding the second fall.

374 I turn first to the Vibrations Thesis.

The Vibrations Thesis

375 I find that vibrations were not the primary cause of the 2nd Fall. Rather, vibrations were at most a minor contributory cause of the 2nd Fall.

376 I accept Mr Hartog's evidence that vibrations could only have been "the straw that broke the camel's back" in relation to the 2nd Fall.[707] In this regard, Mr Hartog's evidence was as follows:

(a) First, Mr Hartog explained that if vibrations were the sole cause of the 2nd Fall, other parts of the Building made of material that was more susceptible to vibration would have been damaged. There would have been loose plasterboard grout falling out of coffered ceilings such as the ceilings of the lift lobbies in the Building.[708] Damage would also have been observed in among other things, thin stone slabs and wall tiles, glass blockwork, wall-mounted mirrors and brittle joint fillers.[709]

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706 Arup's closing submissions at paras 420–442.

707 Transcript, 29 June 2016, p 40.

708 Transcript, 29 June 2016, p 41.

709 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, para 5.13.

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(b) Secondly, Mr Hartog added that materials closer to the path of the vibrations would have been more susceptible to damage. He noted that the lift core would have been in the path of the vibrations and the ceilings in the lift lobbies in the Building were attached to the lift core. This was a further reason, apart from the brittle nature of plasterboard, why damage would have been found at the ceilings of the lift lobbies.

(c) However, and significantly, Mr Hartog emphasised that from his own inspections of the Building and from records that he viewed, *there was no evidence that the Building had sustained any damage apart from damage to toilet wall tiles and a single glass panel*.[710] He concluded that it was "improbable … that structure-borne vibration from extraneous sources such as the vibration from nearby construction activities … was more than a *minor contributory factor*" [emphasis added].[711]

377 Importantly, *Mr Lalas accepted that vibrations could not have been the sole cause of the 2nd Fall*. He agreed with Mr Hartog that vibrations could have caused the 2nd Fall only in the sense of being the straw that broke the camel's back or, in his words, as the "trigger" of the 2nd Fall.[712] He explained this by observing that if vibrations had been the sole cause of the 2nd Fall, many more panels would likely have fallen off the Building.[713] I agree with this observation and accept this expert evidence.

378 Furthermore, the factors I have relied on in rejecting the theory that vibrations caused cracks and chips on panels – the lack of defects on Millenia

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710 Transcript, 29 June 2016, p 41.

711 Joint Expert Report of Façade Experts dated 22 February 2016 at p 51 (S/N 10.8).

712 Transcript, 29 June 2016, pp 103 and 113.

713 Transcript, 29 June 2016, p 44.

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Tower, the scant objective evidence that the Building was subject to vibrations that would have resulted in damage, the weak evidence that vibrations would have led to the growth of cracks in panels – also indicate that vibrations could not have been the primary cause of the 2nd Fall.

379 For all of these reasons, I find that vibrations were, at most, a minor contributory cause of the 2nd Fall.

The No Top Pins Thesis

380 As I have noted, it is undisputed that the 1st Panel was not installed with top pins but was attached to the panel above with epoxy instead, and that this was the principal cause of the 1st Fall (see [48] above). Millenia similarly contends that the 2nd Panel may have fallen because it was not restrained by two top pins. It was undisputed that the 2nd Panel was restrained by two bottom pins because these were found at the bottom brackets of the 2nd Panel, after the 2nd Fall.[714] The pins had also rotated outwards, which shows that the panel fell outwards – a point to which I return at [399]–[401] below. It is also undisputed that the two top pins were not found at the upper brackets of the 2nd Panel.

381 On balance, I do not accept the No Top Pins Thesis. I find that the 2nd Panel was installed with two top pins for the following reasons.

382 First, after the 2nd Fall, Millenia's employees swept up the fragments of the 2nd Panel (see [150] above) and stored the debris in the basement of the Building.[715] The debris was subsequently inspected by several persons:

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714 85AB 67799, 67830–67831.

715 Transcript, 14 July 2015, pp 174–175.

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(a) On 31 March and 3 April 2011, Arup inspected the debris in the course of an exercise to piece together the fragments of the 2nd Panel. During this inspection, Arup found pieces of stone which contained the top left and right pin holes. Arup also found, among other things, two stainless steel pins. Arup described the pins in a file note ("Arup's File Note") as "possible pins used for stitching".[716] The photographs taken by Arup do not show PVC sleeves in the debris. During cross-examination, Mr Chin maintained that Arup did not find PVC sleeves in the debris.[717]

(b) On 1 April 2011, Mr Yang inspected the debris of the 2nd Panel. In Mr Yang's first expert report, he stated that he found, among other pins, "two long and thin pins of about 75mm long and 4mm in diameter" in the debris.[718] However, it is not clear whether Mr Yang found PVC sleeves in the debris. In his first expert report, Mr Yang did not state or deny that he found the sleeves. Rather, he noted that Meinhardt Façade had found sleeves in the debris and shown in a report on its inspection of the debris ("Meinhardt's 2nd Panel Report") that the sleeved pins fitted in the pin holes in the 2nd Panel (see [(c)] below). Mr Yang stated, however, that the two pins had not been the top pins of the 2nd Panel on the basis that they were 4mm in diameter and the restraining pins were 6mm in diameter (see [25] above). He opined that the two pins were pins that were used to stitch the 2nd Panel during the Rectification Works.[719]

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716 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-6 (p 293); 87AB 69039, 69049.

717 Transcript, 14 July 2015, p 175.

718 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 301 (p 117).

719 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, paras 302–305 (pp 118–121).

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(c) On 5 April 2011, Mr Meur, Mr Ong and Mr Adrianto inspected the debris. Significantly, this inspection was done in the presence of two representatives of Millenia and a security camera was also installed in the room.[720] Mr Meur, Mr Ong and Mr Adrianto found, among other things, two stainless steel pins and black plastic tubes or sleeves in the debris. According to Mr Meur, the pins fitted perfectly within the sleeves, and the sleeved pins fitted perfectly within pin holes in the stone.[721] Meinhardt Façade therefore concluded that the pins were the two top pins of the 2nd Panel, and accordingly stated in Meinhardt's 2nd Panel Report that missing pins was not the cause of the 2nd Fall.[722]

(d) On 28 June 2013, Mr Lalas inspected the fragments of the 2nd Panel. He found two stainless steel pins, which were 65mm and 70mm long respectively and 4.8mm thick. He also found two black sleeves with an internal diameter of 5.6mm. Mr Lalas observed in his report that this meant that the sleeves would fit onto the pins which were of 4.8mm in diameter, but not onto the usual 6mm pins used to restrain panels. *In other words, the two pins and the PVC sleeves were non-standard*. Mr Lalas inserted the pins into the PVC sleeves and found that the sleeved pins fitted neatly into the pin holes in the granite. He concluded that the two stainless steel pins found were the two top pins of the 2nd Panel.[723]

383 Two stainless steel pins were found by all of the parties who inspected the debris. I find, contrary to Mr Yang's opinion (see [382(b)] above), that these

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720 87AB 69129–69143; Vol 20 BAEIC, AEIC of Ong Ching Pau dated 28 February 2014 at para 71.

721 Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 89.

722 87AB 69129, 69143.

723 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, Annex 10, paras 193–198.

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two pins, which were of 70mm in length, were not used to stitch the 2nd Panel. First, I have found that no rectification works were performed to the 2nd Panel (see [118] above). Therefore, the 2nd Panel would not have been stitched. Mr Yang accepted during cross-examination that there was no evidence that the 2nd Panel had been stitched at all.[724] Secondly, in any event, the evidence was that panels were stitched using plates rather than pins (see [316] above).

384 Notably, however, Arup did not find PVC sleeves in the debris whereas Mr Meur, Mr Ong, Mr Adrianto and Mr Lalas did. Having considered the evidence, I find it unlikely that Mr Meur, Mr Ong and Mr Adrianto introduced the PVC sleeves into the debris during their inspection on 5 April 2011. I note that the inspection was witnessed by representatives of Millenia and there was a security camera in the room (see [382(c)] above). Moreover, the photographs in Arup's File Note only purported to show *some* of the items gathered with the fragments of the 2nd Panel: they were not a comprehensive photographic record of the debris.[725] I thus find on balance that the PVC sleeves were in the debris all along.

385 In the light of these findings and the evidence that the two pins, when inserted into the PVC sleeves, fit into the two top pin holes of the 2nd Panel, I find that these two pins were the top pins of the 2nd Panel.

386 Secondly, the 2nd Panel was inspected before the 2nd Fall. The results of these inspections indicate that the 2nd Panel was installed with two top pins:

(a) In 2004, after the 1st Fall, Arup inspected Drop 80, the drop from which the 2nd Panel fell. Arup did not find any panels on Drop 80 with

724 Transcript, 27 June 2016, p 127.

725 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-6 (p 293).

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missing top pins.[726] Further, Mr Clarke of Arup, who was involved in preparing Arup's 2nd 2004 Report,[727] admitted that Arup inspected the 2nd Panel specifically in 2004 and did not find any defects on the 2nd Panel.[728] I note that Mr Clarke also suggested that epoxy or Maxbond may have obscured Arup's view of missing top pins.[729] However, Mr Clarke accepted that whenever Arup found, during its inspection of the 8 Drops in 2004, that Maxbond had been applied to a panel, it took a photograph of the affected panel and included it in Arup's 2nd 2004 Report.[730] There was no photograph of the 2nd Panel in Arup's 2004 Report. On balance, therefore, I do not accept that the 2nd Panel had missing top pins whose absence was obscured by epoxy or Maxbond.

(b) In December 2006, Millenia engaged Earth Arts to inspect the Cladding (see [63] above). *Critically, Earth Arts inspected the 2nd Panel and made a comment in its report regarding the top left pin of the panel*. Earth Arts noted that the pin was "only in 5mm" and the panel was loose.[731] It is clear from this, and I find, that Earth Arts found at least one top pin, the top left pin, on the 2nd Panel.

387 Thirdly, Mr Yang, Millenia's own expert, did not endorse the No Top Pins Thesis. In his report, Mr Yang emphasised that there was no evidence that a half pin was used to restrain the panel above the 2nd Panel (see [155(a)] above).[732] By contrast, the panel above the 1st Panel was restrained by a half pin

726 Transcript, 14 May 2015, pp 31–32.

727 Vol 23 BAEIC, AEIC of Stuart Clarke dated 27 February 2014 at para 83.

728 Transcript, 14 May 2015, p 53.

729 Transcript, 14 May 2015, p 71.

730 Transcript, 14 May 2015, pp 32–33.

731 73AB 57715, 57729.

732 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, para 322 (p 129).

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(see [47(b)] above). Mr Yang observed that it was "difficult to understand how an installer would have left both the fallen panel and the panel above unsecured and simply use[d] epoxy to stick on the panel". In other words, Mr Yang found it difficult to believe that a stone installer would have been so cavalier as to leave two panels without adequate restraints. He accordingly opined that it was "difficult to conclude" that the 2nd Panel was an infill panel (in the sense of a panel that was installed without pins being fixed into its top edge).

388 Fourthly, significantly, Mr Chin admitted that over four inspections of the Cladding, including the 100% Inspection after the 2nd Fall, *Arup did not find a single panel with missing top pins* (besides the 1st Panel).[733] The four inspections were the inspection of the 8 Drops in 2004 (see [54] above), the inspection of 20 drops in 2007 (see [62] above), Arup's "representative inspection" in early 2010 (see [135] above) and Arup's 100% Inspection (see [152] above). I would also add that the Reclad Report did not state that any other panels with missing top pins were found. This evidence is important for the following reason. Arup was the principal proponent of the No Top Pins Thesis. A key plank of this hypothesis, however, was that it was impossible to install infill panels with their top pins (see [49] and [155(b)] above). If that were true, one would have expected other panels to have been found with missing top pins. The problem would have been a more widespread issue. Yet no other panels with missing top pins were found. This indicates that contrary to Arup's hypothesis, apart from the 1st Panel, infill panels were installed with top pins, *and, on balance, I so find*. Once that is accepted, a vital premise of the No Top Pins Thesis – it was impossible to install infill panels with top pins – falls away.

389 For all of these reasons, I do not accept the No Top Pins Thesis.

733 Transcript, 14 July 2015, p 182.

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The Stacking Thesis

390 According to Mr Yang, "the most probable cause" of the 2nd Fall is that stacking caused cracks in the body of the panel or around its top pin holes.[734] However, I do not accept the Stacking Thesis for the following reason.

391 As I have noted, the brackets were strong enough to take the weight of two panels (see [234] above). In this regard, Mr Yang opined that cracks and chips would form on panels if "there are *more than 2 panels* that are stacked on top of each other with no movement joints" [emphasis added].[735] I find on this basis that stacking would only have caused cracks or chips on the 2nd Panel if panels 40, 41 and 42 (the 2nd Panel) on drop 80 were stacked together. If panels 41 and 42 had been stacked together, but not panels 40 and 41, stacking would not have caused cracks in the body of the 2nd Panel or near its top pin holes.

392 I find, however, that panels 40 and 41 were not stacked together:

(a) First, during the witness conferencing, Mr Jeyaretnam showed Mr Yang photographs of panels 40 and 41 which Arup had taken during the 100% Inspection.[736] Mr Yang admitted that the photographs showed a gap of about 1mm between the tongue of the shaft between panels 40 and 41.[737] Panels 40 and 41 were not stacked together.

(b) Secondly, in the elevation mark-ups reflecting Arup's observations during the 100% Inspection, it was recorded that Arup had observed a "narrow gap" between panels 40 and 41 on drop 80.[738] By

734 Joint Expert Report of Façade Experts dated 22 February 2016 at p 49 (S/N 10.3).

735 Joint Expert Report of Façade Experts dated 22 February 2016 at p 27 (S/N 6.8).

736 4D-5 (photograph 20).

737 Transcript, 27 June 2016, p 134.

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> contrast, Arup recorded that it had observed "stacking joints" between panels 32 and 33 and panels 52 and 53. This indicates that Arup did not observe that panels 40 and 41 were stacked together.

393 Accordingly, I do not accept the Stacking Thesis: even if panels 41 and 42 were stacked together, such stacking would not have caused the 2nd Fall.

The BMU Thesis

394 As I have noted (see [362] above), leaving aside panel 1-25-42-R, there is scant evidence that BMU impacts caused the defects in the Cladding. First, there were no reports of a BMU damaging the Façade. Secondly, there was scant evidence of improper use of the BMU, before the 2nd Fall, that could have caused the defects. These same two factors indicate that the 2nd Panel did not sustain an impact from the BMU that caused the 2nd Fall.

395 However, in this context, there are two additional points. First, Meinhardt Façade notes that the panel which I have found was damaged by a BMU impact (panel 1-25-42-R) was on the same level as the 2nd Panel and in a drop adjacent to drop 80.[739] Yet in my view, it cannot be safely inferred from this that the 2nd Panel was also damaged by a BMU impact. It is speculative to suppose that because a panel on the same level in an adjacent drop was damaged by a BMU, the same was true of the 2nd Panel. Notably, notwithstanding his view that panel 1-25-42-R was damaged by a BMU, Mr Hartog opined that the 2nd Fall was not caused by a BMU impact.[740] I accept his view for the reasons he gave.

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738 106AB 84169–84170.

739 Meinhardt Façade's closing submissions at para 585.

740 Vol 32 BAEIC, AEIC of Peter Hartog dated 26 February 2014 at PH-1, para 6.19.

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396 Secondly, the BMU Thesis would have been more difficult to discount if there had been no evidence of any issue with the 2nd Panel before the 2nd Fall. However, when Earth Arts inspected the 2nd Panel in 2007, it observed that the pin was "only in 5mm" and the panel was loose. Applying Occam's razor leads to the conclusion that it was a problem with the 2nd Panel related to Earth Arts' observations in 2007, rather than an impact from a BMU, which caused the 2nd Fall. Further, I note that it is undisputed that a BMU impact would have caused cracks on a panel; it would not have caused a pin to become insufficiently embedded or a panel to become shaky. In other words, a BMU impact would not have led to the issues with the 2nd Panel which Earth Arts noted in 2007.

397 I therefore do not accept that the 2nd Fall was caused by a BMU impact.

The Lack of Maintenance Thesis

398 I do not accept the Lack of Maintenance Thesis, for the same reasons why I have rejected it in relation to the cause of the defects (see [363] above).

My further findings

399 Notably, despite the fact that the parties raised different theses regarding the cause of the 2nd Fall, there was ultimately some convergence between the façade experts on this topic. I now set out the relevant evidence:

(a) Mr Hartog noted that the bottom pins of the 2nd Panel were bent outwards (see [155(c)] above). He inferred from this that it was "more than likely" that the 2nd Panel had rotated outwards and fallen from the Façade in one piece.[741] He opined that the cause of the 2nd Fall was that

[741] Transcript, 28 June 2016, pp 112–113.

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the 2nd Panel "had *come loose, that its restraints at the top edge had, for whatever reason, failed*" [emphasis added]. Critically, Mr Hartog's evidence in this regard went unchallenged.

(b) Mr Lalas agreed with Mr Hartog that the 2nd Panel fell out of the Cladding "substantially in one piece". He opined that the likely cause of the 2nd Fall was "critical cracks around the top pins or across the top of the panel",[742] and spoke during the trial of "unseen cracking".[743]

(c) Mr Yang opined that the most likely cause of the 2nd Fall was chips on the back of the 2nd Panel at the area of its top pins.[744]

In short, Mr Hartog, Mr Lalas and Mr Yang agreed that the most likely cause of the 2nd Fall was some failure at the top edge of the panel.

400 Furthermore, Mr Hartog's evidence regarding the cause of the 2nd Fall was corroborated by undisputed aspects of Arup's 1st 2004 Report.

(a) First, in that Report, Arup noted that the lower pins of the 1st Panel were bent outwards and opined that this occurred when the 1st Panel rotated outwards before falling from the Façade (see [47(c)] above). This accorded with Mr Hartog's account of why the lower pins of the 2nd Panel were bent outwards.

(b) Secondly, in gist, Arup's explanation of why the 1st Panel rotated outwards was that it had not been adequately restrained along its

742 Joint Expert Report of Façade Experts dated 22 February 2016 at p 49 (S/N 10.3).

743 Transcript, 29 June 2016, p 104.

744 Transcript, 27 June 2016, pp 130–131 and pp 137–138.

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top edge. This was the same explanation that Mr Hartog gave as to why the 2nd Panel rotated outwards and then fell from the Cladding.

401 In this light, I find that the primary cause of the 2nd Fall was that the restraints at the top edge of the 2nd Panel failed. More precisely, in view of my finding that the 2nd Panel was installed with top pins, the primary cause of the 2nd Fall was that those top pins failed to adequately restrain the 2nd Panel. The 2nd Panel was therefore able to rotate outwards, bending the lower pins of the 2nd Panel in the process, before falling from the Cladding.

402 I now make the following findings regarding the 2nd Fall:

(a) In 2007, Earth Arts inspected the 2nd Panel and noted that:

(i) the top left pin was "only in 5mm", which I find means that the pin was only embedded into the top left pin hole of the 2nd Panel by 5mm, when it should have been 30mm (see [313] above); and

(ii) the panel was shaky.

(b) The 2nd Panel was installed with the two pins that were found in the debris. These pins were not the normal pins which were 70mm long and 6mm in diameter (see [25] above). Instead, they were of a smaller diameter, either 4mm (according to Mr Yang) or 4.8mm (according to Mr Lalas) (see [382(b)] and [382(d)] above). ***The top pins were thus undersized and in breach of the specifications.*** They were inserted into PVC sleeves with an internal diameter of 5.6mm (see [382(d)] above).

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(c) The specifications provided for the top pin holes to be 8mm in diameter, to contain a PVC sleeve that was 1mm thick, which was to hold a pin that was ***6mm*** in diameter (see [314(a)] above).

(d) As far as I am aware, the top pin holes of the 2nd Panel were not measured by any party who inspected the panel before the 2nd Fall, or the debris after the 2nd Fall. But it is very likely, and I find, that they were *at least* 8mm in diameter. *Critically, there is no evidence (I am aware of) that any pin holes were* ***undersized***. As noted above, most of the pin holes, which were drilled in the factory, would have been of the correct size, *ie*, 8mm in diameter. But there were some pin holes that were *oversized*: these were those drilled on site (see [298] above).

(e) The undersized top pins of the 2nd Panel were loose in their pin holes. The 2nd Panel was therefore found to be shaky by Earth Arts when it inspected the 2nd Panel in 2007 (see [(a)(ii)] above). Moreover, and *significantly*, ***there was insufficient embedment of the top left pin into the pin hole*** (see [(a)(i)] above).

(f) Because its top pins were loose, the 2nd Panel rattled forwards and backwards and consequently, cracks or chips formed around the top pins on the back of the 2nd Panel (see my finding at [301] above).

(g) The cracks or chips at the back of the panel eventually gave way and as a result, the top pins of the 2nd Panel failed to adequately restrain it (see [245] above). The 2nd Panel therefore came loose from its top fixings and rotated outwards before falling off the Building.

403 For completeness, I note that during the trial, Mr Jeyaretnam suggested to Mr Yang – rather valiantly, I thought – that the photograph of the pieced-

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together 2nd Panel indicated that there was no chip at the top left pin area on the back of the 2nd Panel. Mr Yang said the photograph did not clearly indicate that there was no chip.[745] Having reviewed the photograph,[746] I agree with Mr Yang.

404 I now turn to Millenia's claims against Dragages and Builders Shop.

Millenia's claims against Dragages and Builders Shop

405 Millenia brings claims against Dragages and Builders Shop in contract and tort. I turn first to the duties Dragages and Builders Shop owed to Millenia.

What duties did Dragages and Builders Shop owe Millenia?

The contractual duties

406 I hold that Dragages owed, *inter alia*, the following duties to Millenia under the express terms of the Contract:[747]

(a) *Design*: To ensure that the design of the Building met Millenia's requirements as set out in two contractual documents, the Statement of Owner's Intent for Package 11, Office 117B and/or the Owner's Design Intent (cl 2.6.1 of the Conditions of Contract). This included the design of the cladding system.

(b) *Materials*: To use materials of good quality and in conformity with contractual specifications (cl 21.1.1 of the Conditions of Contract).

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745 Transcript, 27 June 2016, p 139.

746 Vol 27 BAEIC, AEIC of Derrick Yap Chong Yeow dated 28 February 2014 at DY-3 (p 270).

747 60AB 47582–48000.

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(c) *Installation*: To carry out the Works "in a proper and workmanlike manner", with workmanship "of a good standard" (cll 21.1.2 and 21.1.3 of the Conditions of Contract).

407 I hold that Dragages and Builders Shop owed, *inter alia*, the following duties to Millenia under the express terms of the Deed:[748]

(a) *Design*: To ensure that reasonable skill and care was used in the design, that the design complied with the contractual requirements, and that the design would be fit for its purpose (cl 3(a)–(d)).

(b) *Materials*: To ensure that the materials used for the Works and Sub-contract Works were "the best of their respective kinds of merchantable quality, free of defects and fit for the purposes for which they are intended" (cl 2(a)).

(c) *Works*: To "at all times use skill, care and diligence" in the performance, execution, completion and maintenance of the Works and Sub-contract Works (cl 1(b)), and to ensure that the Works and Sub-contract Works were "free of defects and fit for the purposes for which they [were] intended" (cll 2(b) and 3(d)).

As I have noted, the Warranty Period was from 27 September 1997 to 26 September 2012 (see [29(a)] above).

408 I hold that Dragages and Builders Shop owed the following duties to Millenia under the express terms of the Settlement Agreement:

748 67AB 52921–52927.

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(a) To appoint Meinhardt Singapore "to carry out a full inspection of the entire façade of [the Building] (with Meinhardt and Arup at liberty to discuss and agree on the extent of such inspection)" (cl 1), excluding the 8 Drops (see [76] above).

(b) To rectify the Identified Defects in accordance with rectification methods proposed by Meinhardt and approved by Arup (cl 6).

(c) To ensure that the Rectification Works were, *inter alia*, carried out in a good workmanlike manner, complied with the contractual specifications, were of a permanent nature, and were carried out on the terms and conditions set out in cll 1–3 of the Deed for the remainder of the Warranty Period (cll 12 and 13). In particular, I hold that under cl 13 of the Settlement Agreement read with cl 2(b) and 3(d) of the Deed (see [407(c)] above), Dragages and Builders Shop owed duties to (1) exercise reasonable care in performing and executing the Rectification Works and (2) ensure the Rectification Works were fit for their purposes.

409 I hold that the Contract contains an implied warranty that the Building would be reasonably fit for its purpose, *ie*, as Millenia submits, to serve as "an office building that allows its occupants to enter and exit safely".[749] Notably, Dragages accepts that it was under this obligation (though it makes submissions on the scope of the obligation which I will address below).[750] A warranty of fitness for purpose is readily implied where three conditions are fulfilled (see Stephen Furst QC and Sir Vivian Ramsey, *Keating on Construction Contracts* (Sweet & Maxwell, 10th Ed, 2016) ("*Keating*") at para 3–078):

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749 Millenia's closing submissions at para 468; Millenia's SOC at para 8.

750 Dragages' reply submissions at para 772.

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(a) "the employer makes known to the contractor the particular purpose for which the work is to be done";

(b) "the work is of a kind which the contractor holds itself out as performing"; and

(c) "the circumstances show that the employer relied on the contractor's skill and judgment in the matter".

All three conditions are met. First, Dragages knew that the Building was to be an office building (this was clearly stated in the first recital to the Contract).[751] Secondly, Dragages holds itself out as a party who designs and builds office buildings: that is its business (see [8] above). Thirdly, Millenia plainly relied on Dragages' exercise of care and skill in designing and constructing the Building.

410 Millenia submits that the Deed and the Settlement Agreement contain similar *implied* warranties of fitness of purpose.[752] I note, however, that the Deed contains *express* warranties that the design of the Building and the Works would be fit for their purposes (see [407(a)] and [407(c)] above). Similarly, under the Settlement Agreement, Dragages and Builders Shop owed an *express* duty to ensure the Rectification Works were fit for their purpose (see [408(c)] above). In this light, in my judgment, there is no gap in either the Deed or the Settlement Agreement to be filled by implied warranties of fitness of purpose. I therefore do not accept Millenia's submission that there were such implied warranties.

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751 60AB 47582, 47584.

752 Millenia's closing submissions at para 490.

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411 Dragages does not appear to deny that it owed the aforementioned duties to Millenia. However, Dragages submits that its obligations "do not extend to external factors outside the contract specifications".[753]

(a) First, Dragages submits that its warranties of fitness for purpose under the Contract and the Deed do not extend to ensuring that the Building could withstand three factors:[754]

(i) vibrations generated by MRT works carried out in the immediate vicinity of the Building;

(ii) improper use of the BMU and installation gondola; and

(iii) lack of proper maintenance of the Façade by Millenia.

(b) Secondly, Dragages submits that the Contract and the Deed contain an implied term that it "is not liable for any defects [and/or] failure arising from abnormal and unforeseen circumstances".[755]

412 I note at the outset that these submissions do not take Dragages very far. I have found that (1) vibrations were at most a minor contributory cause of the defects (see [331]–[332] and [335] above) and the 2nd Fall (see [379] above); (2) improper use of the BMU did not cause the defects besides cracks on one panel (see [361]–[362] above), nor did it cause the 2nd Fall (see [397] above); and (3) lack of maintenance did not cause the defects (see [363] above) or the 2nd Fall (see [398] above). In other words, I have found that the defects and the 2nd Fall were *not* (primarily) caused by abnormal circumstances or external factors that fall outside Dragages' and Builders Shop's contractual obligations.

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753 Dragages' reply submissions at p 386.

754 Dragages' closing submissions at paras 364–367, 371–376, 385–392

755 Dragages' closing submissions at paras 393–397.

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It is therefore academic whether Dragages' duties were subject to the limitations it relies on, because those limitations do not apply on the facts of this case and given my findings.

413 However, for completeness, I state my views on Dragages' submissions. I accept the submissions noted at [411(a)(ii)]–[411(a)(iii)] above: I agree that Dragages' warranties did not extend to ensuring that the Building was proof against improper use of the BMU/gondola and a lack of proper maintenance. Again, this does not assist Dragages, given the facts of this case.

414 I do not entirely accept the submission noted at [411(a)(i)] above.

(a) First, during the trial, I put it to the vibration experts, and they agreed, that in a dense city state such as Singapore, a building is not designed and built on the basis that there will not be any construction activity around the Building. The vibrations experts also agreed that MRT works are common in Singapore and "there are lines running around in fairly comprehensive coverage … all going near existing buildings".[756]

(b) Secondly, the evidence of Mr Lalas, Mr Keithly and Mr Hartog was that once a building was built, the subsequent contractor would bear the burden of ensuring it was not damaged by construction activity.[757] I accept this. However, Mr Keithly and Mr Hartog also agreed that the (earlier) building would nonetheless be designed to have a certain degree of robustness. Mr Hartog's evidence, which I accept, was that the robustness would be "based on what was required without taking into account *future unforeseeable construction*" [emphasis added].

[756] Transcript, 15 September 2015, p 152.

[757] Transcript, 22 September 2015, pp 95–100.

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In this light, I hold that Dragages' and Builders Shop's warranties *did* extend to ensuring that the Building would be able to withstand foreseeable vibrations generated by construction activity, including MRT works, in the vicinity of the Building, which was carried out with reasonable care consistent with prevailing engineering and industry standards. This activity should have been accounted for in the design and construction of the Building.

415 As I understand Dragages' position, it does not dispute this proposition. Dragages emphasises that there were "*massive and extensive* MRT construction works in the *immediate* vicinity of the Building" [emphasis added].[758] In other words, Dragages' case is that the particular vibration-generating activity here was unforeseeable and unforeseen: in Mr Ho's words, it was a "completely different [creature]".[759] I reject Mr Ho's submission because there is scant evidence that the construction activities Dragages relies on – the piling works at Entrance 5/5A of the Promenade Station and the breaking of the diaphragm wall – generated vibrations that caused the defects. The evidence before me shows normal foreseeable construction activity that the Building should have been able to withstand. There were no abnormal or abnormally strong vibrations during these periods of construction activity.

416 Finally, I do not agree that the Contract and the Deed contain the implied term that Dragages contends for (see [411(b)] above). First, as Millenia submits, Dragages did not plead this implied term.[760] Secondly, I find that the proposed term does not satisfy the business efficacy and officious bystander tests which apply at the second and third steps of the framework set out in *Sembcorp Marine*

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758 Dragages' reply submissions at para 9(1).

759 Dragages' reply submissions at para 781; Transcript, 24 February 2017, pp 42–43.

760 Millenia's reply submissions at para 292.

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Ltd v PPL Holdings Pte Ltd and another and another appeal [2013] 4 SLR 193 ("*Sembcorp Marine*") at [101].

The tortious duties

417 Millenia submits that Dragages and Builders Shop owed it the following duties of care in tort:[761]

(a) Dragages owed Millenia a duty of care in relation to the Works, in particular in designing and installing the Façade and using materials for the Works;

(b) Builders Shop owed Millenia a duty of care in relation to the Sub-contract Works, in particular in installing the Façade and using materials for the Sub-contract Works; and

(c) Dragages and Builders Shop owed Millenia a duty of care in performing the Rectification Works.

418 In *Go Dante Yap v Bank Austria Creditanstalt AG* [2011] 4 SLR 559 ("*Go Dante Yap*"), the Court of Appeal noted at [20] that where "the parties have … negotiated an obligation on one of them to exercise care and skill in the exercise of his rights or duties under the contract, it is entirely possible that an identical duty of care could exist in … tort". The Court of Appeal observed that in such a case, there may be sufficient proximity between the parties to ground a duty of care in the absence of policy considerations militating against the same. A duty of care would therefore arise under the test in *Spandeck Engineering (S) Pte Ltd v Defence Science & Technology Agency* [2007] 4 SLR(R) 100 ("*Spandeck*").

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761 Millenia's closing submissions at para 491.

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419 Here, Dragages and Builders Shop owed Millenia a contractual duty of care in relation to the Works and Sub-contract Works under cl 1(b) of the Deed (see [407(c)] above), which duty of care also applied to the Rectification Works under cl 13 of the Settlement Agreement (see [408(c)] above). I am satisfied that no policy considerations militate against the imposition of a concurrent duty of care in tort. I therefore hold that Dragages and Builders Shop owed Millenia the duties of care set out in [417(a)]–[417(c)] above. Notably, Dragages accepts that it owed Millenia the duties of care in tort referred to above.[762]

420 However, Dragages submits that its duty of care did not require it to ensure that the Building was proof against external factors such as vibrations from the MRT Works, which were not foreseeable.[763] Dragages submits that its duties in tort are co-extensive with its contractual duties which did not extend to ensuring the Façade was proof against external factors.[764] This argument is old wine in a new bottle: I have dealt with Dragages' submissions on the scope of its contractual duties above. I hold that Dragages' and Builders Shop's duties of care did not extend to ensuring the Façade was proof against improper use of the BMU or gondola and a lack of proper maintenance (see [413] above). However, I do not accept that Dragages and Builders Shop would have fulfilled their duty of care if the Works, Sub-contract Works and Rectification Works were carried out with no account for foreseeable construction activity, including MRT works, near the Building (see [414] above).

421 I now turn to the issue of breach.

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762 Dragages' closing submissions at paras 1039 and 1045.

763 Dragages' closing submissions at para 1034(1).

764 Dragages' closing submissions at paras 1036 and 1046.

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Did Dragages and Builders Shop breach their duties?

422 Mr Singh made the following three submissions on the issue of breach:[765]

(a) First, the Façade was unsafe. It was therefore not fit for purpose. Hence, Dragages and Builders Shop breached their duties to ensure that the Façade was fit for purpose.[766]

(b) Secondly, the doctrine of *res ipsa loquitur* applies to establish a *prima facie* case that Dragages and Builders Shop breached their duties of care to Millenia.[767]

(c) Thirdly, in any event, there is overwhelming evidence that Dragages and Builders Shop breached their duties to Millenia.[768]

423 I will focus on Mr Singh's first and third submissions. As to his second submission, I note that *res ipsa loquitur* is "a rule of evidence that enables a plaintiff to establish a *prima facie* case of negligence in the event that there is insufficient direct evidence to establish the cause of the accident": *Grace Electrical Engineering Pte Ltd v Te Deum Engineering Pte Ltd* [2018] 1 SLR 76 at [39]. *Res ipsa loquitur* does not apply where the cause of the accident is known. I have made positive findings on the cause of the defects (see [331]–[332] and [371] above). In other words, the cause of the defects is known. The doctrine of *res ipsa loquitur* therefore does not apply.

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765 Transcript, 23 February 2017, p 62.

766 Millenia's closing submissions at para 492; Transcript, 23 February 2017, pp 5–6, 61–62.

767 Millenia's closing submissions at para 513.

768 Transcript, 23 February 2017, pp 63–64; Millenia's closing submissions at paras 211–212, 233, 245, 254–256, 260–264, 310–315, 455–456, 462–467.

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Contractual duties to ensure fitness for purpose

424 I have found, based on the objective evidence and the evidence of the façade experts, including Mr Lalas, that the Façade was unsafe before the Reclad (see [225(a)] above). I find on this basis that the Facade was not fit for its purpose before the Reclad.

425 I find that the fact that the Façade was not fit for purpose was not due to external factors or abnormal circumstances falling outside the contractual duties of Dragages and Builders Shop (see [412] above).

426 I therefore make the following findings:

(a) Dragages breached its implied duty under the Contract to ensure that the Building was fit for its purpose (see [409] above).

(b) Dragages and Builders Shop breached their express duties under the Deed to ensure that the Works and Sub-contract Works were fit for their purposes (see [407(c)] above).

(c) Dragages and Builders Shop breached their express duties under cl 13 of the Settlement Agreement read with the Deed to ensure that the Rectification Works were fit for their purpose (see [408(c)] above).

Contractual duties regarding design, materials and installation

(1) Design

427 I find that Dragages breached its duty under the Deed to ensure that reasonable care and skill was used in the design and that the design was fit for its purpose (see [407(a)] above), in that the design did not provide for certain

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half pins to be welded though this should have been required (see [328] above).

(2) Materials

428 I have found that components made of non-AISI Type 316 stainless steel were used to secure brackets and shafts (DT4 and DT7). This was a departure from the contractual specifications which required use of AISI Type 316 stainless steel, and also gave rise to a real safety risk (see [273]–[275] above).

429 I therefore make the following findings:

(a) Dragages breached its duty under the Contract to use materials of good quality and complying with specifications (see [406(b)] above).

(b) Dragages and Builders Shop breached their duty under the Deed to ensure that the materials used for the Works and Sub-contract Works were the best of their respective kinds of merchantable quality and fit for their intended purposes (see [407(b)] above).

(3) Installation

430 I have made the following findings:

(a) DT1: There were oversized pin holes on some panels. This gave rise to a real safety risk (see [298] and [300]–[301] above).

(b) DT3: Some anchor bolts were insufficiently or excessively embedded into the RC wall. This gave rise to a risk of stacking and thus presented a real safety risk (see [281] above).

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(c) DT8: Nuts and washers were mounted onto shafts supporting some panels. In cases where the shafts were installed in contact with the panels below, this gave rise to a risk of stacking and thus amounted to a real safety risk (see [259] above).

(d) DT10: There were insufficient or no movement joints between some panels, in breach of the design. Many cases of DT10 arose because the panels were not installed with the required movement joints (see [332] above). Where there were no movement joints, this gave rise to a real safety risk (see [253]–[254] above).

(e) DT17: Some pins were insufficiently embedded into the pin holes. Depending on the embedment depth, this may have given rise to the risk of cracks forming around the pins if there were no PVC sleeves around the pins, and the risk of pins disengaging from the panels (see [314] above).

431 I therefore make the following further findings:

(a) Dragages breached its duty under the Contract to carry out the Works in a proper workmanlike manner with workmanship of a good standard (see [406(c)] above).

(b) Dragages and Builders Shop breached their duties under the Deed to (1) take care in performing and executing the Works and Sub-Contract Works and (2) to ensure the Works and Sub-contract Works were free of defects and fit for their purposes (see [407(c)] above).

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Contractual duties regarding the Rectification Works

432 I find that Dragages and Builders Shop breached their duties under the Settlement Agreement in carrying out the Rectification Works:

(a) I find that Dragages and Builders Shop breached their duties under cll 12 and 13 of the Settlement Agreement (see [408(c)] above).

(i) Many defects were not rectified: cracked panels (DT13: see [241] above), panels with cracks or chips at pin areas (DT14a: see [247] above), panels with narrow or no movement joints (DT10: see [256] above), panels with nuts or washers mounted onto shafts (DT8: see [261] above), rusty components (DT4 and DT7: see [276] above), improperly embedded anchor bolts (DT3: see [282] above), oversized pin holes/shaky panels (DT1 and DT15: see [302] above), and insufficiently embedded pins (DT17: see [313] above).

(ii) The silicone setting blocks (DT9a), which were inserted during the Rectification Works, were used across more than two vertically adjacent panels in a row. Additionally, the blocks were not removed, giving rise to a risk of stacking and thus a real safety risk which was not completely addressed (see [265]–[268] above).

(b) I find that Dragages and Builders Shop breached cl 6 of the Settlement Agreement in departing from the Rectification Works Method Statement by adopting the Stitching Procedure.

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Duties of care in tort

433 I find on the basis of the facts noted in [427], [428], [430] and [432] above that Dragages and Builders Shop breached the duties of care in tort to Millenia set out at [417(a)]–[417(c)] above.

Did the breaches cause Millenia to suffer loss?

434 I find that the aforementioned breaches by Dragages and Builders Shop of their duties to Millenia caused Millenia to suffer loss, namely:

(a) the cost of rectifying or replacing the Cladding; and

(b) various losses flowing from the 2nd Fall (for my findings and the cause, see [402] above).

435 I will determine the quantum of these losses in the second tranche of these proceedings.

436 I now turn to the issue of compromise.

Are Millenia's causes of action compromised?

437 Dragages and Builders Shop contend that Millenia's causes of action in respect of the defects are compromised (see [176(c)] above). To be clear, it is undisputed that Millenia's causes of action for (1) breach of the Settlement Agreement and (2) negligent performance of the Rectification Works have not been compromised. The issue here is whether Millenia's causes of action based on the mere presence of the defects – as opposed to *the failure to properly rectify the defects* – have been compromised. For brevity, in addressing this issue, I will refer to the causes of action in question as "Millenia's causes of action".

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The parties' submissions

438 Millenia submits that its causes of action have not been compromised. Millenia's submission is founded on two premises:[769]

(a) First, *the Settlement Agreement effected a conditional discharge of Millenia's causes of action*. The discharge of Millenia's causes of action was conditional upon Dragages and Builders Shop performing their duties under the Settlement Agreement. Millenia emphasises that Ms Perez apparently agreed during cross-examination that if Dragages and Builders Shop did not perform the Settlement Agreement, there would be no release of Millenia's claims.[770]

(b) Secondly, Dragages and Builders Shop did not perform their duties under the Settlement Agreement.

439 Dragages does not appear to challenge the first premise of Millenia's submission (see [438(a)] above). In particular, Dragages does not deny that the Settlement Agreement effected a conditional discharge of Millenia's causes of action. Rather, Dragages challenges the second prong of Millenia's argument (see [438(b)] above), contending that it adequately rectified the defects and thus (substantially) performed its duties under the Settlement Agreement.[771]

440 By contrast, Builders Shop challenges the first premise of Millenia's submission, submitting that Millenia's causes of action were compromised *upon the execution of the Settlement Agreement*. In gist, Builders Shop's case is that the Settlement Agreement effected an *unconditional* discharge of Millenia's

769 Millenia's closing submissions at para 519; Millenia's reply submissions at para 357.

770 Millenia's closing submissions at para 520; Transcript, 30 April 2014 at pp 110–111.

771 Dragages' closing submissions at p 359 (Section H heading) and para 623; Dragages' reply submissions at para 820.

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causes of action. Builders Shop submits that to the extent the defects were not properly rectified, Millenia's only recourse would be to sue for breach of the Settlement Agreement. Millenia may not revive its original causes of action.[772]

441 Two issues therefore arise for determination:

(a) *The nature of the discharge*: Did the Settlement Agreement effect an unconditional discharge of Millenia's causes of actions, or a discharge conditioned on Dragages' and Builders Shop's performance of their duties under the Settlement Agreement?

(b) *The scope of the discharge*: In the light of the answer to [(a)], to what extent, if any, have Millenia's causes of action been discharged?

The nature of the discharge

442 In *Turf Club Auto Emporium Pte Ltd and others v Yeo Boong Hua and others and another appeal and other matters* [2017] 2 SLR 12 ("*Turf Club*"), the Court of Appeal noted at [152(c)] that a settlement agreement generally has the effect of "[superseding] the original cause of action altogether". However, the Court of Appeal recognised a caveat to this general rule at [154]:

> The only caveat to this would be ***where the settlement agreement itself permits recourse to the original claim in the event of a breach of its terms***. If so, and if a breach is subsequently committed, *the innocent party may then proceed with the original claim* (see the observations of the High Court in *The Dilmun Fulmar* [2004] 1 SLR(R) 140 at [7] that an agreement of compromise would discharge all original claims and counterclaims ***unless it expressly provides for their revival in the event of breach*** … [emphasis added in italics and bold italics]

772 Builders Shop's closing submissions at paras 49 and 50.

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The court then held that the relevant consent order had "unequivocally and immediately compromised" the consolidated suits in respect of which it was made. The court noted that (1) the order did not expressly provide for the revival of the original claims in the event of a breach and (2) the clear language of the clause militated against interpreting the compromise of the suits as conditioned on the parties' performance of the terms of the order: see *Turf Club* at [156].

443 David Foskett, *Foskett on Compromise* (Sweet & Maxwell, 8th Ed, 2015) ("*Foskett*") states the following at paras 8–02, 8–04 and 8–07:

> Given the normal meaning, purpose and effect of a compromise, *the natural inference is that the parties' common intention is that the compromise will henceforth govern their legal relationship in connection with the disputes in which they have been engaged.* Accordingly, ***those disputes would still be regarded as "dead" even in the event of the breach of the compromise****. … recourse to the original claims will not be permitted* ***unless, upon a true construction of the compromise, it is clear that this is what the parties intended****. …*
>
> …
>
> … Where there is a ***clear and unconditional discharge****, abandonment or release of a claim by one party in return for the promised performance by the other of a series of acts,* ***that original claim can never be revived****.* Where the agreement involves ***merely the suspension of the claim pending the carrying-out of the acts by the other party*** *then the claim* ***may*** *not be lost forever. …*
>
> Generally speaking, therefore, *a compromise agreement will discharge all original claims and counterclaims* ***unless it expressly provides for their revival in the event of breach.***
>
> [emphasis added in italics and bold italics]

444 The following propositions are clear from these passages:

(a) The general effect of a settlement agreement is that the parties' causes of action prior to the conclusion of the agreement are discharged, and may not be revived upon breach of the agreement.

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(b) Yet in some cases, the discharge of a party's causes of action is *conditioned* upon the counterparty's performance of its duties under the settlement agreement. The causes of action are not discharged upon the execution of the agreement but *suspended* pending performance.

(c) It must be *clear* that the parties intended that they might have recourse to their original claims for the settlement agreement to be construed to have the effect noted in [(b)] above. A settlement agreement will generally not be construed to have that effect unless it *expressly provides for the original claims to be revived upon breach*.

445 With these propositions in mind, I turn to the relevant provisions of the Settlement Agreement which deal with the effect of the same on the parties' rights and liabilities. The relevant provisions are cll 25 and 26, which state:

> 25. ***Subject to the Parties' obligations*** under this Agreement, *each Party hereby* ***unconditionally and absolutely*** *discharges and releases the other* from all and any debts, claims, demands, liabilities, obligations, disputes, actions, proceedings, judgments or issues whatsoever *that each Party may now, in the past* ***or in the future*** *have* ***arising from or in connection with the [1st Fall], [Suit 480] and [Arup's 2004 Reports]***.
>
> 26. Nothing herein shall prejudice [Millenia's] right to bring any claim against Dragages and/or Builders Shop ***arising out of or in respect of present and future defects, where such defects have not been the subject of this Agreement***, nor shall this Agreement affect any rights [Millenia] may have against Dragages and/or Builders Shop *arising out of any other breaches of the Contract,* ***where such breaches have not been the subject of this Agreement***.
>
> [emphasis added in italics and bold italics]

446 In my judgment, it is plain from cl 25 that the Settlement Agreement effected an *unconditional, immediate discharge of Millenia's causes of action*:

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(a) First, cl 25 states that the parties to the Settlement Agreement "*unconditionally* and absolutely" [emphasis added] discharge and release each other from, *inter alia*, claims and liabilities. Clause 25 thus expressly indicates that the discharge of Millenia's causes of action was to be unconditional, and not conditioned upon performance by Dragages and Builders Shop of their duties under the Settlement Agreement. The opening words of cl 25 – "[s]ubject to the Parties' obligations" – do not suggest otherwise. This clause simply indicates that while the causes of action prior to the Settlement Agreement were discharged, *the parties to the Settlement Agreement acquired new obligations under the Settlement Agreement – which, upon breach, would give rise to fresh causes of action*. The analysis would have been different if the opening words of cl 25 read "[s]ubject to the *discharge* of the Parties' obligations" or "[s]ubject to the *performance* of the Parties' obligations". However, such words are not used in cl 25.

(b) Secondly, cll 25 and 26 do not expressly provide for Millenia's causes of action to be revived on breach by Dragages and Builders Shop of their duties under the Settlement Agreement (see [444(c)] above).

(c) Thirdly, the issue of whether the Settlement Agreement effected an unconditional discharge of Millenia's causes of action is an issue of law. I therefore do not think that Ms Perez's apparent concession, which Millenia emphasises (see [438(a)] above), is very material. In any event, Ms Perez's evidence was equivocal. She was asked whether there would be "no release" if the Settlement Agreement was not performed by Dragages and Builders Shop. Ms Perez replied that she did not exactly know the meaning of release, but that she "would generally agree".

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447 For the above reasons, I hold that the Settlement Agreement effected an unconditional discharge of Millenia's causes of action.

448 Moreover, even if the Settlement Agreement conditioned the discharge of Millenia's causes of action on performance by Dragages and Builders Shop of their duties under the Settlement Agreement, and Dragages and Builders Shop breached those duties (as I have found), I would have found that it is not open to Millenia to sue on their original causes of action.

449 *Foskett* states the following at para 8-09:

> Where an agreement, on its proper construction, does provide for recourse to the original claim in the event of a breach by the other party, the question arises as to whether the innocent party is thereby *obliged to revert to that claim* ***or*** *whether he can proceed to enforce the compromise* … the most likely formulation of such an agreement is that [the innocent party] *may* [revert to the original claim]. … In this situation it would appear that the innocent party ***may elect between*** *reverting to the original claim and pursuing his rights under the compromise*. [emphasis added in italics and bold italics]

450 In *Korea Foreign Insurance Company v Omne Re SA* [1999] Lloyd's Rep IR 509 ("*Korea Foreign Insurance*"), the parties entered into a settlement agreement under which the defendant agreed to pay a sum to the claimant in settlement of the latter's claims under reinsurance contracts. The English Court of Appeal held that the agreement, properly construed, entitled the claimant to revive its original claims if the sum was not paid: see *Korea Foreign Insurance* at 514 and *Foskett* at para 8-07 fn 13. The court then considered whether the claimant was *obliged* to pursue its original claims upon the defendant's breach of the settlement agreement. The court held that upon the defendant's breach, the claimant had the right to elect between (1) terminating the agreement and suing on the original claims and (2) affirming the agreement and suing for breach of the same. *Significantly, the court plainly did not contemplate that the*

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claimant was entitled to pursue both its original claims and a claim under the settlement agreement. The court found that the claimant had elected to sue for breach of the settlement agreement because that was the only claim that had been brought: see *Korea Foreign Insurance* at 515.

451 I agree with the analysis in *Korea Foreign Insurance*. In my judgment, where a settlement agreement entitles a party to have recourse to its original claims upon the counterparty's breach of its duties under the agreement, then unless the agreement otherwise provides, the innocent party must elect between (1) terminating the agreement for the counterparty's repudiatory breach of the agreement and suing on the original causes of action and (2) suing for breach of the agreement. The innocent party may not bring *both* the original causes of action and an action for breach of the agreement.

452 Millenia has not brought my attention to any evidence that it sought to terminate the Settlement Agreement. On the contrary, Millenia is suing Dragages and Builders Shop for breach of the Settlement Agreement. Hence, even if the Settlement Agreement conditioned the discharge of Millenia's causes of action upon performance by Dragages and Builders Shop of their duties thereunder, I would have found that Millenia cannot now raise its original causes of action against Dragages and Builders Shop.

The scope of the discharge

453 Up to this point, I have referred to the compromise of "Millenia's causes of action". However, what precisely was compromised?

454 Under cl 25, Dragages and Builders Shop were discharged from "claims … liabilities, obligations … actions … or issues … arising from or in connection with the [1st Fall], [Suit 480] and [Arup's 2004 Reports] (see [445] above).

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Clause 26 preserved Millenia's causes of action based on defects and breaches of the Contract that were not "the subject of [the Settlement] Agreement".

455 Therefore, the only causes of action that were compromised were those based on matters "arising from or in connection with the [1st Fall], [Suit 480] and [Arup's 2004 Reports]". It is thus necessary to have regard to the issues raised in Suit 480 and Arup's 2004 Reports to identify what was compromised.

456 In Millenia's statement of claim in Suit 480, Millenia referred to, *inter alia*, the following defects identified in Arup's 1st 2004 Report, which defects Millenia has also raised in these proceedings:[773]

(a) incorrect washers, *ie*, DT4 and DT7;

(b) incorrect installation of brackets, *ie*, DT5;

(c) the presence of temporary spacers within horizontal joints, *ie*, DT8;

(d) the local spalling of stone panels, *ie*, DT14a (Arup's 1st 2004 Report refers to spalling at the position of pins); and

(e) visible hairline cracks to the external surface of panels, *ie*, DT13.

457 Apart from referring to these defects, Arup's 1st 2004 Report referred to the variation of joint widths between panels and Arup's 2nd 2004 Report referred to stacking (see [51(a)] and [54(a)] above), *ie*, DT10.

458 I accordingly find that Millenia's causes of action based on DT4, DT5, DT7, DT8, DT10, DT13 and DT14a *per se* – *ie*, based on the mere presence of these defects – were all compromised by the Settlement Agreement. However,

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773 72AB 57340, 57351–57352 (para 34).

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as I have noted, Millenia's causes of action for the failure to properly rectify these defects have not been compromised (see [437] above).

459 I now turn to consider whether any of Millenia's claims are time-barred.

Are Millenia's claims time-barred?

Dragages' and Builders Shop's pleadings on limitation

460 It is trite that a defence of limitation must be pleaded specifically: O 18 r 8 of the Rules of Court (Cap 322, R 5, 2014 Rev Ed). Section 4 of the Limitation Act (Cap 163, 1996 Rev Ed) ("the Limitation Act") also provides that "[n]othing in [the Limitation Act] shall operate as a bar to an action unless [the Limitation Act] has been expressly pleaded as a defence thereto …".

461 Both Dragages and Builders Shop pleaded the defence of limitation. However, they did not plead that defence to all of Millenia's claims:

(a) Dragages only pleaded the limitation defence to Millenia's claims concerning Dragages' breach of (1) the Contract and (2) its duty of care in tort in performing the Works and/or Sub-contract Works.[774]

(b) Builders Shop only pleaded the limitation defence to Millenia's claim that Builders Shop breached its duty of care in tort to Millenia in performing the Sub-contract Works.[775]

462 Neither Dragages nor Builders Shop pleads that Millenia's claims against them for breach of the Deed, breach of the Settlement Agreement and breach of their duties of care in tort in performing the Rectification Works are

774 Dragages' Defence at paras 46F and 48A.

775 Builders Shop's Defence and Counterclaim at para 35.

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time-barred. I therefore do not consider the defence in respect of those claims. I address whether (1) Millenia's claim against Dragages under the Contract and (2) Millenia's claims against Dragages and Builders Shop in tort for negligent performance of the Works and/or Sub-contract Works are time-barred.

Analysis

463 Section 24A of the Limitation Act provides as follows:

> **Time limits for negligence, nuisance and breach of duty actions in respect of latent injuries and damage**
>
> **24A.**—(1) This section shall apply to any action for damages for ***negligence, nuisance or breach of duty (whether the duty exists by virtue of a contract*** or of a provision made by or under any written law or independently of any contract or any such provision).
>
> …
>
> (3) An action to which this section applies, other than one referred to in subsection (2), shall not be brought after the expiration of the period of —
>
> > (*a*) ***6 years from the date on which the cause of action accrued***; or
> >
> > (*b*) ***3 years from the earliest date on which the plaintiff***… first had *both the knowledge required for bringing an action for damages in respect of the relevant damage and a right to bring such an action*, if that period expires later than the period mentioned in paragraph (*a*).
>
> (4) In subsections (2) and (3), the knowledge required for bringing an action for damages in respect of the relevant injury or damage (as the case may be) means knowledge —
>
> > (*a*) *that the injury or damage was attributable in whole or in part to the act or omission which is alleged to constitute negligence, nuisance or breach of duty*;
> >
> > (*b*) *of the identity of the defendant*;
> >
> > (*c*) if it is alleged that the act or omission was that of a person other than the defendant, of the identity of that person and the additional facts supporting the bringing of an action against the defendant; and

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> (*d*) ***of material facts about the injury or damage which would lead a reasonable person who had suffered such injury or damage to consider it sufficiently serious to justify his instituting proceedings for damages*** against a defendant who did not dispute liability and was able to satisfy a judgment.
>
> …
>
> (6) For the purposes of this section, *a person's knowledge includes knowledge which he might reasonably have been expected to acquire —*
>
> (*a*) from *facts observable or ascertainable by him*; or
>
> (*b*) from *facts ascertainable by him with the help of appropriate expert advice which it is reasonable for him to seek*.
>
> (7) A person shall not be taken by virtue of subsection (6) to have knowledge of a fact ascertainable only with the help of expert advice so long as he has taken all reasonable steps to obtain (and, where appropriate, to act on) that advice.
>
> [emphasis added in italics and bold italics]

464 I note the following points about s 24A:

(a) First, s 24A applies to *all* claims for breach of contract and in tort: s 24A(1) and *Yan Jun v Attorney-General* [2015] 1 SLR 752 at [62]. Section 24A thus applies to all of Millenia's claims against Dragages and Builders Shop.

(b) Secondly, where s 24A applies, s 6 of the Limitation Act, which sets out the general limitation period for actions founded on a contract or on tort, does not apply concurrently; only s 24A applies: *Lian Kok Hong v Ow Wah Foong and another* [2008] 4 SLR(R) 165 ("*Lian Kok Hong*") at [14]).

465 The applicable sub-provision in s 24A is s 24A(3). I will first consider whether Millenia's claims are time-barred under s 24A(3)(*a*). I then consider whether the claims are time-barred under s 24A(3)(*b*). I note that the time limits

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set out in s 24A are subject to an overriding time limit of 15 years from the "starting date" under s 24B. It will not be necessary to discuss s 24B, however, because for the reasons given below, I find that the claims by Millenia which are in issue are time-barred under s 24A(3).

466 I first turn to Millenia's action for breach of the Contract.

(1) Millenia's action against Dragages for breach of the Contract

467 Section 24A(3)(*a*) states that an action to which s 24A applies shall not be brought after "6 years from the date on which the cause of action accrued". A cause of action in contract accrues on the date of breach: *Lim Check Meng v Orchard Credit Pte Ltd* [1997] 2 SLR(R) 709 ("*Lim Check Meng*") at [18].

468 When did Dragages breach the Contract? Millenia's position is that the breaches occurred on the date of practical completion, *ie*, 27 September 1997: Millenia claims "the Written Statement … must be the point in time from which limitation runs".[776] On the other hand, Dragages submits that the Cladding was installed before 13 August 1997, based on several documents pertaining to the pre-handover inspection of the Façade. Dragages therefore contends that the breaches (if any) occurred before 13 August 1997.[777]

469 Regardless of which date – 13 August 1997 or 27 September 1997 – is adopted, it is evident that this suit, which was commenced on 28 August 2012 (see [159] above), was brought after 6 years from the date on which Millenia's cause of action for breach of the Contract accrued. I therefore find that Millenia's action for breach of the Contract is time-barred under s 24A(3)(*a*) of the Limitation Act.

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776 Millenia's reply submissions at para 351.

777 Dragages' closing submissions at paras 16–18.

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470 For completeness, however, I add that I agree with Millenia that time began to run from *the date of practical completion*, 27 September 1997. The limitation period for an action for breach of contract in respect of defective work generally runs from this date: see *Chitty on Contracts* vol 1 (H G Beale gen ed) (Sweet & Maxwell, 32nd Ed, 2015) ("*Chitty*") at para 28–054; *Keating* at para 11–035. In *Chia Kok Leong v Prosperland Pte Ltd* [2005] 2 SLR(R) 484 ("*Prosperland*"), the Court of Appeal accepted that the limitation period for breach of contract ran from the date of practical completion. In that case, the construction of the condominium was completed in 1993: see *Prosperland* at [3]. Subsequently, in August 1997, a wall tile on the façade of the condominium was noticed to be becoming de-bonded. In August 1999, some more tiles were found de-bonded. In September 1999, two tiles fell off the façade: see *Prosperland* at [60]. The developer sued the main contractor and the architects for breach of contract and also sued the main contractor in negligence. The Court of Appeal held at [62] that "*[s]ince the building was completed in May 1993*, the normal limitation period for a claim *in contract or tort* of six years would have expired by May 1999" [emphasis added]. I note that the Court of Appeal suggested that the limitation period for a claim in tort also ran from the date of practical completion. I will address this at [479(a)] below.

471 I now consider whether Millenia's action for breach of the Contract is time-barred under s 24A(3)(*b*) of the Limitation Act. The test is whether this suit was brought within 3 years from the earliest date on which Millenia had both (1) the knowledge required to sue for breach of the Contract and (2) the right to sue for breach of the Contract. I have found that the right to sue would have accrued by 27 September 1997 (see [470] above). The key issue is thus whether Millenia brought this suit within 3 years from the earliest date on which it had the requisite knowledge to sue for breach of the Contract. This suit was commenced on 28 August 2012 (see [159] above). Therefore, Millenia's action

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for breach of the Contract would be time-barred if it had the requisite knowledge to sue for breach of the contract before 28 August 2009.

472 Section 24A(4) of the Limitation Act defines the requisite knowledge for the purpose of s 24A(3). Section 24A(4)(*c*) is not relevant in this case. I note the following in relation to ss 24A(4)(*a*) and 24A(4)(*d*):

(a) Section 24A(4)(*a*) (knowledge that the injury or damage was attributable to the allegedly wrongful act/omission): the plaintiff "need not know the details of what went wrong … as long as he knew or might reasonably have known of the *factual essence of his complaint*": *Lian Kok Hong* at [42(a)].

(b) Section 24A(4)(*d*) (knowledge of material facts that would lead a reasonable person who suffered such injury or damage to consider it "sufficiently serious" to justify instituting proceedings against the defendant): the plaintiff must know enough to consider the action not "frivolous or wholly without merit, taking into account the effort required in instituting a court action": *Lian Kok Hong* at [39].

473 Dragages submits that Millenia had the requisite knowledge to sue for breach of the Contract by either of the following points in times:

(a) By 28 December 2004, the date of Arup's 2nd 2004 Report.[778] This is because Arup's 2nd 2004 Report contained a list of 16 "*noted deviations from the design condition*" [emphasis added] observed by Arup in its inspection of the 8 Drops, five of which were assessed to be of high severity (see [54(a)] above). Moreover, Arup's 2nd 2004 Report cautioned that it was not unreasonable to expect that similar defects were

778 Dragages' closing submissions at para 33.

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present on the other drops which Arup had not inspected, and that those areas of the Cladding might also have other issues (see [56] above).[779]

(b) By 14 August 2007, the date of the Settlement Agreement.[780] Dragages submits that Millenia would have had the requisite knowledge after it received the results of the inspections of the Cladding carried out by Earth Arts and Arup from December 2006 to 2007 (see [62]–[63] above). This would have been no later than 14 August 2007 as the results were annexed to the Settlement Agreement.

474 Millenia does not directly address Dragages' submissions on the date on which it had the requisite knowledge to sue for breach of the Contract. Millenia simply submits that even if its claims under the Contract are time-barred, Dragages is still liable under the Deed, the Settlement Agreement and in tort.[781]

475 I find that Millenia had the requisite knowledge to sue for breach of the Contract by 28 December 2004, the date of Arup's 2nd 2004 Report:

(a) First, by that date, Millenia knew that there were deviations from the design (see [473(a)] above): Millenia would have known, *inter alia*, that components made of non-AISI Type 316 stainless steel were used and brackets were not installed in accordance with the design. Accordingly, I find that Millenia had the requisite knowledge under s 24A(4)(*a*).

(b) Secondly, Millenia would have known of the identity of the defendant, Dragages: it had the requisite knowledge under s 24A(4)(*b*).

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779 69AB 54901.

780 Dragages' closing submissions at para 37.

781 Millenia's closing submissions at para 547.

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(c) Thirdly, Millenia would have known Arup had noted 16 apparent deviations from the design, some of "high severity", and that there may have been other instances of these defects and other types of defects on other parts of the Cladding apart from the 8 Drops which Arup had inspected (see [473(a)] above). I thus find that Millenia knew enough to consider an action against Dragages not "frivolous or wholly without merit" (see [472(b)] above): it had the requisite knowledge under s 24A(4)(*d*). *Notably, Millenia in fact commenced proceedings in Suit 480 against Dragages and Builders Shop based on the defects identified in the 2004 Reports*.

Even if I am wrong about this, I agree with Dragages that Millenia would have had the requisite knowledge from the results of the inspections by Earth Arts and Arup, which Millenia received by 14 August 2007 (see [473(b)] above).

476 I thus find that Millenia's action for breach of the Contract is time-barred under s 24A(3)(*b*) of the Limitation Act. Given my prior finding that this action is also time-barred under s 24A(3)(*a*) (see [469] above), I find that Millenia's action for breach of the Contract is time-barred.

(2) Millenia's actions against Dragages and Builders Shop for breaches of their duties of care in tort in performing the Works and/or Sub-contract Works

477 I turn first to the application of s 24A(3)(*a*). As I have noted, this sets out a limitation period of six years from the date on which the cause of action accrued (see [467] above).

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478 When did Millenia's causes of action for Dragages' and Builders Shop's breaches of their duties of care in tort to Millenia in performing the Works and the Sub-contract Works arise? The parties take the following positions:

(a) Millenia does not address this issue; instead, Millenia focuses on the application of s 24A(3)(*b*) (see [483(a)] below).[782]

(b) Dragages appears to suggest that Millenia's cause of action against it would have accrued by 28 December 2004 (the date of Arup's 2nd 2004 Report).[783]

(c) Builders Shop contends that Millenia's cause of action against it accrued upon the completion of the Sub-contract Works, and by no later than 27 September 1997 (the date of practical completion).[784]

479 I hold that *Millenia's causes of action accrued when it suffered damage* due to Dragages' and Builders Shop's breaches of their duties of care. A cause of action in negligence accrues when damage is sustained by the plaintiff: *Lim Check Meng* at [18]. When, however, does a plaintiff suffer damage for the purposes of a claim in tort for defects in a building? I turn now to the authorities:

(a) In *Prosperland*, as I have noted (see [470] above), the Court of Appeal suggested at [62] that the limitation period for a claim in tort would have begun on the date of practical completion. This would imply that the plaintiff suffered damage on the date of practical completion.

(b) However, in the subsequent case of *Lian Kok Hong*, the Court of Appeal cited with approval the decision of the House of Lords in *Pirelli*

782 Millenia's closing submissions at para 530.

783 Dragages' closing submissions at para 25.

784 Builders Shop's closing submissions at para 68a.

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General Cable Works Ltd v Oscar Faber & Partners (A Firm) [1983] 2 AC 1 ("*Pirelli*") at [24]. In *Pirelli*, the plaintiff engaged the defendant to design an addition to its factory, including a chimney. The chimney was then built with unsuitable material. Cracks formed on the chimney by April 1970. The plaintiff discovered the damage in November 1977 (and could only have discovered it with reasonable diligence by October 1972 at the earliest). The plaintiff sued the defendant in negligence. The House of Lords held that the plaintiff's cause of action accrued by April 1970 when the cracks formed on the chimney, and was therefore time-barred. The rule established by *Pirelli* is that damage occurs *when the defects manifest themselves in the form of physical damage*.

(c) In *Management Corporation Strata Title Plan No 2827 v GBI Realty Pte Ltd and another* [2014] 3 SLR 229 ("*GBI Realty*"), the management corporation ("MCST") of an industrial development sued the contractor who designed and built the development in negligence, after it discovered settlement around the building. The contractor alleged that the claim was time-barred. In addressing the defence of limitation, Woo Bih Li J considered when the damage had occurred for the purpose of the accrual of the plaintiff's cause of action in negligence. After citing *Pirelli*, and noting that it was approved by the Court of Appeal in *Lian Kok Hong* at [24] (see [(b)] above), Woo J held at [27] that the plaintiff's cause of action had likely accrued by March 2004 when it had first complained of a sunken driveway. Woo J observed that the sinking of the driveway was akin to the occurrence of the cracks in *Pirelli*.

480 In my judgment, the rule in *Pirelli* represents the law in Singapore today. In *Prosperland*, the Court of Appeal did not directly consider when exactly the plaintiff suffered damage that gave rise to his cause of action in tort. Rather, the

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court simply stated at [62] that time began to run for the purposes of limitation from the date of practical completion. The court also did not consider *Pirelli*. However, *Pirelli* was subsequently cited with approval by the Court of Appeal in *Lian Kok Hong* and the High Court in *GBI Realty* applied the rule established in *Pirelli*. I thus hold that the law as it stands is that the plaintiff suffers damage for the purpose of a claim in tort for defects in a building when the defects manifest themselves in the form of physical damage to the building.

481 I would note, however, that it is not entirely clear that the rule in *Pirelli* should *remain* the law. The difficulty stems from the nature of the loss which the owner of a building suffers where a building is built defectively. Our courts have recognised that the loss sustained by the owner is pure economic loss: see, *eg*, *RSP Architects Planners & Engineers v Ocean Front Pte Ltd and another appeal* [1995] 3 SLR(R) 653 at [27] and [47]. When, however, does the owner suffer such loss? This issue was explored by the Privy Council in *Invercargill City Council v Hamlin* [1996] 1 AC 624, by the Hong Kong Court of Final Appeal in *Bank of East Asia Ltd v Tsien Wui Marble Factory Ltd & Ors* [2000] 1 HKLRD 268, and the English Court of Appeal in *Abbott v Will Gannon & Smith Ltd* [2005] EWCA Civ 198. The answer may either be (1) the date on which the physical damage occurred or (2) the date on which such damage was discovered or was reasonably discoverable. It is unnecessary for me to decide between these alternatives because they lead to the same conclusion in this case. There were several types of defects. The defects, like the defective material in *Pirelli*, would only have manifested themselves in the form of physical damage after some time. The first manifestation was probably the 1st Fall. Other defects would have manifested themselves by October or December 2004, when they were noted in Arup's 2004 Reports. For example, in Arup's 1st Report, Arup noted the spalling of panels near pin areas and cracks on panels (see [51(d)] and [51(e)(i)] above). In its 2nd 2004 Report, Arup noted that some washers were

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beginning to corrode (see [54(c)] above). Further, this physical damage was reasonably discoverable by October or December 2004, and would have been discovered by Millenia through Arup's 2004 Reports. I therefore find that Millenia's causes of action for Dragages' and Builders Shop's breaches of their duties of care in tort accrued by no later than 28 December 2004. Since more than six years elapsed before these proceedings were commenced on 28 August 2012, I find that Millenia's actions against Dragages and Builders Shop for breach of their duty of care in tort in performing the Works and/or Sub-contract Works are time-barred under s 24A(3)(*a*) of the Limitation Act.

482 I now discuss the application of s 24A(3)(*b*) of the Limitation Act. Millenia's actions would be time-barred under s 24A(3)(*b*) if it had the requisite knowledge to sue Dragages and Builders Shop in tort, for negligent performance of the Works and/or Sub-contract Works, by 28 August 2009 (see [471] above).

483 The parties make the following submissions on this point:

(a) Millenia submits that it did not have the requisite knowledge to sue until after the 2nd Panel fell, either (1) after Arup's 2011 Report was issued or (2) after Arup completed the 100% Inspection of the Façade.[785] The thrust of Millenia's case is that it was only after this time that it became aware of the *full extent* of the defects in the Cladding.

(b) Dragages submits that Millenia had the requisite knowledge to sue by 28 December 2004 or 14 August 2007 (see [473] above).

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785 Millenia's closing submissions at paras 534–535 and 546.

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(c) Builders Shop submits that Millenia had the requisite knowledge to sue by 28 December 2004 or 20 March 2008, the date of Meinhardt's 2008 Report.[786]

484 I find that Millenia had the requisite knowledge to sue for Dragages' and Builders Shop's breaches of their duty of care in performing the Works and/or Sub-contract Works by 28 December 2004. My reasons are essentially the same as those I have given in addressing Millenia's action for breach of the Contract (see [475] above). By 28 December 2004, Millenia would have known that Arup had found multiple (alleged) defects on the Cladding. It would have known that these were attributable to acts or omissions of Dragages and Builders Shop in carrying out the Works and/or Sub-contract Works. It would have known that several defects were of "high severity" and that other portions of the Cladding that had not been inspected might contain the same and other defects. I thus find that Millenia had the requisite knowledge under s 24A(4) by 28 December 2004. It is immaterial that Millenia did not know the *full extent* of the defects by 28 December 2004 (see [483(a)] above). What matters is that Millenia knew the *factual essence* of its complaint by that date (see [472(a)] above).

485 I thus find that Millenia's actions against Dragages and Builders Shop for breaches of their duties of care in tort in performing the Works and/or Sub-contract Works are time-barred under s 24A(3)(*b*) of the Limitation Act. Given my prior finding that they are time-barred under s 24A(3)(*a*) (see [481] above), I find that these actions are time-barred.

486 For completeness, I note that in reply to Dragages' submissions on the application of s 24A(3) of the Limitation Act, Millenia emphasises that it did sue Dragages and Builders Shop in Suit 480, before withdrawing the suit after

786 Builders Shop's closing submissions at para 69.

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the parties entered into the Settlement Agreement.[787] I struggle to understand the import of this submission. However, to the extent that the argument is that the Settlement Agreement suspended the limitation period, I do not accept it.

487 It is settled that once time begins to run for the purpose of a limitation period, it generally runs continuously unless a statutory exception applies: see Andrew McGee, *Limitation Periods* (Sweet & Maxwell, 7th Ed, 2014) at para 2.001 and 2.018. The Limitation Act does not provide for limitation periods to be extended or suspended where the parties enter into a settlement agreement.

488 Furthermore, cl 13 of the Settlement Agreement expressly states:

> For the avoidance of doubt, *nothing herein shall be construed as extending* ***in any way whatsoever*** *…* ***any limitation period(s) at law in respect of the Identified Defects, the Schedule A Defects, the Schedule B Defects and the areas unaffected by the Rectification Works***. [emphasis added in italics and bold italics]

It is thus evident that Millenia, Dragages and Builders Shop, the parties to the Settlement Agreement, the parties whose rights and liabilities are in issue in relation to the limitation defence, contemplated and intended that the limitation period would continue to run notwithstanding the Settlement Agreement.

Summary of conclusions

489 In summary:

(a) I find that Dragages and Builders Shop breached the Deed, the Settlement Agreement, and their duties of care in tort to Millenia in carrying out the Rectification Works (see [426(b)]–[426(c)], [427], [429(b)] and [431(b)]–[433] above). These breaches caused Millenia to

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787 Millenia's reply submissions at paras 354–355.

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suffer loss in the form of the cost of rectifying or replacing the Cladding and losses flowing from the 2nd Fall (see [434] above). Accordingly, Dragages and Builders Shop are liable for these losses (whose nature and quantum I will determine in the second tranche of these proceedings). Millenia's causes of action for the aforementioned breaches are not time-barred (see [462] above).

(b) I find that Dragages breached the Contract, and Dragages and Builders Shop breached their duties of care in tort in performing the Works and/or Sub-contract Works (see [426(a)], [429(a)], [431(a)] and [433] above). However, Millenia's causes of action for these breaches are time-barred (see [476] and [485] above).

(c) I find that Millenia's causes of action based on DT4, DT5, DT7, DT8, DT10, DT13 and DT14a *per se* – *ie*, based on the mere presence of these defects – have been compromised by the Settlement Agreement (see [458] above). But insofar as these defects were not rectified, Dragages and Builders Shop breached the Settlement Agreement and the duties of care in tort which they owed to Millenia in carrying out the Rectification Works (see [(a)] above).

490 I now turn to Millenia's claims against the Meinhardt Parties.

Millenia's claims against the Meinhardt Parties

Introduction

491 Millenia's case is that the Meinhardt Parties breached their duties of care in tort to Millenia (see [171] above). There is no claim in contract since Millenia did not enter into any contract with either of the Meinhardt Parties.

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492 As I have noted, subject to one caveat which I discuss shortly, Millenia does not claim the cost of rectifying or replacing the Cladding from the Meinhardt Parties (see [175] above). In other words, Millenia does not claim that breaches by the Meinhardt Parties of their alleged duties caused Millenia to suffer losses relating to the cost of rectifying or recladding the Façade. Millenia's case is that the breaches by the Meinhardt Parties of their alleged duties of care caused or contributed to the 2nd Fall, and the Meinhardt Parties are therefore liable for the losses suffered by Millenia flowing from the 2nd Fall.

493 I now discuss the caveat referred to at [492] above. Millenia submits that to the extent that its claims have been compromised due to negligence by the Meinhardt Parties, it is entitled to recover the full amount of loss that it claims in this suit from the Meinhardt Parties (see [175] above). I do not agree. First, as Mr Jeyaretnam submitted,[788] this claim was not pleaded. Secondly, Millenia has not made any submissions regarding how or why it lost any remedy against Dragages or Builders Shop, or had any of its claims compromised, due to the negligence of the Meinhardt Parties. I have found that some of Millenia's claims are compromised (see [489(b)] above). But they are compromised due to cl 25 of the Settlement Agreement. The conduct of the Meinhardt Parties has nothing to do with the compromise of Millenia's claims. Hence, if necessary, I find that Millenia has not pleaded nor shown how it lost any remedy against Dragages or Builders Shop, or had any of its claims compromised, due to the negligence of the Meinhardt Parties. I therefore do not accept the claim raised by Millenia in its submissions.

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788 Transcript, 24 February 2017, pp 118–119.

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Millenia's shifting case

494 In its closing submissions, Millenia submits that the Meinhardt Parties owed and breached duties of care in relation to two sets of statements:[789]

> (a) First, statements regarding the "inspection and identification of defects on the [Façade] and methods of rectification that would be used to remedy the identified defects" ("the 1st Set of Statements"). These statements were made in Meinhardt's 2007 and 2008 Reports.
>
> (b) Secondly, statements that the Rectification Works were carried out in accordance with the Settlement Agreement ("the 2nd Set of Statements"), which were made in letters by the Meinhardt Parties.

In other words, in its closing submissions, Millenia claims that the Meinhardt Parties are liable for negligent misstatements or misrepresentations.

495 In oral submissions, Mr Jeyaretnam accepted that Millenia had pleaded that the Meinhardt Parties owed and breached duties of care regarding the 2nd Set of Statements (see [171(d)] above).[790] However, he submitted that Millenia did not properly plead that Meinhardt Parties owed and breached duties of care in relation to the 1st Set of Statements.[791] I agree with Mr Jeyaretnam. Millenia pleaded that the Meinhardt Parties had breached their duties of care by (1) failing to properly inspect the Cladding, (2) approving the rectification works involving stitching, and (3) failing to propose remedial methods or works that would ensure that the Building was fit for its purpose (see [171(a)]–[171(c)] above). By these averments, Millenia pleaded that the Meinhardt Parties were

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789 Millenia's closing submissions at paras 555, 567 and 631.

790 Transcript, 24 February 2017, pp 116–117.

791 Transcript, 24 February 2017, pp 113–117.

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negligent in their *conduct*. There was no claim that the Meinhardt Parties made negligent *misstatements* or *misrepresentations* regarding the inspection of the Façade, identification of defects and rectification methods (see [494(a)] above). I do not consider that it is open to Millenia to submit that the Meinhardt Parties are liable for negligent misrepresentation in making the 1st Set of Statements, because Millenia did not properly plead that case against the Meinhardt Parties.

496 Moreover, while Millenia submits at the outset of its submissions for its claims against the Meinhardt Parties that they breached their duties of care in issuing the 1st Set of Statements, the actual breaches cited by Millenia, relating to the inspection of the Façade and proposal of rectification methods, do not involve misstatements or misrepresentations (see [558(a)]–[558(d)] below). In other words, the alleged breaches track Millenia's pleaded case.

497 For these reasons, I will focus on Millenia's pleaded claims against the Meinhardt Parties.

498 I now address the first issue in relation to Millenia's claims against the Meinhardt Parties, namely, whether Meinhardt Singapore carried out the roles assigned to it under the Settlement Agreement (see [198(a)] above).

Did Meinhardt Singapore perform the roles assigned to it under the Settlement Agreement?

499 A key issue in relation to Millenia's claims against the Meinhardt Parties is whether Meinhardt Singapore performed the roles the Settlement Agreement contemplated it would perform. This is because Millenia's case is that the Meinhardt Parties were negligent *in the course of performing certain works or making statements regarding those works*. To put the point in a different way,

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the negligence alleged is *misfeasance* rather than *nonfeasance*. But if Meinhardt Singapore did not perform the works or make the statements, it could not have been negligent *in doing so*. The issue of one party being negligent does not arise if another party committed the allegedly negligent act. If the former is sued, the defence that the claimant has sued the wrong party is a complete answer.

500 The evidence indicates that it was Meinhardt Façade who was engaged to perform the roles that the Settlement Agreement contemplated would be carried out by Meinhardt Singapore. It was Meinhardt Façade, not Meinhardt Singapore, who inspected the Façade, identified the defects and proposed the methods of rectification. Ms Perez and Mr Meur gave evidence to this effect,[792] which was corroborated by the following pieces of objective evidence:

(a) the June 2007 Proposal, which was issued by Meinhardt Façade and not Meinhardt Singapore (see [67] above);

(b) invoices issued by Meinhardt Façade for its services and payment vouchers and cheques issued by Builders Shop identifying Meinhardt Façade as the payee;[793] and

(c) Meinhardt's 2007 and 2008 Reports, both of which indicate that it was Meinhardt Façade, and not Meinhardt Singapore, who inspected the Façade, identified the defects and proposed methods of rectification.

501 Millenia did not bring any objective evidence to my attention – whether in the form of fee proposals, correspondence or other documents – that indicated

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792 Vol 12 BAEIC, AEIC of Audrey Perez dated 4 March 2014 at para 358; Vol 19 BAEIC, AEIC of Mathieu Serge Meur dated 6 March 2014 at para 37.

793 74AB 58927–58930; 75AB 59456–59459; 76AB 60704–60706; 78AB 62144–62145.

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that Dragages and/or Builders Shop had appointed Meinhardt Singapore to carry out the works that Meinhardt was to perform under the Settlement Agreement.

502 Millenia submits, however, that Meinhardt Façade was Meinhardt Singapore's agent or nominee: the latter inspected the Façade, identified the defects and proposed rectification methods through Meinhardt Façade.[794]

503 I do not accept this submission. The objective evidence referred to at [500(a)]–[500(c)] indicates that Dragages and Builders Shop *directly* appointed Meinhardt Façade to perform Meinhardt's roles under the Settlement Agreement. Moreover, there is no objective evidence that Meinhardt Singapore was appointed by Dragages and Builders Shop at all (see [501] above). During cross-examination, Mr Foo admitted that he did not know whether there was an agency agreement between the Meinhardt Parties, and also did not know whether Dragages and Builders Shop had engaged Meinhardt Singapore.[795]

504 Millenia emphasises, however, the following two points:[796]

(a) First, Builders Shop pleaded that Meinhardt Façade was Meinhardt Singapore's agent or nominee (albeit Builders Shop later claimed in its opening statement – and, I add, in its closing submissions – that it was Meinhardt Façade who was engaged).

(b) Secondly, Ms Perez conceded that Meinhardt Façade did its work as an agent for Meinhardt Singapore.

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794 Millenia's closing submissions at para 554.

795 Transcript, 16 April 2014, p 15.

796 Millenia's closing submissions at paras 586–598.

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505 However, these points do not assist Millenia. Builders Shop's pleadings do not amount to evidence, and are unsupported by the evidence (see [500] above). I also do not give much weight to Ms Perez's apparent concession because it does not accord with the evidence. I would add that having reviewed Ms Perez's testimony, it is clear that her apparent concession was an inadvertent slip that departed from her clear testimony, which I accept on this point, that Meinhardt Façade carried out the works in its own right.[797]

506 For all these reasons, I find that it was Meinhardt Façade, not Meinhardt Singapore, who was appointed to carry out Meinhardt's roles under the Settlement Agreement. I find that Meinhardt Façade carried out these roles on its own account, and not as agent or nominee for Meinhardt Singapore. I therefore find that Meinhardt Singapore did not inspect the Façade, identify defects, propose the rectification methods or make statements relating to the same in Meinhardt's 2007 and 2008 Reports.

507 I now turn to Millenia's claims against Meinhardt Singapore.

Millenia's claims against Meinhardt Singapore

508 I first address Millenia's claims regarding the inspection of the Façade, identification of defects, and methods of rectification and/or statements relating to the same in Meinhardt's 2007 and 2008 Reports (see [171(a)]–[171(c)] and [494(a)] above). I have found that Meinhardt Singapore did not inspect the Façade, identify defects, propose rectification methods and make statements regarding the same (see [506] above). It follows that Meinhardt Singapore could not have been negligent in performing these acts, for it never performed or undertook to perform them in the first place (see [499] above), and I so find.

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797 Transcript, 19 May 2014, p 124.

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509 I now turn to the claim that Meinhardt Singapore negligently misstated or misrepresented that the Rectification Works were carried out in accordance with the Settlement Agreement (see [171(d)] and [494(b)] above). In this regard, Millenia relies on the 19 July 2010 Letter issued by Dr Qureshi (see [143] above), which was sent by Ms Perez to Millenia on 20 July 2010 (see [145] above). For ease of reference, I set out the contents of this letter again here:

> **TO WHOM IT MAY CONCERN**
>
> This is to confirm that [Meinhardt Singapore] and [Meinhardt Façade] are both subsidiaries of Meinhardt Group International.
>
> The areas of expertise of [Meinhardt Singapore] are Civil, Structure [*sic*], Mechanical and Electrical Engineering.
>
> All matters related to façade engineering are undertaken by [Meinhardt Façade].
>
> *For any further information or enquiry, please do not hesitate to contact our Mr Mathieu [Meur] …*
>
> [emphasis added]

510 Millenia describes the 19 July 2010 Letter in these terms:[798]

> [The 19 July 2010 Letter] was by itself a representation to Millenia, which Millenia relied upon, that Meinhardt Singapore had confirmed that Meinhardt Façade had acted on behalf of Meinhardt Singapore in performing the Settlement Agreement, and that statements made by Meinhardt Façade had been made on behalf of Meinhardt Singapore.

The submission appears to be that the 19 July 2010 Letter was a representation from Meinhardt Singapore that Meinhardt Façade had authority to make statements on behalf of Meinhardt Singapore. On this basis, Millenia suggests that Meinhardt Façade had actual or apparent authority to make statements pertaining to the Rectification Works on behalf of Meinhardt Singapore. In support of this submission, Millenia relies on Mr Singh's cross-examination of

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798 Millenia's closing submissions at para 618.

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Dr Qureshi.[799] Millenia also submits that Dr Qureshi gave Dragages authority to represent to Millenia that Meinhardt Façade was acting on behalf of Meinhardt Singapore.[800]

511 I do not accept these submissions. I deal first with the alleged authority given to Dragages. Dr Qureshi did not concede that Meinhardt Singapore authorised Dragages to make representations on its behalf. The passage cited by Millenia in its submissions derives from the cross-examination of Mr Meur, who was not an employee of Meinhardt Singapore and so could not have authorised Dragages to make representations for Meinhardt Singapore.[801]

512 I now address the alleged authority given to Meinhardt Façade:

(a) *Actual authority*: Dr Qureshi accepted that by the last paragraph of the 19 July 2010 Letter (see [509] above), he authorised Mr Meur to deal with information sought or enquiries made in relation to the contents of the 19 July 2010 Letter, and I so find.[802] Yet Dr Qureshi was clear that he did not authorise Mr Meur in connection with *anything* beyond the contents of the 19 July 2010 Letter, albeit he accepted, upon being pressed by Mr Singh, that it "possibly can be" inferred that Meinhardt Singapore did that.[803] This concession is insufficient basis for a finding that Dr Qureshi authorised Mr Meur to make statements pertaining to the Rectification Works on behalf of Meinhardt Singapore (see [510] above). Importantly, the actual contents of the 19 July 2010

799 Millenia's closing submissions at paras 626–629.

800 Millenia's closing submissions at para 627.

801 Millenia's closing submissions at para 627; Transcript, 7 May 2015, p 167.

802 Transcript, 6 May 2015, p 60.

803 Transcript, 6 May 2015, pp 62–63.

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Letter pertained solely to the respective areas of specialisation of Meinhardt Singapore and Meinhardt Façade, and it was completely silent on all other matters. I therefore find that Dr Qureshi did not give Mr Meur (and Meinhardt Façade) actual authority to make statements pertaining to the Rectification Works on behalf of Meinhardt Singapore.

(b) *Apparent authority*: I find that Meinhardt Façade did not have apparent authority to make statements pertaining to the Rectification Works on behalf of Meinhardt Singapore. An agent has apparent authority if (1) the principal represents that the agent has authority to act for the principal, (2) the agent acts within the scope of the authority which the principal represents that the agent has and (3) the third party relies on the representation: see *Banque Nationale de Paris v Tan Nancy and another* [2001] 3 SLR(R) 726 at [67]–[69]. I do not accept Millenia's argument on apparent authority for two reasons:

(i) First, even if Meinhardt Singapore represented by the (last paragraph of the) 19 July 2010 Letter that Mr Meur had authority to act on its behalf on certain matters, I find that it did not represent that Mr Meur had authority to make statements pertaining to the Rectification Works. As I have noted, the actual contents of the 19 July 2010 Letter were far more limited in scope (see [(a)] above). Therefore, any statements made by Meinhardt Façade on matters outside the limited scope of the 19 July 2010 Letter were not attributable to Meinhardt Singapore.

(ii) Secondly, even if Meinhardt Singapore had made the representation that Meinhardt Façade had the authority to make statements pertaining to the Rectification Works on Meinhardt

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> Singapore's behalf, I find that Millenia did not rely on it. I agree with Mr Jeyaretnam that this is clear from the 6 August 2010 Letter (see [146] above).[804] Millenia stated in that letter that its position was that Meinhardt Singapore had *not* provided the necessary confirmation under cl 11 of the Settlement Agreement. In other words, Millenia did not accept that Meinhardt Façade had acted on behalf of Meinhardt Singapore. Millenia therefore did not rely on any representation by Meinhardt Singapore to that effect.

513 For all these reasons, I do not accept that Meinhardt Façade was acting on Meinhardt Singapore's behalf in making statements pertaining to the Rectification Works (see [510] above). Millenia's claim that Meinhardt Singapore committed negligent misrepresentation by issuing the 19 July 2010 Letter therefore falls to be determined based on the text of the letter. I do not accept Millenia's claim is made out for the following reasons:

(a) *Duty of care*: First, I find that Meinhardt Singapore did not owe a duty of care to Millenia. A duty of care will only arise in tort if there is sufficient legal proximity between the parties (see [517] below). On the facts of this case, I find that there was insufficient proximity between Millenia and Meinhardt Singapore: there was no physical, circumstantial or causal proximity, nor did Meinhardt Singapore assume any responsibility to Millenia.

(b) *Breach*: Secondly, and critically, the statements in the 19 July 2010 Letter about Meinhardt Singapore and Meinhardt Façade and their roles in the Meinhardt group of companies are true. Hence, even if

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804 Transcript, 24 February 2017, pp 110–111.

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Meinhardt Singapore owed a duty of care to Millenia, it did not breach this duty because there was no misrepresentation.

(c) *Causation*: Thirdly, even if there was a breach, I find that this did not cause or contribute to the 2nd Fall. Meinhardt Singapore is therefore not liable for the loss which Millenia claims.

514 For the above reasons, I dismiss Millenia's claims against Meinhardt Singapore. However, I note the following points. Meinhardt was defined under the Settlement Agreement to refer to Meinhardt Singapore (see [77(a)] above). It does not appear that it was ever made explicit to Millenia that Meinhardt Façade was carrying out Meinhardt's role under the Settlement Agreement (though I may be wrong about this and express only a provisional view). If this is right, Millenia may have had no real choice but to sue both of the Meinhardt parties to secure itself against the possibility that one but not the other was liable to it in tort. This may have a bearing on costs. However, I make no decision in this regard at this stage and I will hear the parties before doing so.

515 I now turn to Millenia's claims against Meinhardt Façade.

Millenia's claims against Meinhardt Façade

516 I turn first to whether Meinhardt Façade owed a duty of care to Millenia.

Did Meinhardt Façade owe a duty of care to Millenia?

517 A duty of care will arise in tort if (1) it is factually foreseeable that the defendant's negligence might cause the plaintiff loss; (2) there is sufficient legal proximity between the parties; and (3) policy factors do not negate a duty of care: *Spandeck* at [73], [76], [77] and [83].

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518 Meinhardt Façade accepts, and I find, that the threshold requirement of factual foreseeability is satisfied here.[805]

(1) Proximity

(A) THE PARTIES' SUBMISSIONS

519 Millenia submits that Meinhardt Façade owed it a duty of care in view of the following points, which go to the requirement of legal proximity:[806]

(a) First, Millenia relied on Meinhardt Façade to exercise reasonable care and skill. In particular, Millenia submits that it relied on the 20 July 2010 Certificate issued by Meinhardt Facade because it paid Dragages on 6 August 2010 upon receiving the same (see [146] above).

(b) Secondly, Meinhardt Façade knew or ought reasonably to have known that Millenia would rely on it.

(c) Thirdly, Millenia's reliance on Meinhardt Façade was reasonable.

(d) Fourth, Meinhardt Façade voluntarily assumed responsibility to Millenia by (1) issuing Meinhardt's 2007 Report and Meinhardt's 2008 Report and/or (2) issuing the 20 July 2010 Certificate (see [144] above).

520 Meinhardt Façade submits that the test of legal proximity is not satisfied. Meinhardt Façade emphasises that the Settlement Agreement was structured such that Millenia did not rely, nor was it ever contemplated that Millenia would rely, on Meinhardt Façade. Instead, Millenia relied on Arup, Dragages and

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805 Meinhardt Façade's closing submissions at para 146.

806 Millenia's closing submissions at paras 632–654.

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Builders Shop under the Settlement Agreement. This is, according to Meinhardt Façade, clear from the following provisions of the Settlement Agreement:[807]

(a) Clause 1 provided that Dragages and Builders Shop, not Millenia, would appoint Meinhardt Façade (see [76] above).

(b) Clauses 2 and 16 provided that Arup would be Millenia's consultant for the purpose of, among other things, reviewing and commenting on the Rectification Works Method Statement, while cl 19 stated that "Meinhardt" would be Dragages' consultant (see [88] above). Millenia therefore relied on Arup, and not Meinhardt Façade, to see that the Rectification Works Method Statement was suitable for Millenia's purpose.

(c) Clause 11 provided that the Rectification Works would only be completed upon Arup's written confirmation of the same. Millenia thus did not rely on the 20 July 2010 Certificate; moreover, Arup's written confirmation was never issued. Further, in relation to the payment made by Millenia on 6 August 2010 (see [519(a)] above), the accompanying letter dated 6 August 2010 made clear that the payment was made on a without prejudice basis. Millenia's position in that letter was that it had not received the necessary confirmation by Meinhardt under cl 11 of the Settlement Agreement (see [146] above).

(B) MY DECISION

(I) THE LAW

521 The proximity requirement focuses on the "closeness of the relationship between the parties": *Spandeck* at [77]. Sufficient legal proximity for a duty of

[807] Meinhardt Façade's closing submissions at paras 152–161, 180–187 and 202–212.

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care may be established based on physical, circumstantial and causal proximity, and/or a voluntary assumption of responsibility by the defendant and reliance by the plaintiff on care being taken by the defendant, where the defendant knew or ought to have known of that reliance: *Spandeck* at [78]–[79] and [81].

522 I note that a plaintiff's reliance on the defendant's exercise of reasonable care, and the defendant's knowledge of such reliance, have been of decisive importance in determining whether a duty of care arises in tort in other building and construction cases. I will cite just two such cases:

(a) In *RSP Architects Planners & Engineers (formerly known as Raglan Squire & Partners FE) v Management Corporation Strata Title Plan No 1075 and another* [1999] 2 SLR(R) 134 ("*Eastern Lagoon*"), the plaintiff MCST carried out rectification works to the walls of two blocks of the condominium after discovering that the claddings on those blocks had failed. The plaintiff then sued the architects for the cost of the works, alleging negligent design and supervision of construction. The Court of Appeal held that there was sufficient proximity between the MCST and the architects to ground a duty of care owed by the latter to the former, emphasising that the MCST relied on the architects' care and skill in designing and supervising the construction of the property, and that the architects knew this: see *Eastern Lagoon* at [38]–[39].

(b) By contrast, in *Sunny Metal & Engineering Pte Ltd v Ng Khim Ming Eric* [2007] 3 SLR(R) 782 ("*Sunny Metal*"), the employer of a construction project sued the architect employed by the main contractor after the latter went insolvent, alleging negligence on the architect's part. The Court of Appeal held that there was insufficient proximity for a duty of care to arise, because the employer had not relied on the architect but

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on a project manager and a project coordinator or superintending officer: *Sunny Metal* at [18] and [46]. The court therefore allowed the architect's appeal against the trial judge's finding that he was liable in negligence.

523 What, however, does reliance mean in the inquiry into whether a duty of care arises in tort? This issue is important here because the parties' arguments are joined over whether Millenia relied on Meinhardt Façade. In Gary Chan Kok Yew and Lee Pey Woan, *The Law of Torts in Singapore* (Academy Publishing, 2nd Ed, 2016), the authors make these pertinent observations at para 03.060:

> … the concept of reliance, which is useful for determining proximity, can be interpreted in two senses. In negligent misstatement cases, *the concept of reliance tends to be one of "active reliance" on the part of the plaintiff acting upon the statements made by the defendant to the plaintiff's detriment.* … On the other hand, in cases involving negligent acts, *the reliance by the plaintiff on the defendant's negligent act is normally of a "passive" nature* (*eg*, when we say that the plaintiff owner "relies" on the defendant contractor not to cause damage to his front yard). [emphasis added]

Similar remarks are made in *Clerk & Lindsell on Torts* (Michael A Jones gen ed) (Sweet & Maxwell, 21st Ed, 2014) at para 8-113:

> … The test is one *of reasonable reliance* ***or dependence, because in some cases there is no factual reliance by the claimant on the defendant***. In cases of negligent statements, *the claimant's loss is usually caused by his factual reliance upon the statement but* ***this is not always the case***. In *Spring v Guardian Assurance Plc* the claimant had lost his job as a result of a negligently prepared reference sent by the defendant, his ex-employer[,] to his new employer … to distinguish this type of situation from one where the claimant actually relies on the statement, *it may be preferable to describe the claimant as* ***reasonably depending on his employer to take care in giving the reference***. *This is all the more the case with negligent services.* In *White v Jones*, members of the House of Lords struggled to analyse the relationship of the claimant, a disappointed beneficiary, and the defendant solicitor in terms of reliance … *it may be helpful to describe this as* ***a relationship of reasonable dependence*** *to distinguish it from a situation of actual reliance.* [emphasis added in italics and bold italics]

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I therefore hold that reliance, for the purposes of the inquiry into whether a duty of care arises in tort, need not involve active reliance by the plaintiff. Active reliance connotes a change in the plaintiff's position to the plaintiff's detriment, *eg* where the plaintiff buys a defective property based on a negligently prepared surveyor's report. However, reliance in this context includes passive reliance or dependence by the plaintiff on the defendant, such as the passive reliance by the MCST on the architect's exercise of care and skill in designing and supervising the construction of the condominium in *Eastern Lagoon*. I also note that while active reliance appears to be more common in cases of negligent misstatements, some such cases have involved passive reliance or dependence.

(II) ANALYSIS

524 I find that Millenia relied on Meinhardt Façade to take reasonable care in inspecting the Façade and proposing rectification methods. To be clear, the reliance was that of passive reliance or dependence (see [523] above).

525 First, I find that Millenia relied on the Meinhardt party who inspected the Façade to exercise reasonable care and skill in doing so. This was Meinhardt Façade. I accept Mr Foo's evidence to this effect.[808] In my judgment, it is crucial to bear in mind the purpose and scheme of the Settlement Agreement. As I have explained, it is evident from the Settlement Agreement, in particular Recital H, that the parties had entered into that agreement with the common intention that all of the defects in the Cladding would be rectified (see [74] above). The Settlement Agreement thus provided for three phases of works to be performed to achieve this end: the Inspection Phase, the Rectification Phase and the Confirmation Phase (see [75] above). The Inspection Phase was of central importance in this scheme because, as Ms Perez accepted, the defects could only

808 Transcript, 23 April 2014, p 95.

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be rectified if they were identified to begin with and it was from the inspection that a list of defects was to be identified.[809] It was thus vital that the party who undertook the inspection, Meinhardt Façade, took reasonable care in doing so. This was especially because *the Settlement Agreement did not provide for any other party to inspect the Façade to identify defects or to check or review the inspection by Meinhardt Facade.* The responsibility of preparing a list of defects therefore fell squarely on the shoulders of Meinhardt Façade. This was against the backdrop of Arup having found defects in the Façade after the 1st Fall. In this light, it is plain that Millenia, the owner of the Building, relied on Meinhardt Façade, the party inspecting the Façade, to take care in doing so, and I so find.

526 Secondly, I find that Millenia relied on Meinhardt Façade to take care in proposing rectification methods. Meinhardt Façade claims that Millenia did not rely on it but on Arup because under cl 2 of the Settlement Agreement, Millenia engaged Arup to review and comment on the Rectification Works Method Statement (see [520(b)] above). I do not agree. I find that Millenia relied on both Meinhardt Façade and Arup: the Rectification Works Method Statement was a *joint product of Meinhardt Façade and Arup* for the following reasons:

(a) Meinhardt Façade and Arup had different roles in relation to the Rectification Works Method Statement. Meinhardt Façade's task was to identify defects and to propose rectification methods therefor. Arup's role was to serve as a check on Meinhardt Façade's performance of this role. In my view, Millenia relied on both parties to perform their separate roles.

(b) After it proposed rectification methods, Meinhardt Façade was required under cl 2 of the Settlement Agreement to consider and respond

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809 Transcript, 30 April 2014, p 116.

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> to Arup's queries about the Rectification Works Method Statement to the latter's reasonable satisfaction. Clause 3 further provided that the Rectification Works Method Statement would only bind Millenia upon this event. In short, the rectification methods would only be finalised after a process in which both Meinhardt Façade and Arup were to participate. Millenia thus relied on both parties in this additional sense for the preparation of the Rectification Works Method Statement.

527 Further, I find that Meinhardt Façade knew that Millenia was relying on it to exercise reasonable care and skill in inspecting the Façade and proposing rectification methods. To begin with, I find it difficult to conceive that a façade engineer who undertakes to inspect a façade, and propose rectification methods for defects which are found thereon, would not appreciate that the owner of the Building relies on him or her to take reasonable care and skill. The nature of the task is such that the engineer must know such reliance is placed on him or her.

528 Furthermore, Meinhardt Façade was not just any other façade engineer. It had detailed prior knowledge about the state of the Façade before it inspected the Cladding. Mr Meur knew, since 2005, that a panel had fallen off the Building (see [59] above). He knew from Arup's 2004 Reports that (1) the 1st Panel was installed without its two top pins, in breach of the design and (2) various defects were found by Arup on the Façade. He knew the BCA had intervened and issued the 1st BCA Order. I therefore find that Meinhardt Façade knew that there were multiple defects on the Façade it was to inspect and that a panel had fallen off the Façade due to shoddy workmanship. Given this knowledge, Meinhardt Facade must have known that (1) it was imperative for it to take care and skill in inspecting the Façade and proposing rectification methods and (2) the owner of the Building was relying on it to do so, and I so find.

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529 Moreover, I find that it was reasonable for Millenia to rely on Meinhardt Façade. I accept Millenia's submission that Meinhardt Façade held itself out to Millenia as a façade expert.[810] In 2005, Meinhardt Façade had proposed method statements for the replacement of the 1st Panel and two other panels damaged in the 1st Fall and the rectification of defects noted by Arup (see [60] above).

530 I now analyse the proximity requirement with respect to the issuance of the 20 July 2010 Certificate. In my judgment, in this context, a further proximity factor – assumption of responsibility – is relevant.

531 For ease of reference, the 20 July 2010 Certificate states:

> **NOTIFICATION OF RECTIFICATION WORK COMPLETION TO CENTENNIAL TOWER, SINGAPORE**
>
> We would like to confirm that, to the best of our knowledge, the rectification works carried out by Builder's Shop Pte Ltd (from September 2007 - October 2009) to the external perimeter of the Centennial Tower stone cladding (3 Temasek Avenue Centennial Tower, Singapore 39190), has been completed in accordance with the approved method of statement and in accordance with clauses 12 and 14 of the settlement agreement between [Millenia] and [Dragages] and [Builders Shop].

532 I find that, by issuing the 20 July 2010 Certificate, Meinhardt Façade voluntarily assumed responsibility to Millenia for the following two reasons.

533 First, as I have noted, Meinhardt Façade was not contractually required to issue the 20 July 2010 Certificate, which was akin to a completion certificate, and Meinhardt Façade knew this as of June 2009 (see [124] above). In this light, I find that Meinhardt Façade knowingly went above and beyond its contractual duties in issuing the 20 July 2010 Certificate.

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[810] Millenia's closing submissions at para 641.

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534 Secondly, I find that when Meinhardt Façade issued the 20 July 2010 Certificate, it knew that it was assuming responsibility to Millenia:

(a) The first draft of the certificate was addressed to Builders Shop and Dragages (see [126] above). Dragages then requested for a revised version of the certificate addressed to Millenia (see [130(a)] above). Critically, upon receiving this request, Mr Ong expressed concerns about acceding to it, noting that "business wise & contractual wise we are engaged by [Builders Shop]". I have found that Mr Ong knew there would be implications if the certificate was addressed to Millenia (see [130(b)] above).

(b) Similarly, I have found that Mr Meur knew the issuance of a revised certificate would affect the liability of Meinhardt Façade. He approved the issuance of the certificate nonetheless because he believed the Rectification Works were carried out properly, *ie*, he believed that liability to Millenia would never accrue or arise (see [130(d)] above).

535 Furthermore, I find that Millenia relied on Meinhardt Façade to exercise reasonable care and skill in issuing the 20 July 2010 Certificate. The reliance I have in mind is again that of passive reliance or dependence (see [523] above).

(a) I deal first with Meinhardt Façade's claim that Millenia did not rely on it because (1) cl 11 provided that the Rectification Works would only be completed upon Arup's written confirmation of the same and (2) Arup did not issue this confirmation. I accept that Millenia did not *actively* rely on the 20 July 2010 Certificate: it did not lead to a change in Millenia's position to its detriment (see [523] above). In particular, I agree with Meinhardt Façade that Millenia did not actively rely on the 20 July 2010 Certificate by making the 6 August 2010 payment:

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Millenia made clear by its letter of that date that the payment was made on a without prejudice basis; its position was that the written confirmation under cl 11 had not been issued (see [520(c)] above).

(b) However, I find that Millenia passively relied or depended on Meinhardt Façade to take reasonable care in issuing the 20 July 2010 Certificate. First, the 20 July 2010 Certificate is akin to a completion certificate and the very nature of such certificates is that the owner of the relevant building will rely on the issuer of the certificate to take reasonable care. Secondly, cl 11 provided that Meinhardt was *required* to inspect the Cladding to "ensure" the Rectification Works complied "in all respects" with, *inter alia*, the Rectification Works Method Statement, *before* issuing its confirmation. The fact that an inspection was required, with the nature and extent of the inspection clearly specified, *before* Meinhardt issued its written confirmation shows that Millenia relied on Meinhardt Façade to take reasonable care in issuing the written confirmation.

536 I also find that Mr Meur knew Millenia would rely on the 20 July 2010 Certificate. I note the following points:

(a) Mr Meur knew that Millenia, as the owner of the Building, would rely on the 20 July 2010 Certificate (see [130(d)(ii)] above).

(b) Further, Mr Meur knew even more. Importantly, *before he issued the 20 July 2010 Certificate, he obtained a copy of the Settlement Agreement and read it, in particular cll 11, 12 and 14* (see [144] above). I find that Mr Meur would therefore have known the following:

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(i) the rectification of all the defects in the Cladding was a central goal in the Settlement Agreement (see [525] above);

(ii) the 20 July 2010 Certificate was crucial to the scheme of the Settlement Agreement since *it was to reflect an independent expert opinion that the defects had in fact been rectified*; and

(iii) Millenia thus relied or depended on Meinhardt Façade to take care in issuing such an opinion (see [535(b)] above).

537 Again, for the reasons in [529] above, I find that Millenia *reasonably* relied on Meinhardt Façade to take care in issuing the 20 July 2010 Certificate.

538 In summary, I find that Millenia relied on Meinhardt Façade to exercise reasonable care and skill in three respects: inspecting the Façade, proposing rectification methods and issuing the 20 July 2010 Certificate. I also find that Meinhardt Façade knew Millenia was relying on it in these respects and such reliance was reasonable. Additionally, I find that Meinhardt Façade voluntarily assumed responsibility to Millenia by issuing the 20 July 2010 Certificate which was addressed to Millenia. For all these reasons, I find that there was sufficient proximity between the parties for a *prima facie* duty of care to arise in relation to the three aforementioned respects. I now consider whether policy factors negate this *prima facie* duty of care.

(2) Policy

(A) MEINHARDT FAÇADE'S SUBMISSIONS

539 Meinhardt Façade claims that even if there was legal proximity, policy considerations militate against holding that it owed a duty of care to Millenia. This is because, according to Meinhardt Façade, to hold that it owed a duty of

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care to Millenia would subvert the parties' contractual arrangements. Meinhardt Façade emphasises three points:[811]

(a) First, Millenia chose not to contract with Meinhardt Façade but to allow Dragages and Builders Shop to engage Meinhardt Façade.

(b) Secondly, the Settlement Agreement expressly provided for Meinhardt Façade to be Dragages' consultant.

(c) Thirdly, Millenia was adequately protected under the Settlement Agreement since it obtained remedies thereunder against Dragages and Builders Shop. In particular, under cl 24, Dragages and Builders Shop agreed to indemnify Millenia against personal injuries, property damage and third party claims "arising from and/or in connection with the carrying out of the inspection and/or Rectification Works". The court should therefore not better Millenia's bargain by holding that Meinhardt Façade owed a duty of care to Millenia.

540 Meinhardt Façade also relies on cl 34 of the Settlement Agreement.[812] Clause 34 provided that if a dispute arose between the parties to the Settlement Agreement, the dispute would first be resolved by meeting(s) between the chief executive officer/managing director/equivalent of the parties (see [90] above). Meinhardt Façade claims cl 34 is similar to the arbitration clause in *Spandeck*; the court there held that no duty of care arose because the arbitration clause showed the parties intended their mutual liabilities would only be in contract.

811 Meinhardt Façade's closing submissions at paras 162–167 and 188.

812 Meinhardt Façade's closing submissions at para 160.

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(B) MY DECISION

(I) THE LAW

541 In *Animal Concerns Research & Education Society v Tan Boon Kwee* [2011] 2 SLR 146 ("*Animal Concerns Research*"), the appellant engaged a contractor to construct an animal shelter. The shelter appointed its director as the clerk of works. The Court of Appeal held that the director owed a duty of care as clerk of works to the appellant. The court held that the presence of a contractual matrix could be relevant to both limbs of the *Spandeck* test (at [66]). The court then made the following remarks at [71]–[74] on the relevance of a contractual matrix at the second stage of the *Spandeck* test:

> 71 *The mere fact that there is a pre-existing contractual relationship or backdrop between the parties should not, in itself, be sufficient to exclude a duty of care* on one of them to avoid causing pure economic loss to the other (*the situation is a fortiori where, as here, there is in fact no contractual relationship between the parties, but* ***merely a contractual backdrop*****, in the sense that** ***each party was in a separate contractual relationship with a third party****, viz, A.n.A*). ***The true principle***, in determining whether or not any contractual arrangement has this effect, ***should be whether or not the parties structured their contracts intending thereby to exclude the imposition of a tortious duty of care*** …
>
> 72 In *Spandeck* and *Pacific Associates*, *the presence of an arbitration clause pointed unequivocally to the fact that the parties deliberately wished for their contractual arrangements to exclusively govern their respective liabilities*, and to prevent a tortious duty of care which would cut across and be inconsistent with that contractual structure …
>
> 73 Here, however, there is no inconsistency between, on the one hand, the contract between the Appellant and A.n.A, and, on the other, a duty of care owed by the Respondent to the Appellant. Certainly, there is no evidence to suggest that the Appellant and A.n.A had ***deliberately organised their contractual arrangements to exclude any potential tortious liability on the part of the Respondent***.
>
> 74 Hence, ***in the absence of any positive steps taken by the parties during the negotiation and conclusion of the***

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> ***contract between A.n.A and the Appellant***, we are unable to see how the contractual matrix militates against the existence of a duty of care owed by the Respondent to the Appellant.
>
> [emphasis added in italics and bold italics]

In sum, the test is whether the parties entered into their contractual arrangements *intending to exclude the imposition of a tortious duty of care*.

(II) ANALYSIS

542 I find that holding that Meinhardt Façade owed a duty of care to Millenia would not subvert the contractual arrangements between the parties.

543 The critical provision here is cl 5 of the Settlement Agreement. As I have explained (see [80(b)] above), the first part of cl 5, in contradistinction to the second part, expressly envisioned and sought to preserve the liability of the Meinhardt party who inspected the Cladding and proposed the Rectification Works Method Statement. It is plain that this liability was to Millenia. Further, this liability could only have been liability in tort since the Settlement Agreement did not provide for Millenia to contract with Meinhardt. I therefore find that the parties to the Settlement Agreement, *far from intending to exclude the liability of Meinhardt Façade, expressly contemplated and sought to preserve Meinhardt Façade's potential liability in tort to Millenia*. The facts are even stronger than those in *Animal Concerns Research*. In that case, there was merely a paucity of evidence to suggest the parties intended to exclude the tortious liability of the clerk of works: see *Animal Concerns Research* at [73]–[74] (see [541] above). By contrast, cl 5 *expressly* indicates that the parties contemplated that Meinhardt Façade might be liable in tort to Millenia.

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544 Clause 5 thus indicates that it would not subvert the parties' contractual arrangements to hold that Meinhardt Façade owed Millenia a duty of care in tort. I now turn to address Meinhardt Façade's submissions.

545 I begin with the submissions noted at [539(a)]–[539(b)] above. In my view, it cannot be inferred from the fact that the Settlement Agreement provided for Dragages and Builders Shop to engage Meinhardt as their consultant that the parties wished to exclude Meinhardt Façade's liability to Millenia in tort. It must be recalled why a role was carved out for Meinhardt under the Settlement Agreement to begin with. Meinhardt was appointed because Dragages wanted an independent third party to play a counterbalancing role vis-à-vis Arup, to "keep the reasonableness going" (see [65] above). Mr Jeyaretnam himself made this point during oral submissions for Meinhardt Façade.[813] *There was no reason for Millenia to engage Meinhardt Façade when it already had Arup as its consultant and the issue (as Dragages perceived it) was that Dragages had no expert to provide an opposing view to that of Millenia's consultant*. *This* was why the Settlement Agreement provided for Dragages and Builders Shop to engage Meinhardt as its consultant – the reason was *not* that the parties intended that Meinhardt Façade would not owe duties to Millenia.

546 I now turn to the argument that Millenia was adequately protected under the Settlement Agreement and the court should not better its bargain by holding that Meinhardt Façade owed Millenia a duty of care (see [539(c)] above). I do not accept this submission. The test is not whether recognising a duty of care would better the plaintiff's bargain; else, a duty of care would scarcely be recognised where there was a pre-existing contractual matrix or backdrop, since to do so in such cases would invariably better the plaintiff's contractual bargain. The test is whether the parties intended to exclude the imposition of a duty of

813 Transcript, 24 February 2017, p 65.

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care in tort (see [541] above). I do not see how cl 24 and the other remedies given to Millenia under the Settlement Agreement show that the parties thereto intended to exclude the potential liability of Meinhardt Façade to Millenia.

547 I now address the relevance of cl 34 (see [540] above). In my view, cl 34 is distinguishable from the arbitration clause in *Spandeck*. For present purposes, an arbitration clause has two key features: (1) it only binds the parties thereto; and (2) as Millenia emphasises, it sets out "the entire framework" by which the parties thereto agree to resolve their disputes relating to the matter.[814] In my judgment, the combination of these two factors may support the conclusion that the parties to the clause intend to exclude the liability of a third party in tort. By contrast, cl 34 only set out the first port of call for the resolution of disputes under the Settlement Agreement. In other words, it does not have the second material feature of an arbitration clause noted above. I therefore do not accept that it may be inferred from cl 34 that the parties intended to exclude Meinhardt Façade's liability in tort. Moreover, any such inference would be undercut by the clear language of cl 5 which, as I have explained, envisioned and sought to preserve such liability (see [80(b)] and [543] above).

548 In sum, I do not accept that it would subvert the Settlement Agreement or the contractual arrangements between the parties more broadly to hold that Meinhardt Façade owed a duty of care to Millenia. I reject Meinhardt Façade's contention that policy considerations negate its *prima facie* duty of care.

(3) Conclusion

549 I find that Meinhardt Façade owed Millenia a duty of care regarding:

(a) the inspection of the Façade;

814 Millenia's reply closing submission at para 409.

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(b) the proposal of rectification methods and the preparation of the Rectification Works Method Statement more broadly; and

(c) the issuance of the 20 July 2010 Certificate.

What was the scope of Meinhardt Façade's duty of care?

(1) The parties' submissions

550 Meinhardt Façade submits, however, that even if it owed a duty of care to Millenia, this duty was limited by its scope of works under the June 2007 Proposal. In respect of the inspection of the Façade and proposal of rectification methods, its duty of care (if any) only extended to the following:[815]

(a) *Inspection*: Inspecting the Façade excluding the 8 Drops, with experienced manpower supplied by Dragages, from the exterior of the Building and without removing the stone panels. The inspection would be of the surface conditions of the panels and of fixing details that could be observed through the movement joints.

(b) *Proposal of rectification methods*: Proposing steps required for remedial works and advice on alternative solutions, advising on areas of the Façade representing a significant safety risk and outlining temporary measures to make the Façade safe, and discussing remedial solutions and assisting Dragages with the best decision to proceed. The duty of care did not extend to proposing rectification methods that would ensure that the Façade would be fit for its purpose.

551 Millenia submits that Meinhardt Façade's duty of care is not limited by the latter's scope of works under the June 2007 Proposal. Rather, the relevant

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815 Meinhardt Façade's closing submissions at paras 168–177 and 189–198.

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contractual context was the Settlement Agreement, in whose light the scope of Meinhardt Façade's duty should be determined. The duty of care extended to an inspection of the entire Façade by Meinhardt Façade's inspectors.[816]

(2) My decision

552 In *Animal Concerns Research*, the Court of Appeal stated at [89]–[90]:

> 89 Given that the Respondent was under a common law duty of care to the Appellant, it is necessary to consider whether, on the facts, this duty was breached. *This raises, in turn, the issue as to what the scope of that duty is*, for, if the duty does not even include or encompass the matters complained of, then there is no duty to breach. *This will obviously depend heavily on the specific fact situation of each case and* ***will include such factors as the contractual duties****, if any, that the clerk of works concerned has undertaken.*
>
> 90 On the facts of the present appeal, it is clear, in our views, that, *qua* clerk of works, the Respondent owed the Appellant a duty of care to supervise the backfilling works, ***which was undoubtedly an operational matter under the responsibility of the Respondent***. …
>
> [emphasis added in italics and bold italics]

The Court of Appeal thus recognised that the scope of a defendant's duty of care in tort will depend on, among other things, his or her contractual duties. On the facts, the respondent's duty of care extended to supervising the "backfilling" of the site because this matter fell under his responsibility.

553 I do not agree with Millenia that the scope of Meinhardt Façade's duties, in relation to the inspection of the Façade and proposal of rectification methods, should be determined by reference to the Settlement Agreement (see [551] above). First, Meinhardt Façade was a not a party to the Settlement Agreement and did not owe any duties thereunder. Secondly, Meinhardt Façade did not

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816 Millenia's reply submissions at paras 421–433.

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have sight of the Settlement Agreement until July 2010 (see [144] above). By then, it had already inspected the Façade and proposed rectification methods.

554 I find that Meinhardt Façade's duty of care is limited by its scope of works under the June 2007 Proposal. Meinhardt Façade's duties thereunder did not extend to conducting a full inspection of the Cladding: as I have found, the 2007 Inspection was only to cover 64 drops: drops 1–16, 22–37, 41–56 and 62–77 (see [100] above). ***In other words, and this is of critical importance, Meinhardt Façade's duty of care did not extend to an inspection of drop 80 (during the Inspection Phase), from which the 2nd Panel fell***. Nor was Meinhardt Façade required to inspect the Cladding with its own manpower; in fact, Meinhardt Façade quoted a sharply reduced fee of $112,000 for the full inspection under the June 2007 Proposal on the basis that manpower supplied by Dragages would perform the inspection (see [67] above). Meinhardt Façade's duty of care could not be enlarged by what Ms Perez had said or represented to Millenia (see [38(a)] above), or by cl 1 of the Settlement Agreement which was only entered into between Millenia, Dragages and Builders Shop. Meinhardt Façade did not participate in the negotiations leading up to the execution of the Settlement Agreement and in fact did not see its terms until July 2010 (see [144] above). *In any event, as I have emphasised, Millenia accepted that cl 1 of the Settlement Agreement did not require an inspection of the 8 Drops* (see [76] above) *and drop 80 was one of the 80 Drops.*

555 I thus find that Meinhardt Façade's duty of care in relation to the 2007 Inspection, with one caveat, only extended to the 64 drops noted above. The caveat is that, in my judgment, Meinhardt Façade's duty of care also extended to drop 17 which it did inspect although it was not engaged to do so. I also find that Meinhardt Façade's duty of care did not require it to carry out the inspection with its own employees.

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556 I accept Meinhardt Façade's arguments on the scope of its duty of care relating to the nature of the inspection and proposal of rectification methods (see [550(a)]–[550(b)] above). Moreover, I hold specifically that Meinhardt Façade was not obliged to identify mere departures from contractual requirements. It does not appear that Meinhardt Façade was provided with the specifications at the time of the 2007 Inspection. In any event, I find that Meinhardt Façade was engaged to identify defects which gave rise to safety risks, not mere deviations from contractual requirements. I hold that Meinhardt Façade's duty of care required it to take care in identifying defects amounting to safety risks.

557 I now consider whether Meinhardt Façade breached its duty of care.

Did Meinhardt Façade breach its duty of care?

(1) Millenia's submissions

558 Millenia submits that Meinhardt Façade breached its duty of care by:[817]

(a) failing to identify the 2nd Panel as defective and failing to ensure that it was rectified;

(b) failing to conduct a proper full inspection of the Cladding;

(c) failing to propose effective rectification methods;

(d) approving the use of the Stitching Procedure; and

(e) failing to ensure that the Rectification Works were properly done before issuing the 20 July 2010 Certificate.

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817 Millenia's closing submissions at paras 667–716; Millenia's reply submissions at paras 438–444.

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559 The allegations of breach in [558(b)]–[558(e)] above were pleaded by Millenia (see [171] above). However, the allegation in [558(a)] above was not expressly pleaded. Mr Jeyaretnam took this point in relation to the first limb of [558(a)], submitting that "the failure to observe" which Millenia pleaded (see [171(a)] above) "is not related to the [2nd Fall]".[818] He did not submit, however, that Millenia did not adequately plead the second limb of [558(a)] (Meinhardt Façade failed to ensure that the 2nd Panel was rectified). I note that Millenia pleaded that the Meinhardt Parties breached their duty of care in tort by failing to propose remedial works that would ensure the Building was fit for its purpose, and referred to its pleading on the 2nd Fall in doing so.[819] I therefore accept that the second limb of the allegation was adequately pleaded, although I agree with Mr Jeyaretnam that the first limb was not. Nonetheless, for completeness, I will deal with both limbs of the allegation.

560 I now address the allegations of breach in turn.

(2) Failing to identify the 2nd Panel as defective and failing to ensure that it was rectified

561 I find that Meinhardt Façade did not breach its duty of care in failing to identify the 2nd Panel as defective during the 2007 Inspection. Significantly, the 2nd Panel was located on drop 80, which was one of the 8 Drops. I have held that an inspection of drop 80 fell outside the scope of Meinhardt Façade's duty of care (see [554] above). Since Meinhardt Façade was not obliged to inspect drop 80, it could not have breached its duty in failing to identify the 2nd Panel, which was located on drop 80, as defective during the 2007 Inspection.

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818 Transcript, 24 February 2017, p 114.

819 Millenia's SOC at paras 60 and 77(A).

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562 I find that Meinhardt Facade did not breach its duty of care by failing to identify the 2nd Panel as defective while inspecting the Rectification Works and by failing to ensure that it was rectified. The critical facts are these:

(a) First, an inspection of the Rectification Works was not part of Meinhardt Façade's scope of works under the June 2007 Proposal (see [64], [67] and [124] above).

(b) Secondly, Meinhardt Façade never inspected the 2nd Panel during its inspection of the Rectification Works (see [118] above).

(c) Thirdly, the reason why Meinhardt Façade was not required to inspect the 8 Drops was that Arup and Earth Arts had already inspected them and identified the defective panels on the 8 Drops. These were the Schedule A and (some of the) Schedule C Defects.

(d) Fourthly, Mr Meur saw the Settlement Agreement in July 2010 (see [144] and [536(b)] above). He would have seen, among other clauses, cll 1 and 11. He would have learnt that under cl 11, Meinhardt had to provide written confirmation of *its approval of the Rectification Works*. It is vital to note that the certification concerned *the Rectification Works*. *It did not pertain to panels that were not rectified*. Now, Mr Meur would also have seen that under cl 1, Meinhardt Façade was obliged to inspect the Façade for defects and the Rectification Works would be performed to those panels Meinhardt Façade identified as defective and the Schedule A and Schedule C Defects. But it is not in dispute in this trial – and this is also of critical importance – that cl 1 did not require an inspection of the 8 Drops (see [76] above).

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> In this light, in my view, Meinhardt Facade's duty of care (in relation to the issuance of the 20 July 2010 Certificate) did not require it to inspect panels on the 8 Drops that had not been identified as defective or rectified to ensure that they were not defective. Meinhardt Façade was not obliged to inspect the 2nd Panel before issuing the 20 July 2010 Certificate.

563 Millenia submits as follows: (1) Meinhardt Façade had a duty to inspect the Rectification Works to ensure that all the remedial methods which were required were carried out properly; (2) the Final Progress Report identified the 2nd Panel as defective and requiring rectification; (3) yet no rectification works were carried out to the 2nd Panel.[820] I do not agree. To take a step back, Millenia's submission here is essentially that Meinhardt Façade knew or should have known the 2nd Panel required rectification but did not see that this was done. This submission is difficult to accept because, as I have noted, Meinhardt Façade did not inspect drop 80 in the Inspection Phase and the 2nd Panel was not identified as a panel with a Schedule A or a Schedule C Defect; the need to rectify the 2nd Panel was not brought to Meinhardt Façade's attention (see [117] above). Premise (2) of Millenia's argument is thus critical because it seeks to establish that Meinhardt Facade *did* know or should have known that the 2nd Panel required rectification. Yet I have found that the Final Progress Report, which was prepared by Dragages, *wrongly* identified the 2nd Panel, *not as a panel requiring rectification*, but as a panel that was rectified (see [118] above). There could be many reasons for this, *eg*, a transposition error by Dragages, and there is thus little basis for me to find that the idea that the 2nd Panel required rectification was brought to Meinhardt Façade's attention. The Final Progress

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820 Millenia's closing submissions at para 673.

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Report is thus scant basis for me to infer that Meinhardt Façade knew or should have known the 2nd Panel required rectification. I thus reject this submission.

(3) Failing to conduct a proper full inspection of the Cladding

564 First, Millenia submits that Meinhardt Façade breached its duty of care during the 2007 Inspection because (1) it only inspected 45 drops instead of the 72 drops it was required to inspect at the minimum, and (2) Meinhardt Façade did not carry out the 2007 Inspection all by itself: rather, Builders Shop workers did (most of) the inspection.[821] I do not accept Millenia's submissions:

(a) First, I have found that Meinhardt Façade inspected 65 drops (see [101] above). I have also found that Meinhardt Façade's duty of care only extended to an inspection of these 65 drops (see [555] above). I therefore find that Meinhardt Façade did not breach its duty of care by virtue of the fact that it inspected 65 drops instead of 72 or 80 drops.

(b) Secondly, I have found that Meinhardt Façade's duty of care did not require it to carry out the inspection with its own workers. I thus do not accept that Meinhardt Façade breached its duty of care because it did not carry out the 2007 Inspection by itself (see [554] above).

565 Additionally, Millenia submits that Meinhardt Façade negligently failed to identify certain defects:

(a) First, Millenia submits that Meinhardt Façade negligently failed to identify two categories of defects completely (during the Inspection Phase): brackets that were not perpendicular to the RC wall (DT5) and panels resting on shafts that were too short (DT6).[822] I disagree. I have

821 Millenia's closing submissions at paras 683–688.

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found that DT5 and DT6 were defects in that they were departures from the contractual specifications. But I have found that DT5 and DT6 did not give rise to a real safety risk (see [288] and [293] above). As I have held, Meinhardt Façade's duty of care only required it to take reasonable care in identifying defects amounting to safety risks (see [556] above). I thus do not accept that Meinhardt Façade breached its duty of care in failing to identify DT5 and DT6.

(b) Secondly, Millenia claims Meinhardt Façade negligently failed to identify all instances where nuts and washers were inserted between panels (DT8) and shaky panels (DT1/DT15). Meinhardt Façade only found 156 panels with DT8, whereas Arup found 757 panels affected by DT8; Meinhardt Façade only found a single panel that was shaky due to oversized holes, whereas Arup found 240 such panels.[823] I note here that Arup's figures are based on an inspection of the entire Façade. As I have noted, Meinhardt Façade only inspected 65 drops and it did not breach its duty of care in failing to inspect the others (see [564(a)] above). But given the large discrepancies in the numbers, it appears that Meinhardt Façade negligently failed to identify *some* instances of DT8 and DT1 and DT15. I have found that cases of DT8 where the shafts were installed in contact with the panels below and DT1/DT15 were defects that gave rise to a real safety risk (see [259] and [301] above). I therefore find that Meinhardt Façade breached its duty of care in failing to identify some instances of DT8 and DT1/DT15 on the 65 drops it inspected.

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822 Millenia's closing submissions at para 693.

823 Vol 9 BAEIC, AEIC of Yang Li dated 15 January 2014 at LY-02, paras 237–238 and 242–243 (pp 100–101).

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(4) Failing to propose effective rectification methods

566 As I have noted, I accept Meinhardt Façade's submission that its duty of care did not require it to propose rectification methods that would *ensure* that the Façade was *fit for its purpose* (see [550(b)] and [556] above).

567 I find that Meinhardt Façade did not breach its duty of care in proposing rectification methods, for the following reasons:

(a) First, I agree with Meinhardt Façade that the applicable standard of care is that of a reasonable façade consultant in Meinhardt Façade's position, and that I should account for whether the rectification methods proposed were in accordance with industry standards.[824]

(b) Secondly, critically, the rectification methods that Meinhardt Façade proposed were all ultimately approved by Arup apart from the structural silicone method, which was not used on the Cladding (see [111] and [123] above). I accept Meinhardt Façade's submission that Arup's approval of the rectification methods which it proposed shows that those methods met industry standards, and that Meinhardt Façade did not breach its duty of care in proposing them.[825]

(5) Approving the use of the Stitching Procedure

568 I find that Meinhardt Façade breached its duty of care in approving the use of the Stitching Procedure. As I have noted, the Stitching Procedure was used with the aim of stabilising cracks on panels (see [316] above). However, I have found that it was not an appropriate rectification method for even small cracks, in particular because it involved use of straight smooth rods instead of

824 Meinhardt Façade's closing submissions at paras 361–362.

825 Meinhardt Façade's closing submissions at para 411.

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rods akin to staples with indented or threaded surfaces (see [319]–[320] above). I therefore find that Meinhardt Façade was negligent in approving the use of the Stitching Procedure.

(6) Negligently representing that the Rectification Works were carried out in accordance with the Settlement Agreement

569 I find that Meinhardt Façade breached its duty of care by negligently representing in the 20 July 2010 Certificate that the Rectification Works were carried out in accordance with the approved rectification methods and cll 12 and 14 of the Settlement Agreement, for the following reasons.

570 First, some of the Rectification Works involved the use of the Stitching Procedure. This did not form part of the Rectification Works Method Statement, as was noted in Arup's 1st 2010 Report: see [136] above. It was also not an appropriate rectification method (see [319]–[320] and [568] above).

571 Secondly, in my discussion of the Defects Issue, I have found that there were several cases of various defects that were not adequately rectified. I note that Meinhardt Façade submits that defects could have arisen between the date of the completion of the Rectification Works and the date of Arup's 100% Inspection due to unforeseen events, such as BMU impacts and vibrations from the MRT Works.[826] I do not accept this submission for two reasons.

(a) First, some of the defects could not have arisen due to external events, *eg*, the insertion of silicone setting blocks that were not removed thereafter (DT9a) and improperly embedded anchor bolts (DT3).

826 Meinhardt Façade's closing submissions at paras 543–544.

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(b) Secondly, I have rejected the Vibrations Thesis and the BMU Thesis (apart from finding that one panel was damaged by a BMU): see [359] and [362] above.

I therefore find that most of the defects that were found on the Cladding to be inadequately rectified must have been present on the Cladding at the completion of the Rectification Works. Nonetheless, Meinhardt Façade issued the 20 July 2010 Certificate representing that the Rectification Works had been carried out in accordance with, *inter alia*, cl 12 of the Settlement Agreement which required the works to have been "carried out in a good workmanlike manner" and to be "of a permanent nature" (see [82] above). I find that this statement was incorrect and Meinhardt Façade was negligent in making it. I would add that the fact that the 20 July 2010 Certificate included the caveat "to the best of our knowledge" does not detract from this conclusion. In my judgment, that caveat would not have significantly qualified the meaning of the 20 July 2010 Certificate. On the facts of this case, it would have carried the full weight of a professional engineer's assessment that the Rectification Works had been properly implemented. To its credit, Meinhardt Façade did not suggest otherwise.

572 I now turn to consider whether Meinhardt Façade's breaches of its duties of care caused the loss Millenia claims was caused.

Did any breach cause the loss Millenia claims was caused?

573 It is important at the outset to recall the nature of the loss in respect of which Millenia brings its claims against Meinhardt Façade. Millenia's claim is for *the loss which flows from the 2nd Fall* (see [492] above). Millenia would only be entitled to recover this loss if it showed that Meinhardt Façade's breaches was a cause of the 2nd Fall, and therefore caused Millenia to suffer the losses flowing from the same.

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574 Having carefully considered the evidence, I have come to the conclusion that Millenia's claims against Meinhardt Façade fail at this final hurdle. I have found that Meinhardt Façade breached its duty of care by:

(a) failing to identify some instances of DT8 and DT1/DT15 on the 65 drops it inspected (see [565(b)] above);

(b) approving the rectification works carried out using the Stitching Procedure (see [568] above); and

(c) negligently representing in the 20 July 2010 Certificate that the Rectification Works were carried out in accordance with the Settlement Agreement (see [569] above).

575 However, I find that none of these breaches have any causal connection to the 2nd Fall, for the following reasons:

(a) First, in relation to the breach in [574(a)] above, the key point is that the 2nd Panel was not located on the 65 drops that Meinhardt Façade inspected. Hence, even if the 2nd Panel fell because it was affected by DT8 and/or DT1/DT15, this would not have been caused by the breach noted in [574(a)] above. Further, I have found that the 2nd Panel fell because its top pins failed to adequately restrain the panel. This was due to chips or cracks around the pins (caused by the use of undersized pins) and the insufficient embedment of the top left pin (see [402] above). This was not due to DT8. I note that DT8 gave rise to a risk of stacking (see [259] above); and chips around the pins could have been caused by stacking (see [233] above). Yet I have rejected the hypothesis that stacking caused the 2nd Fall (see [393] above).

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(b) Secondly, it is plain that the breach in [574(b)] does not have any causal connection to the 2nd Fall. I have found that the 2nd Panel was not stitched (see [383] above).

(c) Thirdly, the breach in [574(c)] above did not cause the 2nd Fall. There is no evidence of any causal connection between the 20 July 2010 Certificate and the 2nd Fall. For example, there is no evidence that, but for the certificate, Millenia would have requested Arup to inspect the entire Cladding and would have identified the 2nd Panel as defective in the course of that inspection. In fact, there is no evidence of any causal link between the 20 July 2010 Certificate and *any loss* that Millenia suffered. I note that upon receiving the 20 July 2010 Certificate, Millenia paid $37,450 to Dragages (see [146] above). However, as I have found, Millenia did not actively rely on the certificate because it made clear in the 6 August 2010 Letter that it did not accept it received a written confirmation in accordance with cl 11 of the Settlement Agreement and was making payment on a without prejudice basis (see [535(a)] above). I therefore find that the 20 July 2010 Certificate did not even cause Millenia to suffer loss in the form of the $37,450 which it paid out.

576 Ultimately, the key difficulty with Millenia's case on causation is this. Millenia has not established any breach on Meinhardt Façade's part *pertaining specifically to the 2nd Panel or the 2nd Fall*. I have not accepted Millenia's submission that Meinhardt Façade breached its duty of care by failing to identify the 2nd Panel as defective or by failing to ensure that it was rectified (see [561]–[563] above). In the circumstances, it is difficult to establish any causal link between breaches by Meinhardt Façade and the 2nd Fall.

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577 For these reasons, I find that Meinhardt Façade's breaches of its duty of care did not cause the loss which Millenia is claiming for against Meinhardt Façade. I therefore dismiss Millenia's claims against Meinhardt Façade.

Millenia's claims against Arup

Introduction

578 Millenia's claims against Arup are for (1) breach of Arup's duties under the 2004 Appointment Letter and duty of care in tort ("the 2004 Appointment Claims") and (2) breach of Arup's duties under the 2007 Appointment Letter and duty of care in tort ("the 2007 Appointment Claims").[827] Millenia's claims mirror many claims advanced by Dragages, Builders Shop and the Meinhardt Parties against Arup in the third-party proceedings; my analysis of Millenia's claims will therefore apply to many of the third party claims.

579 Millenia does not claim the cost of rectifying or replacing the Cladding from Arup, albeit Millenia submits that if it has lost remedies against the other defendants due to Arup's negligence, it is entitled to recover the full loss it claims in this suit from Arup (see [175] above). I have not accepted a similar conditional claim against the Meinhardt Parties (see [493] above). For similar reasons, I do not accept this conditional claim against Arup. First, no such claim was pleaded. Secondly, Millenia has not made any submissions regarding how or why it has lost any remedy against the other defendants, or had any of its claims compromised, due to Arup's negligence. Hence, if necessary, I find that Millenia has not lost any remedy against the other defendants, or had any of its claims compromised, due to the negligence of Arup.

827 Millenia's submissions at para 717.

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580 In this light, as with Millenia's claims against the Meinhardt Parties, Millenia's claims against Arup are essentially for the losses it sustained flowing from the 2nd Fall. Millenia's case is that Arup's breaches of its duties caused or contributed to the 2nd Fall, and Arup is thus liable for losses due to the same.

581 I now examine the issue of whether Arup breached its duties to Millenia, turning first to the 2004 Appointment Claims.

Did Arup breach its duties to Millenia?

The 2004 Appointment Claims

582 I first examine the duties which Arup owed to Millenia in relation to the 2004 Appointment Claims.

(1) Arup's duties to Millenia

(A) CONTRACTUAL DUTIES UNDER ARUP'S 2004 CONTRACT

583 I hold that Arup owed the following express duties to Millenia under Arup's 2004 Contract:

> (a) to investigate the 1st Fall and the integrity of the Cladding, by inspecting a representative portion of the Façade, which was to be a non-destructive, visual inspection conducted with the use of a borescope to enable inspection of the brackets supporting the stone panels (Sections 1, 2.3.1.2 and 4.1–4.2 of Arup's 2004 Proposal); and
>
> (b) to produce two reports: an interim report setting out the required remedial works, to satisfy the BCA's requirements under the 1st BCA Order (see [32] above), and a finalised report containing the inspection results, Arup's structural and technical assessment of the Façade, advice

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on potential remedial works and recommendations on future action (Sections 4.3–4.4 of Arup's 2004 Proposal).[828]

584 I also agree with Millenia that Arup owed an implied duty under Arup's 2004 Contract to inspect the Façade with reasonable care and skill.[829] Where a skilled or professional person contracts to render services to a client in return for a fee, "there is at common law an implied term in law that he will exercise reasonable skill and care in rendering those services": *Go Dante Yap* at [24].

585 Millenia submits that under the 2004 Contract, Arup was obliged to (1) identify infill panels on the 8 Drops and (2) warn Millenia if Arup knew, from its inspection, that the infill panels could not be located.[830]

586 I do not accept that the 2004 Contract included any such express term or implied term. Millenia did not plead such a term. I note, however, that Millenia submits that Arup was required, as part of its duty to inspect the Cladding (with reasonable care) (see [583(a)] above), to identify infill panels on the 8 Drops and to warn Millenia that infill panels could not be located if Arup learnt this from its inspection.[831] In other words, Millenia claims Arup breached its duty to inspect the Façade (with due care) because it did not identify infill panels and did not warn Millenia that these panels could not be located. I address this submission at [591]–[598] below.

587 Millenia also submits that Arup owed it a contractual duty to advise it to (1) undertake proper maintenance of the Building and/or (2) implement safety

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828 68AB 53901, 53908, 53910–53911, 53916–53918.

829 Millenia's closing submissions at paras 725–738.

830 Millenia's closing submissions at paras 744–769.

831 Millenia's closing submissions at para 744.

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and risk management measures to guard against foreign and/or external forces caused by deep underground works in the Building's vicinity.[832]

588 I hold that the 2004 Contract did not contain any such express term. Further, Millenia did not plead or submit, and I hold, that the 2004 Contract also did not contain any such implied term. Nonetheless, I recognise that even if the 2004 Contract did not *specifically* provide for Arup to advise Millenia in relation to maintenance and the implementation of safety and risk management measures, Arup may have breached its contractual or tortious duty of care in failing to provide such advice. I address this possibility at [599]–[604] below.

(B) DUTY OF CARE IN TORT

589 I hold that Arup owed Millenia a duty of care in tort in relation to its works under Arup's 2004 Contract. In *Go Dante Yap*, the Court of Appeal noted at [20] that where parties "have expressly *or impliedly* negotiated an obligation on one of them to exercise care and skill in the exercise of his rights or duties under the contract, it is entirely possible that an identical duty of care could exist in the tort of negligence" [emphasis added]. I find that there is sufficient proximity between the parties, based on the contractual relationship between Millenia and Arup, for a duty of care to arise. Arup also does not contend that there are any policy considerations which militate against a duty of care, and I find that there are none. The *Spandeck* test for a duty of care is therefore fulfilled.

(2) Millenia's allegations of breach

590 Millenia submits that Arup breached its duties to Millenia by:[833]

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832 Millenia's closing submissions at paras 786–788 and 795.

833 Millenia's closing submissions at paras 770–785 and 786–795.

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(a) failing to identify the 2nd Panel as defective in Arup's 2nd 2004 Report;

(b) failing to warn Millenia that infill panels could not be located;

(c) failing to advise Millenia:

(i) to undertake proper maintenance of the Cladding; and

(ii) to implement measures to guard against the adverse effects of underground works in the vicinity of the Building.

I now address these allegations of breach in turn.

(A) FAILING TO IDENTIFY THE 2ND PANEL AS DEFECTIVE

591 I find that Arup did not breach its duties to Millenia by not identifying the 2nd Panel as defective in its 2nd 2004 Report.

592 The thrust of Millenia's submission here is that (1) the 2nd Panel was an infill panel; (2) Arup breached its duty to inspect the Cladding with due care by failing to identify the 2nd Panel as an infill panel. Premise (2) is based on Arup's hypothesis that infill panels were installed without top pins: Millenia claims that a façade inspector exercising due care would have ascertained that the 2nd Panel was an infill panel missing its top pins.[834] I do not accept this submission.

(a) First, I have found that infill panels generally, and the 2nd Panel specifically, were installed with their top pins (see [388]–[389] above). Therefore, the factual basis of Millenia's submission that Arup breached its duty – infill panels generally, and the 2nd Panel specifically, were

834 Millenia's closing submissions at paras 775 and 776(b).

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installed without top pins; Arup breached its duty of care in failing to identify the 2nd Panel as a panel missing its top pins – falls away.

(b) Secondly, more broadly, I do not accept that Arup breached its duty of care in failing to identify infill panels in its inspection of the Cladding. The key reason is that Arup was engaged to conduct *a non-destructive, visual inspection of the Cladding* (see [583(a)] above). Yet the evidence was that it would have been very difficult to identify infill panels in the course of a non-destructive inspection. In a letter to the BCA dated 13 June 2011, Arup stated as follows:[835]

> Infill panels are not specifically identified and reported in the inspection. This is because it [is] physically very difficult to positively identify an infill panel ***unless the granite panel and the insulation are removed to check for evidence of the tower fixings***. [emphasis added in italics and bold italics]

It appears that the key sign of an infill panel was tie back anchor marks on the RC wall. This was how Arup identified the 2nd Panel as an infill panel.[836] However, in a non-destructive inspection, the inspector's view of marks on the RC wall would have been obscured by the panel and the insulation between the RC wall and the panel (see [22] above). I find on this basis that it would have been extremely difficult, if not impossible, to identify infill panels in a non-destructive inspection of the Cladding.

593 Furthermore, putting the matter of the 2nd Panel being an infill panel to one side, in view of my findings on the cause of the 2nd Fall, there is insufficient evidence that Arup breached its duty of care in failing to identify the 2nd Panel as defective. I have found that the 2nd Panel fell because its top pins failed to

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835 89AB 70870.

836 85AB 67799, 67828.

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restrain it, due to chips or cracks around the top pins at the back of the 2nd Panel (see [402] above). *Critically, there is no evidence that the chips or cracks began to form when Arup inspected the 2nd Panel in 2004*. Instead, the evidence points in the other direction. When Earth Arts inspected the 2nd Panel in 2007, it simply noted that the top left pin was "only in 5mm" and that the panel was loose (see [386(b)] above). It did not note that chips or cracks had formed around the top pins. This indicates that such deterioration in the state of the 2nd Panel occurred after 2007, years after Arup inspected the 2nd Panel in 2004. I also bear in mind that Arup inspected the 8 Drops under time constraints, and that the inspection was a non-destructive visual inspection, albeit with the use of a borescope.

594 I am therefore unable to find that Arup breached its duty of care under the 2004 Contract or in tort by not identifying the 2nd Panel as defective in its 2nd 2004 Report. Hence, I do not accept this allegation of breach.

(B) FAILING TO WARN THAT INFILL PANELS COULD NOT BE LOCATED

595 I find that Arup did not breach its duties to Millenia by not warning the latter that infill panels could not be located.

596 I accept that *if Arup knew* infill panels could not be located, around the time it submitted its 1st and/or 2nd 2004 Reports, it would have been obliged to inform Millenia of this. In my view, this would not have fallen under Arup's duty to *inspect* the Cladding, as Millenia submits (see [586] above), but its duty of care and skill in advising Millenia on remedial works/future courses of action (see [583(b)] and [584] above). In the 1st 2004 Report, Arup took the view that there was a systemic problem with all infill panels which Arup believed had been installed without their top pins (see [49] above). *If Arup knew that* the infill panels could not be located, Arup should have informed Millenia of this because

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this would have had significant implications for the remedial works or safety measures which (Arup believed) were necessary to be effected.

597 However, I find that Arup did not know at or around the time of the 2004 Reports that infill panels could not be located. I find that at the time, the parties were proceeding on the basis that Dragages had a list of the infill panels:

(a) First, the first time that Dragages made clear that it did not have such a list was on 29 April 2008 (see [108] above).

(b) Secondly, I find (based on meeting minutes) that Arup asked Dragages during a meeting on 24 November 2004 for the number and location of infill panels.[837] It seems Dragages then gave Arup with a rough plan of the drops on which infill panels would be found, which Arup forwarded to the BCA by a letter dated 16 December 2004.[838] The evidence thus indicates, and I find, that Arup did not know that the infill panels could not be located. Arup had been given a rough plan of where the infill panels would be found, and was not informed until 2008 that Dragages did not have a list of all the infill panels (see [109] above).

598 I therefore find that Arup did not breach its duties to Millenia by not warning Millenia that infill panels could not be located. For completeness, I note that Millenia did not plead or submit that Arup had breached its duties by failing to inform Millenia that there was no list of infill panels *once it learnt this in 2008*. It is unclear on the evidence whether Arup informed Millenia of this. The point was neither pleaded nor pursued in submissions and I therefore need not consider it further.

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837 69AB 54620.

838 69AB 54822–54823.

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(C) FAILING TO ADVISE MILLENIA TO UNDERTAKE MAINTENANCE

599 I find that Arup did not breach its duties to Millenia by not advising the latter to undertake proper maintenance of the Building.

600 Arup did not owe a *specific* contractual duty to advise Millenia to undertake proper maintenance (see [588] above). However, there remains the question of whether Arup breached its contractual or tortious duty of care to Millenia in failing to provide Millenia with such advice.

601 I accept that Arup may have breached its duty of care in not advising Millenia to undertake maintenance *if* (1) Arup had come to the view that lack of proper maintenance caused or contributed to the 1st Fall or the defects and/or (2) improper maintenance in fact caused the same. Yet Arup did not reach such a view, and there is no evidence that lack of maintenance caused the defects (see [363] above). I thus find that Arup did not breach its duty of care in not advising Millenia to undertake proper maintenance. Notably, Mr Foo accepted this: he conceded that advising Millenia on maintenance of the Façade "was not in the appointment, unless it [was] … the cause of it … *But if those are not the causes, then – then I guess Arup need not have to advise us*" [emphasis added].[839] I therefore do not accept this allegation of breach.

(D) FAILING TO ADVISE MILLENIA TO IMPLEMENT SAFETY OR RISK MANAGEMENT MEASURES

602 I find that Arup did not breach its duties to Millenia by not advising the latter to implement safety or risk management measures to guard against the adverse effects of underground works in the vicinity of the Building.

603 Millenia submits that Arup breached its duties because:[840]

839 Transcript, 23 April 2014, p 72.

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(a) Arup stated in the 1st 2004 Report that vibrations from the MRT Works could have contributed to the 1st Fall (see [47(b)(iii)] above) and also knew that Mr Lauw had taken the position that the 1st Fall occurred due to foreign and/or external forces (see [40(c) above); however,

(b) Arup did not follow up on the issue of vibrations in its 2nd 2004 Report or thereafter but "decided that it could simply drop the issue".

604 I do not accept this submission. It is critical to understand why Arup did not pursue the issue of vibrations after raising it as a possible cause of the 1st Fall in the 1st 2004 Report. As noted at [57] above, Mr Chin explained that after Arup had reviewed the vibration records from the LTA, and inspected Millenia Tower and found no defects thereon, Arup concluded that it was "too highly improbable" that vibrations were a cause of the defects. I find that in the circumstances, given the evidence indicating that vibrations were not a primary cause of the 1st Fall or the defects, it was reasonable for Arup not to advise Millenia to implement safety or risk management measures to guard against the adverse effects of the MRT Works. Notably, I have relied on the same pieces of evidence – the absence of defects on Millenia Tower and the evidence from the vibration meters – to conclude that vibrations were at most a minor contributory cause of defects such as cracks and chips (having found that other defects were not caused by vibrations): see [336] and [347(a)(i)] above. I therefore do not accept this allegation of breach.

605 For all of these reasons, I do not accept the 2004 Appointment Claims. I now turn to the 2007 Appointment Claims.

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840 Millenia's closing submissions at paras 789–792.

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The 2007 Appointment Claims

606 Millenia submits that Arup breached its duties under the 2007 Appointment Letter and/or its duty of care in tort by:

> (a) negligently accepting the Rectification Works when they had not been properly completed, and
>
> (b) by failing to ensure the Rectification Works rendered the Building fit for its purpose.

In relation to [(a)], I note that Millenia's primary case is that Arup did *not* accept the Rectification Works.[841] This submission is advanced in the alternative on the premise that I find that Arup accepted the Rectification Works. Arup submits that Millenia may not claim that Arup had accepted the Rectification Works as this is inconsistent with Millenia's primary case.[842] I disagree: it is settled law that a plaintiff may plead inconsistent causes of action in the alternative, so long as the facts relied upon are set out separately, and the alternatives do not offend common sense and justice: *Ng Chee Weng v Lim Jit Ming Bryan and another* [2012] 1 SLR 457 at [33]–[36]. Here, Millenia's pleadings were clear and I find that it would not "offend common sense and justice" for Millenia to advance its alternative case, because the issue of whether Arup accepted the Rectification Works was disputed by Dragages and put before me for my determination.

607 I now address the 2007 Appointment Claims. First, as for the submission noted in [606(a)] above, I have found that Arup did not issue its confirmation that the Rectification Works were carried out in accordance with the Settlement Agreement; the disagreements between Arup and Meinhardt Façade regarding

841 Millenia's closing submissions at para 797.

842 Arup's closing submissions at paras 284–288.

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the cracked panels were never finally resolved (see [149] above). I thus find that Arup did not accept that the Rectification Works were properly completed. It follows that this allegation of breach has no factual basis, and I reject it.

608 Secondly, in relation to the submission noted in [606(b)] above, I do not accept that Arup owed Millenia a duty, whether in contract or in tort, to ensure that the Rectification Works rendered the Building fit for its purpose:

(a) First, I hold that there was no such contractual duty. The 2007 Appointment Letter did not include such an express term. Moreover, I am satisfied that there was no such implied term. I agree with Arup that none of the three stages of the test set out in *Sembcorp Marine* are fulfilled.[843] In particular, I hold that the business efficacy and officious bystander tests are not satisfied, because an onerous duty of ensuring the Building was rendered fit for purpose does not sit well with (1) cl 7 of the 2007 Appointment Letter, which laid down a standard of reasonable skill and care, a far less stringent standard than that of ensuring fitness for purpose and (2) the fact that Arup contracted to perform its services for a fixed fee of $40,000 (see [91(a)] and [91(b)] above).

(b) Secondly, I hold that there was no such duty in tort. The alleged duty is not a duty of care. It is a strict duty to ensure a result, *viz*, that the Building would be fit for purpose. I was not shown any authorities for the proposition that such a duty could have arisen in tort.

609 For these reasons, I do not accept the 2007 Appointment Claims.

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843 Arup's closing submissions at paras 279–282.

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Conclusion

610 I conclude that Arup did not breach its duties to Millenia: the 2004 and 2007 Appointment Claims are not made out. For completeness, however, I now address the defences raised by Arup.

Arup's defences to Millenia's claims

611 Arup raises the following defences to the 2004 Appointment Claims:[844]

(a) First, the 2004 Appointment Claims (premised on breach of the 2004 Contract) are time-barred under:

(i) cl 6.5 of the Conditions of Engagement for Report and Advisory Work of the Association of Consulting Engineers ("ACES" and "the ACES Terms" respectively): Arup claims that the ACES Terms were incorporated into the 2004 Contract; and

(ii) s 24A(3) of the Limitation Act.

(b) Secondly, even if Arup is liable to Millenia in respect of the 2004 Appointment Claims (premised on breach of the 2004 Contract), its liability is limited to:

(i) the sum of S$1,000,000, pursuant to Section 5.3 of the 2004 Proposal, and

(ii) the proportion of loss or damage attributable to Arup's breaches, pursuant to cl 6.4(iii) of the ACES Terms.

612 Arup raises the following defences to the 2007 Appointment Claims (premised on breach of the 2007 Appointment Letter):[845]

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844 Arup's closing submissions at para 293b.

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(a) First, the 2007 Appointment Claims are time-barred under cl 7 of the 2007 Appointment Letter.

(b) Secondly, Arup's liability to Millenia is in any event limited to S$500,000 pursuant to cl 1 of the 2007 Appointment Letter.

613 I turn first to Arup's defences to the 2004 Appointment Claims.

Arup's defences to the 2004 Appointment Claims

(1) Time-bar

(A) CL 6.5 OF THE ACES TERMS

(I) INCORPORATION

614 I first examine whether the ACES Terms, and cl 6.5 in particular, formed part of the contract between the parties.

615 Whether terms are incorporated into a contract turns on "the parties' objective intentions gleaned from their correspondence and conduct in light of the relevant background …", the "relevant background" including "the industry in which the parties are in, the character of the document which contains the terms in question as well as the course of dealings between the parties": *R1 International Pte Ltd v Lonstroff AG* [2015] 1 SLR 521 at [51]. Where a document "is expressly incorporated by general words, it is still necessary to consider … whether *any particular part* of the document is 'apt to be a term of the contract'" [original emphasis omitted; emphasis added]: *ABB Holdings Pte Ltd and others v Sher Hock Guan Charles* [2009] 4 SLR(R) 111 at [24(b)].

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845 Arup's closing submissions at para 293c.

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616 I find that apart from terms conflicting with the express provisions of the 2004 Contract, the ACES Terms were incorporated into the 2004 Contract:

(a) First, section 5.3 of Arup's 2004 Proposal stated that the contract between the parties would be *"[u]nder standard ACES conditions* modified for the scope of works and the investigative nature of the project" [emphasis added]. The 2004 Appointment Letter stated that Millenia was "agreeable to [the 2004 Proposal]" subject to eight terms and conditions set out in the letter, and expressly provided that the 2004 Contract would be governed by, among other things, the 2004 Proposal (see [33] above). I therefore find that the parties' intention, objectively ascertained from the documents, was that the ACES Terms would form part of the 2004 Contract, albeit that terms which conflicted with the express provisions of the same would not be incorporated, because these terms would not be "apt to be a term of the contract" (see [615] above). (For example, cl 6.4(ii) of the ACES Terms provides for liability to be limited to not more than $250,000. I find that this was not incorporated into the 2004 Contract: it conflicts with the provision in section 5.3 of Arup's 2004 Proposal for liability to be limited to $1,000,000: see [627] below. Arup has not relied on cl 6.4(ii) in its submissions.)

(b) Secondly, this conclusion is supported by the correspondence between the parties leading up to the 2004 Contract. After Arup sent the 2004 Proposal to Millenia, Millenia replied by email to state that it was agreeable in principle to the same subject to seven additional terms (later reflected in the 2004 Appointment Letter), and handwritten comments and amendments to a copy of the 2004 Proposal attached to the email.[846]

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846 68AB 53861–53899.

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As Arup points out, no amendments were made to the portion of Section 5.3 of the 2004 Proposal which provided for the ACES Terms to apply.[847]

(c) Thirdly, with regard to the character of the document whose terms were incorporated into the contract, I accept Arup's submission that the ACES Terms were "a set of industry-recommended terms" to define the mutual rights of consulting engineers and their clients.[848]

617 Clause 6.5 of the ACES Terms states:[849]

> **Duration of Liability**
>
> *Neither party shall be considered liable for any loss or damage resulting from any occurrence unless a claim is formally made against that party before* the expiry of the period specified in the Specific Provisions or, if no such period is specified, ***six years from the completion of the Services****, whether or not the loss or damage has become apparent, or been suffered, within that period.* [emphasis added in italics and bold italics]

618 I agree with Arup that cl 6.5 of the ACES Terms does not contradict the other terms of the 2004 Contract: the express provisions of the 2004 Contract do not provide for a time period within which Millenia was obliged to bring its claims against Arup, or exclude or restrict such a provision.[850] Hence, I find that cl 6.5 of the ACES Terms was incorporated into the 2004 Contract.

(II) UCTA

619 Millenia submits, however, that cl 6.5 is unenforceable because it was unreasonable under the UCTA.[851] In reply, Arup submits that the UCTA does

847 Arup's reply submissions at para 70; 68AB 53861, 53880.

848 Arup's closing submissions at para 314.

849 107AB 84180, 84200.

850 Arup's closing submissions at para 323.

851 Millenia's closing submissions at para 842.

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not apply to the 2004 Contract because Millenia did not deal as "consumer" or on Arup's "written standard terms of business": hence, the preconditions for the UCTA to apply under s 3(1) of the same are not met. Arup also submits that in any event, cl 6.5 satisfies the requirement of reasonableness under the UCTA.[852]

620 I hold that the UCTA applies to the 2004 Contract:

(a) I agree with Arup that Millenia was not dealing "as consumer" in making the 2004 Contract. Under s 12(1)(*a*) of the UCTA, a party to a contract does not deal "as consumer" if he contracts "in the course of a business". In *Koh Lin Yee v Terrestrial Pte Ltd and another appeal* [2015] 2 SLR 497 ("*Koh Lin Yee*"), the Court of Appeal held at [22] that the test for whether one contracts "in the course of business" is whether the contract is "clearly integral" as opposed to "merely incidental" to the party's business. I find that the 2004 Contract was clearly integral, rather than merely incidental, to Millenia's business as the owner of the Building. I therefore find that Millenia made that contract in the course of its business, and thus did not deal "as consumer" in doing so.

(b) However, I find that the 2004 Contract was made on Arup's "written standard terms of business" for the following reasons:

(i) First, in *Koh Lin Yee*, the Court of Appeal defined the phrase "standard terms of business" at [24] as follows:

> … a set of terms in the written form existing prior to the making of the agreement *which was intended to be adopted more or less automatically in respect of all transactions of a particular type without any significant opportunity for negotiations*. [emphasis added]

852 Arup's reply closing submissions at paras 78 and 84.

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According to Mr Clarke, "[i]t was Arup's standard practice to incorporate the ACES [Terms] into its contractual documents to supplement the same".[853] I therefore find that the ACES Terms were Arup's "written standard terms of business". Although the ACES Terms were the terms of ACES, a trade association, rather than terms exclusive to Arup, it appears that the phrase "standard terms of business" embraces the standard terms of a trade association that are incorporated into a contract: see *Chitty* at para 15–084 and Richard Lawson, *Exclusion Clauses and Unfair Contract Terms* (Sweet & Maxwell, 11th ed, 2014) at para 8–015, referring to *British Fermentation Products Ltd v Compair Reavell Ltd* [1999] 2 All ER (Comm) 389.

(ii) Secondly, I find that the 2004 Contract was made on those standard terms. I accept that where standard terms are significantly altered to fit the circumstances of the parties, the contract will not be found to have been made on those terms. The test is whether there is a significant discrepancy between the standard terms and the actual terms of the contract: see *The Law of Contract in Singapore* (Andrew Phang Boon Leong gen ed) (Academy Publishing, 2012) ("*The Law of Contract in Singapore*") at para 07.116. There were differences between the terms of the 2004 Contract and the ACES Terms, *eg*, a less stringent limitation of liability clause was adopted (see [616(a)] above). But many other provisions of the ACES Terms, *eg*, terms pertaining to payment, *force majeure*, and settlement of disputes did not conflict with the express provisions of the 2004 Contract, and it appears that these provisions were incorporated into the

853 Vol 23 BAEIC, AEIC of Stuart Clarke dated 27 February 2014 at para 32.

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> same. On the whole, I find that there is no significant discrepancy between the ACES Terms and the terms of the 2004 Contract.

I therefore hold that in making the 2004 Contract, Millenia was dealing on Arup's "written standard terms of business" and s 3 of the UCTA thus applies.

621 However, I find that cl 6.5 of the ACES Terms meets the reasonableness requirement under s 3(2) read with s 11 of the UCTA, for two principal reasons:

(a) First, one relevant factor in determining the reasonableness of a term is the relative bargaining power of the parties: see *Smith v Eric S Bush* [1990] 1 AC 831 at 858 (*per* Lord Griffiths), cited in *The Law of Contract in Singapore* at para 07.144. I agree with Arup that Millenia is "a large commercial entity with considerable bargaining power", who was advised by in-house counsel when it negotiated the 2004 Contract. This militates against a finding that cl 6.5 was unreasonable.

(b) Secondly, in *Press Automation Technology Pte Ltd v Trans-Link Exhibition Forwarding Pte Ltd* [2003] 1 SLR(R) 712 ("*Press Automation Technology*"), the High Court held that a nine-month time bar clause, a standard term incorporated into the contract between the parties, was unreasonable, emphasising at [56] that the normal limitation period where goods were damaged due to breach of contract was six years, and the contractual time bar would thus have amounted to a "substantial restriction" of the plaintiff's rights. By contrast, cl 6.5 stipulates a much longer time bar period of six years, similar to the statutory limitation period, albeit one that does not account for latent defects. In my judgment, it does not constitute a substantial restriction of Millenia's rights. I thus find that it is reasonable under the UCTA.

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622 For these reasons, I do not accept Millenia's submission that cl 6.5 of the ACES Terms is unenforceable for breach of the UCTA.

(III) APPLICATION OF CL 6.5

623 Clause 6.5 stipulates a time-bar of "six years from the completion of the Services". Arup submits that Section 4 of Arup's 2004 Proposal, which sets out Arup's scope of works, defines the term "Services" for the purposes of the 2004 Contract. Section 4 provided for Arup to "lead and provide technical input into a survey and investigation of the existing stone façade elements as a whole to determine their present condition", and stated that Arup's works – apart from the inspection of Millenia Tower, which Arup's 2004 Proposal provided for – were "to fulfil the requirements of Section 23 of the Building Control Act".[854] Arup accordingly submits that it completed the Services by 31 August 2006. On this date, the BCA sent an email to Millenia stating that the requirements of the 1st BCA Order had been fulfilled and "the case will be closed".[855]

624 I accept Arup's submission. Millenia challenges Arup's submission only to the extent that it contends that Arup failed to advise Millenia to undertake maintenance and implement safety or risk management measures, and therefore had outstanding work under the 1st 2004 Contract after 31 August 2006.[856] However, I have found that Arup was not obliged to advise Millenia on these matters (see [588] and [599]–[604] above). I thus find that Arup completed the Services under the 1st 2004 Contract by 31 August 2006.

625 Millenia named Arup as a defendant to this suit on 18 October 2013 (see [166] above), more than six years after 31 August 2006. Therefore, I find that

854 68AB 53901, 53916.

855 72AB 57397.

856 Millenia's closing submissions at para 841.

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even if the 2004 Appointment Claims were made out, they would be time-barred under cl 6.5 of the ACES Terms which was incorporated into the 2004 Contract.

(B) SECTION 24A(3) OF THE LIMITATION ACT

626 Arup submits that the 2004 Appointment Claims would also be time-barred under s 24A(3) of the Limitation Act. Arup's position seems to be that the six-year period under s 24A(3)(*a*) began on 31 August 2006, when Arup completed its works under the 2004 Contract, while the three-year period under s 24A(3)(*b*) began on 25 March 2010.[857] I disagree. It appears that Millenia would only have had the requisite knowledge to bring the 2004 Appointment Claims – especially the claim for failure to identify the 2nd Panel as defective – after the 2nd Fall occurred, as Millenia submits.[858] Accordingly, time would only begin to run for the purposes of s 24A(3)(*b*) after the 2nd Fall. I therefore do not accept that the 2004 Appointment Claims would be time-barred under s 24A(3).

(2) Limitation of liability

(A) SECTION 5.3 OF THE 2004 PROPOSAL

627 Section 5.3 of the 2004 Proposal states: "… For this type of project *we limit our liability to S$1,000,000*" [emphasis added].[859] Arup submits that its liability under the 2004 Contract was accordingly limited to S$1,000,000.[860]

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857 Arup's closing submissions at para 330; Arup's reply submissions at paras 100–106.

858 Millenia's closing submissions at para 853.

859 68AB 53901, 53922.

860 Arup's closing submissions at paras 333–337.

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628 However, Arup did not plead that its liability was limited under Section 5.3 of the 2004 Proposal. Instead, Arup pleaded that its liability under the 2004 Contract was limited under cl 6.4(ii) of the ACES Terms,[861] which I have found was not incorporated into the 2004 Contract (see [616(a)] above). Millenia only addresses cl 6.4(ii), and not the limitation clause in Section 5.3 of the 2004 Proposal, in its submissions.[862] I therefore hold that Arup is not entitled to rely on the limitation provision in Section 5.3 of the 2004 Proposal.

(B) CLAUSE 6.4(III) OF THE ACES TERMS

629 Clause 6.4(iii) of the ACES Terms states:[863]

> If either party is found to be liable to the other, in circumstances where the acts or omissions of a third party have contributed to the loss or damage, the proportion of damages payable by the party found liable *shall be limited to that proportion which is attributable to that party's breach of duty*, whether the claims are made under contract, tort or otherwise. [emphasis added]

Arup relies on this provision to submit that even if Millenia's claims against it are made out, it would only be liable for the losses flowing from the 2nd Fall, and not for the defects in the Cladding which it did not cause.[864]

630 I accept this submission. I find that cl 6.4(iii) was incorporated into the 2004 Contract: I am satisfied that it did not conflict with any express provision of the same (see [616] above). I also find that cl 6.4(iii) has the effect described by Arup (see [629] above). Nonetheless, in the final analysis, cl 6.4(iii) is not

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861 Arup's Defence and Counterclaim at para 13.

862 Millenia's closing submissions at paras 821–831; Millenia's reply submissions at para 510.

863 107AB 84180, 84200.

864 Arup's closing submissions at paras 339–340.

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crucial as Millenia is only claiming the losses due to the 2nd Fall from Arup (subject to a conditional claim that I have rejected: see [579]–[580] above).

Arup's defences to the 2007 Appointment Claims

(1) Time-bar

631 Arup submits that the 2007 Appointment Claims are time-barred under cl 7 of the 2007 Appointment Letter. Clause 7 states:[865]

> … *After the expiration of* ***one (1) year from the date of invoice in respect of the final amount claimed by Arup****, Arup shall be* ***discharged from all liability*** in respect of the services whether under the [law] of contract, tort or otherwise. [emphasis added in italics and bold italics]

632 Millenia submits that this provision is unreasonable under the UCTA and is thus unenforceable.[866] I disagree. I accept that the one-year time bar period stipulated under cl 7 is much shorter than the six-year period under cl 6.5 of the ACES Terms (see [617] above). However, critically, unlike cl 6.5, and unlike the provision in *Press Automation Technology* (see [621(b)] above), *the time bar provision in cl 7 was not a standard term*. As Arup submits, cl 7 is found "in the main body of the negotiated terms of the [2007 Appointment Letter]".[867] Bearing this in mind, and the fact that Millenia was not in a position of unequal bargaining power and was a legally-advised commercial entity (see [621(a)] above), *and the relatively low fixed fee of $40,000 for Arup's work under the 2007 Appointment Letter*, I find that the time-bar provision in cl 7 satisfies the test of reasonableness under the UCTA. I therefore do not accept Millenia's submission that the provision is unenforceable under the UCTA.

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865 73AB 58073, 58075.

866 Millenia's closing submissions at para 850.

867 Arup's closing submission at para 344.

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633 Arup submits that "the date of invoice in respect of the final amount claimed by Arup" was 29 September 2010, the date of its final invoice under the 2007 Appointment Letter.[868] Millenia denies this, contending that since Arup did not accept that the Rectification Works were complete, "Arup continues to be obliged to oversee the [Rectification Works] … [and] will continue to issue invoice for its work".[869] I do not accept Millenia's submission. It is simply unreal to suppose that Arup will issue any further invoice in respect of its works under the 2007 Appointment Letter, years after the 2nd Fall and the Reclad. I accept Arup's submission that the relevant invoice was issued on 29 September 2010. The time bar period under cl 7 of the 2007 Appointment Letter thus commenced on that day. Millenia named Arup as a defendant to this suit on 18 October 2013 (see [166] above), more than one year after 29 September 2010. I accordingly conclude that even if the 2007 Appointment Claims were made out, they would be time-barred under cl 7 of the 2007 Appointment Letter.

(2) Limitation of liability

634 Arup claims the 2007 Appointment Claims are subject to the limitation clause in cl 1 of the 2007 Appointment Letter, which states:[870]

> **1. Limit of Liability**
>
> To the maximum extent permitted by law and notwithstanding any other provision of this Contract, [Arup's] liability to [Millenia] arising out of or in connection with this project (including the performance or non-performance of the Services) whether in contract, in tort (including negligence), in statute or otherwise, is *limited in aggregate to [S$500,000]*
>
> [emphasis added]

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868 Arup's closing submissions at para 347; 5D-1.

869 Millenia's closing submission at para 848.

870 73AB 58073, 58074.

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635 Millenia submits that cl 1 is unenforceable because it is unreasonable under the UCTA.[871] I disagree. Clause 1 was not a standard term but a negotiated term. Again, Millenia was not in a position of unequal bargaining power, was a legally-advised commercial entity, and the 2007 Appointment Letter provided for a relatively low fixed fee of $40,000 (see [632] above). I therefore find that cl 1 of the 2007 Appointment Letter was not unreasonable under the UCTA. I accordingly accept Arup's submission that its liability under the 2007 Appointment Letter was limited to $500,000 pursuant to cl 1 of that contract.

Summary of conclusions

636 In sum, my findings on Millenia's claims against Arup are as follows:

(a) I dismiss the 2004 and 2007 Appointment Claims: I find that Arup did not breach its duties to Millenia (see [610] above).

(b) Even if the 2004 and 2007 Appointment Claims were made out:

(i) The 2004 Appointment Claims premised on breach of the 2004 Contract would be time-barred under cl 6.5 of the ACES Terms that was incorporated into the contract (see [625] above);

(ii) The 2007 Appointment Claims premised on breach of the 2007 Appointment Letter would be time-barred under cl 7 of the same (see [633] above), and subject to the limitation clause in cl 1 of the same (see [635] above).

The counterclaims against Millenia

637 I now address Builders Shop's and Arup's counterclaims.

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871 Millenia's closing submissions at paras 832–834.

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Builders Shop's counterclaim

638 Builders Shop submits that in the event it breached its duties under the Settlement Agreement by adopting the Stitching Procedure, and is thus liable to Millenia, Millenia breached the Settlement Agreement by failing to highlight this breach and by representing that the Rectification Works were carried out in accordance with the Settlement Agreement, and is liable to Builders Shop.[872]

639 This counterclaim is entirely without any basis. I find that Millenia did not owe any express or implied duty to Builders Shop under the Settlement Agreement to highlight the latter's breaches to it. Further, even if Millenia owed such a duty, I find that it did not breach it: (1) its consultant, Arup, highlighted the improper use of the Stitching Procedure in the 1st 2010 Report (see [137] above) and (2) Millenia did not represent that the Rectification Works were carried out in accordance with the Settlement Agreement. I thus dismiss this counterclaim.

Arup's counterclaim

640 In its submissions, Arup does not maintain its pleaded counterclaim for a declaration or order that Millenia's claims against it are time-barred, an abuse of process and should be struck out. Arup also does not pursue its pleaded argument that Millenia had breached an implied term of the 2007 Appointment Letter, thereby causing Dragages, Builders Shop and the Meinhardt Parties to commence third party proceedings against Arup (see [181] above).

641 Rather, Arup only pursues its counterclaim for an indemnity from Millenia based on cl 2(a) of the 2007 Appointment Letter. Clause 2 states:[873]

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872 Builders Shop's closing submissions at para 207.

873 73AB 58073, 58074.

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> **2. Indemnity**
>
> [Millenia] indemnifies [Arup] against *all claims, losses, actions, damages, costs (including **legal costs**) and expenses (losses) of any kind whatsoever that the Consultant incurs arising out of*:
>
> (a) *The performance of works by Dragages or [its] related entities in connection with [the Rectification Works]*, ***including any cross-claim made by either of these parties against the Consultant in connection with the project***
>
> (b) any losses [Millenia] or [Millenia's] related corporate entities or subsidiaries suffer or incur in connection with the project (including delay costs), *except to the extent the loss is a direct result of the Consultant's negligence* (subject to the limitation of liability clause).
>
> [emphasis added in italics and bold italics]

Arup submits that on a plain reading of cl 2, Millenia agreed to indemnify Arup against claims brought Dragages or its related entities against Arup in relation to the Rectification Works.[874] Arup explains that, although cl 5 of the Settlement Agreement provided that Arup would not assume liability to Dragages, Builders Shop or Meinhardt, it could not enforce this clause against these parties, because it was not a party to the Settlement Agreement and cl 32 of the Settlement Agreement prevented non-parties to the Settlement Agreement from enforcing rights under the same. Arup thus sought to protect its interests by securing an indemnity from Millenia on the terms of cl 2 of the 2007 Appointment Letter.[875]

642 In reply, Millenia submits as follows:[876]

(a) First, cl 2(a) does not apply: cl 2(b) is the applicable provision as the third party claims against Arup arise out of the 2nd Fall or other damage to the Façade, which are losses suffered by Millenia.

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874 Arup's closing submissions at para 362.

875 Arup's closing submissions at paras 368–370.

876 Millenia's reply closing submissions at paras 533–538.

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(b) Secondly, cl 2 is unreasonable under the UCTA and is therefore unenforceable.

(c) Thirdly, insofar as Arup seeks an indemnity for its legal costs, Arup should look to Dragages, Builders Shop and the Meinhardt Parties for these costs and not to Millenia: Millenia will "address the question of apportionment of costs at the appropriate juncture".

643 I do not accept Millenia's submissions for the following reasons:

(a) First, I do not agree that cl 2(b) of the 2007 Appointment Letter is the applicable provision. Clause 2(b) concerns losses suffered by Millenia and its related entities: it covers claims against Arup brought by *Millenia* and its related entities. Clause 2(b) does not extend to claims brought by *Dragages or its related entities* for *their* losses. I agree with Arup that such claims fall within the scope of cl 2(a) of the 2007 Appointment Letter.

(b) Secondly, I find that cl 2 is not unreasonable under the UCTA. As I have emphasized above, Millenia was not in a position of unequal bargaining power, was a legally-advised commercial entity, and the 2007 Appointment Letter stipulated a relatively low fixed fee of $40,000 (see [632] and [635] above). Moreover, I accept Arup's account of the purpose of the indemnity (see [641] above): in the circumstances, it made sense for Arup to seek and for Millenia to grant such an indemnity.

644 I therefore allow Arup's counterclaim for an indemnity from Millenia in respect of the claims brought by Dragages, Builders Shop and the Meinhardt Parties against Arup relating to the Rectification Works. For the reasons given below, I dismiss all of the third party claims against Arup. Accordingly, the

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indemnity only extends to the legal costs incurred by Arup in defending the third party proceedings. More precisely, the indemnity only covers Arup's legal costs in defending the third party claims relating to the Rectification Works: it thus does not cover, *eg*, Dragages' claims noted at [647(a)]–[647(b)] below which pertain to Arup's alleged breach of duties predating the Settlement Agreement.

The third party claims against Arup

645 I address the claims advanced against Arup by Dragages, Builders Shop and the Meinhardt Parties in turn.

Dragages' claims

646 Dragages claims a contribution from Arup. In gist, Dragages submits that Arup breached its duties to Millenia and is thus liable to Millenia for (some of) the same damage in respect of which Dragages is liable to Millenia.[877]

647 As I have noted (see [187] above), Dragages' pleaded case is that Arup breached its duties to Millenia by:

(a) failing to undertake and/or advise Millenia to undertake proper maintenance of the Building;

(b) failing to implement and/or advise Millenia to implement proper safety and/or risk management measures in respect of adverse effects to the Building; and

(c) negligently accepting the Rectification Works as satisfactory and in accordance with the Settlement Agreement.

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877 Dragages' closing submissions at para 1108.

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648 I turn first to the allegations noted in [647(a)]–[647(b)] above. In closing submissions, Dragages rightly does not maintain that Arup breached its duties by failing to undertake maintenance of the Building and by failing to implement safety and/or risk management measures by itself. Dragages submits that Arup breached its duties by failing to *advise* Millenia to undertake maintenance and implement safety and/or risk management measures.[878] Millenia has made an identical submission (see [590(c)] above), which I have rejected at [599]–[604] above. For the reasons given above, I reject Dragages' submission.

649 Again, the allegation noted in [647(c)] above is identical to a submission made by Millenia (see [606(a)] above), which I have rejected at [607] above. For the same reasons given above, I reject Dragages' submission here.

650 I therefore dismiss Dragages' third party claims against Arup.

Builders Shop's claims

651 As Arup notes, in Builders Shop's closing submissions, the latter does not maintain that Arup breached its duties in contract or tort to Millenia.[879] It thus seems that Builders Shop has abandoned these claims against Arup. Nonetheless, Builders Shop adopted Dragages' case against Arup (see [188] above). Since I have rejected Dragages' third party claims against Arup, the equivalent claims which were pleaded by Builders Shop also fall away.

652 Builders Shop claims that "Arup owed a tortious duty of care to Builders Shop in relation to the manner in which it carried out its duties and obligations under the Settlement Agreement", and breached this duty as follows:[880]

878 Dragages' closing submissions at paras 1118 and 1122.

879 Arup's reply closing submissions at paras 172–173.

880 Builders Shop's closing submissions at paras 213–215 and 224.

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(a) by failing to inform and alert Builders Shop that:

(i) the Rectification Works had not been carried out in accordance with the Settlement Agreement;

(ii) there were outstanding inadequacies or defects in the Façade and the location(s), nature and extent of these defects;

(iii) the Façade or a substantial part of it was structurally unsafe and in need of rectification/replacement;

(iv) the Stitching Procedure, apart from being a breach of the Rectification Works Method Statement, raised safety concerns.

(b) by failing to instruct Builders Shop to carry out further remedial works;

(c) by representing to Builders Shop that:

(i) the Rectification Works were carried out in accordance with the Settlement Agreement, by issuing written confirmation to this effect; and

(ii) the general quality and workmanship of the Rectification Works was acceptable, in the 1st 2010 Report (see [136] above).

653 I do not accept this submission. First, I do not accept that Arup owed a duty of care to Builders Shop, in relation to Arup's performance of its duties under the Settlement Agreement, for the following reasons:

(a) I find that there was insufficient proximity between the parties. There was no physical, circumstantial or causal proximity between Arup

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and Builders Shop. Moreover, there is scant evidence that Builders Shop relied on Arup to exercise reasonable care in carrying out its works and that Arup knew of such reliance (see [522] above). I find that only one party to this suit – Millenia, the owner of the Building – relied on Arup to take care in carrying out its works. Furthermore, I find that Arup did not voluntarily assume responsibility to Builders Shop. In this regard, I note the cover page of Arup's 1st 2010 Report specifically disclaimed any responsibility on Arup's part to third parties (see [135] above).

(b) Further, I find that policy considerations negate a duty of care: it would be inconsistent with the Settlement Agreement to recognise that Arup owed a duty of care to Builders Shop. Significantly, cl 5 of the Settlement Agreement expressly stated that Arup would not assume any liability to, among others, Builders Shop in respect of its comments on, among other things, the Rectification Works Method Statement and *its implementation*, *ie*, the Rectification Works (see [80(a)] above). I find on this basis that the parties to the Settlement Agreement, including Builders Shop, entered into that agreement intending to exclude Arup's liability in tort to Builders Shop (see [541] above). Hence, even if there were sufficient proximity between Arup and Builders Shop to ground a duty of care, I would have held that no duty of care arose because such a duty would be inconsistent with the parties' contractual arrangements.

654 Secondly, even if Arup owed a duty of care to Builders Shop, I find that Arup did not breach its duty. This is principally because, as I have found, Arup did not issue written confirmation that the Rectification Works were carried out in accordance with the Settlement Agreement (see [149] above). Arup therefore never represented to Builders Shop that the Rectification Works complied with

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the Settlement Agreement. I also do not accept that Arup would have breached its duty of care by not highlighting the inadequacies of Builders Shop's works to the latter (see [652(a)] above). Nor would Arup have breached its duty of care by not instructing Builders Shop to carry out further works (see [652(b)] above): Arup was not in a position to issue such an instruction to Builders Shop.

655 I therefore dismiss Builders Shop's third party claims against Arup.

The Meinhardt Parties' claims

656 I have dismissed Millenia's claims against the Meinhardt Parties (see [514] and [577] above). Hence, the Meinhardt Parties' claims for an indemnity or a contribution from Arup, which are premised on their being held liable to Millenia (see [189] above), do not arise. For completeness, if I had found that the Meinhardt Parties were liable to Millenia, I would have dismissed their third party claims against Arup. For reasons similar to those given above, I do not accept the allegations of breach which they pleaded against Arup (see [189(a)] above). Tellingly, the Meinhardt Parties only referred very briefly to their third party claims in closing submissions.[881]

Conclusion

657 In conclusion, I dismiss all of the third party claims against Arup. I now turn to the Reclad Issue.

The Reclad Issue

658 As noted above, although this trial was bifurcated, the parties agreed that I would decide one issue relating to quantum – whether Millenia is entitled to

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[881] Meinhardt Façade's closing submissions at paras 588–590.

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recover the cost of a reclad of the Façade – at this stage of the proceedings (see [6] above). It is important to be clear about the issue that is before me:

(a) First, the Reclad Issue is not about whether the proper measure of damages is the cost of cure or the diminution in value of the property. The defendants do not deny that the proper measure of damages is the cost of cure. The dispute is over two methods of curing the defects: (1) a reclad of the whole Façade ("the Reclad Option") or (2) rectifying the defects without recladding the whole Façade ("the Rectification Option"). The latter option is cast in broad terms because, as I explain below, the parties do not agree on what it would involve.

(b) Secondly, I am *not* deciding whether Millenia is entitled to the actual costs of *the* Reclad. It may be that the Reclad was excessively expensive and elaborate, as Mr Ho suggested in oral submissions,[882] but that matter is not yet before me. The issue which I have to decide is whether Millenia is entitled to recover the costs of *a reclad* of the Façade

659 I turn first to the evidence of the parties' quantum experts.

The evidence of the quantum experts

660 The central issue addressed by the quantum experts was the question of whether the Rectification Option would be less costly than the Reclad Option. It is important to note at the outset that the evidence on this point was limited in utility. Importantly, there was no agreement on the remedial methods that the Rectification Option would involve. This was principally because there was no agreement on the nature and extent of the defects and the remedial method(s)

882 Transcript, 23 February 2017, p 89.

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that would appropriately rectify those defects. It was therefore difficult to identify what the Rectification Option would entail (though I note that Dragages suggested that all of the defects could be rectified by inserting four dead load rods into each panel: I address this at [684] below). In this regard, I note that the experts priced 10 schemes (excluding a full reclad of the Façade),[883] and there was a wide gulf between the least costly scheme ($127,980.99) and the most expensive one ($21,417,000.00).[884] This very large range shows the extent of the problem.

661 In the light of these difficulties, and the time that would be necessary to resolve them, along with the fact that the trial was bifurcated, it was decided, with counsel's agreement, that we would not delve into the minutiae relating to the costs of the Reclad and Rectification Options in this tranche of the trial. I reminded counsel of this and made this clear to the quantum experts at the start of the witness conferencing.[885] During the witness conferencing, the focus was instead on the "tipping point" (if any), based on the Defects, where the Reclad Option would become cheaper than the Rectification Option.

662 Mr Winston Hauw Sze Shiung ("Mr Hauw"), Millenia's expert, said that the tipping point would be crossed if 50%–60% of the Façade were defective. In other words, if 50%–60% of the Façade were defective, it would be more economical for the Reclad Option to be adopted rather than the Rectification Option. His opinion was based on the following premises:[886]

(a) The Reclad Option would cost $20,324,000.

883 Transcript, 8 August 2016, p 46.

884 Vol 11 BAEIC, AEIC of Winston Hauw Sze Shiung dated 3 March 2014 at WHSS-2, para 12; AEIC of Martin Anthony Riddett dated 16 April 2014 at MAR-2 (p 25).

885 Transcript, 8 August 2016, pp 3–4.

886 Transcript, 8 August 2016, pp 75–79.

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(b) It would cost $21,417,000 to rectify 75% of the Façade (12,272 panels in total).[887] (Mr Hauw assessed two variants of the Rectification Option. The first involved replacing all of the defective panels on the Façade ("Option 2"). In assessing the cost of Option 2, Mr Hauw relied on Mr Yang's initial option that 75% of the Cladding was defective and priced the cost of replacing 75% of the panels. The second option involved selective removal and repair of panels ("Option 3"), which Mr Hauw assessed would cost $21,417,000. Mr Hauw relied on Option 3 in reaching his opinion that it would be more economical for the Reclad Option to be adopted rather than the Rectification Option. As noted at [660] above, this was the most expensive scheme priced by the experts.)

(c) Based on [(a)] and [(b)], on a "straight line" calculation, about 71% of the Façade could be rectified for the sum of $20,324,000.

(d) However, it was necessary to discount this figure of 71% by 10%–20% to account for six extraneous factors: (1) further deterioration of the Façade since Mr Hauw prepared his report; (2) possible breakage to non-defective stone panels in removing some defective panels; (3) tonality inconsistency (*ie*, differences in colour and texture of panels); (4) costs that Millenia would incur in carrying out rectification works such as business disruption and lower rentals; (5) the fact that certain costs were fixed costs and could not be apportioned on a straight line basis; and (6) the costs of further inspecting the Façade to identify all of the defective methods and decide on appropriate remedial methods.

663 Factor (2) was also mentioned in a letter from Benson Wall Systems Pte Ltd ("Benson"), a well-established façade contractor,[888] to Mr Hauw's firm. Mr

887 Vol 11 BAEIC, AEIC of Winston Hauw Sze Shiung dated 3 March 2014 at WHSS-2, para 33.

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Hauw obtained a quotation from Benson for the costs of Options 1 to 3. The quotation was accompanied by a letter dated 20 November 2013 which states:[889]

> Even though each option under consideration has been considered and budgeted, ***we discourage the Client from pursuing Option Three – "Selective removal and repair".*** *We are of the strong opinion that any removal or handling of the existing granite panels will result in additional damage if selected for re-use.* ***Adjacent panels not under consideration will undoubtedly be affected during removal as well***. There may be no effective way to anticipate the actual costs and final appearance of the finished façade. We suggest a "time & material" contract be considered if this option becomes serious.
>
> [emphasis added in italics and bold italics]

Benson thus noted the risk that selective removal of certain panels would cause damage to adjacent panels. Further, in its letter, Benson discouraged Millenia from pursuing selective removal and repair of the Cladding.

664 The evidence of the defendants' experts on the tipping point was as follows:

(a) Mr Martin Anthony Riddett ("Mr Riddett"), the expert appointed by Dragages and the Meinhardt Parties, testified that there were "many imponderables and that is going to affect the tipping point".[890] However, he testified that the tipping point would be reached if the Rectification Option required replacing 75% of the panels on the Cladding, *ie*, Option 2 assessed by Mr Hauw (see [662(b)] above); albeit in arriving at this view, he did not account for the extraneous factors raised by Mr Hauw.[891]

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888 Transcript, 8 August 2016, p 48.

889 104AB 82679–82680.

890 Transcript, 8 August 2016, p 80.

891 Transcript, 8 August 2016, p 89.

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(b) Mr John Foster ("Mr Foster"), Builders Shop's expert, opined that the tipping point would never be reached: the Reclad Option would always be more expensive than the Rectification Option.[892]

(c) Mr Jonathan Prudhoe ("Mr Prudhoe"), Arup's expert, testified that whatever the Rectification Option entailed, the tipping point would probably be reached if about 85%–90% of the Cladding was defective.[893]

665 I note that the defendants' experts criticised the quantities and rates that Mr Hauw used in arriving at his cost estimates. But leaving that aside, even on Mr Hauw's evidence, the tipping point would only be reached if about 50%–60% of the Façade was defective. Mr Yang's final view was that about 68% of the panels from levels 3 to 35 of the Building – 9,642 panels, *ie*, around 59% of 16,277 panels (see [213] above) were defective. However, this was based on his opinion that the 100% Inspection Reports showed that 66% of the panels from levels 3 to 35 of the Building were defective. That 66% figure in turn was based in part on the pink panels in the 66% Spreadsheets, *ie*, the panels Arup did not observe had certain alleged defects but which Mr Yang did (see [215] above). I have decided that I will not have regard to the pink panels (see [217] above). There were 4,878 such panels. Taking the pink panels out of account (deducting 4,878 panels from the 9,642 panels that Mr Yang assessed to be defective) there is only evidence that 4,764 panels on the Building, *ie*, about 29.3% of the 16,277 panels on the Building, were defective. This is far less than the 50%–60% figure that Mr Hauw posited as the tipping point. Hence, even on Mr Hauw's position, which compared the Reclad Option with the most expensive remedial scheme considered by the quantum experts (see [662(b)] above), the Rectification

892 Transcript, 8 August 2016, p 87.

893 Transcript, 8 August 2016, pp 71 and 82–84.

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Option would be cheaper than the Reclad Option, but by what margin is a large and open question. I return to this issue at [690] below.

666 As noted at [661] above, the parties agreed that we would not delve into the minutiae of the costs of the Rectification and Reclad Options. Nonetheless, I note that the evidence on the cost of the Reclad Option was as follows:

(a) Mr Hauw's evidence was that the Reclad Option would cost about $20,324,000 (see [662(a)] above).

(b) Mr Prudhoe's evidence was that it would cost $17,694,600.[894]

(c) Mr Foster's evidence was that it would cost $12,283,790.[895]

The evidence was thus that the Reclad Option would cost between around $12.3m and $20.3m. Again, this very large difference shows the extent of the problem.

The parties' submissions

667 Millenia submits that it is entitled to recover the cost of the Reclad Option for the following reasons:

(a) First, Millenia emphasises that it has in fact reclad the Façade, upon being pressed by the BCA for a long-term solution to the dangers posed by the Façade, and the reasonableness of its claim for the cost of the Reclad Option must be viewed through this lens. Further, Arup, an independent expert, recommended that Millenia perform a full reclad of the Façade and Millenia proceeded to reclad the Façade on the basis.[896]

894 AEIC of Jonathan Prudhoe dated 1 September 2015 at JP-4, para 2.1 (p 94).

895 AEIC of John Foster dated 14 April 2014 at JF-2, para 5.15 (p 40).

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(b) Secondly, rectification was attempted before. However, it failed to provide Millenia with a Building that was safe and fit for purpose.[897]

(c) Thirdly, the evidence indicates that it was not possible to rectify all the defects in the Cladding, because:[898]

(i) it was impossible to identify all the defects in the bracket systems without removing the panels from the Façade; and

(ii) there was no clear consensus on the cause of the defects, and thus no agreement on the appropriate remedial solutions.

In this regard, Millenia denies it was possible to make the Façade safe by inserting four dead load rods into each panel (see [668(b)] below).[899]

(d) Fourthly, the Reclad Option is more economical than the Rectification Option.[900]

668 Dragages makes the following submissions:

(a) First, the Façade was not entirely defective or structurally unsafe and thus a full reclad of the Façade was not a reasonable course of action. In this regard, Dragages emphasises the following points:[901]

(i) *The BCA's opinion:* The BCA did not consider that a full reclad was necessary: Dragages claims an email from the BCA

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896 Millenia's closing submissions at paras 884–888; Millenia's reply submissions at para 542.

897 Millenia's closing submissions at paras 889–891.

898 Millenia's closing submissions at paras 892–898.

899 Millenia's reply submissions at paras 549–554.

900 Millenia's closing submissions at paras 906–924.

901 Dragages' reply submissions at paras 760–762 and 852–857.

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dated 19 October 2012 shows that the BCA "was considering a timeline for the long term rectification of the [Façade]".[902]

(ii) *Arup's opinion*: First, in the 4 December 2012 Draft, Arup stated that the Façade was safe. Secondly, in his AEIC, Mr Chin stated that a reclad of the entire Façade was not warranted. Thirdly, although Arup recommended a reclad in the 8 August 2012 Letter, this was simply a "commercial proposal instead of a technical recommendation".

(iii) *Mr Yang's opinion*: Mr Yang's view that the Façade had to be replaced was arrived at without inspecting the Façade, and without a comprehensive review of the photographs in the 100% Inspection Reports.

(b) Secondly, even if the Façade was entirely defective and unsafe, it could be fully rectified and made safe with four dead load rods, and the cost of such rectification would be $6,473,879, which would be much less than the cost of the Reclad Option. There is thus no reasonable basis to find Dragages liable for the Reclad Option.[903] More generally, regardless of which rectification method was adopted, the Reclad Option would be more expensive than the Rectification Option.[904]

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902 102AB 81429.

903 Dragages' closing submissions at paras 1057–1060 and 1064–1069.

904 Dragages' closing submissions at paras 1070–1072 and 1093.

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My decision

The law

669 It is undisputed that the test to be applied in deciding whether Millenia is entitled to recover the cost of the Reclad Option is that of reasonableness. In *Ng Siok Poh (administratrix of the estate of Lim Lian Chiat, deceased) and another v Sim Lian-Koru Bena JV Pte Ltd* [2018] SGCA 35, the Court of Appeal held at [35] that the "governing principle" in determining the suitable measure of damages is the principle of objective reasonableness. In applying this principle, I had regard to two cases – the first cited by Dragages and the second by Millenia – that discussed whether the appropriate remedy was replacement of the defective work or less extensive rectification.

670 In the first case, *McGlinn v Waltham Contractors Ltd and others (No 3)* [2007] EWHC 149 (TCC) ("*McGlinn*"), the claimant brought an action in respect of alleged defects in the design and construction of a house in Jersey. After the house was inspected by experts, it was demolished on the instructions of the claimant and not rebuilt. The claimant then sued the defendants for breach of contract and/or negligence. An issue arose as to whether the claimant was entitled to recover the cost of demolishing and rebuilding the house, or merely the lower (and largely agreed) costs of the necessary works to repair the defects.

671 The court held that the claimant was not entitled to recover the cost of demolishing and rebuilding the house, but could only recover the cost of repair works: see *McGlinn* at [845]. In doing so, the court recognised at [827] that reliance on expert advice was relevant to the question of whether the claimant had acted reasonably in putting into effect a particular remedial scheme:

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> Now let us assume that I am wrong to distinguish the *Great Ormond Street* case … It might well be said that [the] decision is authority for the relatively narrow proposition that, *if two remedial schemes are proposed to rectify a defect which is the result of a defendant's default, and one scheme is put in hand on expert advice, the defendant is liable for the costs of that built scheme, unless it could be said that the expert advice was negligent*. For what it is worth, I consider that, *subject to one potentially vital qualification, set out below,* ***this narrow proposition is generally in accordance with other authority and correct in law***. … The important qualification that needs to be made is … to this effect: ***although reliance on an expert will always be a highly significant factor in any assessment of loss and damage, it will not on its own be enough, in every case, to prove that the claimant has acted reasonably***. Moreover, in *Skandia*, Waller LJ made clear [at 344] that *to put in issue the reasonableness of a decision based on expert advice 'does not require proof of conduct amounting to professional negligence or something of that sort'. That seems to me, with respect, to be entirely right* … [original emphasis omitted; emphasis added in italics and bold italics]

In sum, the court recognised that reliance on expert advice will often be "highly significant" in establishing that a claimant has acted reasonably in putting into effect a remedial scheme, albeit (1) such advice will not be sufficient in every case to establish reasonableness and (2) it is not necessary to prove professional negligence by the expert in putting into issue the reasonableness of the decision. I agree with and endorse this proposition.

672 The court then held at [841], applying the test of reasonableness, that the measure of loss was the cost of repair works, noting the following points:

(a) *The reason for the demolition*: First, the demolition of the house was not carried out *solely* due to the defects, but was in part due to the claimant's dissatisfaction with the house. The "starting position" for the claimant was that the house should be demolished; it was unsurprising that those advising the claimant "came down against piecemeal repairs and in favour of 'a full replacement'": *McGlinn* at [809]–[812].

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(b) *The nature of the defects*: Secondly, most of the alleged defects were "aesthetic" and "unconnected with the structural soundness of the building itself": *McGlinn* at [813]. The court stated at [814] as follows:

> In my judgment, this is a very important feature of this case. *It is, on any view an extreme course: to knock down a* ***newly completed*** *building because it is said to be defective, particularly where* ***the majority of the defects can fairly be described as aesthetic matters only***. … If such a course of action is to be justified at all, ***it will ordinarily be because the building is dangerous or structurally unsound***. … I consider that [the house] was demolished because of what might be described as *ordinary building defects*, many of which are *entirely explicable on the simple basis that, as Mr Salisbury put it, 'the building was not finished'.* [emphasis added in italics and bold italics]

(c) *The nature of advice*: The court noted that the advice to the claimant to demolish the house assumed "a relatively modest differential between the costs of demolition and rebuilding … and the cost of repair": the costs of the former were only slightly more than the costs of the latter. However, it transpired at trial that the differential was far greater than forecasted and in excess of £1m: *McGlinn* at [817]–[818]. In other words, the advice was made on erroneous assumptions.

(d) *The absence of reinstatement*: The claimant had not rebuilt the house nearly two years after the demolition works: *McGlinn* at [823].

673 In the second case, *Linklaters Business Services v Sir Robert McAlpine Ltd and another (No 2)* [2010] EWHC 2931 (TCC) ("*Linklaters*"), the claimant lessee of a building discovered extensive corrosion in the insulated chilled water pipework of the building after noticing a leak. On advice, the claimant replaced the pipework and then sued the main contractors, subcontractors and sub-subcontractors for the cost of replacing the pipework. One issue at trial was

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whether the claimant was entitled to recover the cost of replacing the pipework, or only the cost of replacing the insulation: see *Linklaters* at [133].

674 Akenhead J held at [145] that the claimant's decision to replace the pipework was "not only … a wholly reasonable one but … probably the right and necessary one", noting, *inter alia*, the following points:

(a) First, replacement of the pipework "*undoubtedly remedied* the problems of extensive defects in the insulation and extensive corrosion in the pipework. *It had the advantage of certainty*". It avoided the risk that further leaks would occur if the pipes were left in place, and the difficulty of removing all the corrosion: *Linklaters* at [145(a)]–[145(c)].

(b) Secondly, the claimant was advised by "bona fide experienced experts who … advised unequivocally that replacement was required"; the claimant had no reason to ignore this advice: *Linklaters* at [145(f)].

Application of the law

675 For the following reasons, I find that it was reasonable for Millenia to reclad the Façade, and that Millenia is accordingly entitled to recover the cost of the Reclad Option from Dragages and Builders Shop.

676 First and foremost, it is of critical importance that *rectification of the defects had already been attempted and had substantially failed to ensure the Building was safe and fit for its purpose.* The pertinent facts are as follows:

(a) In 2004, *seven years* after the practical completion of a building whose design life was *50 years*, a stone panel weighing more than 100kg fell off the Façade, landing near a bus stop.

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(b) Inspections of the Façade were then carried out and it was discovered that there were many defects on the Cladding.

(c) After disputes arose between the parties, they entered into the Settlement Agreement with the aim of rectifying the defects. It must be emphasised that the Settlement Agreement did not simply provide for defects to be rectified. *It set out a detailed and structured program for rectification* that was to be overseen by *two of the largest facade consultants in Singapore*, Arup and Meinhardt (see [13] above). *It is clear that the remedial scheme was devised to unfailingly guarantee the safety of the Façade for the rest of its design life*:

(i) The defects were first to be identified, not by Dragages and Builders Shop, but by Meinhardt, an independent expert.

(ii) The defects were then to be rectified by the application of rectification methods accepted by *both* Meinhardt and Arup. Clause 12 of the Settlement Agreement expressly provided that Dragages and Builders Shop would *ensure* that the Rectification Works were "of a *permanent* nature" (see [82] above).

(iii) The Settlement Agreement then required Meinhardt to inspect the Cladding, and for Arup to (be entitled to) inspect the Cladding thereafter. Both façade consultants were to provide written confirmation that the Rectification Works complied with the stringent requirements of the Settlement Agreement.

(d) Yet this well-laid plan for the rectification of the defects simply did not succeed. Instead, *less than a year* after Meinhardt Façade issued the 20 July 2010 Certificate confirming that the Rectification Works were carried out in accordance with the Settlement Agreement, the 2nd

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Fall occurred. *Significant property damage was caused and two passers-by were injured*. The situation was so serious that the BCA observed that it "may direct *a closure of the building*" (see [151] above). Plainly, such a result would have been a calamity for the owner of the Building.

(e) The Façade was subsequently re-inspected by Arup and, in the course of the 100% Inspection, Arup found ***630*** panels *at risk of falling in the near future* (see [225(b)] above). Arup also found many defects on the Cladding (which had not been adequately rectified). This was the state of affairs 15 years after completion, with *35 years left in the design life of the Building*.

677 In sum, a detailed program for the rectification of the defects, overseen by two of the largest façade consultants in Singapore, substantially failed to ensure the safety of the Façade. The BCA told Millenia that it might order a closure of the Building. It is clear that there was an issue of public safety. The Building is in an area through which flows a not insignificant volume of human traffic. This includes the National Day parades held at Marina Bay. In those circumstances, in my judgment, even without Arup's advice (see [678] below), it was reasonable for Millenia to conclude that rectification had been tried and found wanting, and the only way forward, to secure the safety of the Building, was a reclad of the entire Façade. The fall of one more panel a few years down the line would have had disastrous consequences for Millenia. There would also have been the spectre of non-recourse due to limitation periods. Extending the limitation period by a deed of warranty would have also added to the cost.

678 Secondly, in the 8 August 2012 Letter, Arup recommended that Millenia reclad the Façade. I do not accept Dragages' submission that this was simply a "commercial proposal" (see [668(a)(ii)] above). Arup's letter contained clear

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advice to reclad the Facade for reasons of safety, speed and aesthetics (see [156] above). In addition, and importantly, Dragages and Builders Shop did not challenge Arup's advice in the 8 August 2012 Letter. There was therefore little basis for me to find that the advice was wrong or unreasonable, and that Millenia acted unreasonably in adopting the advice. The present facts are accordingly distinguishable from those in *McGlinn*, where the advice was premised on assumptions that were shown to be erroneous at trial (see [672(c)] above).

679 I have found that Millenia relied on Arup's advice in deciding to reclad the Façade (see [158] above). As noted above, reliance on expert advice is often "highly significant" in proving that a claimant acted reasonably in carrying out a remedial scheme (see [671] above). In my judgment, the fact that Millenia relied on Arup's advice in deciding to reclad the Façade significantly fortifies the conclusion that it acted reasonably in doing so.

680 Thirdly, and very importantly, subject to my discussion below of the use of dead load rods to rectify the Cladding, *I do not accept the Façade could have been made safe without a reclad.* It is clear from the evidence that ***there was a mosaic of different defects distributed across the Façade***. I do not accept that all of these defects could have been properly rectified for the following reasons.

681 First, the defects could only have been rectified if they were identified to begin with. Yet after reviewing the Reclad Report and the supplementary reports by the defendants' façade experts, and hearing the evidence, it is clear, and I find, that *there were defects in the Cladding that could not be identified, or were very difficult to identify, in a non-destructive inspection of the Cladding, ie, without removing the panels, even with the tedious and time-consuming use of a borescope*. I note in particular the following evidence:

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(a) First, a borescope had to be inserted in the joints between panels to enable inspection of the brackets (see [95] above). A borescope could not be used if the joint was too narrow to permit its insertion. The evidence of the façade experts was that as of February 2016, a borescope could only be inserted through a gap of no less than 3–4mm.[905] If a joint was narrower than that, a borescope could not be used to inspect the relevant bracket. When shown an example of such a joint by Mr Yang, Mr Mann and Mr Lalas agreed that it would have been very difficult for an inspector to examine the bracket behind the panel with a borescope.[906]

(b) Secondly, the façade experts gave evidence that certain defects were not observed until the Reclad. For example:

(i) Mr Yang noted that in their inspections of the Façade, Arup and Meinhardt Façade did not inspect washers behind vertical "C" channels,[907] which were part of type A brackets.[908] The Reclad Report showed that some washers were corroding.

(ii) Having reviewed the photographs in the Reclad Report, Mr Mann and Mr Keithly found 42 cases of DT3 (insufficiently or excessively embedded anchor bolts) and 53 cases of DT5 (brackets not attached perpendicular to the RC wall) that were not recorded in the 100% Inspection Reports, and opined that this discrepancy was either because the defect was hidden from view or was not considered defective.[909]

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905 Transcript, 29 February 2016, p 41.

906 Transcript, 29 February 2016, pp 35–46.

907 AEIC of Yang Li dated 1 October 2015 at LY-03 (p 43).

908 AEIC of James Phillip Mann and Hugh Keithly dated 20 January 2016 at para 9.1 (p 12).

909 Transcript, 2 March 2016, p 24 and pp 121–122.

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> This meant that the number of defective panels or fixings was not static and would have, in all likelihood, increased.

682 Secondly, even if all the defects had been identified, I do not accept that a rectification program akin to the Rectification Works, which employed a wide variety of remedial methods – corrosion inhibitors, twisted rods, dead load rods, dead load plates, *etc* – to address the different defects would have made the Façade safe. While *in theory* such a program may have succeeded, it would have been a very complex and involved enterprise given the number and variety of defects and remedial methods. Bearing in mind workmanship issues by façade contractors and the need for close supervision at every stage by an experienced façade engineer, I do not accept that such a rectification program would have made this Façade safe given the state that it was in in 2014.

683 Nevertheless, Dragages advances a submission that, on first sight, would address both of the aforementioned points. Dragages submits that the entire Façade could be made safe by inserting four dead load rods into every panel on the Cladding (see [668(b)] above). Dragages relies on the evidence of Mr Lalas, Mr Keithly and Mr Hartog that four dead load rods could have taken up the dead load and wind load acting on each panel, rendering the brackets, as Mr Hartog put it, "wholly redundant".[910]

684 I accept the evidence of Mr Lalas, Mr Keithly and Mr Hartog that four dead load rods could have taken up the dead load and wind load acting on each panel. Yet I do not accept that this would have sufficed to make the Façade safe. I find that such a remedial method would not have addressed the safety risk posed by panels with multiple cracks, where the issue was not simply that the bracket systems could not bear the loads acting on the panels but that the panels

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910 Transcript, 3 March 2016, pp 88–92.

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were in danger of splitting and falling off the Façade. Importantly, Mr Lalas, Dragages' own expert, accepted that there were *about* 160 panels that could not be rectified but had to be replaced (see [225(c)] above). These were panels with multiple cracks which were in danger of breaking and falling off the Façade.[911] I find that dead load rods would not have addressed *this* particular safety risk. I would add that Mr Lalas chose *not* to give me a specific number of panels that had to be replaced. In my view, having gone through the evidence and the photographs, and having heard the disagreements amongst the experts, there were likely to be more panels with cracks that could only be confidently assessed with full access to the back of the panels as well as their fixings.

685 This raises the question, however, of whether the use of dead load rods *combined* with the replacement of panels with multiple cracks would have made the Façade safe. On the evidence, I accept that, in *theory*, if carried out *properly*, it could probably have done so. However, there are two important points:

(a) First, Dragages and Builders Shop do not contend, and there is no evidence, that Millenia was informed of such a rectification method before it made the decision to reclad the Façade:

(i) There is no evidence that Arup informed Millenia of such a rectification scheme: on the contrary, it recommended a reclad of the Façade (see [156] and [678] above). As noted at [678] above, the advice in the 8 August 2012 Letter was not challenged on the basis that it was wrong or unreasonable.

(ii) Further, Dragages and Builders Shop did not suggest this remedial scheme to Millenia before Millenia decided to reclad

911 Vol 16 BAEIC, AEIC of Firouzeh Maniquis and Peter Lalas dated 15 January 2014 at FP-1, para 578 (p 112).

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> the Façade. The possibility that the defects could be rectified by inserting four dead load rods into each panel was first raised on *3 March 2016*, during the witness conferencing of the façade experts when Mr Lalas, Mr Keithly and Mr Hartog gave the evidence noted at [683] above. *The Reclad had commenced months earlier on 22 May 2015* (see [168] above).

This is vital because, in my view, the reasonableness of the decision to reclad the Façade must be assessed *at the time at which the decision was made*: I accept Mr Singh's submission in this regard.[912] Since Millenia was unaware of this possible means of rectifying the defects when it decided to reclad the Façade, that decision cannot be found unreasonable on the basis that this remedial scheme should have been adopted.

(b) Secondly, this remedial scheme would have involved removing some panels, giving rise to the risk that other non-defective panels would be damaged in the process. This risk was noted by Benson, who was of the "strong opinion" that such damage would be caused, and therefore did not recommend the selective removal and repair of panels (see [663] above). I would emphasise that Benson is a well-established façade contractor. Notwithstanding its expertise, Benson considered that damage to panels adjacent to those to be replaced could not be avoided. I accordingly find that if a remedial scheme involving dead load rods and replacement of some panels had been adopted, further damage to the Cladding would have been caused in the process. That damage would have had to be assessed and rectified if necessary, giving rise to further costs and leaving a remaining risk that some safety risks due to that damage were not addressed.

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912 Transcript, 23 February 2017, p 6.

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686 For these reasons, I have serious reservations over whether any method of rectifying the defects short of a full reclad would have ensured the safety of the Façade. In my view, this is critical. The risk of one more panel falling off the Facade was simply not acceptable. These were panels of significant size and weight. If a panel or even a piece of it had fallen off the Façade and struck a passer-by, death or very serious injury would almost certainly have followed. If, as I have concluded, the risk of another panel falling off the Façade could not have been eliminated without a reclad, then a reclad, in my judgment, was not only reasonable but the only justifiable course. I have already referred to the location of the Building and the human traffic around it at [677] above.

687 The aforementioned three points indicate that a reclad was necessary to ensure the safety of the Façade. I note, however, that Dragages suggests that the BCA and Arup did not consider that a reclad was necessary (see [668(a)(i)] and [668(a)(ii)] above). I do not accept this submission for the following reasons:

(a) *The BCA's opinion*: I do not accept that the email relied on by Dragages advances its case. The email states:[913]

> **Permanent Rectification Works**
>
> Once the 100% panel inspection is about completed, we will require the PE to recommend the permanent rectification works for those panels which are temporarily restrained (If I remember correctly during our earlier discussion, these panels will be replaced with BCA ST approval). The PE will also be required to comment and recommend whether panels under long term rectification will be replaced or not. …

In my view, it cannot safely be inferred from this that the BCA took the view that a reclad of the Façade was not necessary. The BCA did not express a view on the matter either way.

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913 102AB 81429.

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(b) *Arup's opinion*: In my view, Arup's opinion on the necessity of a reclad of the Façade was clearly stated in the 8 August 2012 Letter: as I have noted, I do not accept that the letter was merely a "commercial proposal" (see [678] above). I also do not accept that the 4 December 2012 Draft and Mr Chin's statement in his AEIC assist Dragages. First, in respect of the 4 December 2012 Draft, Arup was simply expressing the view that the Façade was safe in the short term (see [163(c)] above). Secondly, Mr Chin stated the following in his AEIC:[914]

> In my view, the safety and integrity of the façade is not in a position precarious enough to warrant a full replacement of the entire façade. *The façade should be safe for the next 5 to 7 years or so, with proper and adequate maintenance carried out by experienced personnel*. [emphasis added]

This indicates that Mr Chin's opinion was based on his view that the Façade was safe in the short term. In my judgment, however, Millenia was entitled to consider the safety of the Façade for the rest of its design life in deciding to reclad the Façade.

688 Fourthly, I have found that the Reclad Option would have cost more than the Rectification Option. However, I do not accept that it was unreasonable for Millenia to reclad the Façade despite the difference in cost for two important reasons.

689 First, although the Reclad Option would have been more costly, it would have ensured the safety of the Façade; whereas I have very serious reservations over whether the Rectification Option would have done so (see [685(b)] above).

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914 Vol 24 BAEIC, AEIC of Chin Tze Kiang dated 28 February 2014 at para 317.

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690 Secondly, it is not clear that the Rectification Option would have eventually cost substantially less than the Reclad Option. On balance, considering all the evidence before me, and doing the best that I can given the limited utility of the expert evidence, I find that the difference in cost between the Rectification Option and the Reclad Option is not so wide as to clearly fall in favour of the Rectification Option as the reasonable option to take. I have considered the following factors in arriving at this finding:

(a) The types and extent of the defects was disputed.

(b) The rectification methodology was disputed.

(c) Any supervising façade engineer and contractor tasked with rectification, knowing the extent of the disputes, differences, and stakes (given the public safety concerns and more specifically, the fact that two panels had fallen off the Façade), would have charged a significant premium to undertake rectification works (and so would their professional indemnity, construction all-risks and public liability insurers).

(d) As I have noted, Benson recommended a "time and material" contract (see [663] above). This is unsurprising. Contractors are not likely to price for a contract to perform rectification works where the extent of the defects and the rectifications required are not certain or ascertainable at the time of tender. Such cost-plus contracts are notoriously open-ended regarding the final sum to complete the works.

(e) Mr Hauw's extraneous factors (see [662(d)] above) are valid considerations and carried implications for the cost of the rectifications.

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(f) Such necessarily painstaking, investigative identification of the defects and the development of the repair methodology would have taken a considerable period of time (given the time it took Arup just to carry out a full inspection of the Façade).

(g) There would have been an undoubted effect on tenants and the level of rentals achievable during this period of rectification.

(h) The cost of the rectifications would have posed considerable challenges given the large costing differences between the experts.

(i) Finally, besides the time and costs considerations, there was a public safety element that had to be weighed in the balancing exercise.

691 For the purposes of illustration, I now discuss the remedial method emphasised by Dragages in its submissions: the insertion of dead load rods into every panel on the Cladding. Dragages claims this would have only cost $6,473,879. Dragages arrives at this figure based on Mr Riddett's evidence that it would have cost $456.55 to restrain a panel with four dead load rods and two stitch pins, including preliminaries.[915] Multiplying this figure by 14,180 – the total number of panels between levels 3 and 35 of the Building – yields the sum of $6,473,879. However, I do not accept this sum for these reasons:

(a) First, I note that Dragages did not instruct Mr Riddett to assess the cost of inserting four dead load rods on *every* panel on the Façade. Furthermore, this issue was not raised in the witness conferencing of the quantum experts. Although I indicated that we would not descend into the details, I note that Mr Ho spent more than an hour questioning Mr

915 Dragages' closing submissions at paras 1067–1068; AEIC of Martin Anthony Riddett dated 16 April 2014 at MAR-2 (p 40).

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Hauw on the methodology he used in assessing the costs of the Reclad Option and the two remedial schemes he considered.[916] But notably, Mr Ho did not ask Mr Hauw or the other experts any questions about the cost of inserting four dead load rods on every panel. There was thus no expert evidence in support of the straight line calculation that Dragages adopted in its closing submissions.

(b) Secondly, I have some reservations over the extrapolation that Dragages adopted. Among other things, it does not appear to account for the extraneous factors which Mr Hauw emphasised (see [662(d)] above). The quantum experts also agreed that if the contractor carrying out the remedial scheme was required to provide a warranty to Millenia, this would increase the price for the works.[917] It does not appear that Dragages' sum of $6,473,879 accounts for this.

692 Moreover, as noted above, inserting four dead load rods into each panel would *not* have sufficed to ensure the safety of the Façade. It would have been necessary to replace some panels, which would have added to the cost. On Mr Riddett's calculation, it would have cost $1,161.16, more than two and a half times the cost of inserting four dead load rods (and two stitch pins) into the same.[918] (To be clear, I do not accept Mr Riddett's calculation to be correct at this stage of the proceedings; I refer to it simply to make the point that the replacement of panels would have added to the cost of rectifying the Façade.)

693 Altogether, I find that the cost of rectifying the Cladding by (1) replacing some cracked panels and (2) inserting four dead load rods into every other panel

916 Transcript, 8 August 2016, pp 94–154.

917 Transcript, 8 August 2016, pp 155–162.

918 AEIC of Martin Anthony Riddett dated 16 April 2014 at MAR-2 (pp 39–40).

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would have substantially exceeded $6,473,879, although I am unable to find exactly what the cost would be on the present evidence. The evidence was that the Reclad Option would cost between around $12.3m and $20.3m (see [666] above). Having compared these likely costs, I do not accept that the Reclad Option was unreasonable just because it likely cost more than this rectification option. The cost is but one factor, albeit an important one, to be taken into consideration in weighing what is reasonable. In this case, public safety is also a very important factor. As explained above, the difference in cost is not certain and on balance, I find that difference is not so large as to be a deciding factor for rectification.

694 For all the above reasons, I find that it was reasonable for Millenia to reclad the Façade, and Millenia is accordingly entitled to recover the cost of the Reclad Option from Dragages and Builders Shop.

Conclusion

695 In conclusion, for the reasons set out above, I make the following orders:

(a) *Millenia's claims against Dragages and Builders Shop:* I allow Millenia's claims against Dragages and Builders Shop to the extent set out at [489] above. I hold that Millenia is entitled to recover the cost of the Reclad Option from Dragages and Builders Shop (see [694] above).

(b) *Millenia's claims against the Meinhardt Parties*: I dismiss Millenia's claims against the Meinhardt Parties and Arup (see [514], [577] and [636] above).

(c) *The counterclaims against Millenia*: I dismiss Builders Shop's counterclaim. However, I allow Arup's counterclaim for an indemnity

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relating to its legal costs in defending the third party claims relating to the Rectification Works (see [644] above).

(d) *The third party claims*: I dismiss all of the third party claims against Arup (see [657] above).

696 I will hear the parties on costs.

Quentin Loh
Judge

Davinder Singh SC, Zhuo Jiaxiang, Lea Woon Yee, Seah Wang Ting and Alvin Ee (Drew & Napier LLC) for the plaintiff;
Ho Chien Mien, Tan Li-Jie and Leong Ji Mun, Gregory (Allen & Gledhill LLP) for the first defendant;
Ling Daw Hoang Philip and Yap Jie Han (Wong Tan & Molly Lim LLC) for the second defendant;
Philip Jeyaretnam SC, Paul Wong Por Luk, Melvin See Hsien Huei, Charmaine Kong and Wu Wenbang, Francis (Dentons Rodyk & Davidson LLP) for the third and fourth defendants;
Tan Gim Hai Adrian, Daniel Chia Hsiung Wen, Amarjit Kaur, Thenuga d/o Vijakumar, Ker Yanguang and Kenneth Kong (Morgan Lewis Stamford LLC) for the fifth defendant and third party.

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