Working Trip to Wangdong and Rongshui
(19 – 21 Dec 2019)

Wong Sing Wa, Jacky – BEng (CivE) II

Wangdong Bridge: A flood destroyed the footbridge connecting the school and the county's downtown. Locals, local government and primary school, local contractor and PMSA together funded 320,000 RMB, designed and constructed a new suspension footbridge. The bridge is now paving the wooden deck and the tension cable is not yet installed.

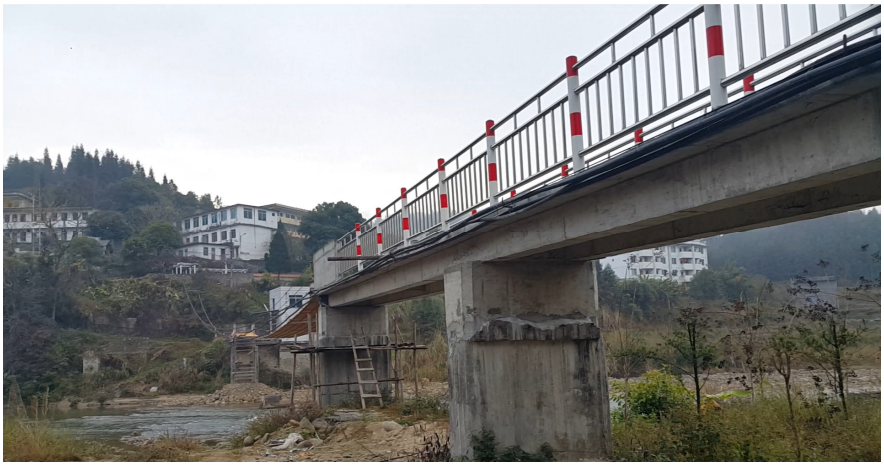

Figure 1 The Construction site of the suspension footbridge

Throughout the site visit, I was inspired the design detail and construction method used by the local contractor to achieve the design, for example:

(1) Increasing the height of the piers by directly pouring more concrete and extend the rebar on the original piers;
(2) Use of rebars which insert into the 1 metre thick concrete and abutment horizontally and vertically by 1.2m to provide counteraction (mainly by friction) to the tension of the steel cable on the school side; Extend the reinforcement of the piers outside the pier concrete and wrap the cables, also wrap the cable around the pier to counteract the tension at the down-town side (mainly by weight of the concrete piers and deck on shore).
(3) A worker will sit on a cage which hangs on two of the deck cables to install the wooden decks;
(4) The 6 deck cables are galvanized to prevent corrosion and is formed by 3 individual cables which are wrapped around the pier at down-town side and connected to a pin joint at school side; (see Figure 2a and 2b)

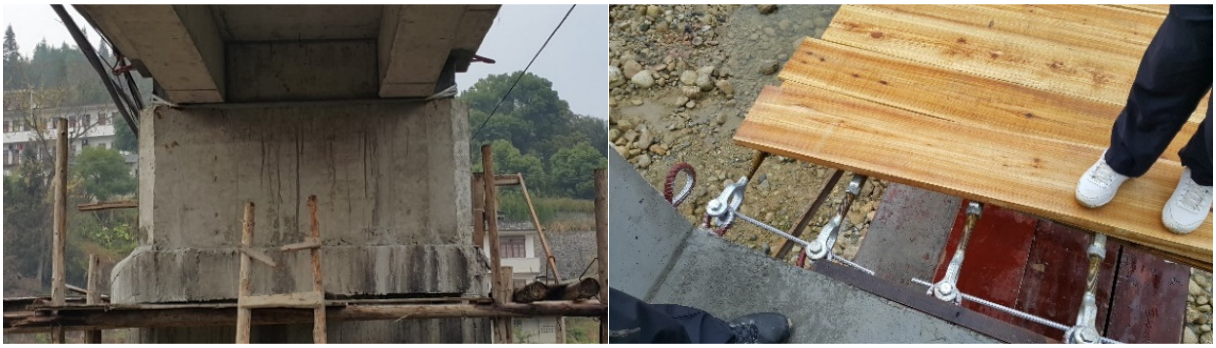

Figure 2a and 2b The cables wrapping around the pier and the structure of the pin joint

Also, I learnt about the overall design mindset of the bridge, like: (1) increasing the height so that flooding is harder to reach the deck level; (2) suspension bridge allow them to construct the new bridge right above the old site without the need of removing the collapsed deck, is simpler to construct and may have better resistance to flooding; (3) this bridge is designed for short term use as the rapid development of the region may change

the local demand of transportation, an over-durable footbridge may not be cost-efficient. Apart from the mindset, Prof. Tham told me that the design team originally proposed a solid bridge with holes on the deck which allow water to pass through but was rejected because of the feasibility issue. This practical example effectively introduces the basic decision-making process of architect, engineer and contractor to me.

And I learnt those two collapsed bridges are all rely on the weight of piers to stand still. If the flood is strong enough, the piers will be pushed away. So, if we want a bridge to stand still, we need pay great attention to the foundation design.

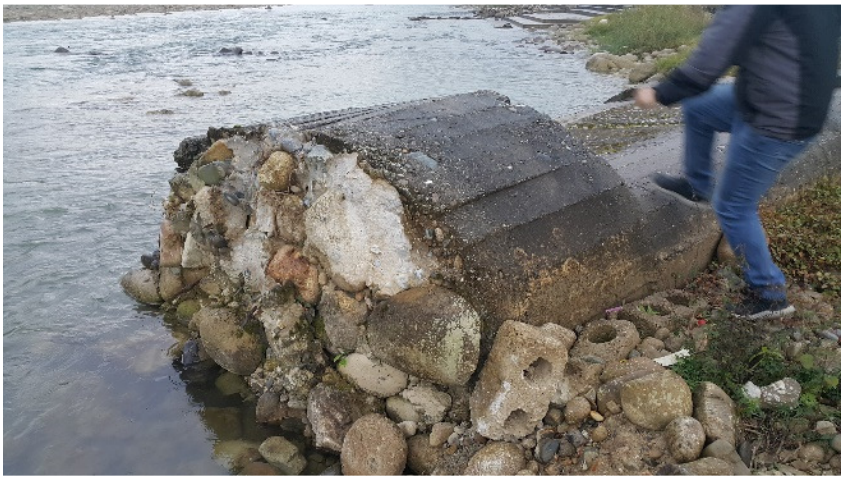

Figure 3 Collapsed old bridge Pier

Moreover, this is a precious opportunity to learn about the construction of small-scale suspension bridge and workflow of small local contractor which is nearly impossible in Hong Kong. It made me realize even small-scale rural infrastructures requires tailor-made and comprehensive design as well as sophisticated document process to maintain a high standard of safety and cost-efficiency.

Besides the suspension bridge, we also visit the 騰村橋 (Tengcun Bridge), and the construction site of a multi-storey government building and 貝江村創業園.

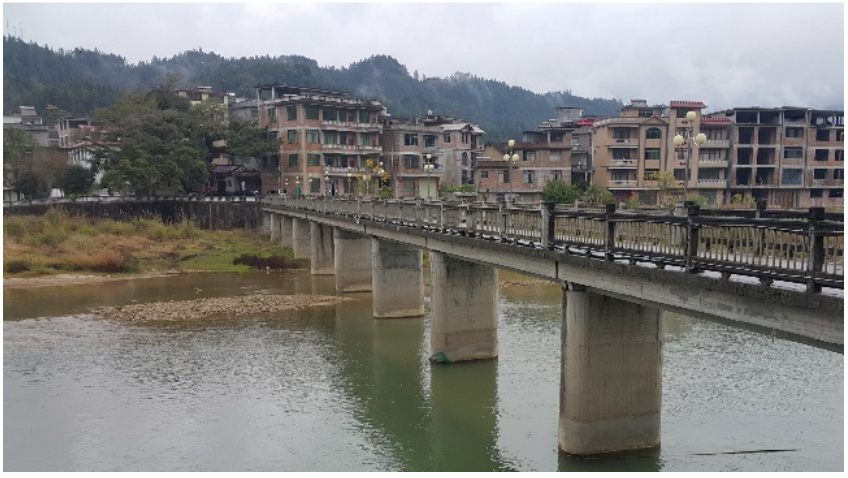

Figure 4 The Tengcun Bridge after righting

Tengcun Bridge: It is a vehicular bridge. Part of the deck and piers of this bridge had inclined during the flood. As most of the components were intact, locals decided to right the collapsed deck and piers. Prof. Tham and contractor introduced the method to us:

Workers built a temporary support first; then they use jack to gradually right the deck and immediately fill the gap between the inclined piers and the deck with wooden planks; finally, they used excavator to right the inclined piers by pushing them. This method require no heavy crane and it is fast and cheap (only about

600,000 RMB). Prof. Tham explained the rent of crane is very expansive, and it may even be higher in rural site; labour cost in this case was cheaper. Therefore, I learnt that the construction cost varies with site location and project scale and sometimes the use of heavy machinery may not always be the best solution.

Multi-storey Government Building: It is a building for national water resource authority. I learnt that the building is originally 1 to 2-storey, but the local government did not want to waste the land. Therefore, they decided to buildings a foundation strong enough to support a building with 4 to 5-storey which allow them to extend the building for other local usages. I think this is one of mindset of client and planner to fully exploit the value of a land. Furthermore, I could observe the wooden formwork and wooden falseworks used for constructing the upper floor slabs and beams closely.

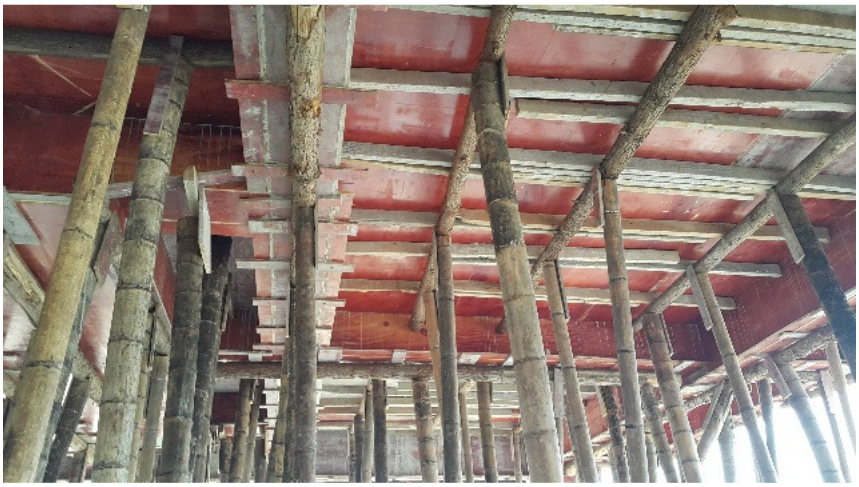

Figure 5 The falseworks and formworks on-site

貝江村創業園: It is a construction site at the city centre. The construction method is moderner (with heavy machinery and higher standard of site safety) and has a much larger scale. I learnt more construction methods, for instance:

(1) Spraying concrete paste to strengthen the slope;
(2) Digging a hole larger than the building perimeter to building the underground structures (like car park) and fill the hole before construction of upper floors;
(3) Mainland tends to use rebar in rolls instead of straight rebars like Hong Kong for ironwork on-site.

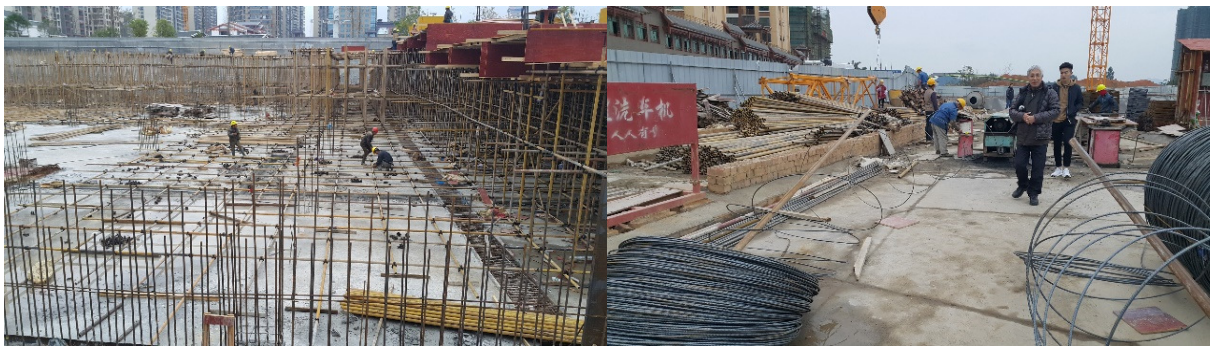

Figure 6a Workers was working on steel falsework; Figure 6b Worker processing rebar from a roll

In this trip, I was also impressed by the development of infrastructure. The new high-speed railway network as well as the highway network has largely shortened the travel time between rural area and downtown, making the trip faster, more convenient and comfortable. Prof. Tham said the journey to Wangdong used to be bumping and slow before the highway is built, and Mr Mung believe the new highway can bring rural goods and people to outside and bring well-being life to locals even they are expansive. These provide me some new perspectives on the evaluation of the cost-benefit of an infrastructure project.

These site visits demonstrate the construction practice and site of condition in Mainland China. Overall, I broaden my horizon on civil engineering field through this field trip.

Cultural Aspect: In semester one, I took a common core course about Chinese ethnic minority. This course has just raised my interest toward Chinese ethnic minority. Therefore, this trip to Rongshui Miao Autonomous County is a great opportunity for me to 'learn outside the classroom'. I indeed learnt a lot of ethnic and local culture and met ethnic locals in this trip. For example, we learn about the traditional Miao scripture Lusheng Zhu (芦笙柱), the local food culture (like 螺蛳粉, hot pot, wine), traditional architecture and custom (like medicated bath; locals like to sit around a fire plate, eat snacks and chat in winter; Zhuang people like singing).

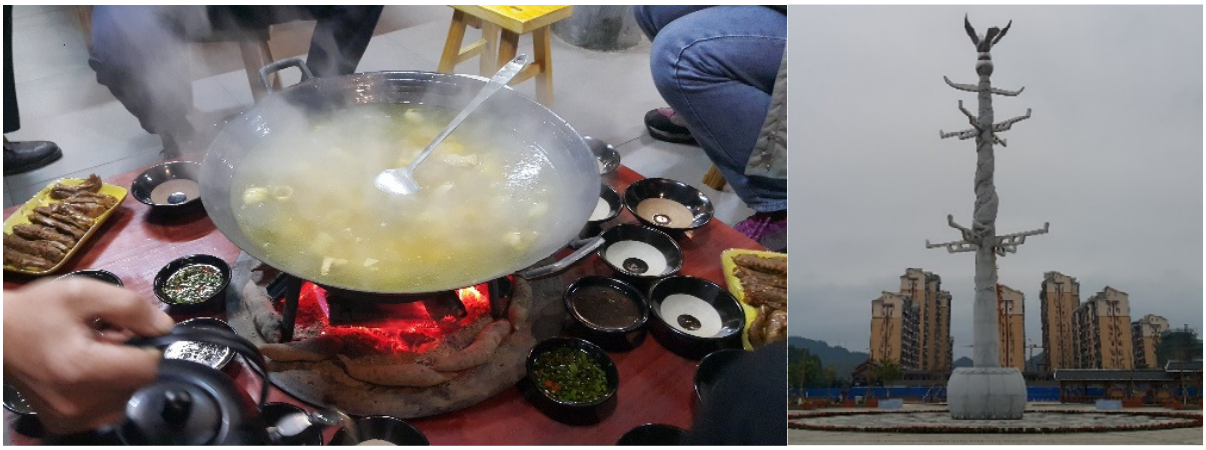

Figure 7a Hot pot; Figure 7b A stone made Lusheng Zhu in downtown of Rongshui

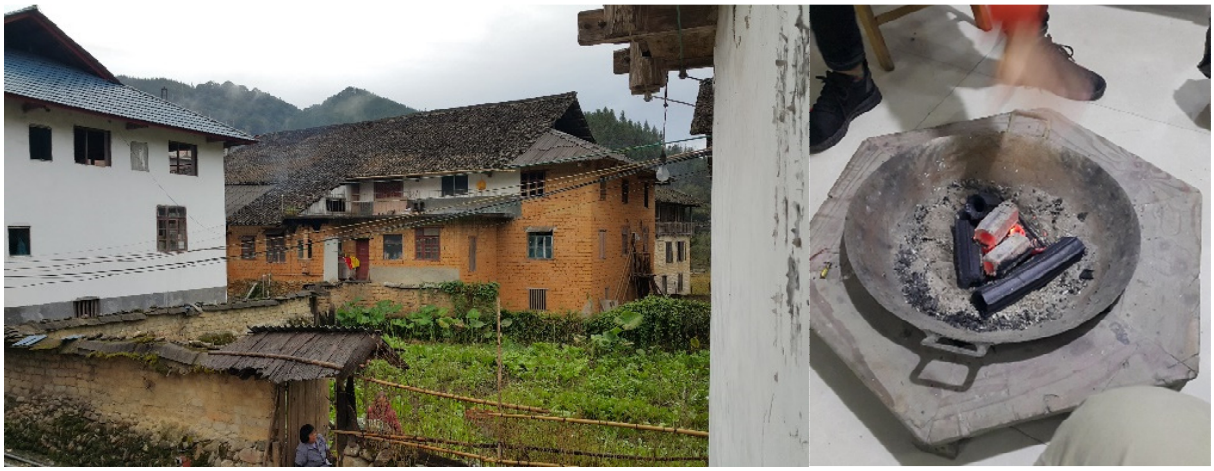

Figure 8a Traditional housing; Figure 8b fire plate

Economical Aspect: Before the end of the second day, we visited an e-commerce centre and learnt about e-commerce and how e-commerce can boost the economy in rural area. It is because PMSA's local partners Mr Mung, and his friends are running e-commerce project supported by government. They wanted to introduce their business to us and hoped to have more cooperation with HKU.

They explored local distinctive crops (like beans, woods, tea, pomelo), livestock (like chickens, eggs, crab, pig) and their processed products (like wine, vegetable oil); they then sign contract with local farmers and workshops for supplying the products to the e-commerce company; the company provide farmers quality control service, start-up training and market information as well as managing the offline, online selling and advertising, logistics and after-sales service. The company can even plan the production amount and type for downstream producer to increase the cost-efficiency of the local economy. By this division of labour, local products have chance to enter outside market and build up the brand image. Moreover, government and Mr Mung hope the e-commerce can help rural area get rid of poverty.

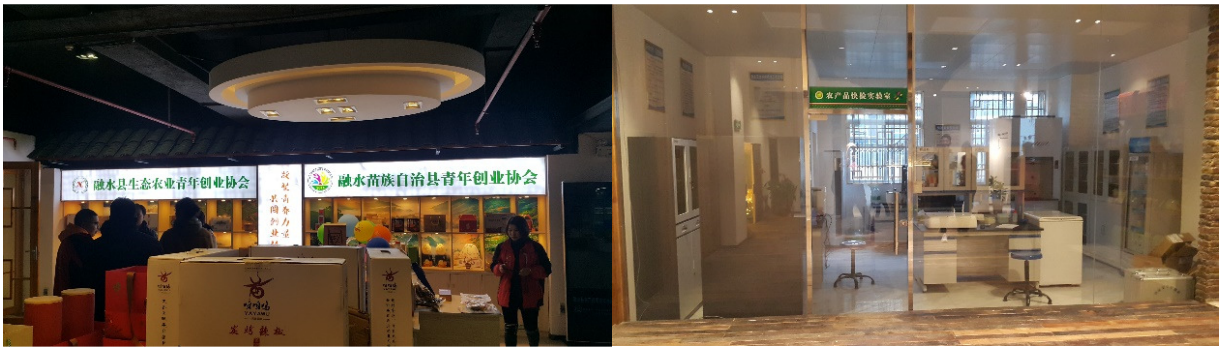

Figure 9a & 9b Visiting of a e-commerce centre in Rongshui

Conclusion: This is my first trip to a Mainland province other than Guangdong. Although we nearly spend two days in this three-day trip in travelling, the experiences I gained are invaluable. In this field trip, I started with curiosity and ended with inspiration and more curiosity, not only about the AEC industry but also the social and economic condition and development of the Chinese rural area. Although I was still confused about others sharing, this remind me the insufficiency of my experience and knowledge in both technical and social area. Last but not least, I would like thanks the generous sharing, companion and entertainment form Prof. Tham, locals and my trip mates, Patrick, Sally, Anila and Candace.

List of team member for the trip:

Teaching Staff:
Ir Professor Leslie George THAM
Anila Ma (Horizon Office)
Candace Mo (Horizon Office)
Sally Ko (Horizon Office)

2 undergraduate students:
Wong Sing Wa, Jacky – BEng (CivE) II
Heung Pak Ki, Patrick – LLB II