From: James Pierce [mailto:jamespa@ozemail.com.au]
Sent: Wednesday, 5 March 2014 12:24 PM
To: Matt Wittwer
Subject: RE: Christiane's Bridge design

Hi Matt,

I have undertaken a quick review of the design as currently presented. Of course I have no local knowledge nor have I visited the site.

With these disclaimers, I make the following comments

1. Is the bridge skew to the flow as I have not got the approach contours sufficient to make that judgement. Piers experience lateral loads due to shape (if rectangular) or filled with debris as may happen here.
2. Piers are shown extending below stream bed and normal water level. This makes for difficulty in construction. While this depends on the Geotech report (that I do not have access to) the pier stems should continue in concrete till above normal stream level. Maybe the 1m of backfill over the footing just needs to be concrete.
3. Steel pier bases should be above normal water level. Concrete filing of the tubes does increase the strength and stiffness of the tubes but may lead to extra loading on the connections. Is there always water here?
4. I presume that the river water is fresh (being at RL 300+).
5. Is the 1:100 even much higher or is it even lower but for a longer duration?
6. While you say that the walking season and the rainy season coincide (I generally don't walk in the extreme rainfall periods unless there is a fantastic waterfall to see) you have to consider how long an access is blocked. A matter of hours or days? My quick guess is that the catchment is about 50 km2. If it is blocked for only an average of 1 day per year then I might opt for a much lower structure and maybe a concrete arch (BEBO Humes). Depends on the approach grades and consequence of afflux & erosion.
7. The **average** stream velocity is lower that the design velocity at the middle of the river and of course the force is a square of the speed. (for flood & debris forces)
8. The wearing surface probably has a waterproof membrane between but even so I always avoid Bondek slabs that are not under a roof as all the reo (pans) can be rusted through. Also Bondek needs propping at that span and removal of props is a WHS issue.
9. Hume Slab is a practical solution with composite action. I think it is close to the limit for propping and a thicker precast (for cover) has to be used to meet the durability requirements of the Bridge code. Steel beams may be moved somewhat inboard (with an open strip for the shear connectors) to reduce the need for propping and maybe slab thickness. The heaviest loading would be a service vehicle or the equipment used for asphalt laying.
10. Are there bearings on the piers or do you allow them to flex laterally for temperature effects or are the bridges simply supported or continuous? (Continuous has more stringent implications).
11. Is the wind truss also needed if the deck acts as a diaphragm (or do you need it for the erection stages). Do you need to vent deck somehow to prevent uplift from entrapped air and to resist uplift forces on a submerged bridge?
12. You need to vent tubes for galvanizing and then plug them so that floodwater does not penetrate. While you could concrete fill the vertical tubes of the piers, the webs are a different matter.
13. Possibility of a precast deck, discontinuous & no wearing surface.

14. Difficult to make barriers collapse with mounting on the side while still having the barriers remaining attached to the bridge.
15. The width of the bridge in Part 14 AustRoads Fig 6.19C does allow down to 2.0m for low use. I note that this is not a commuter or school route and so a lower Load factor could be used but it is always difficult to predict future use. Is this to be rated according to the Walking Track Infrastructure Code? Would this allow more open balustrades that may retain less debris?
16. It is always difficult and expensive to design for log impact on pedestrian bridges. A debris mat may even reduce the impact of a log on the bridge.
17. 1:8.5 grade is at the upper bound for a cycling route for a short (12m) length provided that those ramps are suitably paved.
18. Precast deck units may be an appropriate solution as has been suggested. The headstock however may be more cheaply, quickly & safely constructed using a steel member.

Kind regards

James Pierce
for James Pierce & Associates

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From: Matt Wittwer [mailto:mwittwer@ahc.sa.gov.au]
Sent: Tuesday, 4 March 2014 12:55 PM
To: James Pierce (jamespa@ozemail.com.au)
Subject: FW: Christiane's Bridge design

[I discovered this in my drafts file – forget to get around to actually sending it]

Would you mind running you eye over the attached concept design for a pedestrian bridge at Verdun. While obviously you have no particular knowledge of the site, and no access to calculations etc, but I would value your opinion given your experience in these type of structures. I don't feel I have expertise to review this critically, and would be happy pay for your experienced opinion instead.

I had a couple of queries

- What is the durability of the main supports likely to be with regard to direct impacts and build-up of debris e.g. is damage to coatings lead to corrosion etc.
- Would concrete piers be more durable than steel?
- Is the truss-type support shown likely to be prone to collecting more debris than "H" or box style support .
- Could or should a "sacrificial" CHS (concrete filled?) post be installed upstream to take the impacts, and direct debris around the structural members?
- The designer has flagged minimum width required of 3.0m under Austroads – surely there is another bit of code you work to that allows for a narrower bridge. This bridge would be unlike to be used by more and 20 or 30 walkers a day even in high season, and at 3.0 wide, just seems like vast overkill., and will look out of place in

the landscape. There are no designated bike trails in this area, nor are they likely in the forseeable future.

Gogin into a meeting shortly, but feel free to call me after 3:30 to discuss.

,

Matt Wittwer – **Civil Projects Coordinator, Engineering**
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From: joneaton@bigpond.net.au [mailto:joneaton@bigpond.net.au]
Sent: Friday, 21 February 2014 2:50 PM
To: Matt Wittwer
Cc: Cate Mettam
Subject: Christiane's Bridge design

Hi Matt

I've enclosed the information and design concept that Christiane Husmann has sent just me. She asks for feedback.

Are you able to caste your critical engineer's eye over the design? I would value your opinion.

Perhaps it is possible for you and/or me to confer with an engineer within DCMB? David Cooney is not an engineer as I understand it but I'm conscious that DCMB will need to be kept in the loop.

To my layman's understanding, Christiane has kept to the requirements of a walking/cycling and has understood the challenges at this particular site with her concept of a "breakable, collapsible" bridge that would be repairable if the worst case scenario of an impact during flooding from a large tree. The design is pretty well much what I expected- a simple span with the innovations that I was expecting. That is why Magryn engineers were chosen.

From your engineer's perspective and that of your counterpart within DCMB – will it work?

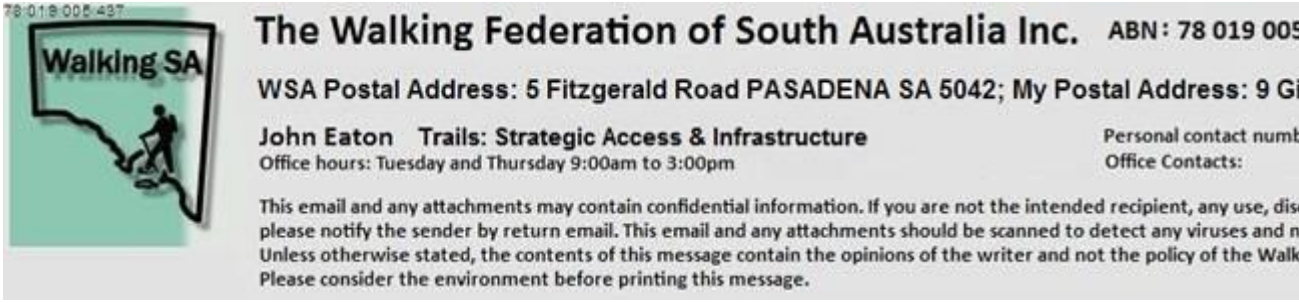
At this stage Christiane has given me no 'ballpark' idea as to the cost of construction, although this is a fundamental piece of info that I will need to include in my final report to ORS on the feasibility study and for when I seek sponsorship for the project. It may cost more for Magryn to do the quantity surveying and arrive at an estimate – although they may consider this tantamount to a quote for the job and fear that they will be held to it. Do you and DCMB have a way of arriving at a ballpark estimate from this design? We do have a quite a bit remaining in the kitty and I will need to have this information in order to determine the feasibility of the bridge design as against the other options we may have to consider. What's the convention in these matters? We are not in a position to put the bridge out to tender - but we need a process for estimating the cost in order to complete the Verdun bridge feasibility study.

I would also like to arrive at a design for the road reserve – track specs, vegetation, schools/community involvement and what's there already in the way of weeds and indigenous species – although ORS have told me that that would be outside the ambit of this study even though I covered this aspect as part of my grant submission and the project will get a bigger tick from the Adelaide and Mt Lofty Ranges Natural Resources

Management Board (AMLRNRMB) for the weeding and biodiversity benefits this aspect of the project will bring.

Best wishes.

John



Christine writes the following explanatory notes:

"I have attached the concept for the bridge at Sandow Rd. We kept the bridge above the 50 ARI year flood inundation so that it will not be flooded frequently. I understand the high season of walking coincides with high flood levels and it is not desirable if the bridge is closed during that time. In addition, there will be less maintenance required in the long run compared to a lower (and shorter) bridge which is likely to be flooded more often. The superstructure has been designed for impact from a floating gum tree; however, the balustrade panel hit by the tree will collapse or be damaged. The concept of discrete panels aims at keeping the damage and repair costs down.

We are showing a 3m wide bridge because this width is specified as the minimum dimension for a shared path according to Austroads, which is the relevant standard for road and bridge design. It also helps reduce conflict between bicycle riders and pedestrians. The desirable width is 3.5m according to the Code. I understand the minimum width also depends on the level of activity, so please let me know if a 3m wide bridge suits you.

I look forward to your feedback. Thank you. "

Regards,

Christiane Husmann

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