Hyder

Rail Access Report

SIMTA

SYDNEY INTERMODAL TERMINAL ALLIANCE

Transitional Part 3A Concept Plan Application

June 2013

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SYDNEY INTERMODAL TERMINAL ALLIANCE (SIMTA)

MOOREBANK INTERMODAL TERMINAL FACILITY (MITF)

TECHNICAL NOTE 6

RAIL ACCESS REPORT

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1 INTRODUCTION

Hyder Consulting (Hyder) was engaged by the Sydney Intermodal Terminal Alliance (SIMTA), to assess the Concept Plan of the proposed Moorebank Intermodal Terminal Facility (SIMTA proposal). Hyder has prepared this technical note to document the rail transport and access issues associated with the site and to respond to the Director General's Requirements for the project.

1.1 Background

The Sydney Intermodal Terminal Alliance (SIMTA) is a consortium of Qube Logistics and QR National. The SIMTA Moorebank Intermodal Terminal Facility (SIMTA proposal) is proposed to be located on the land parcel currently occupied by the Defence National Storage and Distribution Centre (DNSDC) on Moorebank Avenue, Moorebank, south west of Sydney. SIMTA proposes to develop the DNSDC occupied site into an intermodal terminal facility and warehouse/distribution facility, which will offer container storage and warehousing solutions with direct rail access to Port Botany. Construction of the rail connection from the SIMTA site to the Southern Sydney Freight Line (SSFL) will be undertaken as part of the first stage of works for the SIMTA proposal.

The SIMTA site is located in the Liverpool Local Government Area. It is 27 kilometres west of the Sydney CBD, 17 kilometres south of the Parramatta CBD, 5 kilometres east of the M5/M7 Interchange, 2 kilometres from the main north-south rail line and future Southern Sydney Freight Line, and 0.6 kilometres from the M5 motorway.

The SIMTA site, approximately 83 hectares in area, is currently operating as a Defence storage and distribution centre. The SIMTA site is legally identified as Lot 1 in DP1048263 and zoned as General Industrial under Liverpool City Council LEP 2008. The parcels of land to the south and south west that would be utilised for the proposed rail link are referred to as the rail corridor. The proposed rail corridor covers approximately 75 hectares and adjoins the Main Southern Railway to the north and south. The rail line is approximately 3.5 kilometres in length, 20 metres in width (variable width) and includes two connections to the SSFL, one south and one north.

The proposed rail corridor is owned by third parties, including the Commonwealth of Australia, RailCorp, private owners and Crown Land held by the Department of Primary Industries, and would link the SIMTA site with the Southern Sydney Freight Line. Existing uses include vacant land, existing rail corridors (East Hills Railway and Main Southern Railway), extractive industries, and a waste disposal facility. The rail corridor is intersected by Moorebank Ave, Georges River and Anzac Creek. Native vegetation cover includes woodland, forest and wetland communities in varying condition. The proposed rail corridor is zoned partly 'SP2 Infrastructure (Defence and Railway)' and partly 'RE1 - Public Recreation'. The surrounding Commonwealth lands are zoned 'SP2 Infrastructure (Defence)'.

Figure 1 shows the SIMTA proposal in the context of road and rail network.

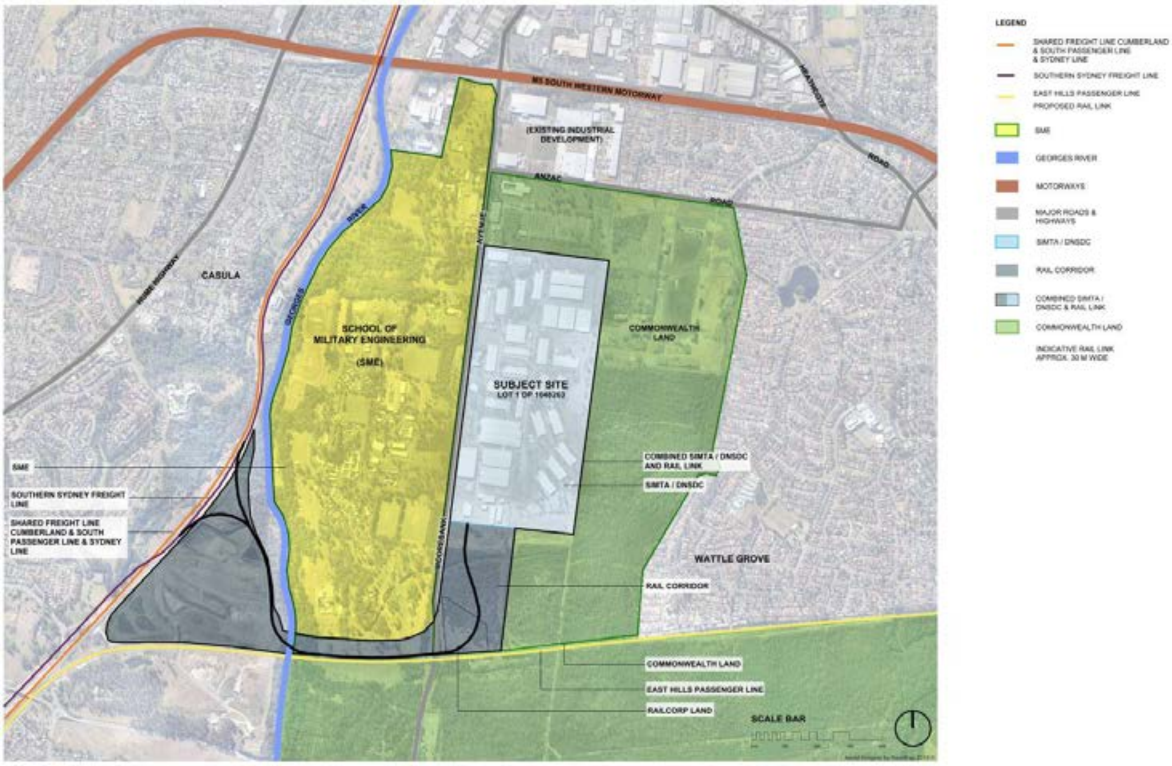

Figure 1: Moorebank Intermodal Terminal site

The SIMTA proposal comprises the following key components:

- **Indicative Rail Link and Rail Corridor**– connecting the SIMTA site with the Southern Sydney Freight Line (SSFL). The detailed design of the rail infrastructure comprising the rail link will be subject to further application and approval process.
- **Intermodal Terminal** – proposed to include on-site freight rail sidings to accommodate local freight trains to Port Botany. Containerised import freight will arrive from Port Botany by rail and be transported to the warehouse and distribution facilities within the SIMTA site, or be directly loaded on to trucks for transport to warehouses and nearby logistics centres. Exports and empty freight containers will be transported to the facility by truck and then loaded onto rail for transport back to Port Botany. The terminal is expected to contain four rail sidings, with areas for container handling and storage. The SIMTA proposal will be undertaken as a staged development. An annually operating capacity of 1,000,000 TEU throughput is anticipated in the ultimate stage, when fully developed.
- **Empty Container Storage** – will be provided within the SIMTA site. Empty containers would either be packed on-site ready for transport to the port by rail, or trucked to off-site locations where they would be packed and returned to the SIMTA site to be loaded onto rail and transported to the port.
- **Warehouse and Distribution Facilities** – approximately 300,000m^2 of warehouse and ancillary offices will be constructed to the east of the intermodal terminal. These buildings will be constructed in a staged development, responding to site servicing availability and market demands. Warehouses will range in size depending on market and tenant needs.
- **Freight Village** – approximately 8,000m^2 of support services will be provided on the SIMTA site. These may include site management and security offices, meeting rooms, driver facilities and convenience retail and business services.

The SIMTA proposal will be undertaken as a staged development and it is intended that an overall Master Plan for the entire site be undertaken for the purpose of applying for Concept Plan approval under Part 3A of the *Environmental Planning and Assessment Act 1979*.

1.2 Purpose of Technical Note

The purpose of this Technical Note is to respond to the Director General's Requirements addressing the key issues relating to the rail component of Transport and Access.

This will form part of a Transport and Accessibility Impact Assessment and will demonstrate how the project will facilitate rail freight transport objectives, meet freight infrastructure requirements and address impacts to local regional rail networks.

It will address access to and from the site and include interaction and integration with existing and planned rail infrastructure and services including the proposed Southern Sydney Freight Line (SSFL), in accordance with the key issues, Transport and Access point 2 of the DGR.

It will review the number of rail freight movements and the capacity of the existing rail system to cope with the predicted increase in traffic based on train modelling, discussions and advice from existing train operators and infrastructure owners that will be impacted by the SIMTA project, in accordance with the key issues, Transport and Access point 3 of the DGR.

It will discuss any likely rail infrastructure upgrades as a result of the SIMTA project initiatives.

1.3 Scope and Exclusions

Scope

The scope of this Technical Note 6 includes the following:

1. Review the operational requirements based on the business objectives of the SIMTA proposal. This included impacts on other existing and potential future users of the site and also the impact on the existing ARTC and RailCorp rail infrastructure interfacing the site.
2. Review the access requirements, issues and solutions and overview the likely requirements for other potential users of the facility and describe how this has been allowed for in the track design proposed for the SIMTA proposal.
3. Review the interaction with other stakeholders including ARTC and RailCorp. Describe how the proposed integration of new rail operations generated by the project will impact on existing and forecast train modelling proposed by the SIMTA proposal. This also looked at the likely interfaces of other users within the facility.
4. Propose suitable rail infrastructure to suit the operational requirements of the SIMTA proposal that will preclude access by other users within the SIMTA site. This included infrastructure requirements to connect with the ARTC/RailCorp main lines. We also reviewed the likely additional infrastructure requirements for other stakeholders (other users, ARTC and RailCorp) as a result of the SIMTA proposal. Consultation with both ARTC and Railcorp was undertaken and this is described in more detail later in this report.
5. This report considers that the total rail movements for both SIMTA and Moorebank Intermodal Terminal Company (**MICL**) Proposal (formerly known as the Moorebank Project Office (**MPO**) proposal) will not exceed those assumed for the SIMTA development for port related freight, given the catchment analysis covered by both developments, contained within.

Exclusions

- Detail Operational Modelling
- Cost Estimates

2 OPERATIONAL REQUIREMENTS

2.1 Need For The Rail Link

The rail link between SIMTA and the SSFL is an essential part of providing the rail connectivity between Port Botany and SIMTA.

The state government is committed to moving at least 28% of containers from Port Botany by rail, and whilst the timing of this objective has been amended it remains one of the most important parts of the freight strategy for Sydney and NSW.

The construction of the SSFL and the planned improvements to its link to Port Botany provides the spine for container movement to the south-west.

Whilst it may be possible to unload containers from rail at other locations across Sydney, and truck them to SIMTA, this would increase the total number of trucks on the road, albeit for relatively shorter distances, and would not meet the requirements inherent in the ‘28% of containers by rail’.

In addition, the logistics of bringing both in and out of SIMTA by road would severely limit the throughput of containers to this site.

It is therefore central to the policy of ‘28% of containers by rail’ that a rail link be provided from the SSFL to, and into, the SIMTA site.

2.2 The Rail Link

The SIMTA intermodal terminal at Moorebank will be predominantly dedicated to receive trains from Port Botany.

The new rail alignment within the SIMTA site will be designed in accordance with ARTC standards, to accommodate critical port shuttle trailing load requirements 600 metres (minimum) which translates to a 650 metre total train length inclusive of locomotives at each end of the train.

This requirement conforms to the *2005 Freight Infrastructure Advisory Board (FIAB) Report and Recommendations.*

It is recognised that the adjacent MICL site will also need to be serviced by a rail connection and potential additional bridge to that proposed by the SIMTA site. It is, however, also noted that the overall catchment for the area is not affected, whether there are one or two intermodal facilities in operation. Therefore the assumptions and statements made in this report in terms of train paths and TEU's are not affected for port related freight by the existence of the adjacent proposal, but in fact refer to a total catchment that could potentially be shared by the two sites.

The current rail alignment and connection to the SSFL is considered to be a suitable alignment to support a future whole of precinct access arrangement, with the MICL site also being able to access through the same connection point. The benefits of this are considered to be of great value, in particular around the reduction in impact on the surrounding communities, as well as the reduction in capital costs of work. Given that the number of train movements servicing the precinct is based on the total catchment, and these same train movements have been considered appropriate for the SIMTA site, then no additional trains servicing the intrastate will need to access to and from the SSFL.

Based on the information currently available for the proposed MICL site, the proposed rail access shown to service that site does not suit a whole of precinct approach, given the complexities in crossing Moorebank Avenue.

The rail operations proposed for the SIMTA site should include the requirement for easy access and to be able to cope with potentially one million TEU's per annum and the should be planned to satisfactorily allow the required train paths to service the site from the planned SSFL rail network.

Subject to agreement with relevant stakeholders, the initial operation modelling anticipates the following train paths as the project develops:

TEU's per year	**Train Paths/Direction/Day**
200,000	5
500,000	11
800,000	17
1,000,000	21

These train paths assume 650 metre long port shuttle trains (inclusive of locomotives), operating 24 hours per day, 365 days of the year on reasonably regular headways.

The SSFL forms part of the ARTC's strategy for reducing transit times on the east coast interstate routes between Sydney-Melbourne and Sydney-Brisbane. An important part of this project runs adjacent to the SIMTA site.

SIMTA rail operations will need to be linked to this in order to fulfil their operational requirements.

The freight demand forecasts from ARTC along the SSFL based on current demand forecasts and interstate growth predictions are as follows:

Corridor	**Freight Demand (Million tonne-km/year)**		
	2005	**2015 low case**	**2015 high case**
Melbourne-Sydney	1,800	4,100	6,200
Sydney-Brisbane	1,700	3,900	4,700

Actual operating scenarios will inevitably be refined as planning for the project develops.

Recent discussions with ARTC indicated that they have a designated train path model that indicates that there are 24 train paths available each way.

With the SIMTA proposal requiring 21-22 paths at its peak, this may severely limit train paths to other users if no improvements were carried out by ARTC to alleviate this limitation in the next 10 years. This could also limit train paths available for containers bound for other intermodals and therefore strengthens the state government's commitment to achieve '28% of containers by rail'. However as the current SIMTA site capacity is based on the capacity of the catchment area, any development within the MICL site would not change the required number of train paths, rather it would require the same number of train paths but possibly with different destinations. With the SIMTA site having the durability to service the entire precinct, the impact on SSFL would be limited; however an independent MICL site access would have impacts to the connectivity to the SSFL.

It was concluded that further capacity reviews were required by ARTC and the project team as the SIMTA proposal progressed. Additional infrastructure on the main line may be required if the predicted projections were to come to fruition.

This would, however, be staged depending on ARTC's corridor capacity strategy development that would take into account ALL users between Port Botany and Moorebank (Sydney Melbourne).

2.3 Train turnaround times

As discussed in detail in Section 2.2 above, at capacity it is envisaged that 21-22 trains will use the SIMTA terminal each day, spread across the entire 24 hour period. This equates to roughly one train per hour. Analysis of the proposed intermodal infrastructure has determined that this turnaround is achievable based on the assumptions below:

- Each train would carry 73 TEU (based on 80% utilisation of 600 m train).
- Each Rail Mounted Gantry Crane (RMG) (or similar) has capacity to undertake 30 moves per hour; equating to 49.5 TEU movements per hour (allowing for 20/40 ft split).
- With two RMGs operational and dedicated to clearing trains it is therefore possible to achieve the 1 hour turn around, leaving 26% redundancy in the system.

The SIMTA terminal will be operating more than 2 RMG's (or similar) and therefore a one hour turnaround of each train is not considered to be an issue.

3 ACCESS REQUIREMENTS

3.1 ARTC Corridor

ARTC advised (letter dated 17 October 2011) that they had undertaken some preliminary modelling that indicates that, although the SSFL in its initial configuration would not be able to accommodate up to the 21 port shuttles per day as proposed by the SIMTA project, it is likely to be feasible to accommodate this additional traffic with appropriate investment.

As such to accommodate 21 services in addition to other forecast traffic will require additional expansionary infrastructure.

Preliminary modelling indicates that the additional task may require two 750 metre loops between Leightonfield and Moorebank, the extension of the existing Moorebank loop and full duplication of the Botany line.

It is important to note that that this is based only upon an initial review and more detailed analysis to indicate that these are feasible projects.

Sites for the proposed loops have been identified based on the availability of adequate corridor width. However, the sites have not had any engineering or environmental feasibility undertaken on them at this stage and as such are conceptual solutions only.

The Moorebank loop extension and Botany duplication have previously had sufficient engineering analysis to indicate that these are feasible projects. None of the identified enhancement projects have been costed and no funding has been allocated toward them at this stage by ARTC.

ARTC advises that they are not in a position to reserve capacity for these proposed potential future users. The *Interstate Access Undertaking* provides a mechanism by which capacity can be added to the network when sought by an applicant and for ARTC to identify what work must be undertaken to provide the sought capacity.

ARTC will be able to give a more detailed response on the scope, timing and cost implications of the requested capacity when SIMTA (or its nominated rail operator) is in a position to make a formal path request.

The ‘Undertaking’ also provides a framework for negotiating the funding of any required capacity enhancement, but ARTC notes that it is not obligated to itself provide such funding.

The required scope will vary from the indicative described by ARTC to the extent that the demand from other users is different to that assumed in ARTC’s current modelling. In this regard, it is important to note that the 21 round-trip paths, together with other users of the rail line, will take the Moorebank – Sefton Park Junction section to around the practical capacity of a single-track railway. Capacity enhancements beyond those identified above are almost certainly possible, but are likely to require major civil works and property acquisition.

It should also be noted that SIMTA’s rail operator will need to validate that the anticipated 21 services required will be sufficient to support a one million TEU terminal and the catchment demand for South Wester Sydney.

ARTC also advised that there is a considerable amount of attention being directed at the future transport solutions for the cross-metropolitan container task and that they are working closely with the NSW Government over the next six months to assist in identifying a preferred strategy for this task and this is likely to lead to a firmer assessment of the scope and timing of capacity enhancements.

ARTC acknowledges that they are very conscious of the opportunities that the proposed SIMTA development offers and they are happy to work with SIMTA to both assist in taking the project forward, and in capacity planning for the SSFL / Botany corridor.

3.2 SIMTA Site

Rail access to and from the SIMTA site has been reviewed in detail, especially given the potential impact and timing of the SSFL implementation.

The design will enable access by SIMTA users and does not preclude access from the School of Military Engineering site, it does not take into account any shared access at this stage. Indications for the adjacent site are that access to that site would be maintained at the northern extent of that site. The current SIMTA site rail configuration does allow for potential delivery to the whole of the precinct, however current indications are that the MICL site proposal will not provide that whole of precinct flexibility

This enables direct access to the SIMTA site from Port Botany.

4 STAKEHOLDER INTERACTION AND PROJECT INTEGRATION

Preliminary discussions were held with ARTC Transport for NSW (TfNSW) and RailCorp regarding the SIMTA proposal.

A letter has been sent to ARTC's CEO, John Fullerton, requesting access to the SSFL and seeking confirmation of train paths that are available to suit SIMTA's operational requirements.

As part of the detailed development requirements, RailCorp have advised that whilst the SSFL will be managed by ARTC, the SSFL is actually located on RailCorp land and as such SIMTA will be required to obtain both an agreement from ARTC for the connection to the SSFL in addition to Railcorp's land owner's consent to enable the construction of SIMTA's proposal.

An additional agreement may need to be obtained from RailCorp for access to various parcels of land affected by the rail line.

Operational impacts from the SIMTA proposal will be utilised by ARTC to input data into their strategic planning and operational modelling. This will in turn enable them to review any potential conflicts or timetabling limitations that will feed into their future growth plans for the SSFL.

This may mean that the design and construction of additional passing loops on the SSFL (or extension of existing designed loops) may need to be implemented sooner than anticipated in the current infrastructure growth plans.

Discussions have been conducted over the past 12 months with both ARTC, TfNSW and Railcorp, although the discussions with ARTC have progressed to a greater extent and ARTC has provided no objection to the project definition design as described below and shown in the attached reference design general layout plans. A number of technical and operational workshops held with ARTC to look at the design options available, and to provide a design that provided satisfactory inter connectivity with the SSFL for both the northern and southern connection branches, resulting in ARTC's 'no objection' to the definition design.

Discussions with Railcorp and TfNSW have also been undertaken, with items discussed to date including the potential quadruplication of the East Hills Line, a future potential Moorebank railway station, and how the proposed SIMTA line and new bridge over Georges River would interact with the existing Railcorp infrastructure.

4.1 ARTC Consultation

A number of meetings were convened between ARTC, Qube, Tactical Group and Hyder to discuss a number of design and operational requirements including:

- Connection of SIMTA's southern connection to SSFL
- Use of Left Hand turn out for the southern connection
- Connection of SIMTA's northern connection to SSFL

All of the above points were discussed in detail with ARTC, and ultimately accepted as being satisfactory. A brief oversight of each option as presented to ARTC is outlined below:

4.1.1 SOUTHERN CONNECTION - GEOMETRY

The southern connection was the subject of most discussions, and after a number of design iterations ranging from a150m radius curve up to a 200m radius, which ARTC initially advised would be the minimum acceptable to them, a business case was put forward by SIMTA for the acceptance of a 160m radius curve which was shown to be compliant with *ARTC Code of Practice, Section 5.1.2 and Section 5.1.1, Table 5.2A*.

Section 5.1.2 begins with a general clause that states: *"This clause specifies the requirements which by definition have a maximum operating speed for all vehicles of 25km/hr".* As the speed of the southern connection has been specified for an operating speed of **35km/hr**, we therefore adopted the requirements of Section 5.1.2 and based our business case for the geometric design on Section 5.1.1.

In Section 5.1.1, *Table 5.2A – Typical and Recommended Limits for Design Parameters Heavy Haul and Intrastate Lines and XPT Type Trains*, states a number of geometric constraints to be taken into account when undertaking a geometric design. Under *Ref 9, Horizontal curve radius*, it states that the 'typical' radius is 200m, with the 'recommended limit' of 150m radius.

Using the ARTC descriptors in the opening statements of Section 5.1.1, the 'typical' and 'recommended limit' were defined. By using the 'recommended limit', which allows for the track to be maintained *within the safety limits* but may result in higher maintenance requirements, Hyder proposed acceptance of a 160m radius curve, as all maintenance of this portion of track will be borne by SIMTA. No objection to this proposal was received from ARTC.

4.1.2 NORTHERN CONNECTION - GEOMETRY

The SIMTA northern connection comes off the SSFL loop with a standard left hand R500:12 tangential turnout with 60 kph train speed. The existing SSFL loop line has been extended north approximately 228m due to signalling overlaps and stopping distances requirements. An additional 81m has been extended southwards.

The SIMTA northern connection has been designed for 60 kph train speed from the clearance point of the SSFL line to the point where the minimum horizontal curve of 200m applies on the curve over Georges River bridges. The train speed over the bridge is 45 kph.

The speed on the 200m radius curve on Georges River Bridge can be increased from 35 kph as stated before to 45 kph by introducing a transition of 25m and super-elevation of 50mm. This can be demonstrated on the Draft Reference Design.

SIMTA's NORTHERN CONNECTION TO THE SSFL	
Design Criteria	**Proposed SSFL Loop Extension**
1. Proposed SSFL Loop turnout TOTP	39km 190.000
2. Current location of the existing SSFL turnout	39km 418.000
3. Proposed SSFL Loop turnout description and speed	Special tangential turnout (R1200:18.5 Base turnout), Speed= 60kmph
4. Proposed SSFL loop line track speed	60 kph
5. Proposed SSFL Loop turnout clearance point	39km 283
6. Proposed SIMTA North connection turnout TOTP	39km 390
7. Proposed SIMTA North connection turnout description and speed	R500:12 standard tangential left-hand turnout , Speed = 60kmph
8. Proposed SIMTA North connection turnout clearance point	39km 450
9. Proposed SIMTA North connection standing room	992m
10. Limit of track, that can permit 60kmph train speed (Geometric TP Location)	0km 870.840
11. Length of track, that can permit 60kph speed from SCP (Safety Clearance Point) of SSFL turnout along the northern SIMTA connection	978m
12. SIMTA Train Length	650m (GW-16)
13. Train stopping distance required to reduce the speed from 60 kph to 45 kph	320m (380m if speed over bridge is 35 kph as stated previously)
14. Minimum required track for train to reduce the speed from 60 kph to 45 kph	(650+320+5)=975m

4.1.3 SOUTHERN PASSING LOOP CONNECTION – TURN OUT

Due to signalling requirements and the interface with the SIMTA connections, the current length of the SSFL loop line is required to increase by approximately 309m. To achieve this under the current constraints, the loop has been extended north for approximately 228m and south for approximately 81m.

Unfortunately, at the southern end of the extension there is an existing communications building, and due to the geometry of the existing tracks in the area, it will not be possible to design a right-hand turn out without affecting the communication building. A right hand turnout for the SSFL loop line requires an SSFL mainline realignment up to approximately 41km 650.000. This will affect the existing communication building which is located at approximately 41km 582.000.

In order to avoid this relocation of the existing communication building we have provided the left hand tangential R1200:18.5 swing nose turnout instead of right hand. The through road is the SSFL loop line and the turnout road is the Main SSFL line but still maintaining 80kph speed. Refer SKR023, rev P1 for more information.

SSFL LOOP EXTENSION AT SOUTH (CLOSE TO GLENFIELD STATION)		
Design Criteria	**Current SSFL Design**	**Proposed SSFL Loop Extension**
1. Turnout TOTP chainage	41km 474.782	41km 580.000
2. SSFL loop line connection turnout	R1200:18.5 Standard tangential Right hand turnout	R1200:18.5 Standard tangential left hand turnout
3. Turnout speed	80 kph	80 kph
4. SSFL Mainline Track speed	80 kph	80 kph
5. SSFL Loop line track speed	60 kph	60 kph
6. Turnout clearance point	41km 405.797	41km 486.000
7. Proposed Location of signals GF16 & GF18	Not applicable	39km 653.000
8. Available standing room from GF16&GF18	1752.797m	1833.000m
9. Effective length of extension	Not applicable	81.000m

SSFL LOOP EXTENSION AT SOUTH (CLOSE TO GLENFIELD STATION)		
1. SIMTA Train Length	650m (GW-16)	650m (GW-16)
10. Stopping distance required from 60 to 35 kph	Not applicable	380.0m [GW-16,Level]
11. Approximate location of existing communication building	41km 582.00	41km 582.00

4.2 RAILCORP/TfNSW Consultation

At this stage, SIMTA are in consultation with TfNSW and Railcorp in developing the proposed rail alignment connecting the SIMTA site with the South Sydney Freight Line (SSFL).

SIMTA are requesting approval from Railcorp (in conjunction with TfNSW) to the proposed concept design which affects Railcorp owned land. Specifically the property titles owned by Railcorp which are directly affected by the proposed SIMTA rail alignment include:

Lot	Deposited Plan	Property Address/Description
1	825352	Part of the East Hills railway corridor and part of land to the north of East Hills Railway Line adjoining Lot 2 DP825348
2	825348	
1	1061150	
2	1061150	
1	712701	
6	833516	
101	1143827	Main Southern Railway corridor
102	1143827	
Conveyance Book 76	Number 361	

Table 1: Affected Lot/DPs from proposed SIMTA rail alignment

The proposed rail alignment will include approximately 3.5km of rail infrastructure and will include two branches line connections from the SSFL, enabling rail traffic to enter the SIMTA rail connection from the north and south. Construction works would generally comprise:

- Construction of a bridge over the Georges River.
- Construction of a culvert style railway bridge over Anzac Creek.
- Modification of the Moorebank Avenue overbridge at the East Hills rail corridor.
- Placement and compaction of sub-grade and blanket.
- Placement of ballast and sleepers.
- Placement of rail and connection to sleepers.

- Installation of services and signalling.

Enabling works would be required within the East Hills railway and Main Southern railway corridors, these works would include:

- Relocation of services, including potable water, sewer, telecommunications and gas.
- Relocation of signalling cables within the East Hills Railway corridor and Main Southern Railway corridor.
- Relocation of a signalling hut within the East Hills Railway corridor.
- Modifications to the existing ARTC Glenfield SSFL passing loop
- Establishment of a protection barrier within the East Hills Railway corridor and Main Southern Railway corridor to allow for the concurrent construction of the rail link and operation of the Main Southern Railway corridor and East Hills Railway corridor.

Major considerations for developing the SIMTA alignment within the existing Main Southern Railway corridor and the East Hills Railway corridor include:

- Accommodating modifications to SSFL to suit ARTC operational requirements
- Enabling works including services and signalling modifications
- Two existing bridges, Georges River bridge and Moorebank Avenue overbridge
- Requirements for Maintenance Access roads
- Existing signalling hut at approximately 30.25km within the East Hills Railway corridor
- Accommodating land allowance for possible quadruplication of Railcorp's existing East Hills Railway line. In undertaking this assessment we have allowed for the new rail line servicing the SIMTA site to be placed in the land directly north of the East Hills line and provided concept sketches (Appendix B) to satisfy that the quadruplication can be catered for to the south of the current East Hills line.
- Possible future Moorebank Railway station at Lot 1 DP825352.

5 INFRASTRUCTURE DESIGN OVERVIEW

A number of concept design options were developed for discussion purposes with ARTC and Railcorp. These options considered a variety of scenarios with respect to the location of the connections to the existing SSFL, turnout types, train speed, signalling configuration and access requirements within ARTC and Railcorp rail corridors. These options are summarised in Section 4 above.

The key objectives for the rail reference design were to:

- minimise the impact to the existing SSFL within relevant rail corridors
- minimise the impact on the operational waste facilities within the Glenfield Waste Facility
- comply with ARTC Code of Practice and guidance
- minimise impact on the Passenger Train line within the East Hills Line Corridor
- minimise land acquisition costs
- comply with operational requirements

Based on the ongoing stakeholder discussions and negotiation a preferred received no objection from ARTC in relation to the tie in to the SSFL rail corridor for further development to reference design which is the subject to this report. At the time of completion the draft reference design, no approval had yet been gained from Railcorp or TfNSW and these discussions are currently ongoing.

The current rail alignment and connection to the SSFL proposed to service the SIMTA site, is also considered to be a suitable alignment to support a future whole of precinct access arrangement, with the MICL site also being able to access through the same connection point to the SSFL. The benefits of providing a single connection point to the SSFL that would service both sites and follows the SIMTA alignment are considered to be of great value, in particular around the reduction in impact on the surrounding communities, as well as the reduction in capital costs of work. Given that the number of train movements servicing the precinct is based on the total catchment, and these same train movements have been considered appropriate for the SIMTA site, then no additional trains servicing the intrastate will need to access to and from the SSFL.

It is expected that there will be a need for the installation of expansionary infrastructure at various locations on the SSFL and East Hills line. The exact nature and scale of these expansions will be developed during the detailed design and at this stage it is expected that the following modifications to the existing rail infrastructure will be required:

- South of the tie in from the southbound loop to the SSFL
- North of the tie in from the northbound loop to the SSFL
- Between the southern and northern connections to the SSFL
- Along the East Hills corridor, with potential to go outside the project boundaries in both the West and East direction along the existing East Hills line

5.1 SSFL Loop Line Modification

The proposed modifications to the SSFL will ensure that ARTC requirements for the Glenfield passing loop are maintained allowing potential operation of future 1800m long trains and all required signalling overlaps to be accommodated within the passing loop.

The SIMTA proposal to connect the rail spur with SSFL to the north and to the south will impact on the loop operation; therefore it was proposed to undertake a modification (extension) to the existing loop. This will result in the length of the passing loop measured from the clearance point of the northern turnout to the clearance point of the southern turnout to be approximately 2200m, as indicated by ARTC as the minimum to be provided.

The proposed SIMTA connections have impacted upon the original SSFL loop arrangement and as such the following changes to the loop have been made:

- The northern turnout has been relocated approximately 230m towards Casula Station on a curved track; therefore the turnout becomes a special turnout, similar flexure R1200:18.5 tangential turnout with the points at approximately 39.190 km.
- The southern standard right hand turnout on the current SSFL loop has been relocated further towards Glenfield Station by approximately 94m but has been specified as a left hand turnout. The reason that this left hand turn out has been changed from the typically provided right hand turn out to a left hand turnout is to avoid any significant impact to the communication building in the vicinity of the points. The provision of this turnout was the subject of a number of design iterations and discussions with ARTC which resulted in no objections from ARTC.
- There will be minor alignment adjustments on the SSFL main line on both ends of the current passing loop due to proposed extensions.

With these changes, the proposed SSFL rail alignment will not encroach onto lands not owned by Railcorp or ARTC

The track will be constructed in accordance with ARTC standards to the necessary class to suit the proposed freight operations and the design.

5.2 SIMTA North and South Connections

SIMTA proposed two connections to the SSFL, namely a northern connection running from the turnout on the SSFL loop line at approximate kilometrage of 39.390 km or (0.00km along the SIMTA alignment) via the Glenfield Waste Facility to the turnout on the proposed Georges River bridge at approximately 1.131 km and a southern connection running from the turnout on the SSFL loop line at approximately 39.880km or (0.00km via SIMTA south connection turnout) via the Glenfield Waste Facility to the turnout on Georges River bridge as well.

The north connection uses a standard left hand R500:12 tangential turnout for 60 kph speed and the south connection standard right hand R190:7 tangential turnout for 35 kph speed.

5.3 Alignment over Glenfield Waste Facility area

The design speed of the alignment on the southern SIMTA connection is 35 kph with a minimum horizontal curve radius of 160m. The length of track that can permit 35kph speed from SCP (Safety Clearance Point) of SSFL turnout connection to the safety point of the special turnout on the bridge is approximately 882m, the required stopping distance for a train speed of 35 kph is approximately 851m

The design speed of the alignment of the northern connection is 60 kph with minimum horizontal curve radius of approximately 350m. The length of track, that can permit 60kph speed from SCP (Safety Clearance Point) of SSFL turnout along the northern SIMTA connection is approximately 978m, the required stopping distance for a 650m long freight train reducing the speed from 60 kph to 45 kph is approximately 975m.

5.4 Alignment over Georges River Bridge

The design speed of SIMTA rail alignment over the Georges River Bridge is proposed to be 45 kph and it is generally single a track with some portion on the western side of the bridge, near the proposed special turnout, as double track. The proposed turnout on the bridge is a special tangential similar flexure outside based on R800:15 standard turnout.

The reason that the turnout is on the bridge is twofold, the required stopping distance for trains travelling along the northern connection at 60 kph, reducing the speed to 45 kph just before the bridge and the property boundaries issue at approximately 1.150km where the rail corridor is not wide enough to allow for two tracks.

5.5 Alignment within East Hills Line Rail Corridor

SIMTA spur line within the East Hills Line corridor is single track with very large radius following the alignment of the existing Up Main.

The current Railcorp maintenance access road is located on the up side of the corridor and can serve both the existing Up and Down East Hills Main lines as well as the SIMTA Rail Spur Line.

In the event of future Railcorp East Hills Line quadruplication then the existing access road may be used for the future Up Relief track, therefore the existing access road could be relocated on the down side of the corridor. In undertaking this assessment we have allowed for the new rail line servicing the SIMTA site to be placed in the land directly north of the East Hills line and provided concept sketches (Appendix B) to satisfy that the quadruplication can be catered for to the south of the current East Hills line.

An existing signalling hut is on the up side of the corridor conflicting with the proposed SIMTA rail spur line therefore it may be required to relocate this hut within the rail corridor.

5.6 Alignment within Commonwealth Land

The rail corridor going east from the Moorebank Avenue and then north from the existing East Hills Lines up to the SIMTA site is on the Commonwealth land. The alignment in this area is designed for 35 kph speed with minimum horizontal curve radius of 200m

Additional infrastructure requirements external to the project scope will be the subject of more detailed modelling and investigation as the project develops further.

ARTC will revisit and update their Main Southern Railway Corridor Capacity Strategy based on the proposed increase in freight from not only the SIMTA site, but also as a result of other potential new operators that will require use of the southern rail corridor between Port Botany and Moorebank (Sydney to Melbourne).

6 ENGINEERING CONSIDERATIONS

The full spectrum of engineering investigations will be undertaken as the project progresses in future design stages. The detailed design phase will be subject to further application and approval process with TfNSW, Railcorp and ARTC, and will be informed by the assessment process undertaken to date for the rail corridor and by subsequent assessment of the rail link.

The findings of this study have identified key engineering areas where mitigation measures may be required in detailed design. The following sections will provide the methodology and process to be followed when preparing the engineering detailed design for future project applications.

6.1 Stormwater and Flooding

The first stage of the flooding and stormwater assessment (using DRAINS, HEC-RAS and MUSIC) will involve quantifying site runoff, any requirements for on-site detention, location of potential flooding impacts on neighbouring land holders and conveyance of stormwater from and around the proposed rail link within the identified rail corridor.

DRAINS software was used to develop a rainfall runoff model to assess the performance of the proposed drainage system along the rail link with respect to mitigating potential flow impacts on neighbouring downstream areas. The DRAINS model was then developed to represent existing site conditions and post development conditions to enable comparison of discharges under the two development conditions. The DRAINS model was run for storm durations of five minutes to 24 hours for the two year, five year, 10 year, 20 year, 50 year and 100 year ARI's, and 15 minute to six hours for probable maximum precipitation (PMP) events.

The Anzac Creek and Georges River flood plain modelling (using a TUFLOW model) assessed and evaluated the 100 year ARI rainfall events and flood levels within the Georges River and Anzac Creek. The results identified in the modelling process will be implemented within the detailed design, mitigating potential adverse flooding and stormwater impacts on neighbouring landholders and used to formulate the basis for the civil drainage design along a defined SIMTA rail link.

The following information will form the database for the flood assessment and stormwater management plan:

- Australian Rainfall and Runoff by the Institute of Engineers Australia (2001).
- NSW Floodplain Management Manual by DIPNR (2005).
- Bureau of Meteorology Rainfall Intensities for the Liverpool City Council Area.
- The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method by Commonwealth Bureau of Meteorology (June 2003).
- Services and Flood Investigation Report for Defence National Storage and Distribution Centre, Moorebank by Cardno Willing (December 2002).
- Anzac Creek Floodplain Risk Management Study and Plan by BMT WBM Pty Ltd (30 May 2008) for Liverpool City Council.
- Georges River Floodplain Risk Management Study & Plan by Bewsher Consulting (May 2004) for Liverpool City Council.
- Practical Consideration of Climate Change Floodplain Risk Management Guideline by DECC (25/10/2007).

- Aerial laser survey provided by AAM Hatch Pty Ltd (May 2008, LiDAR Data Base).
- Ground survey for the site prepared by Hard and Forester (dated 3rd August 2010)
- Liverpool City Council documents:
  - Liverpool Development Control Plan 2008;
  - Liverpool Development Control Plan 2008, Flood planning area map – sheet FLD-013, cadastre 31/7/2009.

The overall stormwater management objective for the rail link within the rail corridor seeks to:

- Adopt recognised standards reflecting current practises adopted for similar facilities around the world.
- Comply with recognised Australian Standards and Liverpool City Council's Development Control Plan 2008, and ensure that post development flows do not exceed the pre-development conditions for any rail link within the rail corridor.
- Provide engineering levels for the rail link above localised flood levels but do not impact upon capacity of existing floodplains.

6.2 Earthworks and Civil Structures

Whilst a proposed rail link has been nominated within the rail corridor, further engineering detail will be required. Once permissibility for rail is determined within the nominated rail corridor, detailed design and further impact assessment will be undertaken to verify the predicted level of impact made during the Concept Plan phase and to identify the need for any additional targeted investigations that may be required to appropriately inform a project application approval. The assessments will be able to consider the actual proposed structural elements identified for the rail link design. These assessments will inform the subsequent project application phase of the SIMTA proposal in order to gain approval to commence construction and operation.

The environmental reports prepared for the Concept Plan application have identified several values that will need to be considered when detailing the engineering design of the proposed rail link. These considerations will include, but not be limited to the following areas;

Civil Structures:

The proposed rail alignment will necessitate the construction of a new Georges River crossing, amendments to the existing Moorebank Ave overbridge and several drainage culvert crossings under the proposed rail line, necessary for the management of stormwater and overland flows.

Further geotechnical investigations will be required along the proposed rail link to determine the geotechnical conditions likely to impact on the design of engineering foundations.

Environmental reports prepared for the Environmental Assessment have identified several constraints that will require mitigation measures during the engineering design development. The location and design of these structures would consider such findings as the proximity to, and crossing of, riparian corridors along the Georges River and Anzac Creek, flora and fauna habitats within the rail corridor, location of bridge piles outside of the Georges River and threatened species located within the rail corridor.

Earthworks and Contamination:

Further site investigation and survey information for the proposed rail link location would be required when detailing the engineering design for the rail link. The locality of the capped contaminated cells within the Glenfield Waste Disposal site has been identified with their location providing the basis for the preferred alignment selected. Design consideration would be given to mitigate any requirements for piering of the rail link through the Waste facility by adopting a reinforced engineered solution subject to further investigation during detailed engineering design to mitigate any impact on the waste cells.

The current investigations undertaken for the rail corridor through the Environmental Assessment process have identified certain values that will need to be considered during the detailed engineering design development of the rail link. It also identifies where additional information and investigations will be required when preparing documentation for the project application for a defined rail link within the rail corridor. Current investigations and reports to date have identified measures that would need to be developed to minimise the impacts associated with the rail link.

6.3 Signalling:

The proposed SIMTA Moorebank Terminal will allow transportation of cargo from Port Botany to Moorebank using the existing ARTC Infrastructure and the newly developed Southern Sydney Freight Line (SSFL).

To enable these operations, a new rail spur line with northern and southern connections joining the SSFL at Glenfield Passing Loop is proposed to be constructed and the associated Signalling system modified to enable the safe operation of trains while maintaining the capacity requirements of the SSFL.

The expected rail traffic operating to/ from the SIMTA Intermodal Terminal consists of port shuttles of up to 650m operating from the northern operation. Longer trains operating from the south will be broken up somewhere else prior to entering Glenfield.

For more details refer the Signalling Functional Specification and Signalling sketches in Appendix C under Draft Reference Design Drawings

6.4 DSS (Detail Survey Services)

ARTC and Railcorp supplied drawings for the existing services in the following areas:

- East Hill Line Corridor
- SSFL Loop Northern Extension
- SSFL Loop Southern Extension

Refer the attached drawings in Appendix C for the Utilities and Services identification and possible impact to the proposed rail alignment.

7 ENVIRONMENTAL CONSIDERATIONS

The following key considerations should be incorporated into the design and construction methodologies for the rail link to minimise environmental impact.

7.1 Noise

Preliminary calculations were carried out to provide an indicative noise impacts on the nearest residential receivers to the new rail link. These receivers were taken as the nearest residential premises to the indicative rail alignment.

Train noise was modelled using line sources within the noise modelling software package CadnaA and the model was validated using RailCorp's Rail Noise Database to within less than 1 dB. If was found that the calculated rail noise levels are well below the absolute trigger criteria for both day and night.

The calculated levels were at least 10dB below the trigger criteria in all cases and it can therefore be inferred that:

- If existing rail noise levels are already in exceedance of the trigger criteria, the combined noise level of the existing SSFL and SIMTA rail link would cause an increase of less than 2dB.
- If existing train levels are below the trigger criteria, the addition of the SIMTA rail spur predictions would not cause the combined noise level to exceed the trigger criteria.

In this way the noise level of the SIMTA rail link on the nearest residential receivers is predicted to comply with the nominated criteria in IGANRIP. This must be confirmed through further assessment once the SSFL is operational and further design of the rail link is complete.

Noise impacts from construction activities must be detailed in a Construction Environment Management Plan and include a Construction Noise and Vibration Management Plan. The Construction Noise and Vibration Management Plan should be prepared based on details of the proposed construction methodology, activities and equipment. This should identify potential noise and vibration impacts and reasonable and feasible noise mitigation measures.

7.2 Air quality

The proposed rail link will be located over 600 m from the closest residential areas to the south (along Goodenough Street) and over 300 m from the closest residential areas to the west (along Leacocks Lane). The SIMTA proposal would accommodate up to 21 train movements per day.

On the basis of these separation distances and the infrequent and transient nature of the train movements (~ one per hour), emissions from locomotives entering and leaving the site are not expected to be significant. While train movements may result in short-term peaks of pollutants (less than a few minutes), emissions would quickly disperse to concentrations that would be unlikely to cause exceedances of air quality goals, considering minimum averaging periods of 1 hour for most pollutants. Further details are contained in the Air Quality Impact assessment (PAE Holmes 2012)

Clearing and earthworks associated with construction of the rail link have the potential to generate dust, causing nuisance to adjacent residents. Dust generated during the construction of the rail corridor and bridge should be controlled as follows:

- Modify working practices by limiting clearing and excavation during periods of high winds.

- Limiting the extent of vegetation removal and topsoil to the designated footprint required for the rail corridor.
- Use of water sprays during rail construction for dusty activities such as ballast dumping and compacting.

7.3 Afflux and flooding

As discussed in Section 6.1, development of the rail link has the potential to cause changes to the site hydrology and afflux within the George's River. The detailed design of the project would seek to ensure that post development flows do not exceed the pre-development conditions for the rail link within the rail corridor. Design of the George's River bridge would aim to limit in-stream structures, thereby reducing the potential for adverse afflux.

7.4 Fish passage

The aquatic habitat provided by the George's River and Anzac Creek has been assessed to be of low value fish habitat. However, to mitigate against the potential for further degradation of the area, the following strategies would be incorporated into design and construction methodology development:

- Design and construction of rail crossings over Anzac Creek and Georges River to be in accordance with Fish Passage Requirements for Waterway Crossings (Fairfull and Witheridge 2003).
- Installation of appropriate drainage infrastructure (e.g. sediment basins), sediment and erosion control to prevent degradation of aquatic habitat.

7.5 Riparian vegetation & bank stabilisation

Works for development of the rail link that involve disturbance to riparian areas, which has the potential to lead to destabilisation and erosion or scour out of banks. To minimise

- As far as practicable, development of the rail link across Anzac Creek and Georges River will comply with the riparian corridor setbacks prescribed under *Guidelines for riparian corridors on waterfront land*. All works within riparian corridors must be undertaken in accordance with planning approval.
- Areas would be rehabilitated and stabilised as soon as possible following construction.
- Potentially hazardous activities would be conducted in accordance with industry standard practice environmental protection measures and in areas isolated from stormwater drainage systems or natural watercourses.

8 CONSTRUCTION

The construction of the rail link will be undertaken over an anticipated 12 month period commencing in early 2014. During the design phase, all relevant design guidelines will be adhered to as necessary to attain the correct level of confidence and approval in the design and the best use of the design standards.

During the construction phase, Railcorp guidelines for construction compliance and the undertaking and scheduling of possessions will be strictly adhered to, where necessary. These standards will be adopted by the successful contractor as it will ultimately be their responsibility to deliver the project to comply with all relevant guidelines.

9 CONCLUSION

The SIMTA rail design has now been progressed to a sufficient level to allow the project to be taken to the next level of design. Discussions with relevant authorities have been ongoing and have now reached a point that has allowed a reference design to be completed that is considered to be a compliant design.

The design has looked at a number of options and opportunities must of which have been the outcomes of internal design review workshops, or in consultation with the relevant authorities and landowners to achieve the best design outcome.

A number of elements of the proposed upgrade still need to be discussed in detail with various parties, but the level of information available limited the possibilities to confirm every detail of the proposal.

APPENDIX A

BRIDGE OPTIONS REPORT

MOOREBANK INTERMODAL TERMINAL OPTIONS STUDY REPORT – BRIDGES

RAILWAY BRIDGE OVER GEORGES RIVER

The proposed railway bridge is for a single-track that will be located on the Up side of the existing East Hills line bridge.

This existing railway bridge (known as the Georges River West Bridge) was constructed in the mid-1980s for the twin-track extension of the railway from East Hills to Glenfield, and comprises five 30.7 metre spans.

The proposed bridge runs parallel and 11 metres away (centre proposed track to centre existing Up Main) for the first span of the existing bridge, then sweeps away on a 190 metre radius curve across the Georges River.

It is usually advantageous when constructing a bridge adjacent to another to align the piers of the new with the existing, for hydraulic and navigation reasons. However, in order to maintain the same span lengths throughout the straight and curved sections of the bridge, the piers would be required to be radial to the curved track.

The proposed bridge length would be in the order of 157.5 metres (five 31.5 metre spans), whereby Pier 3 (located in the middle of the river) would line up with Pier 3 of the proposed bridge. All remaining proposed piers would not precisely line up with the existing bridge piers, due to horizontal alignment differences.

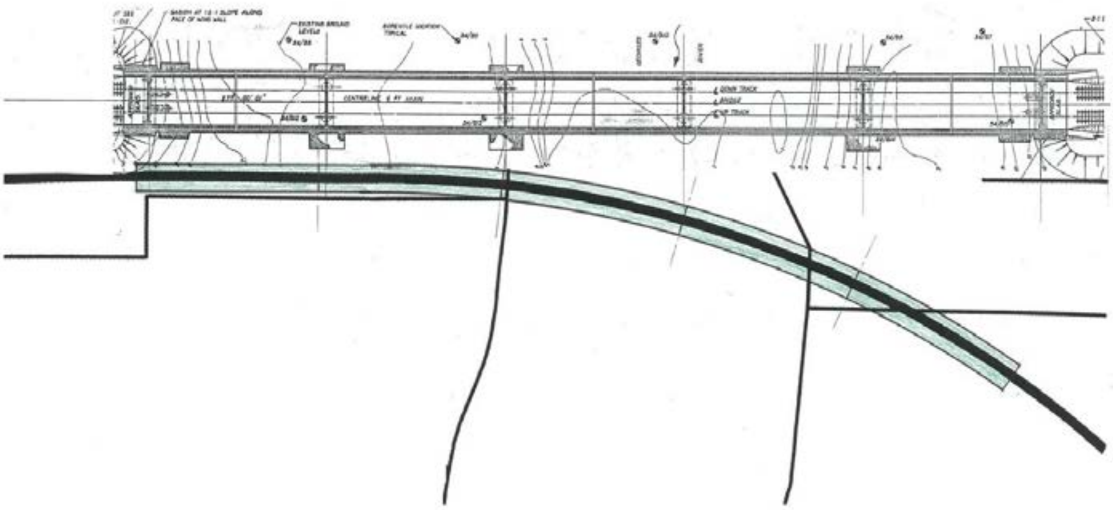

Figure 1 – Plan of Proposed Bridge Configuration

Incremental launching form of bridge construction would not be economical, based on such a relatively short overall bridge length. Also, the combination of part straight and majority bridge length on curve does not lend itself to this type of bridge construction technique.

The bridge will be designed for 300LA railway loading (plus dynamic load allowance), in accordance with AS 5100 *Bridge design* and RailCorp Engineering Standard (Structures) ESC 310 *Underbridges*.

Also, as construction is to be carried out in a minimum period of time, the maximum use of precast or prefabricated elements are necessary.

As such, two (2) broad superstructure types are considered feasible here, as follows:

- Super-T pretensioned concrete girders with cast insitu deck slab; and

- Twin steel I-girders with cast insitu deck slab.

Option 1 – Super-T Girder Deck

The type of superstructure comprises three (3) 1800mm deep pretensioned concrete Super-T girders, together with a 240mm thick cast insitu concrete deck slab.

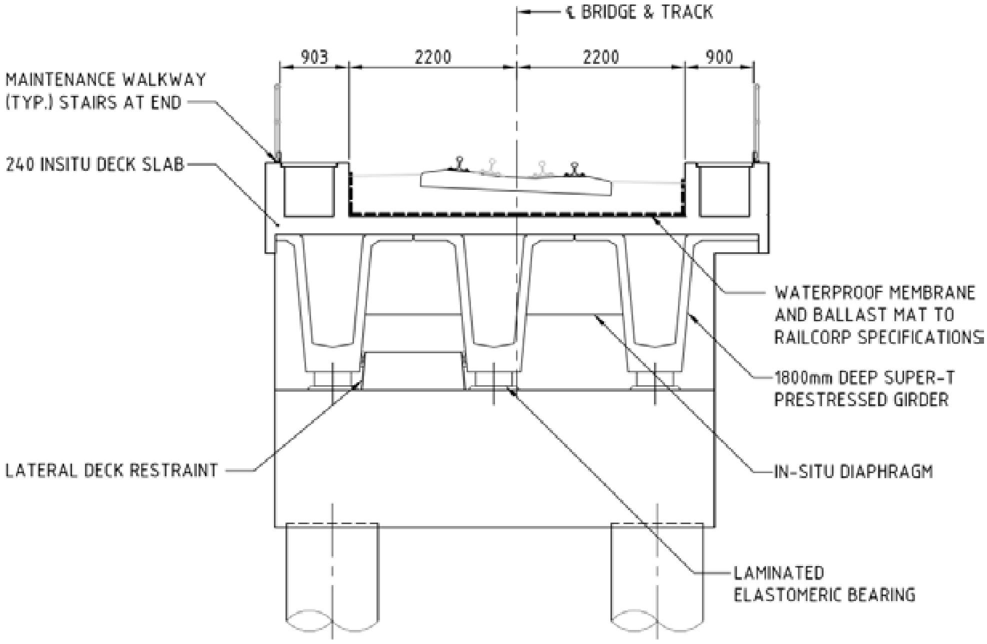

Figure 2 – Superstructure Cross-Section at Pier

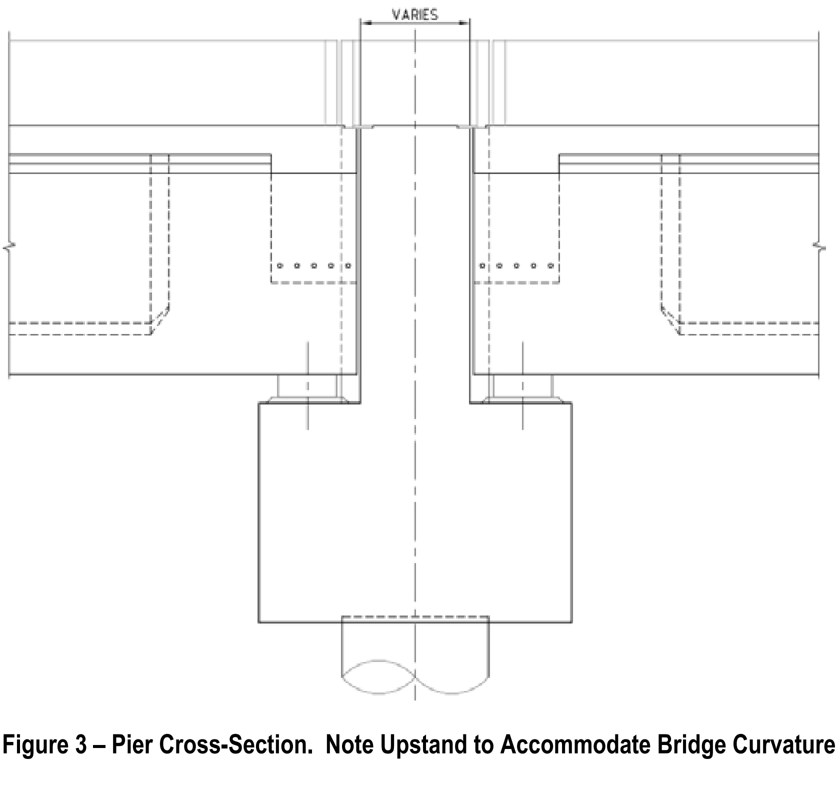

Figure 3 – Pier Cross-Section. Note Upstand to Accommodate Bridge Curvature

Option 2 – Steel I-Girder Deck

This option comprises twin steel I-girders with cast insitu deck slab. The depth of the steel girders would be in the order of 2400mm.

Substructure

The existing adjacent railway bridge's piers comprise twin 1800mm diameter piles that extend as columns above river bed level. A reinforced concrete headstock connects the two columns. This represents an economical form of substructure construction and recommended for adoption for the proposed railway bridge across the Georges River.

MOOREBANK AVENUE OVERBRIDGE

The existing overbridge that carries Moorebank Avenue over the twin-track extension of the railway from East Hills to Glenfield was constructed around 1987/88 and comprises three (3) approximately 13.6 metre spans (13.1 metre perpendicular to tracks), consisting of a post-tensioned concrete slab deck.

This bridge was constructed on the eastern side of the original alignment of Moorebank Avenue, in order to avoid interruption to traffic flow. As such, the current alignment of Moorebank Avenue represents a deviation of the pre-1987 road alignment.

According to the existing bridge drawings, the abutments were designed to be converted to piers for future track amplification. Currently, these abutments are buried in the embankment batter slope.

Examination of the existing bridge drawings would have to be carried out for confirmation, however, it is assumed the existing abutment curtain wall was designed as a removable element, to enable additional spans to be installed.

The proposed SIMTA track, including adjacent maintenance access road, will be located within the existing Span 3 of the overbridge, currently occupied by the road approach embankment batter slope.

Three (3) feasible options are proposed for consideration, as follows:

- Additional span at northern end of overbridge;
- Reinforced soil wall behind northern abutment; and
- New overbridge adjacent to existing overbridge.

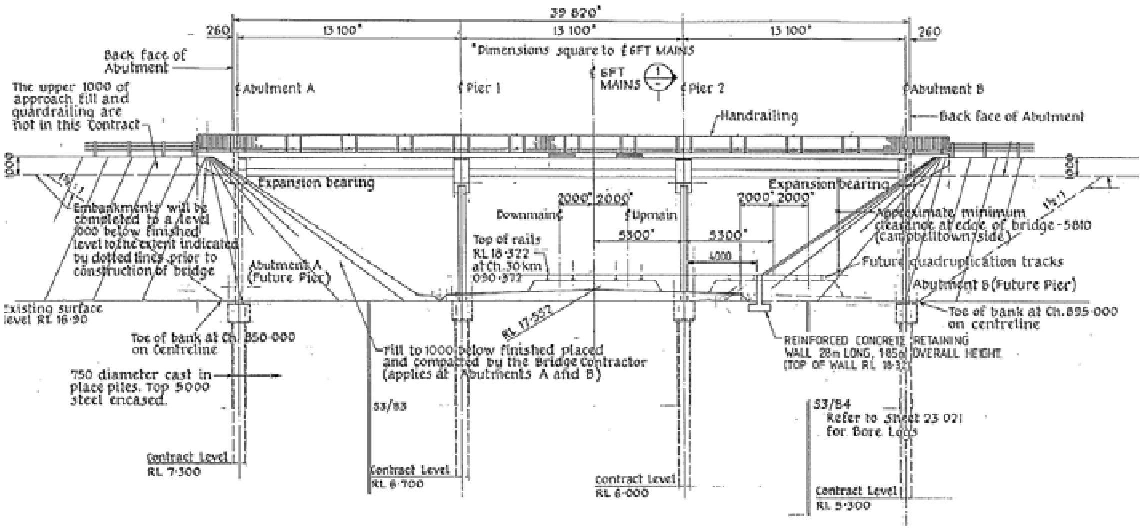

Figure 4 – Moorebank Avenue Overbridge – Existing Configuration

Option 1 – Additional Span

An additional span at the northern end of the existing overbridge will be installed, comprising standard RMS spaced pretensioned concrete planks with a cast insitu deck slab, together with the construction of a new abutment.

Standard RMS pretensioned spaced planks with a cast insitu deck slab would be proposed for this additional span, with an overall deck thickness of 785mm (that is, 535mm plank depth + 175mm deck slab thickness + 75mm thick asphaltic concrete wearing surface).

The bridge will be designed for SM1600 traffic load spectrum (plus dynamic load allowance), in accordance with AS 5100 *Bridge design* and RailCorp Engineering Standard (Structures) ESC 320 *Overbridges and Footbridges*.

To minimise traffic disruption, this work will have to be constructed in stages.

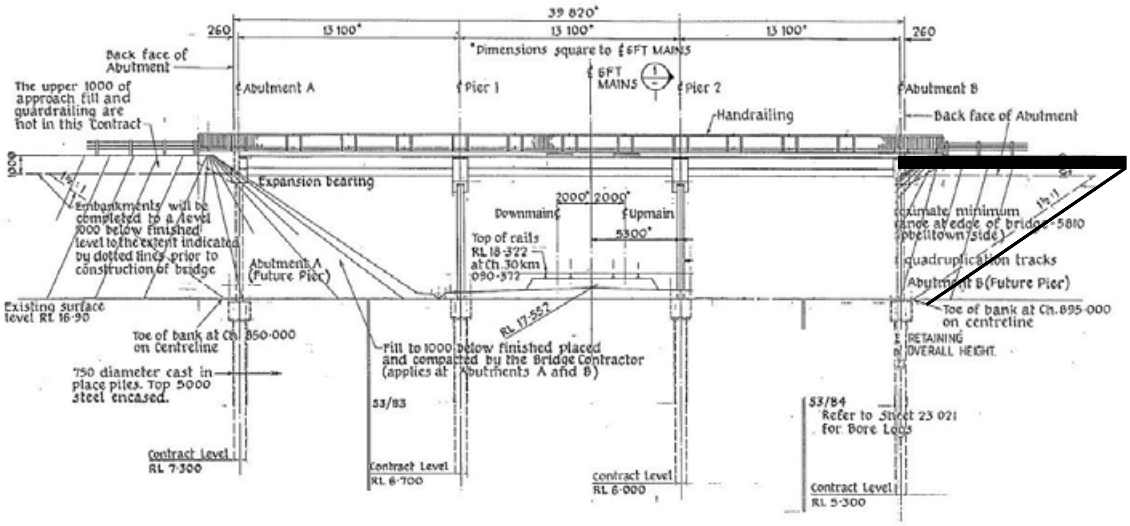

Figure 5 – Additional Span

Option 2 – Reinforced Soil Wall

This option consists of the construction of a reinforced soil (RS) wall immediately behind the existing northern abutment (Abutment B). The RS wall will retain the approach road embankment and obviate the need to extend the overbridge.

In order to construct the RS wall and minimise disruption to traffic flow, temporary bridge systems (e.g. Bailey bridging) would be installed to span from the existing northern abutment to a temporary high-level abutment footing.

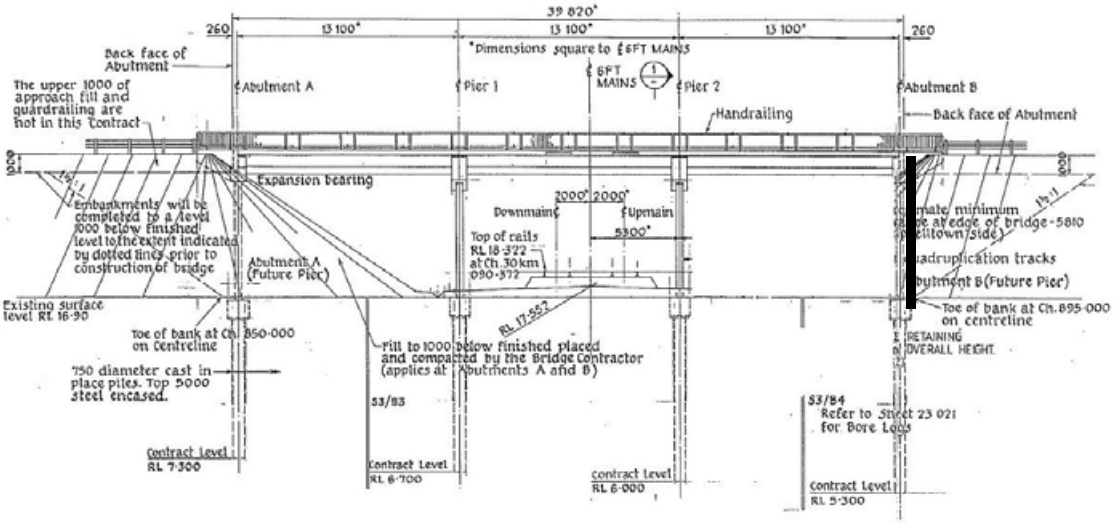

Figure 6 – Reinforced Soil Wall behind Abutment B

Figure 7 below shows a vertical-face RS wall application at an overbridge abutment.

Figure 7 – Overbridge with Reinforced Soil Walls at Abutments

Option 3 – New Overbridge

This option involves the construction of a three (3) span overbridge adjacent to, and west of the existing overbridge.

Construction of the bridge would not interfere with the flow of traffic along Moorebank Avenue and the final alignment of the road would represent a reinstatement of the original straight horizontal alignment.

The proposed bridge would consist of three (3) spans, of similar span lengths as the existing bridge, however, the abutments would be of vertical-face reinforced soil wall construction.

Standard RMS pretensioned spaced planks with a cast insitu deck slab would be proposed for the superstructure, with an overall deck thickness of 785mm (that is, 535mm plank depth + 175mm deck slab thickness + 75mm thick asphaltic concrete wearing surface).

The three (3) spans would accommodate future RailCorp quadruplication (within Span 1), existing double-track East Hills line (within Span 2), and SIMTA track and associated maintenance access road (within Span 3).

The bridge will be designed for SM1600 traffic load spectrum (plus dynamic load allowance), in accordance with AS 5100 *Bridge design* and RailCorp Engineering Standard (Structures) ESC 320 *Overbridges and Footbridges*.

ANZAC CREEK CULVERT BRIDGE

The existing structure that carries Moorebank Avenue over Anzac Creek is a small box culvert.

At the location of the proposed railway line, approximately 100 metres downstream of this road crossing, it would be envisaged a relatively small box culvert-style railway bridge would only be necessary to provide for Anzac Creek.

Ken Maxwell

Associate Technical Director, Bridges

Hyder Consulting Pty Ltd

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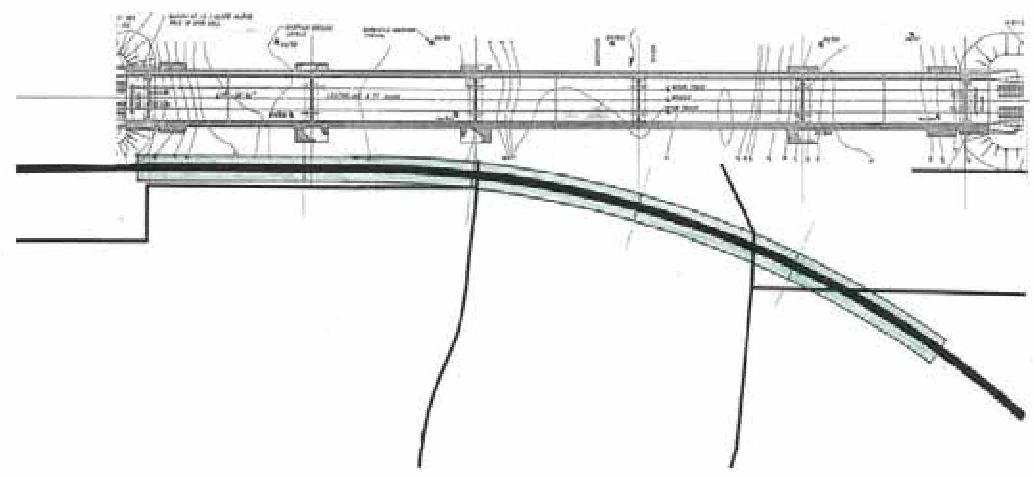

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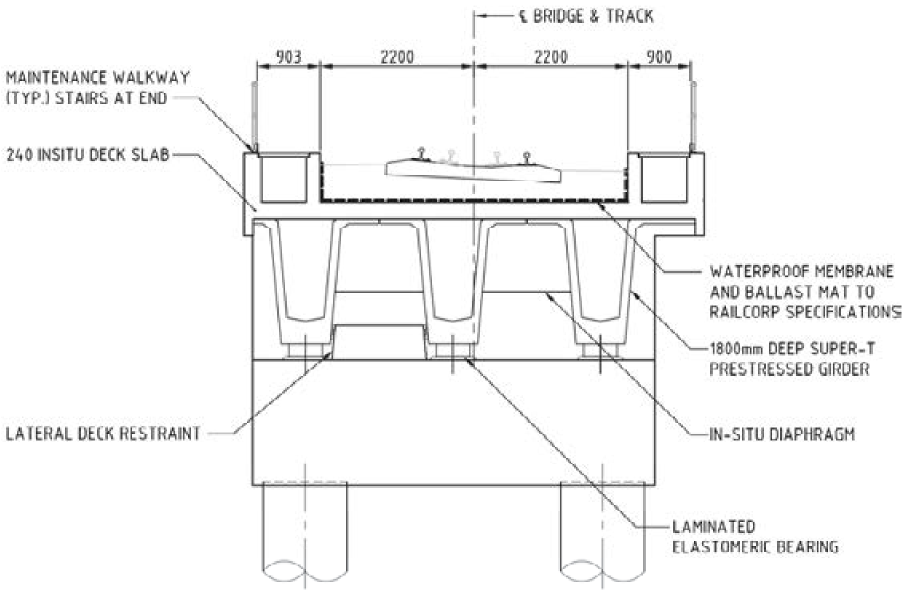

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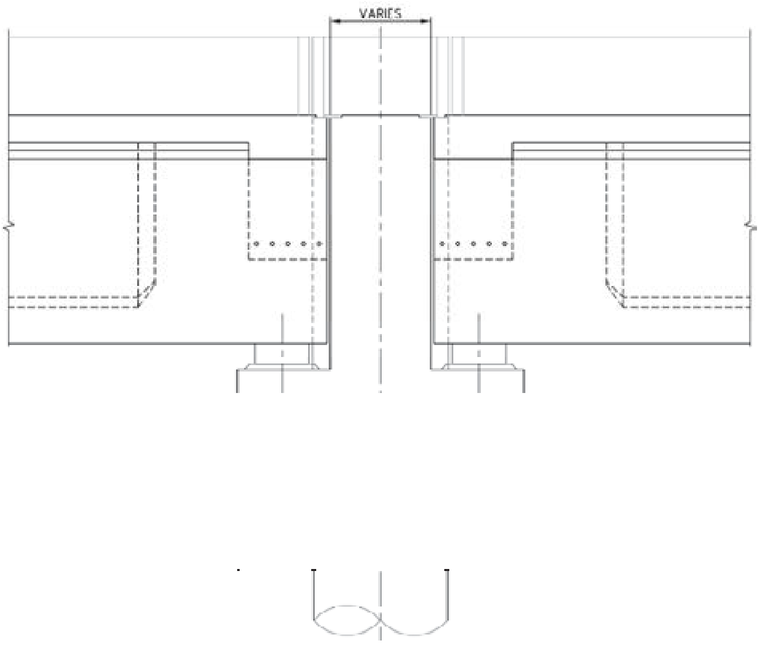

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According to the existing bridge drawings, the abutments were designed to be converted to piers for future track amplification. Currently, these abutments are buried in the embankment batter slope.

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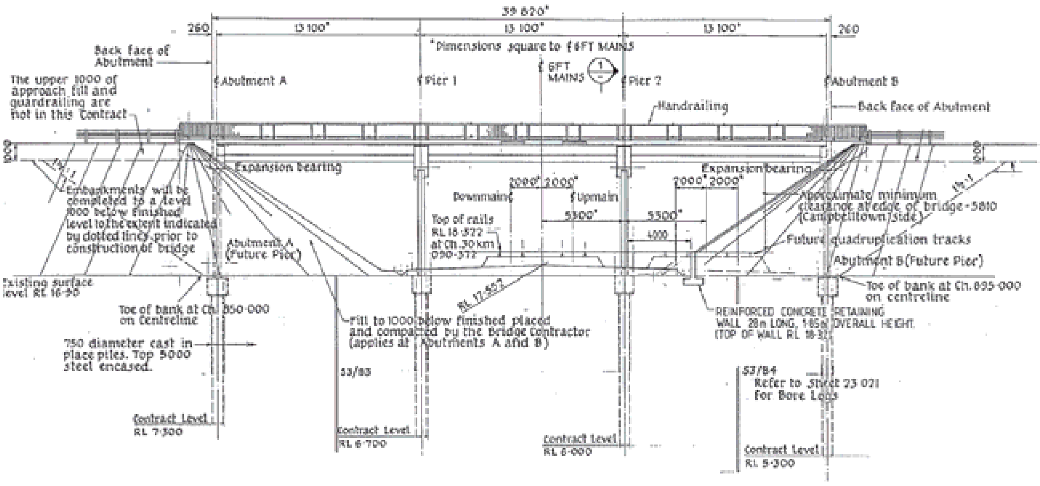

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Standard RMS pretensioned spaced planks with a cast insitu deck slab would be proposed for this additional span, with an overall deck thickness of 785mm (that is, 535mm plank depth + 175mm deck slab thickness + 75mm thick asphaltic concrete wearing surface).

The bridge will be designed for SM1600 traffic load spectrum (plus dynamic load allowance), in accordance with AS 5100 *Bridge design* and RailCorp Engineering Standard (Structures) ESC 320 *Overbridges and Footbridges*.

To minimise traffic disruption, this work will have to be constructed in stages.

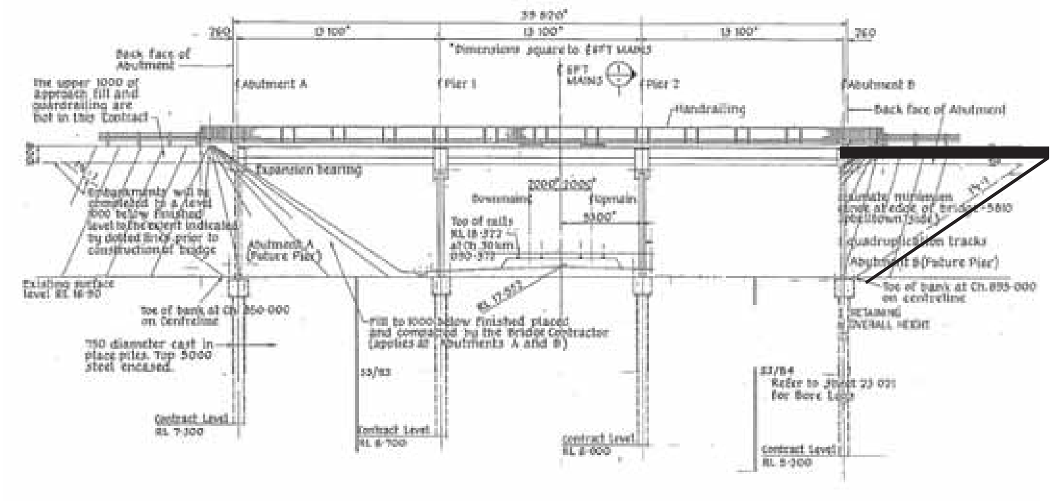

Figure 5 – Additional Span

Option 2 – Reinforced Soil Wall
This option consists of the construction of a reinforced soil (RS) wall immediately behind the existing northern abutment (Abutment B). The RS wall will retain the approach road embankment and obviate the need to extend the overbridge.

In order to construct the RS wall and minimise disruption to traffic flow, temporary bridge systems (e.g. Bailey bridging) would be installed to span from the existing northern abutment to a temporary high-level abutment footing.

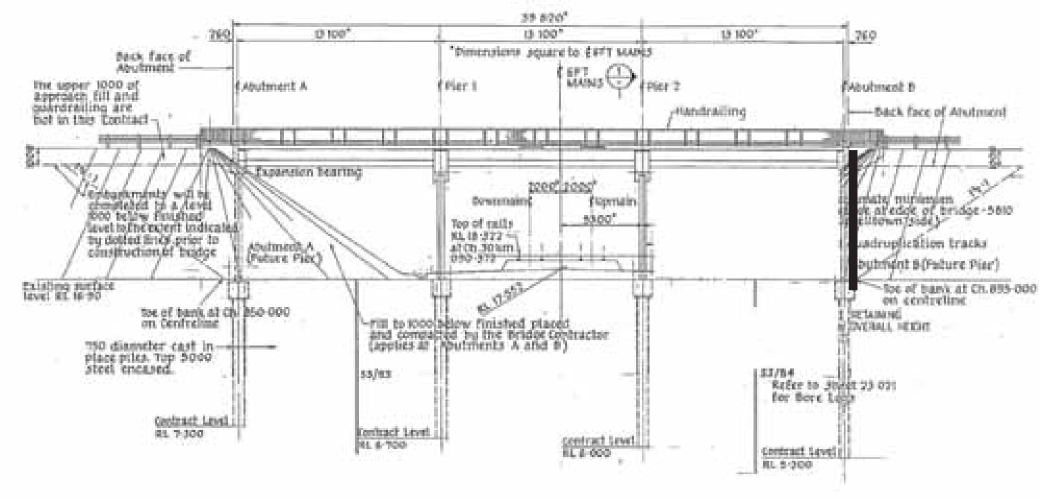

Figure 6 – Reinforced Soil Wall behind Abutment B

Figure 7 below shows a vertical-face RS wall application at an overbridge abutment.

Figure 7 – Overbridge with Reinforced Soil Walls at Abutments

Option 3 – New Overbridge

This option involves the construction of a three (3) span overbridge adjacent to, and west of the existing overbridge.

Construction of the bridge would not interfere with the flow of traffic along Moorebank Avenue and the final alignment of the road would represent a reinstatement of the original straight horizontal alignment.

The proposed bridge would consist of three (3) spans, of similar span lengths as the existing bridge, however, the abutments would be of vertical-face reinforced soil wall construction.

Standard RMS pretensioned spaced planks with a cast insitu deck slab would be proposed for the superstructure, with an overall deck thickness of 785mm (that is, 535mm plank depth + 175mm deck slab thickness + 75mm thick asphaltic concrete wearing surface).

The three (3) spans would accommodate future RailCorp quadruplication (within Span 1), existing double-track East Hills line (within Span 2), and SIMTA track and associated maintenance access road (within Span 3).

The bridge will be designed for SM1600 traffic load spectrum (plus dynamic load allowance), in accordance with AS 5100 *Bridge design* and RailCorp Engineering Standard (Structures) ESC 320 *Overbridges and Footbridges*.

ANZAC CREEK CULVERT BRIDGE

The existing structure that carries Moorebank Avenue over Anzac Creek is a small box culvert.

At the location of the proposed railway line, approximately 100 metres downstream of this road crossing, it would be envisaged a relatively small box culvert-style railway bridge would only be necessary to provide for Anzac Creek.

Ken Maxwell

Associate Technical Director, Bridges

Hyder Consulting Pty Ltd

APPENDIX B

QAUDRUPLICATION SKETCHES

P3	CROSS SECTION LINES SHOWN	03.10.12
P2	CONSTRUCTION SITE SHOWN	04.09.12
P1	FOR INFORMATION ONLY	17.08.12
Issue	Description	Date

0 30 60 90 120 150m

1 : 1500

Client

SIMTA

Status

PRELIMINARY ONLY

NOT TO BE USED FOR CONSTRUCTION

Scales	– 1:1500 –	Current Issue Signatures	
		Drawn V.ALEX	
Original Size	A1	Designed V.ALEX	
Height Datum	–	Checked K.TASESKI	
Grid	–	Approved –	
Filename:			

Project

SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title

POSSIBLE LOCATION OF FUTURE MOOREBANK STATION LOCATION AND TRACK CONFIGURATION

Hyder

HYDER CONSULTING PTY LTD
ABN 76 104 485 289
Level 5, 141 Walker St
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Fax: +61 (0)2 8907 9001
www.hyderconsulting.com

Drawing No.	Project No.	Issue
SKR010	AA003760	P3

100mm on Original

Date Plotted: 3 Oct 2012 - 11:42AM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKR010-Possible_Location_Of_Future_Moorebank_Station_Location_And_Track_Configuration.dwg V1

NOTES:

1. ASSUMED FUTURE QUADRUPLICATION OF RAILCORP EAST HILLS LINES BETWEEN MOOREBANK AVENU OVER BRIDGE AND GEORGES RIVER BRIDGE AT THE DOWN SIDE OF THE EXISTING TRACKS
2. ASSUMED FUTURE QUADRUPLICATION OF THE EAST HILLS LINES BETWEEN HOLSWORTHY AND MOOREBANK AVE ON THE UP AND DOWN SIDE OF THE EXISTING TRACKS
3. FUTURE RAILCOP TRACKS GEOMETRY HAVE BEEN DESIGNED TO SUIT THE EXISTING MAIN LINE SPEED
4. TRACK LAYOUT HAS BEEN DEVELOPED IN ACCORDANCE WITH RAILCOP STANDARDS AND SPECIFICATIONS
5. EXISTING BRIDGE CLEARANCES HAS BEEN OBTAINED FROM FIELD SURVEY AND RAILCORP OLD BRIDGE DRAWINGS
6. EXISTING SIGNALING HUT AND SIGNALLING CABLES TO BE RELOCATED
7. RAILCORP MAINLINE CHAINAGES HAS BEEN ASSIGNED FROM MOOREBANK AVENUE BRIDGE DRAWING

0 30 60 90 120 150m

1 : 1500

Issue	Description	Date
P1	FOR INFORMATION ONLY	21.07.12

Client: SIMTA

Status: **PRELIMINARY ONLY**
NOT TO BE USED FOR CONSTRUCTION

Scales	- 1:5000 -	Current Issue Signatures
Original Size	A1	Drawn M.ZDUNEK
		Designed V.ALEX
Height Datum	-	Checked K.TASESKI
Grid	-	Approved -

Filename:

Project: SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title: PROPOSED SIMTA TRACK LAYOUT WITHIN RAILCORP EAST HILLS CORRIDOR

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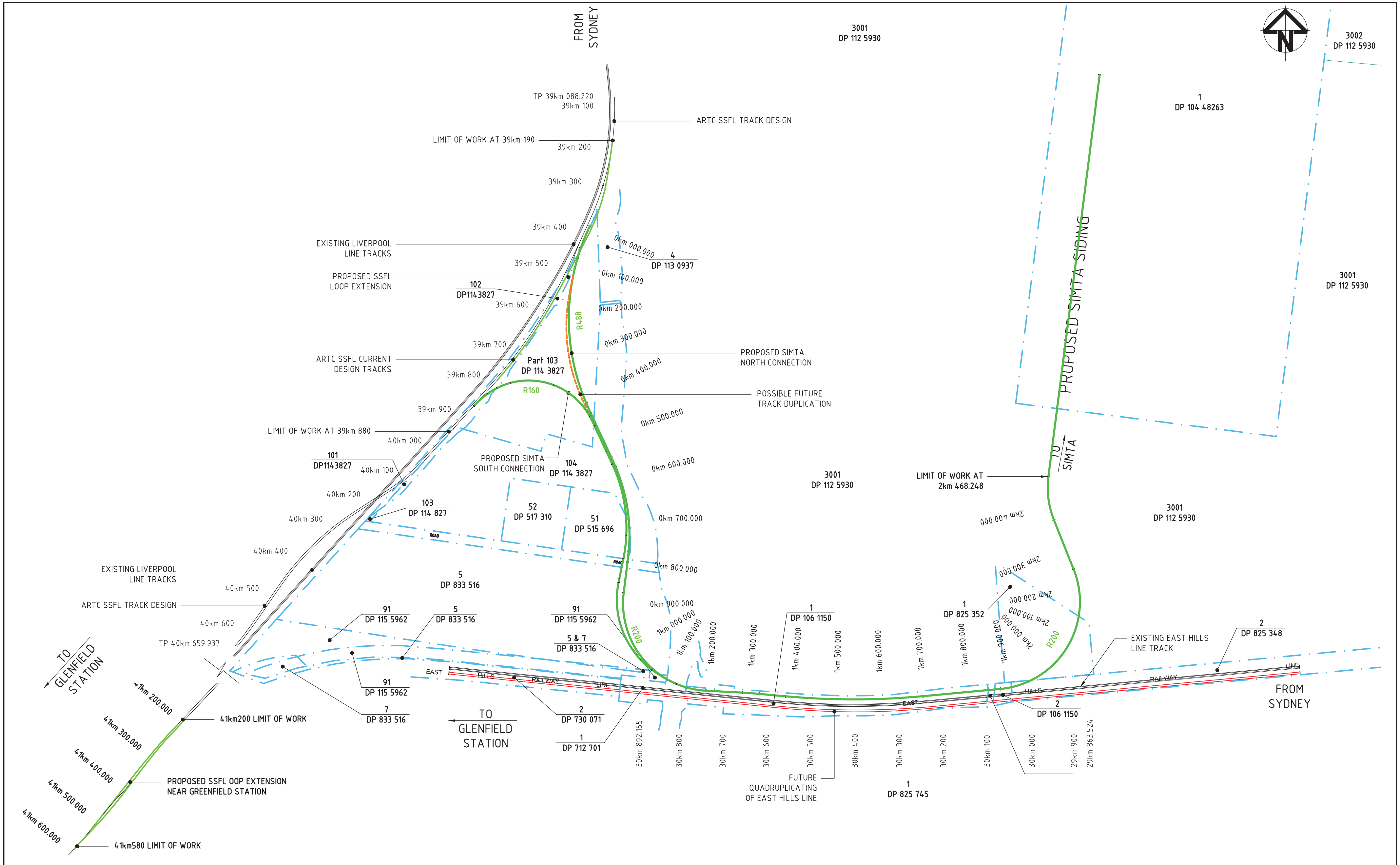
Drawing No.	Project No.	Issue
SKR003	AA003760	P1

Date Plotted: 3 Oct 2012 - 12:22PM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKR003-Proposed_SIMTA_Track_Layout_Within_Railcorp_East_Hills_Corridor.dwg V1

100mm on Original

APPENDIX C

REFERENCE DESIGN LAYOUT PLANS



Issue	Description	Date
P2	FOR INFORMATION ONLY	08.05.13
P1	FOR INFORMATION ONLY	08.11.12

Client: SIMTA

Status: **PRELIMINARY ONLY**
NOT TO BE USED FOR CONSTRUCTION

Scales	1:4000	Current Issue Signatures	
		Drawn	M.ZDUNEK
Original Size	A1	Designed	V.ALEX
Height Datum	-	Checked	K.TASESKI
Grid	-	Approved	-
Filename:			

Project: SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title: PROPOSED SIMTA TRACK FULL LAYOUT

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Drawing No. SKR032 — Project No. AA003760 — Issue P2

Date Plotted: 8 May 2013 - 12:15PM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKR032-Proposed_Simta_Track_full Layout_Plan.dwg

Issue	Description	Date

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1 : 1500

Client: SIMTA

Status: **PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

Scales	1 : 1500	Current Issue Signatures
		Drawn R.DIESTA
Original Size	A1	Designed K.MAXWELL
Height Datum	AHD	Checked
Grid		Approved

Filename: SKC156-Rail_Reference_Design_Sheet_2.dwg

Project: SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title: RAIL REFERENCE DESIGN SHEET 2

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Drawing No.	Project No.	Issue
SKC156	AA003760	P1

Date Plotted: 3 May 2013 - 04:47PM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKC156-Rail_Reference_Design_Sheet_2.dwg V1

100mm on Original

REFERENCE DESIGN

ADJOINS SKC156

ADJOINS SKC156

Issue	Description	Date

0 30 60 90 120 150m

1 : 1500

N

Client: SIMTA

Status: **PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

Scales	1 : 1500	Current Issue Signatures	
		Drawn R.DIESTA	
Original Size	A1	Designed K.MAXWELL	
Height Datum	AHD	Checked	
Grid		Approved	

Filename: SKC155-Rail_Reference_Design_Sheet_1.dwg

Project: SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title: RAIL REFERENCE DESIGN SHEET 1

Hyder

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Drawing No.		Project No.		Issue
SKC155	–	AA003760	–	P1

100mm on Original

Date Plotted: 3 May 2013 - 04:52PM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKC155-Rail_Reference_Design_Sheet_1.dwg V1

REFERENCE DESIGN

Issue	Description	Date

0 10 20 30 40 50m
1 : 500

Client: SIMTA

Status	PRELIMINARY NOT TO BE USED FOR CONSTRUCTION	
Scales	1 : 500	Current Issue Signatures
		Drawn R.DIESTA
Original Size	A1	Designed K.MAXWELL
Height Datum	AHD	Checked
Grid		Approved
Filename:	SKC157-Rail_Reference_Design_Sheet_3.dwg	

Project: SIMTA MOOREBANK INTERMODAL TERMINAL FACILITY

Title: RAIL REFERENCE DESIGN SHEET 3

Hyder
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Drawing No.	Project No.	Issue
SKC157	AA003760	P1

100mm on Original

Date Plotted: 3 May 2013 - 04:44PM File Name: F:\AA003760\E-CAD\C-Civil\B-Sketches\SKC157-Rail_Reference_Design_Sheet_3.dwg V1