

COMMISSION OF INQUIRY
INTO THE DIAPHRAGM WALL
AND PLATFORM SLAB CONSTRUCTION WORKS
AT THE HUNG HOM STATION EXTENSION
UNDER THE SHATIN TO CENTRAL LINK PROJECT

CLOSING SUBMISSIONS
FOR
FANG SHEUNG CONSTRUCTION COMPANY

Legend: [X/Y = Bundle Page No./Para.No.]

[X/Y/Z = Day No./Page No./Line.No.]

1. Fang Sheung is a sub-contractor of Leighton for the steel reinforcement bar cutting, bending and fixing works on the Slabs connecting diaphragm walls in the East West Corridor (Tai Wai to Hung Hom) (“EWL”) and the North South Corridor (Hung Hom to Admiralty) (“NSL”) under Contract 1112.

The Issue

2. In this Inquiry, so far as Fang Sheung is concerned, the issue is whether the coupler installation on the Slabs by Fang Sheung compromises structural safety of the station?

Fang Sheung's Evidence

3. Mr. Pun Wai Shan, the director and Mr. Cheung Chiu Fung Joe, the chief foreman of Fang Sheung gave evidence in this Inquiry.

Pun Wai Shan

4. Mr. Pun had been working in the bar fixing industry since 1975. In 1980, he set up Ying Fai Construction Company specializing in bar fixing construction work. In 1989, Ying Fai was renamed to Fang Sheung Construction Company [**PUN's Statement to Police dated 3/9/2018: E1585/1 & E1595.1/1**]. In the past decades, Fang Sheung had undertaken bar fixing works in major construction projects in Hong Kong, for example the Tung Chung Bridge to Chek Lap Kok Airport and the MTR's South Island Line [**PUN's Statement to Police dated 3/9/2018: E1585/2 & E1595.1/2**].
5. Fang Sheung had a long standing business relationship with Leighton since 1992. For each sub-contract entered into with Leighton, Fang Sheung went through stringent tendering process. In the past five years, the bar fixing work sub-contracted from Leighton accounted for 85% of Fang Sheung's turnover [**Day 12/4/8-25**].
6. For the bar fixing work at Contract 1112, Fang Sheung entered into several sub-contracts with Leighton, namely:
 - a. the sub-contract for the rebar fixing with associated works for pile caps dated 23 April 2014 [**E1/180-184**][**Day 12/5/2-18**];

- b. the sub-contract for the reinforcement bar cutting, bending and fixing dated 28 August 2015 [E1/31-59][Day 12/9/25]; and
 - c. the Amendment to the Sub-contract regarding “Delay recovery measures (DRM)-overtime” dated 30 April 2016 [C6/4659][Day 12/18/20].
7. In gist, the scope of contractual duties of Fang Sheung with Leighton under Contract 1112 was that:
- d. Fang Sheung was not responsible for any design on the works [Day 12/10/8-10];
 - e. Fang Sheung was only responsible for the rebar cutting, bending and installation work. All the construction materials, namely the couplers and the threaded rebars were to be provided by Leighton. [Day 12/15/1-2];
 - f. the sub-contract for reinforcement bar cutting, bending and fixing was a re-measurable one, in that Leighton would re-measure and pay the work actually done by Fang Sheung [Day 12/10/19-25];
 - g. Leighton would supply Fang Sheung with working plans. Based on the plans, Pun of Fang Sheung prepared the bending schedule and requested from Leighton for the right quantities of rebars. Fang Sheung charged on a per-tonne basis and the contract sum was re-measured based on the quantities of the rebars [Day 12/14/1-2];

- h. By the Amendment to the Sub-contract, workers of Fang Sheung would be paid at increased rates for working overtime [**Day 12/19/23**]; and
 - i. Should couplers be damaged, it would be the responsibility of Leighton to repair or replace them [**Day 12/31/4-25**].
- 8. As to the actual operation under this sub-contract, Mr. Pun was responsible for administrative work whilst the works quality and progress were controlled by his foremen [**Day 12/7/22**].
- 9. Mr. Pun reiterated that it had been the principle of Fang Sheung that under no circumstances would Fang Sheung allow workers to cut the threaded section of a rebar. For those three or five reported occasions of threaded rebars being cut, Mr. Pun admitted that it could be due to the shoddy, quick or negligent workmanship of his workers [**Day 12/47/12-25**].
- 10. To deal with the workmanship problem, Mr. Cheung, the foreman, had instructed workers not to put up any excuse to cut the threaded rebar and that Fang Sheung would punish or even sack the workers should they become the subject of complaint again [**Day 12/51/7-12**].
- 11. NCR157 was the only warning letter Fang Sheung received from Leighton [**Day 13/73/4**]. He saw NCR 157 the first time at the MTRC interview on 13 June 2018 [**Day 12/38/18**].
- 12. As to this sub-contract, Fang Sheung had settled the final accounts with Leighton save that some retention moneys were still outstanding [**Day 12/11/6-20**].

Cheung Chiu Fung Joe

13. Mr. Cheung obtained a trade test certificate for bar bending and fixing issued by the Vocational Training Council and Construction Industry Council in 2008 [Day 13/93/6-9]. He was the most senior person from Fang Sheung on the construction site of Contract 1112 [Day 13/93/16-21].

Instruction of Coupler Installation

14. Prior to commencing rebar fixing works, Mr. Cheung together with workers of Fang Sheung and foremen of Leighton attended the workshop of BOSA in Hung Hom for the instructions, guidelines and briefings on how to install couplers [Day 13/95/8-20]. Two sheets of documentation, namely Coupler installation method (standard splice – type A) [C10/7009] and Coupler installation method (position splice – type B) [C10/7010] were shown and explained to the workers during the instructions [Day 13/96/10-25]. He had not seen the BOSA document headed “How to measure the thread length – Servisplíce [C7011][Day 13/97/3-13].

Rectification of Faulty Couplers

15. If a coupler was intact, it would only take 20 to 30 seconds to screw a 4-metre threaded rebar into the coupler [Day 14/58/9-14]. It was only when the couplers contained concrete residue or somehow damaged that would impede the installation work. It was Leighton’s duty to rectify the faulty couplers. [Day 14/67/5-8].

16. After Leighton finished exposing couplers from concrete, Mr. Cheung would perform visual check of couplers before bar fixers of Fang Sheung started their work [Day 14/59/1-4]. Couplers contained concrete residue, or damaged in the sense that they were chipped, squashed, flattened, deformed or tilted were considered problematic. He would take photographs of the faulty couplers and notify site foreman and engineers of Leighton responsible for the area to perform rectification. It was only after the problematic couplers had been cleaned, rectified and replaced that Fang Sheung workers would resume bar fixing work [Day 14/59-64].
17. Mr. Cheung kept a site diary [E5/880-968] with photographs and records of construction progress for the period from 23 May 2015 to 31 March 2016 [Day 13/98/6]. The inspection and rectification of couplers were recorded in photographs [E5/1259; 1265-66; 1272] in his site diary [Day 14/83-87].
18. After being notified by Fang Sheung of faulty couplers, Leighton would follow up within a day [Day 14/63/13]. Fang Sheung could choose to work at another area pending the coupler rectification by Leighton [Day14/67/16-20]. Mr. Cheung would also inspect the couplers in advance so that faulty couplers could be rectified at an earlier time. For example, in Area C2-3, the coupler inspection was done on 22 August 2015, 7 weeks before the commencement of the bar fixing work [Day14/84/7-22].

Cutting of Rebars

19. Fang Sheung had portable wire cutter on site. It was for cutting of the following rebars, general rebars, not the threaded ends:

- a. spacer bars [Day13/109/17-21];
 - b. bars for testing [Day13/111/12-16];
 - c. bars to be cut into the right length when the actual layout of the site was different from the drawings [Day13/113/8-10]; and
 - d. bars for providing reinforcement for the core walls [Day13/114/12-20].
20. Mr. Cheung discussed 2 scenarios where the threaded rebars could be cut:
- a. He heard his steel fitting workers mentioning cutting type B threads to convert that to a type A thread rebars. He did not know whether that indeed happened. He had not seen any. He emphasized that it was not the practice of Fang Sheung to do so. He would have stopped workers doing so had he seen the cutting. [Day 14/101-103]; and
 - b. There were situations where faulty couplers could not be replaced. As a remedial measure taken by Leighton, a hole was drilled nearby the faulty coupler and a dowel planted to the hole. Fang Sheung workers would slightly cut the threaded rebar to fit into the faulty coupler. It was his perception that leaving the faulty coupler hollow would be unsightly and might create misunderstanding that the coupler was left uninstalled [Day 14/105-118].

NCR 157

21. According to Mr. Edward Mok, engineer of Leighton, there were 3 incidents, the 1st in September 2015, 2nd in October or November 2015 and the 3rd in December 2015, involving not more than 8 cut rebars being

- cut and defectively installed into couplers. The defective installations were promptly rectified. It respectively took about 15 minutes, 15-30 minutes and one to two hours to rectify the defective bars on these 3 Occasions. In the 2nd and 3rd Occasions, couplers had to be replaced [C8113-8117/28-48].
22. Mr. Mok related the 3 Occasions to Mr. Cheung and reminded him to ensure his workers properly checking the condition of the rebars before coupler installation [C8115/34].
 23. Mr. Cheung gave evidence that on all 3 Occasions, Mr. Mok informed him after remedial work had been done. Therefore, he did not have the opportunity to see the defective coupler connection himself.
 24. As to the 1st Occasion, he could not recall what was said to him by Edward Mok. It did not occur to him that the defective installation related to the cutting of rebars. He did not report the incident to his boss Mr. Pun as he felt that he was competent to handle the matter.
 25. As to the 2nd Occasion, Mr. Cheung was extremely surprised as Edward Mok told him that workers had cut the threaded rebars. He tried to investigate with his workers but no one answered him. He then very severely took them to task. Seeing the seriousness in the matter, he reported the 2nd Occasion to Mr. Pun [Day 14/126-127].
 26. As to the 3rd Occasion, Mr. Cheung fully appreciated the seriousness of the incident because Edward MOK told him that an NCR would be issued to him. He reported the matter to Mr. Pun. Both PUN and himself were very angry with their workers cutting threaded rebars in defiance of the

company instructions.

27. Mr. Cheung called all the workers for a briefing and gave them a stern warning that should cutting happen again, workers would be sacked. He reminded workers that it was not Fang Sheung's duty to make good defective couplers. He briefed workers to inform Leighton if they encountered difficulties with copulers. He tasked more reliable and competent workers to the coupler installation work. He asked the more experienced workers to pay extra attention to ensure bar cutting did not happen again. He personally stepped up supervision [Day 14/134-135].
28. Mr. Man Sze Ho, engineer of Leighton corroborated Joe Cheung's evidence in the some days after the 3rd Occasion, he and Joe Cheung gathered Fang Sheung's workers for a briefing during which workers were instructed not to cut rebars and to approach Man Sze Ho or Edward Mok should they encounter problems with couplers. Workers signed on an attendance sheet of the briefing [C8/5552][Day22/18-19].
29. As to the actual cause of the bar cutting, it was Joe Cheung's evidence that judging from the fact that the remedial work necessitated the replacement of couplers, the cutting of rebars could have originated from a damaged coupler [Day 16/83-86]. The damaged couplers escaped his inspection and were not picked up for replacement. When workers started their bar fixing work, instead of informing Leighton for replacement, workers proceeded to do things in their own way.
30. With the procedure of checking couplers ahead of installation work, Joe Cheung reiterated that the occurrence of workers having to work on damaged couplers should not be frequent. The occurrence of workers

would take it upon themselves to cut rebars would be even rare. He had reminded his workers to draw to his attention if such damaged couplers were found [Day 16/87-88].

31. NCR 157 was the only complaint Fang Sheung received from Leighton. Since the 3rd Occasion, Fang Sheung did not receive a second warning from Leighton. [Day 14/135/23]. He first saw NCR 157 at the MTR interview on 13 June 2018 [Day 14/130/23-25].

Bar Cutting Experiments

32. According to the experiment done at CIC on 8 November 2018, it took 47 seconds to cut a T40 bar using the portable electric band hacksaw provided by Fang Sheung (the type of band saw depicted in photographs D227 & D228) [Day16/62/5]. Joe CHEUNG had done a cutting test and he recalled that it took about 1.5 to 2 minutes to cut a threaded rebar [Day16/62/5]. He explained that the cutting performance could be varied subject to a number of conditions such as the level of battery power and the wearing of the blade. It took at least one hour to charge up the portable electric band saw. The fully charged battery could only cut about 5 to 8 bars. The cutter performance deteriorated as the battery went down [Day16/81-82].
33. If a rebar was not properly cut, the edge may not be even. It would not be possible to screw into a coupler [Day16/90/7].
34. Fang Sheung did not have hydraulic cutters on site as the electricity supply on site could not support the higher voltage required by a hydraulic cutter [Day16/59/10-21]. The so-called hydraulic cutter that Mr.

Jason Poon alleged workers to have been using in photograph D228 was in fact a portable electric band hacksaw [**Day 10/50/19 & 51/5**].

35. In any event, as experiment at CIC demonstrated, cutting with hydraulic cutter would deform the threads of a rebar and precluded any attempt of coupler connection [**per Prof. McQuillan, para.69, ER1/Item 3/page 33**].

D228, Evidence of China Technology & Expert Evidence

36. Staff of China Technology gave evidence on bar cutting. Despite the requests by their boss Jason Poon, none of them made contemporaneous record by taking photographs. None of them came forward to enquire into the circumstances under which workers were cutting the threaded rebars.
37. D228 was the only contemporaneous documentary evidence that Jason Poon was able to adduced on bar cutting. Jason Poon said on 22 September 2015, he saw workers cutting threaded rebars and he took a photograph with his mobile phone (D228) but he did not intervene as those workers were not Chinat staff [**Day 10/24/3**]. Likewise, Jason Poon did not enquire why the workers were cutting the rebar.
38. Why would workers cut the rebars in D228? Prof. Don McQuillan in his expert report analyzed D228 [**para.108, ER1/Item 3/page 44**]. He elaborated that the enlargement of D228 showed that the blade of the band saw, being below the level of the axis of the bar, demonstrated that the bar had already been cut. Prof. McQuillan's postulation is that workers cut a T40 20-thread Type B rebar down to 13 threads. Prof. McQuillan opined that converting a Type B rebar to Type A rebar, though contrary to

BOSA's quality assurance recommendation, was not a practice compromised safety. [**para.108, ER1/Item 3/page 44**][**Day44/125/1-25; 126/20-23**].

39. From the opening up results, it is true that not many rebars achieved 100% engagement. Prof. McQuillan pointed out that there could be site factors, not constitute poor workmanship, which prevented the rebars from being fully screwed into the couplers [**per. Prof. McQuillain, para.124, ER1/Item 3/page 48**]. Tension load tests performed on couplers show that full ultimate tensile stress (UTS) of the rebar, 650MPa, is achieved with only 60% engagement of the threaded rebars. Prof. McQuillan, Dr. Mike Glover and Mr. Nick Southward all came to this view. Dr. Glover further explained that the safety reserve is to provide for different types of threaded connections and to accommodate the uncertainties and inevitable variations in workmanship that can and do occur in construction [**per Dr. Glover, para.7.3, ER1/Item 6/page 10**].
40. Prof. McQuillan noted that based on the Highway Department's acceptance criterion of a 37 mm thread engagement, none of the threaded rebars in the opening up results up to 6 January 2019 appeared to have been cut, as the engaged threads and the exposed threads (one thread equals 4 mm) of the rebars all achieved a combined length of at least 37 mm [**per Prof. McQuillan, para.125, ER1/Item 3/page 49**].
41. Adopting this methodology of Prof. McQuillan, none of the rebars in the opening up results up to 18 January 2019 [**OU400**] appeared to have been cut.

Submissions

42. Based on the contractual arrangements of Fang Sheung and Leighton, Fang Sheung had no reason to cut threaded rebars and would not ask its workers to do so. According to the re-measurable sub-contract, Fang Sheung was paid according to the tonnes and quantities of rebars fixed calculated under the bending schedule. It was not the contractual duties of Fang Sheung to make good faulty couplers. Should any faulty couplers delay the progress of the work which necessitated any overtime working, Fang Sheung workers would be paid at an increased rate. On the other hand, any cutting of the threaded rebars would entail extra cost, labour, and risk. It took only 20-30 seconds to screw in a rebar but at least 47 seconds to cut a rebar. There was no gain but every harm to Fang Sheung to cut threaded rebars.

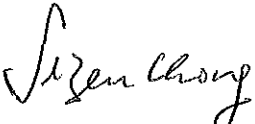
43. As to the 3 Occasions of bar cutting, it was most regretful that workers when encountering difficulties with couplers proceeded to tackle the problem in their own way. Dr. Glover, speaking from his experience, said that workers generally want to do a good job. They do not get up in the morning and maliciously decide to cut 10 bars that day. The construction industry in Hong Kong still has good operatives. [per Dr. Glover's evidence, **Day 43/124/2-25**]. On the other hand, the construction of Hung Hom station was a complex and difficult project involving massive use of couplers. When facing with a difficult task, workers embarked on a foolish course of cutting threaded rebars. It is submitted that the workers albeit reckless, was not malicious and was acting out of misconceived sense of responsibility to get the job done.

44. Evidence reveals that the cutting of threaded rebars would be exceedingly rare, 3 in the evidence of Leighton or 5 in the evidence of MTRC. All had been picked out and remedied. After the 3rd Occasion on 15 December 2015, workers were briefed, warned and inspections were stepped up. Fang Sheung continued to perform and deliver its work which was accepted and paid by Leighton. Fang Sheung received no further complaints thereafter.
45. Mr. Jason Poon once said that there were as many as 30,000 threaded rebars having been cut but later reduced the figure to around 1,000. It is submitted that Jason Poon's complaint has been clouded with his commercial dispute with Leighton and his credibility is in serious doubt.
46. As to the workers of China Technology, their observations were out of context, momentary, at a distance from imperfect angles. Without contemporaneous records, and with the lapse of time, they could only recount their observation from fading memory and yet there was no specific reason for them to remember such observations. All said that they did not investigate with the workers cutting bars as that did not concern them. It is submitted that their evidence is equivocal and at best impression. Mr. Li Run Chao said that he saw bar cutting on 12 January 2015 in Area B which in fact had been concreted at the material time is just an example of the unreliability of the worker's evidence [Day 4/122-123].
47. The expert evidence in particular the expert report of Dr. McQuillan fortified the view that Hung Hum station is structurally safe.

Conclusion

48. The Hung Hum project is complex and difficult. During the long span of time (2013-2016) that it was involved, Fang Sheung and its bar fixers had worked hard and endeavoured to do a good job. As in other construction projects, there were incidents of sub-standard workmanship in this project. These incidents had either been remedied or had no relevance to structural safety. It is submitted that the coupler installation on the Slabs by Fang Sheung did not compromise structural safety of the station.

Dated this the 22nd day of January, 2019.



Sezen CHONG

Counsel for Fang Sheung

