IN THE HIGH COURT OF THE REPUBLIC OF SINGAPORE

[1994] SGHC 155

S2289/1990

Between

Shanghai Chong Kee Furniture
& Construction Pte Ltd

… Plaintiff

And

Intraco Limited

… Defendant

GROUNDS OF DECISION

Version No 1: 29 Oct 2026 (23:45 hrs)

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Shanghai Chong Kee Furniture & Construction Pte Ltd v Intraco Limited

[1994] SGHC 155

S2289/1990
Lai Siu Chiu J
31 May 1994

1 **Judgment:**

2 Coram: Lai Siu Chiu J

3 **Cur Adv Vult**

4 JUDGMENT

5 The facts

6 The plaintiffs in this case are renovation contractors and the defendants are a public company listed on the Stock Exchange of Singapore carrying on inter alia the business of general importers and exporters.

7 In 1988 the defendants were awarded the subcontract for installation of vitreous enamel (VE) panels (at the platform and concourse areas) for MRT C405 which comprised the Bukit Batok (BBT) Bukit Gombak (BGB) and Choa Chu Kang (CCK) Mass Rapid Transit stations by the Mass Rapid Transit

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Corporation (MRTC). The completion dates for the defendants for BGB, CCK and BBT stations were July, August and September 1989 respectively. In turn the defendants invited the plaintiffs to submit a quotation to do the installation as sub-subcontractors. The plaintiffs' director Henry Lew Kum Weng (Lew) accordingly submitted a quotation (exh P1) dated 29 August 1988 (the quotation) to the defendants.

8 Before accepting the quotation the defendants asked to look at the plaintiffs' work. Lew (PW1) arranged for the defendants' representatives to see the Eunos station where the plaintiffs had installed VE panels (the panels). Being satisfied with the plaintiffs' workmanship, the defendants accepted the quotation by their fax (the fax) to the plaintiffs dated 2 September 1988 (exh P2) subject to certain terms and conditions which salient clauses I quote herewith:

9 1. The price agreed (Alternative A at $65 per sq m) includes ...all labour, material (except the VE panels proper), supervisory staff, tools and equipment (which shall also include crane or other hoisting equipment), scaffolding, galvanising, painting, silicone sealant, gaskets, brackets, bolts and nuts, protection, cleaning and other services to complete the installation of the VE panelling works and have it ready for hand-over to the < MRTC > ; 3. A copy of our contract signed with RSEA-HLS JV (without the prices) is made available to you and you are deemed fully aware of its contents. Other than the supply of VE panels to site and the preparation of workshop drawings, you are required to undertake all the obligations of Intraco under that contract and indemnify us against all claims for damages.... 4. You are to have full time competent staff available for the proper co-ordination of the works with other trades and to take instructions.

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10 Although the fax stated that a formal contract would be prepared and signed, Lew testified that no formal contract was ever presented to the plaintiffs for signature although he had requested for it. He was given to understand by the defendants' Lim Meng Hoon that the contract was in the standard form. Similarly a copy of the defendants' contract with the main contractor was never made available to the plaintiffs until the trial.

11 RSEA Hock Lian Seng Construction Pte Ltd (RSEA) was the main contractor for the 3 stations. Another party was Dixxema Pte Ltd (Dixxema) who were appointed by the defendants to oversee the design and installation of the panels. The panels were supplied by a company called Inhwa Manufacturing (S) Pte Ltd (Inhwa).

12 The plaintiffs had a site co-ordinator Michael Lim Jeng Hung (Michael Lim) whose duty was to liaise with the defendants and Dixxema. The plaintiffs also appointed their own subcontractor Akane Wong for the contract.

13 After the fax the plaintiffs received from the defendants the work schedules for the two phases of the contract, prepared by Dixxema (see PB1-3). They commenced work in mid-October 1988 beginning with the BBT station.

14 The plaintiffs received a revised schedule of works dated 25 January 1989 (see PB26-28) which was followed by a third revised schedule dated 17 March 1989; there was yet another (fourth) revised schedule dated 10 July 1989 (see 1DB215-217) from the defendants which called for completion by 27 November 1989. The periodic revisions were due to delays which the plaintiffs alleged were due to

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15 (i) late delivery of the drawings or revised drawings by Dixxema; (ii) late/incomplete/non delivery of the panels by Inhwa: (iii) late construction of the main and other structures of the station(s); (iv) the subframes for holding the panels and sometimes the panels themselves not fitting site conditions with the result that modifications had to be made on site or subframes had to be refabricated; (v) misalignment of the main structure at times.

16 The plaintiffs were unable to comply with the defendants' fourth schedule of works (as it shortened the construction period), they said they had no alternative but to follow their own schedule of works dated 10 May 1989 (the plaintiffs' schedule) (see PB42-44) because of the delays. Even then the plaintiffs could not meet their own deadline for completion (November 1989) nor the subsequent deadline (4 February 1990) set by the defendants.

17 Under the quotation, the plaintiffs were to receive progress payments within 30 days of submission of invoices. They complained that the defendants failed to honour their progress claim no 11 dated 21 June 1990 in the amount of $493,353.60 which was not paid in time or at all. Further the plaintiffs did not receive full payment for earlier progress claims submitted nor were they paid for variation works. Even when the sum had been agreed with the defendants the plaintiffs alleged they did not receive full payment.

18 In so far as the variations works were concerned, the plaintiffs alleged they were carried out on site on the verbal instructions of the defendants. At times the plaintiffs sent a subframe to site and they had to modify it before it could be installed, they would then treat the modification as a variation order; similarly if they had to dismantle panels that were already installed because the

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same were rejected by the MRTC, they treated such work as a variation. They also charged the defendants for extra manpower that had to be deployed to make up for loss of time in particular for working during the Lunar New Year period in January 1990. The plaintiffs submitted a total of 12 variations orders amounting to $451,628.76 (see AB65) to the plaintiffs for the three stations -- these were disputed by the defendants save for certain items. Notwithstanding the defendants' stand however, the plaintiffs contended that they were never invited to attend a joint inspection to resolve the dispute, nor did the defendants respond to the plaintiffs' request for a site inspection. The defendants also did not take up the plaintiffs' suggestion to evaluate the variation work they had done, save for a small portion thereof.

19 The parties' relationship deteriorated as work progressed due to the partial payment or non-payment of progress claims submitted by the plaintiffs. Things came to a head over an incident at the CCK station on 2 November 1989 where Akane Wong (PW3) and Michael Lim (PW2) instructed the plaintiffs' workers to dismantle subframes which had been installed. The incident prompted RSEA to notify the defendants (see 1DB211-212) that both persons were to be removed from the site immediately together with Akane Wong's workers and a replacement found for Michael Lim. Further, RSEA expressing doubts that the plaintiffs would be able to complete the work on schedule, requested the defendants to call in another contractor to take over the panel installation at BGB station.

20 The plaintiffs acceded to RSEA's request with the result that 2 other contractors namely Kwan Tong Engineering Works (Kwan Tong) and LSY Construction & Decor Pte Ltd (LSY) were called in to complete the plaintiffs' (phase 2) work at the concourse areas of CCK and BGB stations respectively.

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The two contractors took over whatever subframes the plaintiffs had fabricated for the two stations, at a negotiated rate. Even so neither Kwan Tong nor LSY could complete the project by the defendants' deadline of 25 and end December 1989 respectively.

21 By 27 April 1990 (see PB383) the plaintiffs had completed the contract save for rectification works on which they were awaiting the defendants' instructions and they requested for payment of their claim submitted in March 1990. The defendants did not respond so the plaintiffs wrote again in May 1990 (see PB384) requesting the defendants to identify and to propose a programme to rectify, the outstanding defects; there was again no response. Finally in July 1990 the plaintiffs gave notice to the defendants that the outstanding progress payment claim no 11 must be paid within two weeks. No payment however was received from the defendants within the two weeks or at all. On 20 August 1990 (PB388) the plaintiffs gave notice to the defendants that they were seeking legal recourse for the outstanding claims.

22 The cause of action

23 In the statement of claim, the plaintiffs claimed $493,353.60 being the sum outstanding under progress claim no 11 plus variation works totalling $536,052.84 less payments received of $456,684.76. There was also the usual claim for interest and costs.

24 In their (further re-amended) defence and counterclaim, the defendants inter alia alleged:

25 1. the sum claimed of $493,353.60 is grossly excessive; the value of work done was only $368,810 against which the defendants had paid

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$466,616.76; 2. even if the plaintiffs did carry out variation works as alleged which was denied, the defendants assessed the value to be worth $113,269.88; 3. the plaintiffs' works were defective and the defendants were compelled to engage Colwell Construction & Engineering Pte Ltd (Colwell) Dravoss Engineering Pte Ltd (Dravoss) and LSY to rectify the defects when the plaintiffs failed to do so upon numerous reminders. As at 24 June 1993 the defendants expended $112,061.50 upon such rectification works which are still ongoing; 4. the defendants were also compelled to engage other subcontractors namely LSY, Kwan Tong and Joint Systems & Contractors Pte Ltd (Joint Systems) to carry out and complete some of the works with the plaintiffs' consent due to delay on the part of the plaintiffs, for which the defendants incurred higher costs of $191,704.18; 5. it was implied into the contract that a. the works would be carried out in a good and workmanlike manner; b. the plaintiffs would use materials of merchantable quality and which were reasonably fit for their purpose; which terms the plaintiffs breached in that their works were defective due to (i) failure to fabricate and install the subframes or parts thereof in accordance with drawings and specifications; (ii) bad and or incorrect installation of the panels, gaskets and sealants; (iii) failure to proceed with the works with reasonable diligence; with the result that the defendants were compelled to engage other contractors to complete the plaintiffs' works; 6. as a consequence the defendants suffered loss and damage as follows:

26 Particulars

27 (a) cost of rectification of defective $112,061.50 works as at 24.6.93 (b) cost of accelerating the works due 191,704.18 to plaintiffs' delay $303,765.68

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Less Amount retained by the defendants 13,294.71
Amount due and payable by plaintiffs $290,470.97

28 7. The defendants have tried to negotiate a commercial settlement with the RSEA but were unsuccessful; 8. the defendants counterclaimed against the plaintiffs a. damages; b. the sum of $290,470.97. with interest and costs.

29 In their (re-amended) reply and defence to the counterclaim the plaintiffs:

30 1. denied that their works were defective;
2. contended that even if their works were defective the defendants were wholly liable as they: a. failed to provide accurate and workable drawings, designs and specifications to the plaintiffs; b. failed to provide and ensure that the panels supplied to the plaintiffs were complete and proper for installation; c. failed to provide the requisite and appropriate supervision of the works;
3. contended that the works carried out by the named subcontractors were not within the plaintiffs' scope of works;
4. alternatively the plaintiffs' claim did not include the costs of the work carried out by those subcontractors;
5. Kwan Tong, LSY and Joint Systems were engaged without the plaintiffs' prior knowledge or consent. Their works were necessitated by the defendants' delay in failing to provide the plaintiffs with the requisite designs, materials and instructions and appropriate site conditions;
6. if there were delays, they were caused by the defendants' acts or omissions and by the repeated revision of their work schedules;
7. the monies ($413,985.52) paid by the defendants in so far as they exceeded the cost of the works done by the plaintiffs were applied towards part payment

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of the variation works carried out by the plaintiffs. The defendants' assessment of the variation works at $113,269.88 was inaccurate and far below the cost; 8. the plaintiffs had no knowledge of the works carried out by Colwell, Dravoss and LSY. Their work like the ongoing rectification works were/are maintenance works which were/are not within the scope of the plaintiffs' works.

31 At the commencement of the trial, counsel for the defendants informed the court that his clients were contesting liability as well as the quantum of the plaintiffs' claim. Subsequently nearer the conclusion of the trial, the parties through their respective quantity surveyors reached agreement on the quantum of the plaintiffs' variation claims and on the defendants' counterclaim leaving the issue of liability to be determined by the court. At the hearing in September 1993 the court was informed that the defendants had conceded certain items in the plaintiffs' variation claims upon which I shall revert later.

32 The evidence

33 The plaintiffs had three witnesses while the defendants called seven witnesses including two representatives from the MRTC. I shall start off with a review of the evidence of Lew.

34 Lew testified that when he was first briefed by Ludwig Piatnik (Piatnik) from Dixxema on the contract, he was told that the work was very similar to the plaintiffs' work at Eunos station and the panels to be installed were also identical. On that assumption, Lew prepared the quotation based on $65 per sq m, he did not see all the design drawings for the three stations. Lew was of the view the plaintiffs' scope of work was:

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35 a. to receive shop drawings for the preparation of the subframes; b. to produce cut-lists for the subframes; c. to fabricate the subframes from the cut-lists at the plaintiffs' factory; d. to send the subframes for galvanising and painting before delivering to site for installation onto the main structure; e. the panels would then be installed onto the subframes.

36 The defendants' responsibility was to prepare all the construction drawings and co-ordinate the works on site between RSEA and the MRTC. The drawings were prepared by Raymond Wye (Wye) until he left Dixxema's services some time in July 1989 when his assistant Kamali took over. If there were defects in the subframes and panels, they were due to

37 (i) unsuitable drawings or insufficient tolerance being provided in the drawings; (ii) alterations in the subframes on the defendants' instructions; (iii) lack of protection for the panels when they were delivered on site resulting in their surfaces being chipped and dented. Sometimes panels had to be re- cut to fit the subframes. It was the defendants' duty to inspect the panels when they arrived on site. On one occasion the oversized panels had to be sent to another contractor for cutting after they had been delivered by Inhwa and when they were returned the panels had a lot of chipped pieces.

38 Whenever variation works were necessitated by site constraints or instructed by the defendants, Michael Lim would write or issue site memoranda (memos), to Wye (see PB8 and PB22 as examples) or to the defendants' site representatives who would sign the same. However save for two site memos (see PB96-97) none of the others were described as variation orders. The plaintiffs considered the following works to be outside their scope and charged them as variations:

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39 1. dismantling of panels rejected by the MRTC and their reinstallation thereafter; 2. drilling of holes and fabrication of special gaskets to accommodate oversized panels; 3. drilling of holes for and the installation of brackets for the subframes; 4. touching up of panels which the plaintiffs had cut on Dixxema's instructions; 5. supplying labour to erect scaffolding for the MRTC's or RSEA's inspection of the plaintiffs' works.

40 The cut lists were prepared by Akane Wong although it was not the plaintiffs' responsibility to do so -- they did it as a gesture of goodwill to the defendants. It was also not within the plaintiffs' scope of work to visit the site to verify site measurements before preparing the cut lists.

41 Under cross-examination by counsel for the defendants, Lew:

42 a. agreed that the plaintiffs' scope of works included the supply of all necessary materials besides installation; b. denied that the plaintiffs had underquoted when they tendered for the contract at $65 per sq m and that the plaintiffs were using variation claims in an attempt to recoup their losses but he agreed that if the plaintiffs had underquoted then they would have to bear the additional costs; c. conceded that the plaintiffs' schedule must be but was not, agreed to by the defendants. Lew explained that when the plaintiffs received the defendants' third schedule he had informed the defendants by fax (PB40) on 17 April 1989 that it was not possible to comply with the same, hence the plaintiffs' schedule which was prepared by Michael Lim in consultation with Akane Wong and which was based on the programme for the main contract (with revisions) received from the defendants. In any event the plaintiffs' schedule was forwarded to the defendants for their comments and they did not respond; d. agreed that the plaintiffs' schedule cannot be forced on the defendants as the

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latter is contractually bound to follow RSEA's programme but disagreed that the plaintiffs' schedule was not the yardstick for measuring the delay in the works; e. said he was aware that the defendants had a deadline under the main contract to complete their works and if the defendants failed to comply with the same due to the plaintiffs' non compliance, it was possible that liquidated damages would be imposed on the defendants under cl 16.1 of the defendants' contract (see 1DB120) with RSEA which entitled the defendants to terminate the plaintiffs' services; f. said that on 10 July 1989 the parties agreed on a revised programme of works (1DB215-217) wherein panel installation was to be completed by November 1989 -- the plaintiffs thenceforth followed the July schedule; g. claimed he was on site every day between May-December 1989 save for one period in November 1989 when he was not in Singapore; h. said the plaintiffs had familiarised themselves with site conditions (cl 4.1 of the contract at 1DB133) when they took possession of the site at all three stations; i. agreed that the plaintiffs were bound by the provisions in the defendants' contract with RSEA regarding the definition of variations (cl 15 at 1DB140) and that it is for the defendants to make such claims on the plaintiffs' behalf; j. disputed the MRTC's allegations of discrepancies between shopdrawings, cut lists and actual fabrication of the subframes and the plaintiffs' bad workmanship in....subframe fabrication and installation...and haphazard site drilling (see DB219). Lew explained that fabrication according to shopdrawings did not fit site conditions and the plaintiffs were instructed to make modifications on site by the defendants' representatives which the MRTC may not be aware of. He pointed out that the plaintiffs' galvanising and fabrication work was checked and approved by the MRTC's representatives before installation and the cut lists too had to have the professional engineer's (PE) endorsement before the subframes were fabricated based on the cut lists; k. opined it was unfair of the MRTC to say that 74% of the panels installed at the BBT station were defective;

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l. agreed that the MRTC was entitled to reject and so were the defendants, panels which were misaligned but asserted that the plaintiffs arranged an inspection and carried out rectification of the alleged defective works pursuant to the MRTC's complaint; m. notwithstanding such complaints he maintained that the plaintiffs' standard of workmanship was good and they had sufficient manpower at all times; n. he disagreed that the plaintiffs' services were terminated due to (i) failure to control Akane Wong; (ii) defective works; (iii) insufficient and unskilled manpower.

43 Lew explained that the plaintiffs had obtained unskilled and semi-skilled Thai as well as Indian workers from a labour supplier in January 1990 to meet the completion deadline of February 1990. Further the skilled Chinese workers returned to Malaysia for Chinese New Year by 20 January 1990. He denied that the foreign workers may have cut the subframes or panels on site without the plaintiffs' knowledge.

44 I next move on to the evidence of the plaintiffs' site co- ordinator Michael Lim. He said:

45 1. besides Wye the defendants had a site manager. The MRTC and RSEA also had site inspectors who would do random checks of the plaintiffs' completed works before the plaintiffs moved on to the next stage. He would inform the inspectors when the plaintiffs had completed each stage of the work; 2. the defendants' site manager was not often on site, they had several changes of personnel; 3. the plaintiffs were not invited to the site meetings between the MRTC, RSEA and the defendants and they had to rely on feedback from the defendants on what transpired; 4. after the subframes were brought on site the plaintiffs would check the site measurements against the drawings and take

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alignment readings; sometimes the MRTC and or RSEA took their own readings but they would not always inform the plaintiffs of the results. If the readings showed discrepancies with the drawings the plaintiffs would inform Wye who with the defendants' engineer would then sketch the modifications to be made to the subframes. The result was that if the subframes on site could not be adjusted, the plaintiffs could not use them and new subframes had to be fabricated, the plaintiffs would then make a variation claim; 5. there were occasions when other trades (example Gan Tat) stepped on and or dismantled panels which had been installed and they damaged, dented, scratched and or caused the panels to be misaligned in the process; 6. sometimes the panels which were delivered were chipped or rusty nevertheless the defendants instructed the plaintiffs to install the panels and to then touch up with paint provided by and under the guidance of, Inhwa's workers who however did not turn up after one session; 7. initially (under phase 1 of the works), Wye instructed the plaintiffs to cut the panels if the same did not fit the subframes. After the cut panels were rejected by RSEA/the MRTC, the defendants in phase 2 of the works sent outsized panels for laser cutting by another contractor; sometimes the panels contained manufacturing defects; 8. admittedly the plaintiffs caused certain panels to be chipped due to drilling for insertion of self tapping screws; 9. at times there were design problems with regard to the main structure causing the panels and the subframes to sag; 10. if the panels had to be joined before they could be mounted onto the subframes the plaintiffs considered the work as outside their scope and therefore a variation; 11. sometimes the MRTC was unaware that the shop drawings which they used for inspection purposes were no longer applicable because they had been amended on the defendants' instructions and 'as built' drawings had yet to be submitted to incorporate the amendments.

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46 Under cross examination Michael Lim

47 a. denied there were insufficient numbers of and inadequate supervision of, the workers resulting in their doing abortive work and stopping work at 5pm as alleged by RSEA in letters addressed to the defendants in December 1989 (see 1DB237 and 253); b. maintained that he and Akane Wong supervised the workers together with a skilled foreman at every station (notwithstanding that Akane Wong's time sheets for 12 and 13 December 1989 seemed to suggest there were no or few workers on site < see 5AB62-63 >). The plaintiffs in fact had 20 and later 30 workers on the three sites. The workers may have gone off or gone off earlier from a particular site because there were no panels for them to install and they were re-deployed at another site either to install panels or to carry out rectification works; c. said phase 1 was completed in March/April 1989 and the plaintiffs had completed about 70% of the phase 2 works before Kwan Tong and LSY took over; d. said he and Akane Wong removed about 15% of the subframes from the soffit area of the CCK station and transferred them to the BGB station -- it was not an act of sabotage as alleged by RSEA; e. denied that he had been informed before Kwan Tong's workers came on site that Kwan Tong or other subcontractors would be taking over their work because of the plaintiffs' delay; delay was sometimes due to the plaintiffs having to wait for other contractors (like Gan Tat) to finish their work before the plaintiffs could do so; f. asserted that it was not the fault of the plaintiffs that rectification works were required as the plaintiffs carried out modifications on the instructions of the defendants' representatives or the same were necessitated by other contractors' works (an example being the sagging of the subframes and the panels due to understrength of the main structure and the panels being too heavy). In any event some of the alleged defective works were not done by the plaintiffs but by either Kwan Tong or LSY; g. agreed that if he did not check

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the site measurements against the drawings then the subframes may not fit the site.

48 I turn now to the evidence of the plaintiffs' third and last witness, that of Akane Wong (PW3). He testified that he had had more than 13 years' experience as a subcontractor during which time he worked on three Mass Rapid Transit projects (City Hall and Eunos besides MRT C405). As the plaintiffs' subcontractor his scope of works was to install brackets, subframes and panels. Before the plaintiffs fabricated subframes and brackets, he would prepare cut lists which he extracted from the main (detailed) drawings. The defendants' John Tan and Wye approached him and Michael Lim to help prepare the cut lists when he received the first drawings saying they were shorthanded. He spent about 1-2 hours a day preparing the cut lists (for which he was not paid) and the rest of his time was taken up with instructing and supervising the workers; he had a supervisor at every station. After he had completed the cut lists he would hand them to Wye who would have the PE endorse the same before the plaintiffs proceeded with fabrication of the subframes.

49 He started work first on the BBT station at which time the roof of the main structure was not yet up. He was on site full time together with Michael Lim and if they encountered any problems, they would telephone John Tay who would then come to the site. Later, under phase 2 of the works, John Tay was replaced by Tan Yew Chin who was followed by S H Leong and then C C Tan. Wye was seldom on site but if problems were encountered, he and or Michael Lim would seek Wye's advice and Wye would then decide whether and what modifications should be made. Modifications were required from time to time due to such factors as:

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50 i. the main roof structure sagging resulting in insufficient tolerance for installation of brackets, subframes or panels; ii. incorrect positioning of the slot holes provided for the brackets or the brackets being too big for the slot holes; iii. the panels not fitting the subframes -- they had to be cut for both phases of the work; initially the plaintiffs used a grinder to cut the panels, later another contractor cut by the laser method; iv. the absence of holes which should have been but were not, drilled on the main structure for installation of the subframes, sometimes pre-drilled holes were not suitable and the plaintiffs had to drill new holes.

51 It was not his or the plaintiffs' duty to check site conditions, rather it was Wye's duty as the designer to ensure that there was co-ordination with the main contractor. However after the subframes had been fabricated he and Michael Lim would take them to the site to check whether they could be installed and if they could not, then Wye and or the defendants' representatives would be called to see how the subframes could be modified to fit the site. If any cutting was done on site, Michael Lim would instruct the workers to apply coats of paint to the cut areas. He would go to the plaintiffs' factory to collect the subframes and sometimes he met the MRTC representatives who were there to check that the cut lists tallied with the drawings.

52 Completion was delayed due to the plaintiffs' late receipt of the drawings from Wye, not because the plaintiffs were slow. As stated by Lew, there were various revisions of the schedule of works. He discussed the various schedules with Michael Lim and they both decided it would not be possible to follow the defendants' schedules, instead he and Michael Lim prepared and followed the plaintiffs' schedule as the most practicable and they informed the defendants' S H Leong and C C Tan accordingly.

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53 In order to meet the defendants' deadline he had to and did, increase his manpower. Completion was in January 1990 and although he had by then withdrawn from the project, his workers continued to help the plaintiffs. At one time the plaintiffs also provided extra workers to meet the shortened construction period. Completed works in particular the subframes were inspected by him as well as by representatives of RSEA and the MRTC. Anything found to be unsatisfactory during such inspections had to be and were, rectified and re-inspected thereafter before the plaintiffs were allowed to proceed with the next stage of the work. Until Lim Tau Boon joined their services during phase 2 of the works, the defendants did not attend these inspections. He had been paid in full for his services by the plaintiffs.

54 When questioned by counsel for the defendants Akane Wong said the PE's endorsement (as told to him by Wye) was to certify that the brackets could hold the weight of the panels, not that the brackets fit site conditions which responsibility he said was that of the defendants. He was on site daily until the day's work was over and that could be as late as 10.30pm. If there were complaints by the MRTC to RSEA (see for example the MRTC's letter to RSEA dated 6 October 1989 in 1DB227) about the plaintiffs' work, the defendants were to blame as the plaintiffs carried out the defendants' instructions. He disputed the MRTC's inspection forms (see 4AB1-70) setting out defects in the plaintiffs' work as he had not seen the MRTC representatives with the forms when they inspected pursuant to his request. He denied counsel's suggestion that damage was due to using the wrong tools (steel or metallic instead of rubber hammers) and mishandling of the panels by his/the plaintiffs' workers; in any case there was bound to be some chipping when holes were drilled in the panels for screws to be fixed -- it was unavoidable. The workers applied epoxy paint to prevent chipped panels from rusting but the measure was not completely

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effective. It was true that from October 1989 onwards there were daily site meetings with the defendants to discuss the work in progress, sometimes there were meetings with RSEA. When modifications were made on site he was not certain whether they constituted variation orders, it was a matter between the plaintiffs and the defendants.

55 The plaintiffs had attempted to obtain summary judgment for their claim in the early stage of the proceedings but it was resisted successfully by the defendants who filed a comprehensive affidavit by Lim Tau Boon (Lim) to explain why the defendants disputed the plaintiffs' claim. At the trial counsel for both parties referred the witnesses to Lim's affidavit from time to time.

56 I turn now to the evidence adduced from the defendants' witnesses. Their first witness was S K Roy (Roy) a senior lecturer from the School of Buildings & Estate Management from the National University of Singapore. Roy (DW1) whose field of expertise is material science and technology was approached by the defendants on how to repair the chipped panels. He recommended that special coats (2) of paint be applied to the panels. His recommendation which passed SISIR's test for corrosion was accepted by the MRTC and was the most cost effective but it was subject to access to the panels; even then panels which were extensively chipped should be replaced as also those where the public can see them. He was approached for a solution to a problem and he was not concerned with the causes for the chipped panels.

57 The defendants' second witness was Rajan Krishnan (Krishnan) a senior engineer with the MRTC who took charge of the three stations at end 1990 during the defects liability period (1+ years) after R M Hockin left. He said that although it had been 3 years since the stations were handed over to the MRTC,

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there were still outstanding defects which basically pertained to the panels and subframes. The MRTC took a serious view of the defects and they had to be rectified, there was to be no compromise. Quite a number of problems had been rectified but there was still work to be done.

58 The major defects were a) unauthorised cuts to the panels b) cuts to the subframes and c) misalignment. Some panels were also dented and or chipped due to poor handling during transportation and installation. Most of the panels affected were in areas not accessible to the public. It was unlikely (as the plaintiffs alleged) that damage to the panels was caused by other contractors as all works including electrical trunking would have been finished before the panels were clad onto the subframes.

59 Whilst it is true that some rectification works had to be done after the lines had closed down for the night, Krishnan (DW2) said no serious efforts had been made to comply with the MRTC's outstanding defects list. He had been told that some areas (such as the roof) were not repaired because they were inaccessible. Even so, access could have been gained by constructing scaffolding/gates to such areas albeit with some difficulty. The MRTC took a strict view of panel cutting and subframes were only allowed to be cut in an authorised manner followed by proper touching up to prevent rusting; panels taken down from the eave areas were found to be chipped, rusty, cut and uneven. He had also seen oversized bolts on the subframes and due to improper alignment of the subframes, the panels were also misaligned and in some cases they were warped (due to the underlying subframe being under-strength); the misaligned panels could be seen visually. He was unable to check the panels on the jackroof, gable ends and roof truss areas as no scaffolding was available. With few exceptions the MRTC required rusty panels to be replaced. The

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correspondence between the MRTC and RSEA showed that the former checked the works during installation and discovered defects notwithstanding which the contractor ignored the complaints made and continued with the works.

60 Krishnan informed the court that the Jurong East and Boon Lay stations also used similar panels and although they had similar defects the problems were minor, the workmanship at Boon Lay (for which station the defendants were the subcontractor) was very good. This was due to a high level of site co-ordination and co-operation by all contractors and good site management.

61 During cross-examination it was pointed out to Krishnan that

62 1. he would not know whether the unauthorised cutting of the panels and their touching up was done on the instructions of the defendants; 2 RSEA as the main contractor had a duty to co-ordinate the MRTC's designs with the drawings produced by Dixxema; 3. he would not know the defendants' role as subcontractor nor the work which they contracted out to the plaintiffs; 4. as he was not on site at the material time, he (i) could not confirm that works by other trades had been carried out before the panels were installed, (ii) would not know whether there was periodic inspection of the plaintiffs' work by the MRTC and or RSEA, (iii) would not know whether the plaintiffs continued with the work after inspection on the verbal instructions of the defendants/RSEA notwithstanding the defects highlighted in the correspondence between the MRTC and RSEA; (iv) could not say whether the drawings had been amended on the defendants' instructions without the knowledge of either the MRTC or RSEA; 5. it was the duty of the PE to check and endorse amendments in drawings and to calculate the strength of the subframes therefrom before the subframes were fabricated; 6. he would not know whether the panels were

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inspected when they were delivered by Inhwa to site nor whether the panels were damaged in the process of transportation; 7. neither would he know (the cantilever arms of the roof eaves for instance) whether the main structure done by RSEA was out of alignment and thereby caused the subframes as well as the panels to be out of alignment.

63 In so far as the lack of effort in the rectification works was concerned Krishnan clarified that his comment referred to the defendants. Another reason for the rectification works being still outstanding was because some remedial works which had been done were not done properly and were therefore rejected by the MRTC. He explained that the MRTC's complaint of understrength steel related to the materials used by the plaintiffs for the angles and therefore mistakes made by the PE in the calculations for the drawings would be irrelevant.

64 I move next to the evidence of Cheong Yew Seng (Cheong) who is with the MRTC and at the material time he was the assistant resident engineer for BBT station in charge of overseeing construction with a team of technical officers. Cheong (DW3) confirmed that there was inspection of the subframes after installation, some rectification works which were required had been done but some had not. Defects which were not rectified were recorded in a defects list. If the defects were serious the MRTC would write to RSEA. He attended 70% of the inspections which were mostly requested by RSEA, he was not certain whether the defendants or the plaintiffs attended the inspections but the attendees were well aware of the MRTC's stand that cutting of panels and subframes was not allowed in principle. At the final inspection he discovered that some panels had been installed without rectification of the defective subframes underneath.

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65 Cheong testified that he had seen the workers installing the subframes and panels and he was not happy with their workmanship -- drilling of the subframes was done without proper protection for the panels causing the surface of the panels to chip. The panels were also not properly kept but were haphazardly stacked one piece on top of another causing dents and when they were mounted on the subframes, metal instead of rubber hammers were used causing chipping. As there were gaps between the panels, it was untrue (as asserted by the plaintiffs) that the panels clashed with each other and had to be cut at the flanges; cutting caused rusting unless the cut areas were properly touched up with paint. It was more likely that the panels clashed with the subframes. Similarly if the main structure had been installed with proper tolerance the subframes should be aligned if properly adjusted, even allowing for sagging of the main structure. Sagging was noted when the roof structure was completed but before the subframes were installed. He had seen Michael Lim on site but he was uncertain who Michael Lim worked for. Generally he saw workers installing the panels and subframes by themselves without supervision.

66 Cheong confirmed the main defects of the plaintiffs' work were chipping, warping, misalignment and cutting of the panels. The plaintiffs also misdrilled holes or drilled extra holes unnecessarily on both the panels and the subframes, sometimes self tapping screws were missing or sealant was not applied to anchor the panels to the walls to prevent water seepage. Instead of adjusting the subframes to fit the panels the plaintiffs did the reverse as it was easier.

67 Under cross-examination Cheong agreed that he had stationed one of his technical officers Ooi Ah Choon (Ooi) at the factory where the plaintiffs were

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fabricating the subframes to ensure that the fabrication was in accordance with the drawings. However he recalled that sometimes the plaintiffs could not wait for the drawings to be approved and had proceeded with the fabrication and Ooi would only check what was fabricated with whatever drawings submitted to the MRTC. Often Ooi would check the subframes against the cut lists. Sometimes the cut lists did not tally with the drawings because amendments had been made. Ooi would note his comments on the subframes and his approval/disapproval on an inspection form which would be checked at random by Cheong later against subframes which were installed on site.

68 As with Krishnan, counsel for the plaintiffs put it to Cheong that as he was not on site full time he could not say whether it was the defendants who had instructed the plaintiffs to cut the panels and to modify the subframes. Neither could he be sure it was the plaintiffs' bad workmanship that caused such defects as misaligned subframes and dented/chipped panels and not other trades.

69 S H Leong (Leong) next testified for the defendants. Leong (DW4) a professional/mechanical engineer and the defendants' assistant general manager, was assigned to take overall charge of MRT C405 in August 1989. He said he understood the plaintiffs' scope of works to be a back to back arrangement with the defendants' contract with RSEA save for the supply of panels. Completion was extended from December 1989 to February 1990 due to delays in, panel deliveries, fabrication of subframes and installation. Initially between August-September 1989 there was some delay in the shop drawings but subsequently the problem was rectified. He was aware of the delay in subframe fabrication as he had visited the plaintiffs' factory on one occasion and he found that their facilities were not adequate for the painting of subframe components and he was also informed that the plaintiffs had problems in getting

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the galvanising done on time. He took charge at a very critical period when the plaintiffs had only managed to install 25-30% of the panels and this was at the eaves area.

70 Leong testified that there was no correspondence in the defendants' file to show that the plaintiffs had asked for a copy of the defendants' contract with RSEA. As John Tay was no longer with the defendants he could not confirm that Lew had orally requested for a copy of the contract.

71 In regard to the plaintiffs' overtime claim, Leong denied that he had agreed to it as per the plaintiffs' site memo dated 6 October 1989 (PB260). He had asked the plaintiffs to put in extra manpower to keep up with the construction programme because he noticed they had insufficient workers on site. He did not consent to the plaintiffs' overtime claim nor did he reply to the site memo as the defendants' main objective was to finish the work on time to avoid liquidated damages -- he left the matter open.

72 Leong said he understood variation claims to mean any changes different form the original contract. The defendants resisted the plaintiffs' variation claims for the following reasons:

73 a. in so far as the modification of subframes to suit site conditions was concerned, he contented the plaintiffs should have first checked the site and made sure that the subframes fit the site; b. the plaintiffs were not entitled to charge for the difference in the size of subframes between new and original drawings because they had not fabricated the original subframes and the contract rate was $65 per sq m; c. drilling of holes on the main structure for installation of the subframes was part of the plaintiffs' scope of works as, if the

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holes were not drilled, the subframes could not be installed. However drilling of holes was not part of the defendants' contract with RSEA nor with the plaintiffs. If holes had been drilled by RSEA it was to save time but that did not mean it was not the plaintiffs' work.

74 In relation to the incident on 2 November 1989, Leong said it was not true that Kwan Tong's workers had moved in that day to commence work without the plaintiffs' knowledge or consent. He negotiated for Kwan Tong to take over the plaintiffs' work at CCK station at RSEA's insistence in order to speed up the work. Kwan Tong's workers merely checked the work in progress and site conditions that day without the defendants' knowledge. The defendants only signed the contract with Kwan Tong on 15 November 1989 (see 3DB1-3). Kwan Tong took over the plaintiffs' work with the plaintiffs' consent (albeit given reluctantly) after lengthy discussions between him and Lew on the possibility of the plaintiffs' contract being terminated and liquidated damages being imposed on the plaintiffs otherwise.

75 Prior to November 1989 Leong was on site 2-3 times a week, thereafter he was on site every day because he had daily site meetings with RSEA and the plaintiffs to review the latter's progress and also to discuss rectification works. Lew and or Michael Lim attended the meetings on the plaintiffs' behalf and once or twice Akane Wong was also present to talk about site problems. He had seen the plaintiffs' defective works caused by mishandling and poor workmanship. Usually he saw foreign/Thai workers installing the subframes without supervision and making adjustments and solving problems on their own. If the plaintiffs had done proper alignment checks and there were no other causes affecting the alignment, the panels should be properly aligned when installed. There were no records to show that the defendants had instructed the plaintiffs

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to cut the panels. Neither was he aware that Tan Yew Chin had given such instructions. In any case after he took charge, the defendants did not allow panels to be cut save by the laser method with the approval and in the presence of the technical staff, of the MRTC. Cut panels have to be touched up with approved galvanised paint and then coated with enamel paint.

76 Although there was some delay in the delivery of panels by Inhwa (up to end October 1989) that did not mean that the plaintiffs had no or not enough work as they had to rectify subframes and panels already installed. It was not necessary for Inhwa to deliver the panels in sequence. Even if it was, the plaintiffs could have installed some of the panels that were delivered (except for the beam casing and special areas) with proper alignment readings.

77 As for the cut lists, Leong explained that PE endorsement was required to confirm the strength calculations of the subframes so that the MRTC can check against the fabrication in the plaintiffs' workshop. The plaintiffs should have checked site conditions after the drawings had been approved but before fabrication, to avoid abortive work. The defendants only accepted variation claims for fabricated subframes which could not be installed on site due to errors in design.

78 Under cross-examination Leong maintained that the panels when delivered to site were checked by his staff but agreed that it was possible that some panels may not have been checked and they could have been chipped. Although he had instructed the plaintiffs to tie together the beam casing panels he had not agreed that the work amounted to a variation (see variation claim no 10 item 1 for $20,460.13); he viewed the work as part of the plaintiffs' contract. He did not however inform the plaintiffs it was not a variation as his main

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concern then was to finish the job and if he had rejected the plaintiffs' claim they might have stopped work. The defendants paid the plaintiffs what was agreed under the contract and left the issue of variation orders to be discussed when the contract was completed. Leong pointed out that the defendants paid the plaintiffs the contract rate even when changes resulted in less materials (including subframes) being used. He conceded that before August 1989 there were no written instructions from the defendants to the plaintiffs not to cut panels. Neither were there letters from the defendants denying Wye had authorised the plaintiffs to do the cutting.

79 Raymond Tan Si Jue (Tan) a chartered engineer testified that he was engaged as a PE by the defendants between September 1989 and February 1990 to check that the designs for the subframes could withstand the required load. Prior to working for the defendants he had been engaged by Dixxema in June 1988 for the same purpose. The subframe drawings were provided by Wye and they had to show detailed dimensions of the length of the members, how they were connected to each other and how they fit into the actual site. Besides checking the calculations on the drawings Tan (DW5) said he also checked the cut lists to ensure that the size of the members and bolts were correct and also the quantities of the bolts; sometimes he specified the spacing between the bolts. Generally the drawings were submitted to him on time-- he received no complaints from any quarters that there was a delay.

80 With regard to the plaintiffs' allegation that he and Wye should have checked the designs for the cut lists, Tan said the cut lists were prepared by the installer/fabricator for 3 reasons, namely

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81 a. the person had to go down to the site to check site dimensions and conditions to reflect it in his cut list; b. the contractor would want to save material and by planning a proper cut list he will minimise wastage of material; c. the contractor will also prepare his cut list to suit his method of installation.

82 Therefore the cut lists which were prepared by the plaintiffs must correlate with the drawings to make sure the sizes tally. As a PE, his duty was merely to check that the sizes in the drawings tallied with those in the cut lists. In his view it was not Wye's duty to check the site measurement against the drawings but that of the installer. Cut lists have to be done by someone who has some experience in structural steel work although not necessarily qualified whereas Wye is only an architectural draughtsman. Allowance for the tolerance factor should be made in the preparation of the cut lists, not in the drawings. Further it is the cut lists not architectural drawings that would contain such details as slot holes, quantities and dimensions, as the main drawings cannot contain so many details.

83 If the plaintiffs had fabricated the subframes after measuring the actual site there would have been no necessity for modifications to be made to the subframes. If modification was due to the contractor's error in measurement or for some other reason, then he should be informed. He was not informed of the modifications which the MRTC said were not supported by PE calculations. He liaised with C C Tan (who he described as hardworking), and sometimes Leong and if the plaintiffs had submitted modified cut lists to C C Tan then the same would definitely have been transmitted to him. He recalled that there was one incident of sagging at the eyebrow area of BBT station which he investigated at Wye's request. He found that the panels not the subframes, were slightly out of

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alignment but they could have been forced back into alignment with some effort. He was on site from time to time as and when he was required.

84 Tan Chiow Choon (C C Tan) also testified. He was employed by the defendants between January 1981 and July 1992. He worked on MRT C405 from July 1989 until its completion and handing over to the MRTC in 1990. When he joined the project in July 1989, a lot of time was taken up in trying to read the drawings. His primary task was to 'troubleshoot' vis a vis the installation of subframes -- when the plaintiffs raised a problem with the subframes, he would sit down with them to solve it, he even prepared sketches to show how to overcome the problem. In addition he submitted cut lists to Tan for PE endorsement. As far as he was concerned there was no occasion, as alleged by the plaintiffs, when cut lists submitted to the defendants were not passed to Tan or Tan's assistant engineer Tan See Chuan for endorsement. There were times when he personally sent the cut lists to Tan's office. In any case only major changes involving structural integrity required PE approval, not minor ones like enlarging slot holes.

85 C C Tan (DW6) said he signed the site memos submitted by Michael Lim merely to verify that the work was done or that labour was supplied and not as acceptance of what was stated. It was not true that he signed site memos for the supply of labour before instead of after, it was supplied. Costs were not within his portfolio, neither were variation orders since he is not a quantity surveyor. Another reason why he signed the site memos was because he was on site most of the time and it was easy for the plaintiffs to get hold of him. He agreed that the plaintiffs provided workers to do installation over the Chinese New Year period for 1990 but he did not agree to the amount they had claimed as the costs involved.

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86 C C Tan echoed Leong's complaints on the plaintiffs' workmanship and the tools they used. He agreed however that there was one occasion when he thanked the plaintiffs (his letter dated 14 November 1989) for letting him know that the panels were chipped when delivered by Inhwa. He could not remember whether, as alleged in the plaintiffs' letter to him dated 13 November 1989 (PB142), he had instructed them to proceed on occasions when the panels were found to be twisted or varied in size -- it was highly subjective whether the panels were 'wavy' but in any case it was up to the MRTC whether to accept such panels. He recalled that he spent some time trying to solve the problem of the gable end panels; eventually he simplified and speeded up the installation process by recommending welding instead of using bolts and nuts; all welding was substantiated by Tan's endorsement but the standard of the welding was subject to the MRTC's approval.

87 C C Tan testified that if indeed he had instructed the plaintiffs to cut the panels or make other modifications on site, they would have confirmed his instructions in writing and he would inform the PE and submit amended drawings to the MRTC. Panels which were cut without confirmation in writing were not authorised by him. Although he did not tell the plaintiffs, they should know that after cutting, bare metal should not be exposed and a primer coat should be applied to the panels. He sourced the contractor who could do laser cutting, which was very expensive as compared with manual cutting, but it gave a neater cut and a smoother edge and it minimised the damage to the panels.

88 The defendants' last witness was Lim Tau Boon (Lim) who joined them in August 1989 and is currently their senior marketing executive. Lim (DW7) who is a qualified mechanical engineer was the site co-ordinator assigned by

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the defendants to take charge of the installation of the panels. Until 1 March 1990 his superior was Leong, thereafter it was K K You.

89 According to Lim's affidavit evidence in chief, in August 1989 the main structures for the 3 stations were already erected but the plaintiffs had then only completed about 20% of their contract; phase 1 was completed in March 1989. He deposed that the MRTC through RSEA complained that there were defects in phase 1 which in the main was damage to the panels. A joint inspection was held for all three stations in the week covering 13-14 November 1989 attended by all parties including Inhwa; Michael Lim was only present on 1-2 days of the inspection. Forms were used at the inspection (4AB1-70) which showed that most of the damage under phase 1 consisted of chipping to the first coating of the enamel and cutting of the panels. There were so many chips that it could not be attributed to other trades, in particular there was no possibility of other trades going to the E1 panels at the platform eaves area save for the roof and glass contractors. Neither could it have occurred during the delivery process as the defendants' files had no records of complaints by the plaintiffs of chipped panels being delivered during phase 1. From his site experience (for phase 2) Lim believed chipping was due to mishandling and the plaintiffs' workers using metal hammers and unprotected drills (as the damaged areas were where self tapping screws were mounted).

90 While he could not comment on the instructions allegedly given by Wye to the plaintiffs to cut the panels, to his knowledge Inhwa did not have the expertise to touch up damaged panels which was why the defendants had to engage a consultant to find a way to repair the damaged panels which was acceptable to the MRTC. He did not know until October 1989, that the plaintiffs had been cutting the panels. Even if cutting was required it should be to the

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subframes and not the panels. Cutting of panels should only be as a last resort due to the MRTC's strict instructions. Further it was easier to remedy cut subframes than cut panels. The plaintiffs cut the panels on a) the flanges and b) on the panels proper. If the panels under phase 1 were of the wrong size the plaintiffs should have but did not, complain in writing to the defendants.

91 As for the plaintiffs' claims for additions by way of variations, Lim said they were contractually bound to provide sealants, gaskets and other accessories for the installation of subframes and panels. By the same token if the plaintiffs used less subframes and accessories than originally anticipated, the defendants were still bound to pay the contractual rate of $65 per sq m. Lim then cited some examples in his affidavit to support his contention. Lim repeated the contention of the defendants' previous witnesses that the plaintiffs should have checked site conditions before preparing cut lists and subframes and if they failed to do so and subframes that were fabricated had to be modified or thrown away, then they were not entitled to variation claims for the abortive/additional work done. He had repeatedly requested the plaintiffs to carry out rectification of their defective works in accordance with the MRTC's defects list but they refused on the grounds that

92 a) they wanted to be paid their variation claims first; b) the defects were not their responsibility save for damage between the panels.

93 Even then the plaintiffs refused to repair the damage between the panels although Michael Lim went to the BBT station once to look at the concourse area. He therefore had no alternative but to engage other contractors like Colewell, Davoss and LSY to remedy the defects.

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94 Lim said that in the final accounts between the defendants and RSEA for the project, it was confirmed that the plaintiffs had completed 5,674 sq m of work admitted to be worth $368,810 (5,674 x $65 per sq m) whereas the defendants had paid them based on 6,369 sq m of work done.

95 When cross-examined by counsel for the plaintiffs Lim

96 1. agreed there was a delay in the drawings after August 1989 but the plaintiffs were also responsible for part of the delay as they lacked skilled manpower, supervision (resulting in abortive work) and proper site measurements; 2. said that the defects for phase 1 panels were from the cuts and could not have arisen from wear and tear as panels do not suffer from wear and tear. The plaintiffs chose to cut the panels rather than the subframes because it was an easier option and even after cutting, the plaintiffs did not touch up the panels properly or at all to prevent rusting; 3. said the defect in the panels for which Inhwa was responsible was the difference in the colour tone, not chipping and denting; 4. said under phase 2 of the works, the defendants engaged another contractor to do the touching up of the panels after laser cutting as Inhwa's method was not acceptable to the MRTC; 5. said he knew what was the damage and the extent thereof, of the plaintiffs' work as he had seen and taken photographs thereof (see 3AB1-14); 6. clarified that the defendants carried out rectification works for all unauthorised manual cutting. As laser cutting was an approved method and although the MRTC's defects list included laser cut panels, the defendants only charged the plaintiffs (in the counterclaim) the cost of removal and reinstallation of panels and for laser cutting.

97 Lim also explained that the defendants did not charge the plaintiffs for the repair of panels under phase 1 where the plaintiffs had touched up the same

although the method used was not approved. He denied that the defendants failed to carry out the rectification works properly resulting in increased materials and costs -- the defendants remedied the defects at minimum cost to themselves. Lim pointed out that amongst the plaintiffs' defective works were the use of less subframes than specified for which there were two methods of rectification either a) to remove the panels and replace the subframes or b) to engage a PE to do the checking and certify the works were satisfactory. The defendants opted for the cheaper alternative b) and therefore the plaintiffs should bear the costs of appointing the PE. Although part of the delay in the works was due to the delivery of panels as late as November - December 1989 and January 1990, Lim pointed out that he did not see the plaintiffs' workers idling and waiting for panels to be delivered. The workers could have installed the subframes but he noted that a lot of abortive work was done even when the subframes were on site because the plaintiffs only had one site supervisor and inadequate/unskilled labour. Had the defendants not brought in Kwan Tong and LSY to take over the plaintiffs' work, the defendants and in turn the plaintiffs would have been liable for liquidated damages for late completion. Compared with the plaintiffs, Kwan Tong had on the average 30 workers including 4-5 supervisors and they had 3-4 teams to do the subframes and install the panels. Hence they were able to install the subframes and panels in a shorter period of time. As for LSY, the main defect of their works was that the panels were not properly aligned but they rectified the defect.

98 Lim produced in exh D4 a bundle of his memos to the plaintiffs to rectify defective works before they installed the panels; he said they either ignored his instructions or claimed to have done the rectification and later it was found, upon removal of the panels, that they had not done so.

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99 The main thrust of Lim's cross-examination as well as of the cross-examination of the defendants' earlier witnesses was that the panels under phase 1 of the works were cut manually on Wye's instructions and touched up with paint provided by Inhwa. Had laser cutting then been available as well as the touching up method recommended by Roy (DW1), the plaintiffs would have used them. I should observe at this juncture that as late as 20 October 1989 (see PB123A) Tan Yew Chin on the defendants' behalf pointed out to the plaintiffs that even if they had informed Wye of the cutting of the panels and subsequent touching up, the panels were cut in a haphazard and uneven manner. Further between March 1990 (when the work was completed) and May 1990 (when the MRTC issued its defects list) the plaintiffs made no effort to rectify any defects even if ignorance of the proper touching up method can be said to be a valid excuse earlier. Indeed it was Lim's testimony that the plaintiffs did not rectify the chipped panels from the time they did the installation until the MRTC issued its defects list. Another pertinent point to note is that Wye was not available as a witness to either refute or confirm the plaintiffs' repeated contention, through their three witnesses, that he instructed them to cut the panels under phase 1 of the works.

100 As stated earlier, the parties had agreed on the quantum of the plaintiffs' variations claims. The relevant extracts of the joint assessment of the quantity surveyors FSinn & Andrews Private Limited and Kingstone Management Services International appointed by the defendants and the plaintiffs respectively are as follows:

101 1. a general all-in manday rate of $53.58 per day for the plaintiffs' supply of labour; 2. variation claim no 1 $61,399.88 3. variation claim no 2 $ 2,530.27 4. variation claim no 3 $ 1,380.78 5. variation claim no 4 $ 1,942.28 6. variation

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claim no 5 $ 7,000.00 7. variation claim no 6 $25,730.83 8. variation claim no 7 (installation during Chinese New Year) $ 7,447.62 9. variation claim no 9 $86,315.00 10. variation claim no 10 $70,487.82 11. variation claim no 11 $11,580.40 12. variation claim no 12 $44,225.67

102 Total $320,040.55

103 In so far as the plaintiffs' claim for overtime is concerned, the quantity surveyors observed that sometimes no names or number of hours were recorded by the subcontractors (Sodara Management, Chong Yee Contractor and Akane Wong) against their claim for overtime; for June and July 1989 298 hours were recorded against which there were no names. Overtime was claimed for hours worked in excess of, 8 hours for Mondays to Fridays, in excess of 4 hours for Saturdays and for all hours worked on Sundays and public holidays. The plaintiffs' total overtime claim without apportionment was agreed at $68,082.93.

104 Dealing next with the concessions made by the defendants, these are as follows:

105 (i) variation claim no 4 -- supply of labour on 7.8.89 6 mandays @ $53.58 (agreed rate) $ 1,942.28 (ii) variation claim no 6 -- items 7c, 8, 9, 10, 12, 13, 14, 17. $ 8,765.31 (iii) variation claim no 7 -- supply of labour 26-29 January 1990 62 mandays @ $53.58 per manday $ 3,321.96 (iv) variation claim no 9 -- items 1 - 4 (less $1,000) $86,315.00 (v) variation claim no 10 -- items 6, 9 - 21 $12,925.33

106 Total $113,269.88

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107 Variation claim no 9 included the defendants' claim for $1,000 for rectification of the subframes at the concourse free area which I but not the quantity surveyors, have taken into account. Therefore the figure $113,269.88 is reduced to $112,269.88. The supply of washers for brackets under variation claim no 5 was also conceded by the defendants in the sum of $7,000 and if included, the figure of $112,269.88 is revised to $119,269.88.

108 The findings

109 On the evidence I have several observations to make on the plaintiffs' claim. Firstly, I have no doubt, contrary to Lew's denials, that the plaintiffs under-estimated the scope of works involved when they quoted $65 per sq m as their price to the defendants. This is evident from Lew's testimony where he said he relied on what Piatnik told him that the work required was very similar to the work the plaintiffs had done at the Eunos station and he failed to check the site to verify the actual requirements. It is more than likely therefore that the plaintiffs underquoted for the contract and their price of $65 per sq m either did not provide them with a comfortable margin for their profit or, it could have been their cost figure or worst, below their cost. Hence the plaintiffs constantly resorted to variation claims to try and recover some profit element.

110 I reject Lew's contention that it was not the plaintiffs' scope of works to visit the site to verify the measurements with the subframe drawings provided by Wye before the plaintiffs proceeded with preparing the cut lists and then the fabrication of the subframes. I cannot imagine that any experienced contractor (especially one who had done similar work on other Mass Rapid Transit stations) would not consider such a step as prudent and necessary to ensure that the subframes would fit the site. I therefore reject the argument of their counsel

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that because the plaintiffs were only one of many subcontractors and had no control over site conditions, it would be unreasonable and or impossible to expect the plaintiffs to check the site. Accordingly the plaintiffs only have themselves to blame if the fabricated subframes did not fit the site and they are therefore not entitled to the cost of modifying such subframes let alone the costs of preparing new for unusable, subframes.

111 The plaintiffs are only entitled to charge for the fabrication of new subframes if they had already fabricated subframes in accordance with drawings provided by Dixxema and thereafter revised designs were provided by Dixxema necessitating new subframes. I agree with Leong's contention that there was no basis for the plaintiffs to charge as a variation the fabrication of subframes based on revised drawings received form Wye when no fabrication had been done on the original designs. I reject the submission (para 33) of their counsel to the contrary bearing in mind that the revised drawings may well have resulted in savings in materials for the plaintiffs which they were not obliged to pass onto the defendants. Therefore the plaintiffs' variation claims nos. 1, 6, 9, 10 and 11 for such fabrication save where admitted by the defendants, are disallowed.

112 Similarly I reject the plaintiffs' contention that modification of subframes due to insufficient tolerance or freeplay being provided should be borne by the defendants. The evidence of the PE was very clear -- the tolerance factor should be taken into consideration in the preparation of the cut lists, not in the drawings. I have no reason not to accept Tan's evidence as other than the truth.

113 It is equally clear from the evidence that in order to reduce labour costs the plaintiffs as well as their subcontractor Akane Wong used mainly unskilled

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foreign workers and had no or inadequate supervision of these workers. In consequence there was chipping of the panels caused to a large extent by the plaintiffs' workers using the wrong tools and not taking protective measures when drilling holes on the panels for bolts to mount the subframes or fixing self tapping screws; damage was caused albeit to a lesser extent, by careless/rough handling of the panels.

114 In so far as phase 1 of the work is concerned, I repeat my earlier observation that the defendants were unable to refute the plaintiffs' allegation that they cut the panels to suit the subframes on Wye's instructions since they were unable to produce Wye or John Tay or Tan Yew Chin as witnesses. I would also not wish to speculate whether Wye resigned because his request for an increase in salary was rejected by Leong or whether his services were terminated when the defendants found out about the unauthorised cutting of the panels and subframes. Even if the plaintiffs' contention that they cut on Wye's instructions is true, I note from Lim's testimony that after cutting, the plaintiffs' workers made no efforts to protect the exposed metal by touching up with paint. Counsel sought to argue that the plaintiffs did not touch up because at the material time the method recommended by Roy was not known to the plaintiffs. That contention, with respect missed the point entirely -- there was no touching up at all by the plaintiffs, not that they used the wrong method. I surmised that the likely reasons why no touching up was done were:

115 1. to save the plaintiffs time and therefore costs; 2. the plaintiffs' unskilled workers were ignorant of the effects of oxidation on bare metal and there were no supervisors to tell them of the necessity to touch; 3. the plaintiffs hoped/thought the cut panels would go undetected once they were mounted on

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the subframes not realizing that the MRTC/the defendants would dismantle the panels from the subframes to check.

116 I also note that Lim's evidence that the plaintiffs took the easy way out and cut the panels instead of the subframes went unchallenged.

117 There is little merit in the plaintiffs' argument that other trades damaged the panels after they had been installed. Lim had testified that the panels were so extensively chipped as to rule out this possibility and he as well as the two representatives from the MRTC (Krishnan and Cheong) said other contractors had no reason (save for the roof tiler) to step on or to remove the panels.

118 I also find no basis for the plaintiffs' complaint that misalignment of the subframes was sometimes due to the main structure itself not being aligned. Tan had testified that he could only recall one instance where the roof of the main structure sagged, at the BBT station. Even then, the subframes and the panels could have been forced back into alignment with some effort which apparently the plaintiffs did not attempt.

119 Counsel for the plaintiffs referred to site memos (see PB8, 14-15) as evidence that the drawings provided were not workable. With respect, that contention is again incorrect. Those site memos from Michael Lim referred to modification of brackets, and no mention was made that it was due to design problems.

120 It was not in dispute that late delivery of panels by Inhwa (for which the defendants are responsible), contributed somewhat to the delay in completion; but this problem was arrested sometime in late 1989 or early 1990. On the lateness of the drawings, apart from the oral evidence, I find no documents to

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support this allegation which was also not confirmed by the PE. There is even less evidence to support the submission of their counsel that the plaintiffs encountered obstructions in their work. I should say that a major factor for the delay in completion was the plaintiffs' inadequate and use of unskilled, manpower coupled with lack of supervisors and probably the workers' reluctance to work beyond 5pm daily. I find the explanation of Michael Lim and Akane Wong refuting RSEA's complaints in December 1989 in this regard unconvincing as the number of workers and supervisors they claimed they had were woefully inadequate for the 3 stations.

121 Another observation I would make from the evidence is that the plaintiffs made little if any effort to remedy their defective works.

122 As for the defendants, understandably they were in a predicament. They were under tremendous pressure from RSEA and the MRTC to complete the installation of both subframes and panels on schedule as otherwise they faced the possibility of having to pay liquidated damages. Hence their main concern was on finishing the work rather than the quality of the work. Then when the plaintiffs submitted their numerous variation claims, the defendants (as admitted by Leong in his evidence) decided it would be wiser not to reject the claims outright for fear of the plaintiffs stopping work, but to let the plaintiffs continue working and leave aside the issue of the variation claims until after the work had been completed and final accounts adjusted between the defendants and RSEA.

123 I should observe that contrary to what the defendants submitted, their contract with the plaintiffs was not a 'back to back contract' with the defendants' contract with RSEA as the latter contract provided for maintenance, besides the

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supply and installation, of the panels. The defendants' contract with RSEA was to 'design and fabricate' for a lump sum price whereas the plaintiffs' was a measure and value contract to 'fabricate and to install'. I accept the submission of the plaintiffs' counsel that if the defendants did not provide the plaintiffs with a copy of the defendants' contract with RSEA, regardless of whether the plaintiffs did or did not ask for the same, the terms and conditions of the latter cannot be imposed on the plaintiffs if they are inconsistent with the terms of the fax, the fax being the only agreement between the parties in the absence of a formal contract.

124 At this juncture it would be useful to bear in mind the meaning of what constitutes varied or extra work. It is defined as 'work not expressly or impliedly included in the work for which the lump sum is payable (see Keating on Building Contracts 5 ed p 81). According to Keating to recover such payment the plaintiffs must prove

125 (i) that it is extra work not included in the work for which the contract sum is payable; (ii) that there is a promise express or implied to pay for the work; (iii) that any agent who ordered the work was authorised to do so, and (iv) that any condition precedent to payment imposed by the contract has been fulfilled.

126 Keating's definition is not that different from that set out in cl 15 of the defendants' contract with RSEA.

127 At the same time the plaintiffs' obligation pursuant to the terms of the fax was to install the panels complete with sealant and gaskets and to provide all necessary staff and materials for the purpose. In the quotation the plaintiffs

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themselves stated that their price of $65 per sq m was 'inclusive of all necessary tools equipment for the total installation work carried out at the above 3 stations'.

128 Bearing in mind the criteria set out by Keating as well as the plaintiffs' contractual obligations, I am of the view that the plaintiffs are entitled to claim as variations the following:

129 a. the cost of attaching the panels and fastening them to the beam casing and cross beam areas since they did so on the admitted instructions of Leong. Therefore the quantum assessed by the quantity surveyors of $20,749.39 for variation claim no 10 is allowed; b. labour supplied 4 days before and 6 days after, the 2 day Chinese New Year holiday for 1990 provided the workers supplied were Chinese and not foreign. It is common knowledge that in the construction industry Chinese workers (which would usually refer to skilled or semi-skilled workers or foremen) would return to Malaysia for their annual leave during the Chinese New Year period. This claim includes the labour supplied over the period 26-29 January 1990 (62 mandays) in variation claim no 7 which has been conceded by the defendants. The plaintiffs are not however entitled to their claim for employing additional unskilled labour during the Chinese New Year given the evidence that they had insufficient manpower in the first place; c. drilling of holes on the main structure for mounting of the subframes. The plaintiffs are entitled to this claim as it must follow that if Leong requested them to supply new brackets for attaching subframes at the beam casing and cross beam areas, new holes to replace pre-existing holes would have to be drilled for the new brackets. I allow the plaintiffs item no 5 of variation claim no 10 assessed at $23,848; d. the plaintiffs are entitled to charge the defendants the cost of supplying labour to erect scaffolding for purpose of

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inspection by the MRTC after completion of the work as it does not fall within the scope of the plaintiffs' contract; items 1 and 6 of variation claim no 6 are therefore allowed at one manday each at the agreed rate of $53.58.

130 The defendants' stand on the variation claims seem to be that they would recognise them if in turn RSEA accepted that they were variations. This is unreasonable and unfair to the plaintiffs given my finding that the contract between the defendants and RSEA is not incorporated into the plaintiffs' contract with the defendants.

131 In so far as the plaintiffs' claim for overtime is concerned I note the comments of the quantity surveyor that the amounts appear to be inflated particularly for weekends -- I think it is humanly impossible for a worker however able-bodied or motivated to do construction work for 16-20 hours at a stretch. At the same time some of the claims are not properly documented in particular 298 hours for June and July 1989. Therefore although the plaintiffs only claimed 42.62% of what is now the assessed amount of $68,082.93, I am not inclined to award them that percentage amounting to $29,016.94. The figure ($29,016.94) should be further proportionately reduced by 298 hours by the quantity surveyors. I would add that in allowing the plaintiffs some part of their overtime claim, I have in effect given them the benefit of the doubt that there was some delay on the part of Dixxema in issuing the drawings and on the part of Inhwa in delivering the panels.

132 The counterclaim

133 I move next to the defendants' counterclaim which consisted of a) the cost of rectification works as at 24 June 1993 and b) the cost of accelerating the

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works due to the plaintiffs' delay. The counterclaim was also assessed by the two quantity surveyors and the sums agreed; item a) was quantified at $112,061.50 and item b) at $191,704.18.

134 The cost of rectification comprised of

135 (i) fees paid to professional engineers to justify and endorse 'as constructed' subframe members and connections on site which deviated from approved shop drawings and which had been classified as 'defective work' by the MRTC; (ii) fees paid to Roy and to SISIR to verify the rectification method submitted for the MRTC's approval; (iii) labour supplied by other contractors to rectify the plaintiffs' defective works.

136 The cost of accelerating the work included

137 1. payments to Kwan Tong, LSY and Joint Systems for works claimed by the plaintiffs as variations in particular variation claim no 12 and 2. subframes taken over from the plaintiffs (variation claim no 9).

138 I am of the view that the defendants are entitled in principle to their claim for rectification as the costs incurred were reasonable and arose out of the plaintiffs' defective works and or refusal to rectify their defective works. The defendants cannot recover from the plaintiffs and I believe they have not claimed, the cost of replacing the cut panels and subframes under phase 1 of the contract -- they have not rebutted the plaintiffs' contention that there was no written instructions to the plaintiffs not to cut the panels or subframes even if Wye exceeded his authority when he initially gave the plaintiffs permission to cut.

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139 As for the cost of accelerating the works, I accept that the defendants were pressured by RSEA and by the fear of liquidated damages to accelerate the works, hence they brought in Kwan Tong and LSY with the plaintiffs' consent. The end result was that the defendants met the completion deadline and no liquidated damages were imposed on the defendants by RSEA nor by the defendants on the plaintiffs. It is to be noted from cl 2 of the fax that the defendants referred to a penalty clause in their contract with RSEA which they may pass onto the plaintiffs but no amount was stated; in their submissions the defendants gave a figure of $1,300 per day as the liquidated damages payable under the defendants' subcontract with RSEA (see 1DB121). Lew had testified that he understood from Lim Meng Hoon that the defendants' contract with RSEA was in the standard form which meant that he must be aware that liquidated damages (whatever the quantum) would be one of the terms.

140 It seems to me therefore that the defendants are entitled to recover from the plaintiffs the costs incurred in engaging Kwan Tong and LSY to complete the plaintiffs' outstanding work at CCK and BGB stations as it was a measure taken to save themselves, and the plaintiffs from having to pay liquidated damages. Further they are entitled to reimbursement of the payment made to Joint Systems for sealant work as this work is included in the plaintiffs' quotation of $65 per sq m.

141 Turning to the subframes taken over from the plaintiffs, while the plaintiffs were contractually obliged to provide the subframes, it appeared from Lew's evidence that Leong had negotiated with him that the subframes were to be paid for by the defendants or by Kwan Tong or by LSY. Lew's evidence was not challenged by Leong. That being the case, the defendants cannot charge the

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plaintiffs for those subframes but will have to pay the plaintiffs the cost thereof as per their variation claim no 9.

142 Lim's evidence was that the plaintiffs had completed 5,674 sq m of work whereas the defendants had paid them for 6,369 sq m of work, therefore the plaintiffs were overpaid $45,175 (695 sq m x $65). Apart from a bare denial by the plaintiffs, I find no other evidence to contradict the defendants' measurements in the final accounts. Accordingly I accept their figure and the sum of $45,175 must be set off and deducted from the plaintiffs' claim.

143 The conclusion

144 In summary, the plaintiffs shall have judgment on their claim in the reduced sum of $177,159.29 with costs and interest at 6% from the date of the writ which breakdown is as follows:-

145 a) admitted variation claims revised to $119,269.88; b) (i) variation claim no 9 $58,360.26 (ii) variation claim no 10 $20,749.39 (iii) variation claim no 10 $23,848.00 (iv) variation claim no 6 $ 106.76 $103,064.41 $222,334.29 c) Less the defendants' overpayment $ 45,175.00 Total $177,159.29

146 They are also entitled to their claim for overtime which reduced amount should be calculated by the quantity surveyors, also with interest at 6% per annum from the date of the writ. Similarly the plaintiffs are entitled to the cost for supply of additional Chinese labour for 4 days and 6 days after, the Chinese New Year excluding the period 26-29 January 1990 as it has already been taken into account in the sum of $119,269.88. The assessed amount would also attract interest at 6% per annum from the date of the writ.

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147 As for the defendants they are entitled to judgment on their counterclaim in the sum of $290,470.97 with interest at 6% and costs. made up as follows:

148 a. Cost of rectification as at 24.6.93 $112,061.50 b. Cost of accelerating the works $191,704.18 $303,765.68 Less: Sum retained by the defendants $ 13,294.71 $290,470.97

149 As the works at the 3 stations were completed more than 4 years ago, it is unreasonable of the defendants not to have finalised the cost of rectification works to date. Given the evidence of Krishnan, it seems to suggest that the defendants made no serious efforts to do so. Their plea that they attempted but failed, to negotiate a commercial settlement with RSEA is quite irrelevant to the issue. The defendants are therefore not entitled to any further claim for rectification works after 24 June 1993 although they are not precluded from instituting fresh proceedings against the plaintiffs for such additional costs if indeed they were incurred after the date.

150 I give the plaintiffs liberty to apply in view of my findings on the claims for overtime and the supply of Chinese labour over the Chinese New Year period and the defendants liberty to apply where necessary on the counterclaim. Each party shall bear its own costs for the plaintiffs' O 14 application and also for the summons for directions.

Lai Siu Chiu J

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