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THE HONG KONG INSTITUTION OF ENGINEERS

Assessment Report
on
Guangzhou-Shenzhen-HKSAR
Express Rail Link

October 2009

The Hong Kong Institution of Engineers

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ASSESSMENT REPORT ON GUANGZHOU-SHENZHEN-HKSAR EXPRESS RAIL LINK

EXECUTIVE SUMMARY

Introduction

This report covers the findings by comparing the relative merits on the Government's proposal and the Alternative Integrated Option (AIO) proposed by the Professional Commons (PC) for the construction of an express rail link (XRL) connecting to the hub at Shibi of the high speed rail system in Guangzhou via Shenzhen.

The Task Force

The Hong Kong Institution of Engineers, (The Institution), in response to public queries on its position of XRL as an extension to the National High Speed Rail Network in the Mainland, set up its Task Force to look at the various issues in a proper and professional manner. The Task Force (TTF), as convened by the Immediate Past President, consisted of 5 members from various engineering sectors. Presentation materials from the Highway Department (HyD), MTRCL and PC were used as the basis for this study. TTF also made inquiries to HyD and MTRCL for clarifications.

The Findings

TTF finds increasing presence of High Speed Rail (HSR) in the various parts of the world, and are in keen competition, and at times complementary, with the aviation industry for medium to long distance travel.

It now dawns on the people of Hong Kong that the Mainland government is making a lot of efforts to build its vast National HSR network which would be in progressive commissioning in the next few years. It was therefore high time for us to build our own HSR to connect to the Mainland network if we wish to maintain our position as the southern gateway to the Mainland.

The Institution agreed that XRL must be built in order not to have Hong Kong being "marginalized". It is imminent. The Institution also opined the added values of the project must also be scrutinized in the context of mode choices in travelling.

The Institution found building a functional HSR within the context of Hong Kong and for the best use of resources, it is necessary to locate the terminus in the city centre.

The Institution considered that to realize the economic benefits fully, Hong Kong has to make our HSR solution attractive enough as a destination. It has to be

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appealing not only for the local Hong Kong residents but also to others using the XRL for passage to HKSAR.

The Institution considered that the Government proposal is well balanced

The TTF has also made efforts to study the AIO proposed by the PC. There are general deficiencies in the AIO in terms of railway systems, less realization of strategic values, as well as uncertain land implications.

Conclusion

We owe the duty to make our HSR destination as appealing as possible. In addition, the advantage offered by rail over air is downtown to downtown connection, and it provides better comfort in transit, and enables connection to a huge and fast growing system of rail networks. It would afford us better grounds to compete with regional Air and serves rural areas and mid-size cities in the River Pearl Delta.

The fallacy of the AIO was misinterpretation of what a HSR should be and the choice of terminus location as a midway stop of our MTR.

Unless there were other better and more feasible proposals, the Institution strongly proposed the Government to proceed with the project without further delays before getting into the elliptical chase of decreasing tangible benefits and increasing construction cost.

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Introduction

The HKSAR government has proposed the construction of an express rail link connecting to the hub at Shibi of the high speed rail system in Guangzhou via Shenzhen (XRL). The Hong Kong Institution of Engineers (the Institution) noted, in general, the public supported the project as a means to ensure HKSAR remained abreast with the rapid development in the Mainland. To this end, the Institution was also aware an Alternative Integrated Option (AIO) proposed by the Professional Commons (PC) had received wide media coverage on the merit of whether the AIO is a better option or not.

2. As a professional institution and in order to respond to public queries received during the interim in a proper and professional manner, the Institution set up a task force to assess various issues.

The Task Force

3. The Task Force (TTF) consisted of 5 members from sectors of Industry, Consulting, Contracting, Academia and Government with expertise in Building Services, Civil, Electrical, Mechanical, and Geotechnical disciplines and was convened by the Immediate Past President. Presentation materials from the Highway Department (HyD), MTRCL and PC were used as the basis for this study. TTF also made inquiries to HyD and MTRCL for clarifications. TTF regretted belated request was sent to PC when responsible personnel were not in town for timely clarifications on two issues.

4. It is not the practice of the Institution to make comments on engineering know how in details as this should fall into the remits of hired consultants. On the other hand, the Institution would offer views on general directions, preliminary feasibility and fundamental concepts. In this regard, this report centers on the concept of what constitutes a High Speed Rail.

High Speed Rail (HSR)

5. For medium to long distance there are two modes of transportation, namely, Air and HSR. In some countries these two modes often complement with each other but in others, notably in Japan, where they compete.

6. An airline operating on hub-and-spoke system allows high frequency service between many destinations on a point-to-point basis and is more flexible on destination choices. HSR can offer more frequent stops on destinations in between and along the route result in better accessibility but a slower service.

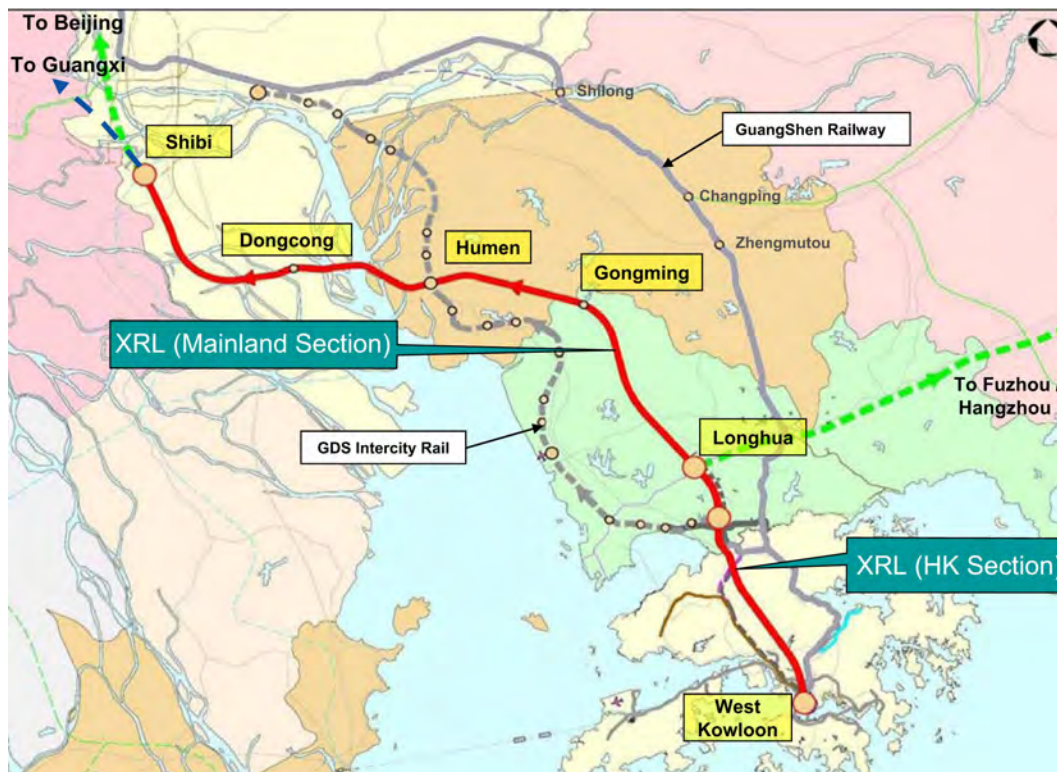
7. For choosing between the two modes of travel of Air and HSR, it is evident that the aggravate time that would be needed for traveling from door to door is a major factor. The degree of emphasis of this factor would vary, depending on the types of passengers.

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8. Historically, the competing nature between Air and HSR was not a concern for HKSAR because as a city-state flights outbound from the airport were all international traffic. There was practical no domestic traffic to speak of, in the context of inter-city travel.

9. The construction of the National HSR network demanded us to examine the role of HKSAR in regional traffic from a different perspective. The Institution opined the recent prolonged public debate was partly fueled by the lack of understanding of an intermediate means of transport between international flights and urban rapid transit.

10. It is now paramount to connect Hong Kong to the rail network if we wish to maintain our position as the southern gateway to the Mainland. The Institution agreed that XRL must be built in order not to have Hong Kong being “marginalized”. It is imminent.



XRL Route to New SZ and New GZ

11. The Institution had no means to ascertain all intangible values of the project but TTF opined the added value of the project in the context of mode choices should be scrutinized.

Travelling

12. Every rail trip has three components: (1) Access to the station, (2) the traveling between stations called “Line-haul”, and (3) Egress from the rail station.

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The impact of Access and Egress variables has a determinant factor on the Line-haul.

13. These variables are intertwined and fairly complicated and have been subject to studies and models stimulation. HSR is a new model to HKSAR. Adopting experience drawn from overseas models must be interpreted in the light of local parameters and characteristics.

14. In essence, the longer the time of the Line-haul, the more tolerant the passengers will be on the combined factors of Access and Egress. This explains even though getting to and out from a distant airport is often hardly a joyous experience, yet the airport is kept moving far away from the metropolitan area, in fact occasionally in between and serving twin cities.

15. Passengers considered time spent on Access and Egress as “lost time” whilst time being spent on Line-haul “productive” as long as it was not interrupted. This is evident by the increasing popularity of the Through Train from Guangzhou to HKSAR even though the alternative with a transfer at Shenzhen could be often faster and definitely cheaper; the problem is the need to break the journey into two parts with immigration control amidst.

16. The individual parameter of and the inter-relationship amongst Line-haul, Access and Egress are the factors that the Institution would use to assess how both the government and AIO would meet the criteria of XRL as below:

Station Location Choice

17. The Institution noted as demonstrated by the news coverage, the major disparity appeared to the public between the proposals from the Government and AIO was the choice of locating the terminus. The Institution wished to point out, the differences were in fact far from what it appeared to be as construction of tracks and other associated facilities have to be differed as the result of the choice taken.

Strategic Value

18. The proposed HSR terminus is aimed at providing two different services, namely the connection to the National HSR for long haul trips, and inter-city shuttle services. For all intents and purposes, the stop at Hong Kong is the last stop at one end of the lines; HKSAR is only a node, not a hub, of the network.

19. First and foremost, if the wish of not being “marginalized” is one of our objectives of building the XRL, Hong Kong has to make our offer attractive enough as a destination. It has to be appealing not only to the local Hong Kong residents but also to other visitors using the XRL for passage to or via HKSAR.

Egress

20. Primarily there are two types of passengers, business and leisure. Their traveling behaviors are different and have diverse attitudes towards Egress, just to

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name one factor. The business travelers would prefer to walk right into central business and commercial districts on arrivals whilst the leisure type could be more indifferent.

21. The proposed location of the terminus at West Kowloon (WKT) by the Government readily serves this expectation of business travelers with added attraction to the leisure type. The alternative location proposed by AIO is an extra trip more remote in term of Egress to town center.

22. This factor concerns not only the physical convenience but also the perceived ease. The Institution wished to point out it was also pertinent to address the different attitudes of passengers on HSR and the inter-city lines.

23. HSR passengers would have a higher demand on the accuracy of estimated time of arrival. They frequently rely on published timetables for trip planning.

24. Here in Hong Kong the locals might have been very expedient in timing down the travelling time of each and different leg of journey including transfers between stations. But for passengers in distance a necessitated last leg to take local track is a huge uncertainty. And that would reflect as perceived Egress hardship, before getting on board.

25. The AIO option proposed an interchange station at Kam Sheung Road (HKIS) and the layout design would allow arriving passengers simply move across the platform for transfer.

26. TTF opined, for passenger taking Tung Chung Line south bound would be confronted with carriages designed for commuters without adequate facilities to accommodate luggage. For airport bound passengers or for those choosing the Airport Line with luggage racks for the south bound leg to town area, they would have to board on the newly constructed extension of Airport Railway (AEL).

27. The Institution found there was no indication how and where immigration clearance would be held in the AIO proposal. But even with immigration control aside, such movement arrangements could hardly ensure that each transfer at HKIS would be alighting and boarding on the opposite sides of the trains as advocated.

28. The Institution wished to point out whilst one could compare routes of transfer calmly on paper, it could be an agony for a visitor arriving in fatigue hauling luggage trying to find out the designated on-going platform and ticket counters to continue the journey, amid commuters.

29. TTF decided there was no material need for this report to examine whether Tsing Yi would be ultimately converted into yet another interchange for the three destinations, namely CLK, HKIS and Kowloon Station.

30. The Institution believed there was no need to repeat the advantages in the context of Egress for passengers arriving at the WKT. The Institution would

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address the matter on the need for CLK bound passengers to travel the length of whole Kowloon twice before reaching the Tsing Yi location in other paragraph.

31. Suffice it to say the Institution agreed with the observation of PC that interconnecting passageways between the WKT and the Kowloon Station should be addressed and enhanced. The Institution also noted PC shared our previous submission that local road traffic in Jordan area should be streamlined. To these, the Institution had received clarifications from both the Government and MTRCL that measures for improvement were in store.

32. Turning to the inter-city passengers, more likely frequent commuters for that matter, the transfer at mid journey would be of no great concern, unless they carry bulky luggage with them.

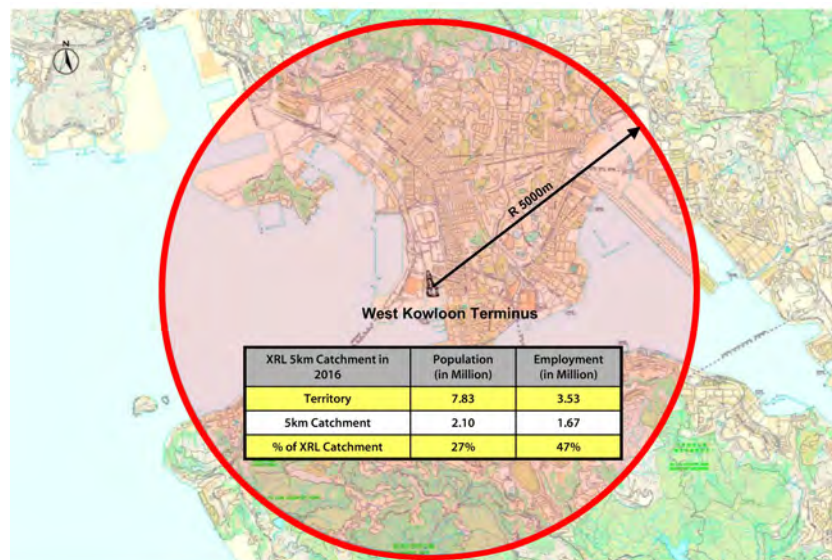
33. For the factor of Egress, the Institution concluded the WKT location was a better choice.

Access

34. Both business and leisure types of passengers exhibit similar patterns of behavior on Access as that of Egress.

35. The Institution noted more studies were available on Access feedback than Egress on the assumption that participants available for survey was more readily reachable on embarkation rather than arrival. At this point, this Report proposes to first deal with the Access of passengers to XRL.

36. The Government produced a chart showing the location of WKT would enable a catchment of 27 percent of population within a 5 Km radius in term of Access.



XRL Terminus – West Kowloon Terminus

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37. The Institution opined whilst it might be relevant for local residents, the effective catchment percentage was understated by failing to take note of the fact that activities of most business travelers and perhaps many of the tourists would be more likely clustering around the urban areas of a smaller radius.

38. It appeared the AIO paid more emphasis on the Access factor on local residents with visitors leaving HKSAR neglected in the estimation to conclude the choice of HKIS at a more northern position would allow a larger catchment. The Institution found such argument of benefit dubious as if moving the terminus northwards would provide more catchment coverage and hence enhanced the factor of Access, it might be more beneficial to move it further north and closer to the border.

39. The factor of Access to HSR terminus is more critical than that to Air travel in order to make the former mode more attractive for journey of mid distance. Many passengers would be travelling with luggage and road vehicles are often utilized.

40. On the face of it, the WKT location would have less room to cater for growing road vehicle access than the HKIS location. The restrained capability for expansion of WKT would likely be off set by the in-town location where the turn around of taxi and other vehicles would be frequent. WKT would also situated between two adjacent rails and in close proximity to ferry terminals.

41. The AIO reported the factor of Access of HKIS in some details. Chiefly by two rails, one existing and one newly constructed.

42. The location of HKIS being immediately next to Route 3 was mentioned. The Institution did not find further information for assessment whether in term of access adequate road vehicle mobility was ensured.

43. Should provisions for road vehicles be taken into account, the construction of HKIS would be of a different scale and building appropriate approaching roads between HKIS and Route 3 would be required.

44. For Access to the terminus, the Institution could only vouch for the WKT.

Line-haul

45. As stated earlier in this Report, the Access and Egress are related variables to and have impact on the factor of Line-haul. Passengers would accept a longer journey as long as it was not interrupted. Passengers would also be more tolerant if connections were made at the early part of journey than towards the end.

46. The WKT proposal offered better comfort to passengers boarding from Shibi where HSR traffic would originate. The need to break the journey at the HKIS location would decimate the competitive edge of the XRL.

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47. The optimal objective of Line-haul was not about only getting down to an absolute minimal of total duration of time for travelling from point A to point B. The attraction of an express train hinged on a longer period of uninterrupted time and lesser fragmentation of journey. Based on these, it would be how the HSR compete with Air.

48. In this connection, the Institution found the benefit of saving minutes within the HKSAR section of XRL not entirely relevant as the true nature of HSR is not a commuter trip made from home to office on Monday mornings. Instead lesser hassle on the journey would be the key to make the HSR competitive.

49. The Institution maintained the government proposal scored better under this principle and offered a better chance on competition with Air.

Air Competition

50. The Institution believed for Hong Kong, the HSR would be more in competition with Air than as its complement.

51. As stated earlier, travelers taking the Government option would be required to make transfer at the Kowloon Station and track back the full distance to Tsing Yi. This would be a set back on the competition edge of WKT.

52. The Institution noted the Government was aware of the handicap and hence a smaller percentage of passengers taking air transfer were envisaged. Further an airport link between the CLK and Shenzhen was planned. All pointing to the expectation that XRL would be competing on its own.

53. To this end, the Institution believed it would be prudent to enhance passageways for air passengers between WKT and Kowloon Station as well as upgrading other amenities like ample installations of lifts and escalators for laden travelers.

54. On balance, the Institution opined the AIO offered no added benefit by providing facilities to Tsing Yi, including an additional section of rail. These provisions were not cost effective since only visitors in direct transit or dwelling in the vicinity would be benefited.

55. On meeting the pre-requisites of HSR, the Institution concluded the AIO failed to demonstrate the proposal was truly a HSR in nature.

56. For completeness, however, TF agreed to examine the technicality to see whether there were other merits worth noting.

Tracks

57. The AIO proposed building a high speed track of 200 kph rating of a length of some 8.4 Km instead of 26 Km as proposed by the Government. There would be considerably saving in cost.

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58. The Institution noted two types of train that would be deployed for traffic to HKSAR would typically require a distance of 4.2 Km and over 8 Km respectively for acceleration to the speed of 200 kph. In other words, according to the AIO a high speed track would be built but not of a adequate length for trains to attain their potential performance and operating in an efficient manner. The Institution questioned the wisdom of this proposal.

59. The AIO was correct that there were spare capacities on tracks running between Tsing Yi Station and Kowloon Station and advocated making use of them. MTRCL advised full capacities would be reached within 3 to 4 years or so instead of around 12 to 15 years to accommodate passengers off the National HSR and Inter-city lines. The Institution opined the premature reach of congested traffic did not justify the overall XRL investment.

Station Construction

60. The AIO showed two options for construction of HKIS, one 8 m above ground and the other 10 m below. The footprint on the attached diagram was basically a sketch of a rectangular block.

61. It was not the intention of the TTF to seek technical design in details but agreed clarifications from PC on whether the footprint would be the same for both options and whether it covered the areas of approaching tracks were useful. TTF also wished to learn what provisions were made for the interconnecting tracks. All these had bearings on the scale of construction and land resumption.

62. TTF also noted the AIO indicated that minimal land resumption was envisaged by locating HKIS at the proposed site. On other front, TTF also noted quite a large sum of about 4 billion was allowed for land resumption.

63. It was unfortunate requests to PC clarifying the above were only made quite recently and at an untimely occasion when responsible personnel of PC were aboard. As promised, TTF made this qualification on our comments on these two matters.

64. The Institution opined construction of HKIS above ground would require negotiation with owners of lands immediately abutting and below. Land resumption might be needed. Construction of the station below ground would require passengers travel upward of about 19 meters, or about 6 building floors, similar to WKT.

65. The construction of WKT was primarily below ground, freeing a vast piece of land immediately adjacent to WKCD. It is more costly to construct.

66. The Institution proposed the level ground be turned into a section of a grand parkland in the area. The Millennium Park of Chicago had moved its 100 years old train terminus to 25 m below ground, giving way to new park features above

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ground. The Institution objected the suggestion from AIO to auction off the area for revenues.



Chicago Millennium Park

67. Construction work of underground station within a congested area would be more onerous, for that matter all work below ground level. The Institution opined engineers in Hong Kong would be capable to coordinate necessary work schedule and have the project completed in time. The Institution found the worry from PC on this issue purely speculative.

68. The Institution agreed with PC that construction would bring undue hardship to the nearby neighbour in terms of traffic congestion and nuisance from work during the construction stage as stating the obvious.

69. The Institution opined building an underground terminus such as WKT in town center topped by parkland would fall in line with the continual quest of sustainability.

Social Benefit

70. The Institution agreed there would be synergistic effects between transportation and land-use.

71. In this regard, the space around the WKT was limited to materialize such benefits. However the Institution believed there would be a mutually rippling effect of commercial benefits with the nearby districts if the appeal of taking the XRL arriving at WKT were enhanced and reinforced.

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72. On the other hand, the location of HKIS was between a motor way and rail track. The Institution regretted to note the construction of the HKIS would be at the expense of a Park-n-Ride car park.

73. Without parking facilities, some of the usual patronage would be turned away. Without provisions of additional roads for vehicles, the HKIS was less attractive as a hub. Expansion of the nearby districts around HKIS would trespass into restrictive parameters of the PLA airport.

74. The Institution viewed the social benefit would be greater with the Government option.

Conclusion

75. The Institution noted there were suggestions by the public to move the terminus off the town center by citing overseas examples.

76. The Institution agreed districts around an off center terminus could become more prosperous and take a leading role to cultivate a new town. The prerequisite would be traffic must come and stop. A hub, that is.

77. The other off town exceptions for a different reason could be found in the States where a down town location did not offer a greater access advantage in decentralized, widely dispersed US metropolitan areas. The Shinkansen in Japan was at the other end, where stations were in town center.



Paris Montparnasse Station



Tokyo Station

78. Hong Kong, once connected to the National HSR would only serve as a node, and in reality one of the last stops of a line, of the whole system. We owe the duty to make our destination as appealing as possible.

79. In addition, the advantage offered by rail over air is the downtown to downtown connection. In particular having the terminal located in the heart of the city.

80. And a dedicated line reserved for HSR all the way to town centre would exemplify the strength of punctuality, increase the comfort in transit, connected HKSAR to a huge and fast growing system of rail networks. It would afford us better grounds to compete with regional Air and at the same time serve rural areas and mid-size cities in the River Pearl Delta.

81. The fallacy of the AIO was that the proposal was not truly a HSR. To save cost, it proposed to share the local commuter track. The choice of terminus location was also more like an interchange station of our MTR.

82. Unless there were other better and more feasible proposal, the Institution strongly proposed the Government to proceed with the project without further delay before getting into the elliptical chase of decreasing tangible benefits and increasing construction cost.



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