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City of Port Phillip

Queens Road Pedestrian Bridge

Concept Design Report

August 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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Introduction

Port Phillip City Council engaged GHD and Wood Marsh Architects in November 2010 to prepare a concept design for a pedestrian bridge over Queens Road, Albert Park. The bridge will link the residential and commercial areas adjacent to St Kilda Road with the Albert Park amenities and the rest of the Municipality. The bridge will cater for pedestrian and cyclists, and be DDA compliant. The concept design was prepared before consultation with stakeholders at Council request, and we understand that this report may be used as basis for discussion on the project with stakeholders. During the concept design, the scope was increased to develop concept designs at two sites along Queens Road.

Existing Transport Facilities

Queens Road is a principal traffic route with limited pedestrian and cyclist crossing opportunities. At-grade signalised crossings are provided at Kings Way and Lakeside Drive. Access from the western side of Queens Road to the golf course is fenced off between Kings Way and Lakeside Drive. Existing pedestrian paths run roughly north-south in the golf course and around the lake. Bike lanes are provided along the service roads on St Kilda Road and along Commercial Road; and cyclists use some of these routes through Fawkner Park.

Site Location

The assessment of sites along Queens Road at the intersections between Roy and Arthur Streets determined that none of the sites within the mid-section along Queens Road between the existing signalised intersections offer significantly improved benefits compared to the other sites. All of the sites provide a reasonable level of connectivity with existing pedestrian and cycling facilities.

Most of the sites have existing residential buildings with limited setbacks which could lead to residents objecting to the bridge. Only Hanna Street has no residential buildings on either side of the intersection.

The impact of the bridge on the golf course operations and the need to protect pedestrians and cyclists from errant golf balls, and golfers from wayward pedestrians is an important consideration. A new pathway in the golf course along Queens Road would minimise the impact on the golf course operations and could extend partially or fully along the length of Queens Road.

Preference for the pedestrian bridge is on the south side of Hanna Street as it has no residential buildings on this side of the intersection and would be located adjacent to tennis courts. The site at Arthur Street has a residential building with limited setback and would overlook the ramps for the bridge which is likely to cause concern to residents.

Site Constraints

The sites at Arthur and Hanna Street do not have major site constraints preventing construction of the pedestrian bridge. However, existing driveways at both sites on the northern side prevent placing the bridge on the northern side at each site. A Heritage Overlay applies to the apartment building ‘Stanhill’ and shadowing of the tennis courts impact the site at Hanna Street. A residential building on the south side of Arthur Street could lead to residents objecting to the bridge.

Architecture

As well as providing much needed pedestrian and cycling access, the bridges over Queens Road positioned at Hanna and Arthur Street provide an opportunity to enhance the urban design of Queens Road.

The bridges have been positioned in order to have minimal impact on existing services and adjacent buildings, while maximising the use of perceived desire lines and existing pedestrian infrastructure.

The coloured metal fins making up the balustrades lining the open ramps provide both colour as well as transparency from various viewpoints.

These ramps were positioned to have minimal effect of existing trees in the park, while elevating pedestrians through the tree canopy. Once at canopy level, a viewing platform in the form of small, open ended ‘ramp to nowhere’ provides pedestrians with a view over Albert Park Lake.

Engineering

A number of forms were considered for the bridge structure: steel trusses, steel plate girder and precast concrete T-Roff beam. A comparison of the five bridge structures considered in the structural analysis indicated that the use of steel trusses or girder allows incorporation of artwork to create an aesthetically pleasing structure compared with the T-Roff beam option, but such structures are more expensive in construction cost and maintenance than the T-Roff beam structure.

Cost Estimate

The project cost to design and construct the pedestrian bridge at either site is in between $4.2 to $5.0 million (approximately) and includes a contingency of 20% and an allowance for inflation over 2 years. The indicated cost estimates do not include any additional costs that may be required with any associated civil/road works, contract administration and service relocation works.

1. Introduction

1.1 Background

Port Phillip City Council engaged GHD and Wood Marsh Architects in November 2010 to prepare a concept design for a pedestrian bridge over Queens Road, Albert Park. The bridge will link the residential and commercial areas adjacent to St Kilda Road with the Albert Park amenities and the rest of the Municipality. The bridge will cater for pedestrian and cyclists, and be DDA compliant.

A temporary bridge is located at Roy Street for the Formula 1 races each year and a permanent bridge would overcome the need to erect a temporary bridge each year. The bridge location is a key consideration and a number of sites along Queens Road were considered. Separate concept designs were prepared for a pedestrian bridge located at the south side of Hanna Street and Arthur Street. The bridge location considered a number of sites along Queens Road at the intersections between Roy Street and Arthur Street with Queens Road.

The concept design was prepared before consultation with stakeholders at Council request, and we understand that this report may be used as basis for discussion on the project with stakeholders.

The Concept Design Report provides the findings of the existing transport facilities, site selection, site constraints, concept designs and cost estimates.

1.2 Scope of Services

The services were provided over three stages to develop a concept design for a DDA compliant pedestrian bridge over Queens Road. During the concept design, the scope was increase to develop concept designs at two sites along Queens Road.

Stage 1 – Pre-Design

Participate in internal client workshop

Conduct desktop investigations for geotechnical, environmental, contamination, town planning, heritage, traffic and services

Develop potential options for structure, materials and architecture

Prepare Pre-design Report

Stage 2 – Concept Design

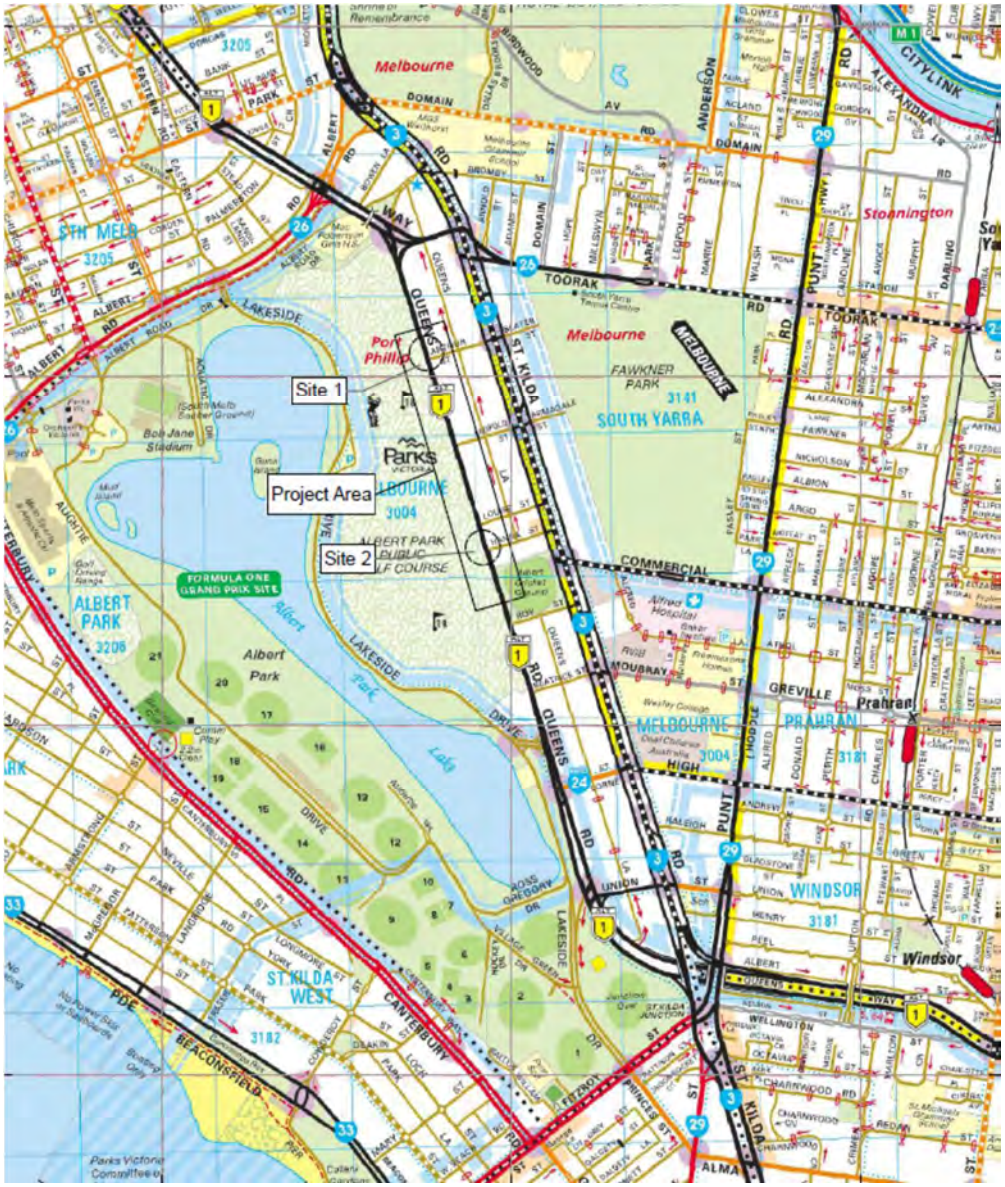
Prepare concept design of structure using architectural and structural design

Prepare Concept Design Report

Stage 3 – Presentation

Present Concept Design to Port Phillip Council Officers

Figure 1 Site Location Plan



Source: http://maps.google.com.au, Melways Reference: **2L A5 & 2L A7**

2. Existing Transport Facilities

2.1 Existing Pedestrian and Cycling Facilities

Existing Facilities

Tram – Services run on St Kilda Road with stops at Arthur Street, Leopold Street and Commercial Road, the latter of which is a DDA compliant platform stop.

Bicycles – Bike lanes are located along the service roads on St Kilda Road and along Commercial Road (between Punt Road and St Kilda Road). A cycle storage box for the right turn from Commercial Road into St Kilda Road is also provided. Cyclists can use some routes through Fawkner Park.

Pedestrians – Pedestrians can use the on-street footpath network and links through Fawkner Park. Pedestrians are reliant on signalised crossings of St Kilda Road. On Queens Road, there are signalised pedestrian crossings located at the Kings Way and Lakeside Drive intersections. Existing pedestrian paths run roughly north-south in the golf course and around the lake.

Bus – Services run along St Kilda Road to/from Commercial Road.

Key Barriers to Pedestrian and Cyclist Movement

Queens Road – Queens Road is a principal traffic route with limited pedestrian and cyclist crossing opportunities. Access from the western side of Queens Road is fenced off between Kings Way and Lakeside Drive.

Lakeside Drive – The existing road environment is not immediately conducive to an uncontrolled crossing point, and provision of a signalised crossing is an unlikely prospect. As such, it would be difficult to link any shared path with the existing path around the lake except at the existing crossing points near the Queens Road and Albert Road intersections.

Golf Course – Shared paths on the desire lines for pedestrians/cyclists that do not interfere with the current layout of holes will be difficult to locate. Flying golf balls are also a hazard to cyclists and pedestrians and they may require protection. Public paths need to be located so as to minimise the prospect of interference with golfers and injury to pedestrians and cyclists.

Queens Lane – Queens Lane is one-way in the northbound direction between Hanna Street and Arthur Street. This may have implications for access if the proposed bridge requires turning movement bans at any of the Queens Road intersection. The one-way operation also prohibits cyclists from using Queens Lane to travel from north to south, making it necessary for them to utilise the far busier Queens Road.

2.2 Existing Road Facilities

Queens Road

Queens Road is the preferred traffic route for inward and outward bound traffic accessing the CBD, City Link and the West Gate Freeway, and has a speed limit of 60 km/h. Both directions are permanent clearways with 2 lanes in each direction as well as a fifth centre lane, which is north bound in the AM peak and south bound in the PM peak (as specified by signs on the gantries) to coincide with traffic demand. Gantries and overhead power lines may be impacted by the proposed bridge.

St Kilda Road

St Kilda Road is a tram priority route along its entire length and a bus priority route north of Commercial Road, and has a speed limit of 60 km/h. The main carriageway incorporates tram tracks as well as two lanes of traffic, one of which is shared with on-street parallel parking. A service road in each direction contains two traffic lanes, a bicycle lane and parallel parking and is separated by a median strip from the main carriageway.

Connecting Streets

Between Queens Road and St Kilda Road there are numerous connecting streets that provide access to a mix of residential and commercial dwellings. From south-east to north-west, the connecting streets in the study area are:

- Roy Street;
- Hanna Street;
- Louise Street;
- Leopold Street; and
- Arthur Street.

Queens Lane bisects each of these connecting streets, running parallel with Queens Road and St Kilda Road. The lane is one-way in the northbound direction between Hanna Street and Arthur Street, whereas the lane on the southern side of Albert Reserve can be used in both directions.

3. Site Selection

3.1 Approach

The assessment was prepared by consideration of local facilities from available mapping, site inspection along Queens Road and within the golf course, and then qualitative and quantitative assessment of the sites to determine the most suitable site. Key risks for all sites and individual sites were also considered. The bridge location was considered at a number of sites along Queens Road at the intersections located between Roy Street and Arthur Street with Queens Road.

3.2 Factors Impacting Bridge Location

Traffic and Transport

The bridge would desirably be located in an area near the mid-point between the signalised intersections at Kings Way and Lakeside Drive. Pedestrian access to the park is already provided at both these locations.

The east-west access road to the bridge (running between St Kilda Road and Queens Road) will desirably be near a signalised crossing of St Kilda Road and tram stop (Arthur Street, Leopold Street or Hanna Street/Roy Street) to facilitate access by pedestrians. The Commercial Road tram stop (near Hanna Street) is DDA compliant and wheelchair accessible.

Placing the bridge further north of Commercial Road would be on the desire line for Commercial Road cyclists who wish to access the northern part of the park or continue through the park to South Melbourne.

Locating the bridge near a signalised intersection on St Kilda Road would help to facilitate cyclist access to the southbound carriageway of St Kilda Road. Cyclists can also utilise pedestrian crossings, however, unless the crossing was upgraded to accommodate cyclists this would necessitate that they dismount.

The bridge could link to the existing north-south pedestrian path in the golf course to minimise conflict with existing fairways and greens. However, this path eventually links to locations in the park that are already accessible to pedestrians crossing Queens Road at one of the signalised intersections at Kings Way or Lakeside Drive. Linking the bridge to the north-south path is expected to provide only limited travel time savings, although there would be amenity improvements. The real benefactors of the bridge would potentially be cyclists (particularly novices) who presently negotiate busy roads to access the park from St Kilda Road, assuming they are prepared to ride over the bridge in lieu of informal at-grade crossing opportunities.

Function

The bridge ramps should avoid existing driveways and services, and minimise the impact on existing Council car parking facilities. The bridge could require up to 100 m long approach ramps in a single line, 50 m for a single return ramp or 35 m for a double return ramp.

The bridge should minimise the impact on:

- Traffic operations in the general area;
- Golf course operations and the need for protective fencing and barriers; and

- Existing trees within the golf course.

3.3 Qualitative Assessment

The qualitative assessment considered issues related to the urban design, access east side, access west side and other constraints for a pedestrian bridge located at the five streets in the mid-section of Queens Road between the existing signalised pedestrian crossings. The results are discussed below and summarised in Table 1 (Appendix C). The location of the sites and their interaction with the existing transport facilities and the golf course operation is provided on the Location Analysis Diagram (Appendix C).

Roy Street - The temporary bridge for the Formula 1 races is located on the north side of the intersection and is well placed to tram stops and Commercial Road. However, the site is located well south of the centre of the mid-section of Queens Road and about 335 m from the existing signalised crossing at Lakeside Drive. While this site could be considered an obvious choice, a driveway on the north side would interfere with the bridge ramps and there is limited opportunity to relocate the driveway. Owners of apartments in a new tower on the south side may express concern at a pedestrian bridge reducing their view and privacy. A drainage pipeline on the south side of the road also reduces the suitability of the south side. Pedestrians and cyclists could use the existing open space adjacent to the Queens Road boundary fence within the golf course to provide safe access to the golf course car park and then connect with existing facilities along Lakeside Drive. A cleared opening is provided within the golf course where the permanent footings are located for the temporary bridge, which will minimise any impact on existing trees.

Hanna Street - The site offers a good connection to the platform tram stop immediately to the north of Commercial Road and to pedestrians and cyclists to/from Commercial Road, assuming measures can be introduced to improve the west to east movement for the latter. The site is located at about a third of the distance along Queens Road between existing crossings. A driveway on the north side would interfere with the bridge ramps and there is limited opportunity to relocate the driveway. The office building on the north side has varied setback and is at a maximum where the pedestrian bridge would be at is highest. Tennis courts are located on the south side and some angled parking may need to be reduced to allow for ramps. Pedestrians and cyclists could use the existing open space adjacent to the Queens Road boundary fence within the golf course to provide safe access to the golf course car park and then connect with existing facilities along Lakeside Drive. The trees within the golf course in this area have been distressed and the upper branches require pruning which should allow the bridge to pass over the trees. Overall, the south side is considered the most suitable location for the bridge.

Louise Street - The site offers a good pedestrian connection to the tram platform stop near Commercial Road, but presents challenges for cycle movements from the western side of St Kilda Road to the southbound carriageway. The site is located close to the midpoint along Queens Road between existing crossings. A driveway on the north side would interfere with the bridge ramps and there is limited opportunity to relocate the driveway. The apartment buildings on both sides have limited setbacks and the bridge ramps may cause concern to apartment owners. Pedestrians and cyclists could link up with the north-south track within the golf course via a new path along the tree line separating the two fairways, but extensive protective barriers would be required. Alternatively, the existing open space adjacent to the Queens Road boundary fence within the golf course could provide safe access and link up with existing paths at the northern or southern end of the golf course.

Leopold Street - The site offers very good connection to Fawkner Park and a tram stop on St Kilda Road, with the signalised intersection with St Kilda Road catering for all cycle and pedestrian movements. The site is located close to the midpoint along Queens Road between existing crossings. A driveway on the north side would interfere with the bridge ramps and there is limited opportunity to relocate the driveway. The buildings on both sides have limited setbacks and the bridge ramps may cause concern to owners. Pedestrians and cyclists could link up with the north-south track within the golf course via a new path along the tree line separating the two fairways and may require protective fencing. Alternatively, the existing open space adjacent to the Queens Road boundary fence within the golf course could provide safe access and link up with existing paths at the northern or southern end of the golf course.

Arthur Street - The site offers very good connection to Fawkner Park and a tram stop on St Kilda Road, with the signalised intersection with St Kilda Road catering for all cycle and pedestrian movements. The site is located well north of the midpoint along Queens Road between existing crossings, and about 350 m from the Kingsway signalised crossing. The buildings on both sides have limited setbacks and the bridge ramps may cause concern to owners. Pedestrians and cyclists could link up with the north-south track within the golf course via a new path clear of existing fairways.

3.4 Quantitative Assessment

A quantitative assessment of the sites was prepared to compare the sites against eight key factors using a score from 1-3 (3 is very good) and is listed in Table 2 (Appendix C). The key factors with the favoured sites are:

- Optimising proximity to crossing location – favoured a crossing near the midpoint between existing at-grade crossing points;
- Cyclist access and movement – limited cycle use is possible and favours locating the bridge at Arthur or Leopold Streets for good connection to Fawkner Park and St Kilda Road;
- Connectivity to north of the lake – favoured a crossing at Arthur Street;
- Connectivity to south of the lake – favoured a crossing at Roy Street;
- Setbacks to existing buildings – favoured a crossing at Hanna Street as all other sites have low setbacks on the south side, which was considered to offer a high risk of residents objecting to the bridge. Driveways on the north side of each site would constrain the location of ramps;
- Heritage issues – favoured a crossing at Arthur and Roy Streets as these locations do not have heritage listed buildings on the site adjoining the intersection;
- Connectivity with existing golf course paths – Arthur Street afforded the best connectivity to existing pathways, but those within the golf course would require screening to protect the public from errant golf balls; and
- East-west connection for future proofing – favoured Louise and Hanna Street to maximise the opportunity from possible redevelopment of the golf course and bridge over the lake.

3.5 Key Risks

Key risks for all sites and for individual sites and possible mitigation measures are presented in Table 3 (Appendix C). The risks relate to:

- Extent of use of the bridge by cyclists and pedestrians. Pedestrians and cyclists may continue to use the existing at-grade crossings until the bridge has good connections to particular destinations or reduces travel times to destinations in general;
- Public and VicRoads object to provision of the bridge;
- Residents objecting to the bridge when it located near an existing residential building with limited setbacks. This occurs at all southern corners except Hanna Street. The north side of all sites have driveways that are likely to interfere with the bridge ramps;
- Heritage issues, as three sites have heritage lists buildings on one side of the intersection;
- Overshadowing issues related to the tennis courts at Hanna Street;
- Visitors to the Grand Prix do not use the bridge; and
- Government rejects to the bridge due to poor connection to DDA compliant tram stops.

3.6 Preferred Site

The conclusion of the site assessment was:

- None of the sites within the mid-section along Queens Road between the existing signalised intersections offer significantly improved benefits compared to the other sites. All of the sites provide a reasonable level of connectivity with existing pedestrian and cycling facilities;
- Most of the sites have existing residential buildings with limited setbacks which could lead to residents objecting to the bridge. Only Hanna Street has no residential buildings on either side of the intersection;
- The impact of the bridge on the golf course operations and the need to protect pedestrians and cyclists from errant golf balls, and golfers form wayward pedestrians is an important consideration. A new pathway in the golf course along Queens Road would minimise the impact on the golf course operations and could extend along the full length of Queens Road. Generally, the pedestrian bridge will provide minimal damage to existing trees within the golf course;
- On balance, locating the pedestrian bridge on the south side of Hanna Street offers the most suitable location and offers very good connectivity to existing pedestrian facilities. The office building on the north side is well set back and a tennis court is located on the south side. A pathway can be placed along the Queens Road fence within the golf course to connect with existing facilities. Consideration will need to be given to ways of improving cyclists' crossing of St Kilda Road from west to east.

The recommended site for the pedestrian bridge is on the south side of Hanna Street. However, Council also requested consideration of the south side of Arthur Street. Therefore, two sites have been considered in the concept design.

4. Site Constraints

4.1 Town Planning, Heritage and Environment

A preliminary desktop assessment of planning, heritage and environment considerations was undertaken for the Hanna and Arthur Street sites. A summary of the existing conditions and site constraints at each site is outlined below.

Refer to Appendix D for the zones and overlays map, and constraints maps at each site.

4.1.1 Hanna Street – Existing Conditions

Overview

Hanna Street extends from Queens Road at its western end to St Kilda Road at its eastern end in the suburb of Melbourne, within the City of Port Phillip. Angle parking is available along the south side of Hanna Street, with some parallel parking available on the northern side.

The Albert Reserve Tennis Centre is located on the south side of Hanna Street, and extends along the entire length of the street. Adjacent and to the south of the tennis centre is the Albert Cricket Ground. Aerial imagery indicates that the tennis centre has off-street parking facilities. It is possible that patrons of the tennis centre also make use of the on-street parking available on Hanna Street.

On the north side of Hanna Street, there is a combination of residential and commercial/office buildings including the heritage listed places at 33 Queens Rd (residential apartment building and 'Stanhill') at the western end closest to the site of the proposed bridge, with office buildings located at the eastern end towards St Kilda Road.

Land Tenure

The Albert Reserve Tennis Centre and Albert Cricket Ground are located on Crown Land. The Crown Land is a reserve managed by Parks Victoria as the Committee of Management.

Similarly, the Albert Park Public Golf Course is located on Crown Land and is also a reserve managed by Parks Victoria as the Committee of Management.

Land on the north side of Hanna Street is freehold land. Queens Road is controlled by VicRoads.

Zones and Overlays

The western end of Hanna Street, at the proposed site of the bridge, is zoned Residential 1 Zone, with the eastern end zoned Business 5 Zone. The tennis centre site is zoned Public Park and Recreation Zone. Queens Road is zoned Road Zone Category 1.

A Design and Development Overlay (DDO) applies to the land from the centreline of Hanna Street towards the north, covering both the residential and business zoned land on the north side of the street.

A Heritage Overlay (HO) applies to the building known as 'Stanhill' at 33 Queens Road. The building is of local significance (HO346) and is listed on the National Trust Register. It is also of state and national significance and is included in the Victorian Heritage Register (H1875) and the Register of the National Estate (15191). A second Heritage Overlay applies to a residential apartment building on the same site. This second building is of local significance only (HO336).

4.1.2 Hanna Street – Constraints

The key site constraints at Hanna Street are:

- Loss of car parking in Hanna Street which may service the tennis centre;
- Setback requirements under the DDO (north side), which specifies that no buildings or works are to be constructed less than 15 metres from a Queens Road boundary and less than 4.5 metres from any other boundary;
- Height controls under the DDO (north side), in the order of 30-40 metres for buildings and works beyond the above setback distances;
- Impact on heritage places at 33 Queens Rd ('Stanhill' and residential apartment building), as the design of the bridge will need to be of a form and scale that is respectful of these heritage places;
- Visual bulk and other visual amenity impacts due to shadow;
- Loss of vegetation along Queens Road and in the golf course;
- Liability of cyclists and pedestrians on golf course;
- Traffic management across Queens Road during construction.

4.1.3 Arthur Street – Existing Conditions

Overview

Arthur Street extends from Queens Road at its western end to St Kilda Road at its eastern end in the suburb of Melbourne, within the City of Port Phillip. Similar to Hanna Street, angle parking is available along the south side of Arthur Street, with some parallel parking available on the northern side. At the western end of Arthur Street, towards Queens Road, there are residential apartment buildings.

Land Tenure

As stated earlier, the Albert Park Public Golf Course is located on Crown Land and is a reserve managed by Parks Victoria as the Committee of Management.

Land on the north and south sides of Arthur Street is freehold land. Queens Road is controlled by VicRoads.

Zones and Overlays

The western end of Arthur Street is zoned Residential 1 Zone on the south side of the road and Business 5 Zone on the north side of the road. Queens Road is zoned Road Zone Category 1.

A Design and Development Overlay (DDO) applies to the land from the centreline of Arthur Street towards the north.

A Special Building Overlay (SBO) applies to both sides of Arthur Street, as well as to Queens Road and the golf course opposite Arthur Street.

4.1.4 Arthur Street – Constraints

The key site constraints at Arthur Street are:

- Loss of car parking in Arthur Street;

- Setback requirements under the DDO (north side), which specifies that no buildings or works are to be constructed less than 15 metres from a Queens Road boundary and less than 4.5 metres from any other boundary;
- Height controls under the DDO (north side), of 60 metres for buildings and works beyond the above setback distances;
- Visual bulk and other visual amenity impacts due to shadow;
- Loss of vegetation along Queens Road and in the golf course;
- Liability of cyclists and pedestrians on golf course;
- Traffic management across Queens Road during construction;
- Site is liable to inundation by overland flows from the urban drainage system as identified by the SBO, and development should maintain the free passage and temporary storage of floodwaters, minimise flood damage, be compatible with the flood hazard and local drainage conditions, and not cause any significant rise in flood level or flow velocity.

4.2 Contamination

A preliminary desktop contamination study was prepared of the land located on the corner of Queens Road and Arthur Street and Queens Road and Hanna Street, Albert Park. The objective of the preliminary desktop contamination study was to gain an understanding of the potential for contamination, with a view to considering what restrictions this may pose to construction of the bridge. The report on the investigation is provided in Appendix E.

Based on the scope of work completed as part of this preliminary desktop contamination study, and subject to the limitations provided in Section 10 of that report, the following conclusions are made in relation to the Queens Road sites:

- Aerial photographs of the sites indicate that they have been occupied by residential and/or commercial buildings to the east of Queens Road and recreation reserves to the west of Queens Road, since at least 1931 when the first historical aerial photograph was available;
- The site history review did not indicate any obvious historical activities at the sites with the potential to have caused contamination;
- Imported soils may have been used for levelling sites during development and depending on the source of this material, such historic filling has the potential to contain contaminants (such as heavy metals); and
- The local area was formerly a swamp and there is potential for acid sulphate soils to be present.

Overall, the sites would be considered to have a low risk of contamination as a result of past and current land uses. As a result of the low risk of contamination, the potential restrictions on future development with regards to contamination would also be considered low (subject to the sensitive nature of any proposed development).

If the bridge proceeds to construction at either of the sites, then the following action is recommended:

- If future activities at the site include excavation, it would be recommended that any soil excavated be inspected by a suitably experienced environmental professional to assess whether there is likely to

be imported soils present on site, and to observe for indicators of contamination or the potential for acid sulphate soils; and

- If any soils are to be removed from site they should be tested, classified and transported in accordance with the relevant Industrial Waste Resource Guidelines published by the Environmental Protection Authority Victoria.

4.3 Services

4.3.1 Arthur Street

Existing Services

Overhead Electricity – Overhead power lines run from the south along the eastern side of Queens Road terminating at approximately 5.5 m south of Arthur Street

Underground Electricity – Underground electricity services are located along both sides of Arthur Street and along the western edge of Queens Road.

Along the southern edge of Arthur Street, there are two separate lines: one is offset approximately 2.0 m, and the other approximately 2.5 m, from the southern building line. These electricity services continue around the south-east corner of the Queens Rd/Arthur St intersection, connecting up to the power pole located approximately 5.5 m south of Arthur Street.

The underground electricity services on the northern side of Arthur Street cross Queens Road and run south along the western edge of Queens Road. These services sit directly behind the western kerb line along Queens Road.

Telecommunications – Telecommunications services are located under the pedestrian footpath along the eastern side of Queens Road and continue through the intersection at Arthur Street.

Fibre Optic Cable – Fibre optic cable is located along the eastern edge of Queens Road at an offset of approximately 1.0 m from the building line. This cable continues through the intersection of Queens Road and Arthur Street.

Water – A 600 mm dia. water main is located along the northern edge of Arthur Street. This service crosses Queens Road and continues through to the Albert Park Public Golf Course.

Existing Stormwater Drainage – Existing stormwater assets are also located in this area. There is a stormwater pit that sits approximately 9.5 m from Queens Road along the southern kerb line of Arthur Street. From this pit, pipes run parallel to the Arthur Street kerb in an east-west direction. Also from this pit, a 900 mm dia. pipe runs in a north-west direction crossing Queens Road and also continuing through to the Albert Park Public Golf Course.

Affected Services

Underground Electricity – The underground electricity services along the southern edge of Arthur Street are likely to be impacted by the piers for the eastern bridge ramp.

There is also a likely clash along the western edge of Queens Road where the western bridge tower sits directly behind the existing kerb line. As identified above, underground electrical services are also located in this area.

Water – There is a potential water service clash with a bridge pier for the western bridge ramp. The exact location of the western ramp piers will be required to determine whether this clash exists.

Existing Stormwater Drainage – The location of the eastern bridge tower is in close proximity to adjacent stormwater drainage. Potential issues may arise here.

There is also a potential clash with a bridge pier for the western bridge ramp. The exact location of the western ramp piers will be required to determine whether this clash exists.

Fibre Optic/Telecommunications- Potential issues in relation to the eastern bridge tower are apparent, however, the tower does appear to be clear of any services clash.

4.3.2 Hanna Street

Existing Services

Overhead Electricity – Overhead power lines run along the eastern side of Queens Road continuing across the intersection at Hanna Street.

Underground Electricity – Underground electricity services run along the southern edge of Hanna Street and both sides of Queens Road.

There are two separate lines running along the southern edge of Hanna Street: one offset approximately 0.8 m, and the other offset approximately 2.9 m, from the southern building line. These services both continue through to Queens Road, from where they run in a southerly direction along the eastern side of Queens Road.

Underground electricity services also run along the western side of Queens Road. These services are located directly behind the western kerb line.

In addition to these services, there is also public lighting conduit in this area. This conduit runs along the southern edge of Hanna Street and is offset approximately 1.2 m from the building line. At approximately 10 m prior to Queens Road, this conduit crosses Hanna Street and continues along this northern edge before reaching Queens Road and continuing to the pole located to the north of this intersection.

Telecommunications – Telecommunications services are located under the pedestrian footpath along the eastern side of Queens Road and continue through the intersection at Hanna Street.

Water – A 100 mm dia. water main runs along the northern edge of Hanna Street. At approximately 8 m from Queens Road, an 80 mm dia. main branches off this main line to a valve on the southern side of Hanna Street.

Gas – A 100 mm dia. gas main is present on the northern side of Hanna Street, offset at approximately 2.1 m from the building line, terminating just prior to Queens Road.

Existing Stormwater Drainage – Existing stormwater assets are also located in this area. There is a stormwater pit located approximately 6.5 m from Queens Road along the southern kerb line of Hanna Street. From this pit, a 300 mm dia. pipe runs perpendicular to Hanna Street to the north and a 225 mm dia. pipe runs in a south-west direction.

Affected Services

Overhead Electricity – Overhead power lines crossing Hanna Street will need to be altered to avoid clash with footbridge.

Underground Electricity – The underground electricity services located along the southern side of Hanna Street may potentially be affected by the pier locations of the eastern bridge ramps. Whilst they do appear to be clear of the electricity services, the exact pier locations will determine this.

In addition to this, the public lighting conduit that crosses under Hanna Street may also potentially be affected by the location of the eastern bridge ramp pier locations.

Water – There is a likely service clash with the 80 mm dia. water main under Hanna Street and the eastern bridge tower. This is likely as the tower appears to sit directly on top of this utility service.

4.3.3 Conclusion

Services that have a potential clash need to be located on site by service proving prior to commencement of preliminary design. The bridge design needs to avoid these services, or if necessary the services may be able to be relocated.

The overhead power lines crossing Hanna Street would need to be placed underground. The 80 mm dia. water main crossing Hanna Street may need to be relocated.

The requirement to relocate services or adjust the bridge structure would be considered in the preliminary design phase.

5. Geotechnical Investigation

5.1 General

A preliminary geotechnical investigation was conducted to provide an overview of the likely ground conditions to be encountered at the proposed site of the footbridge.

The geotechnical investigation involved review of the available geological information and historical borehole logs close to the site area, followed by an interpretation of the presented information and typical parameters for preliminary foundation design.

The borehole location map and borehole logs are provided in Appendix B.

5.2 Regional Geology

The Melbourne geological map, Sheet No. SJ 55-5 from the Australia 1:250,000 Geological Series indicates that the footbridge will be founded in the Brighton Group (Tpb), a Tertiary Pliocene geological unit.

The Brighton Group geological unit comprises of:

- non-marine sand, sandy clay, silt, gravel, locally altered to quartzite and porcellanite; and
- marine sand, shelly silty sand, ferruginous sandstone.

The regional geological map also indicates that the site area is located within close proximity to Port Melbourne Sand (Qrp).

5.3 Geological Properties

The Brighton Group unit consists of two formations: the Red Bluff Sand and the Black Rock Sandstone. The Black Rock Sandstone underlies the Red Bluff Sand but the presence of this formation is rare and shares similar characteristics to the Fyansford Formation and the Older Volcanics, thus, it can be difficult to differentiate.

The Red Bluff Sands are most commonly encountered during civil engineering works within the Brighton Group. Data from previous investigations conducted in the St Kilda Road-Queens Road region reveal a subsurface profile, which comprises highly fissured clay or sandy clay of 2 to 6 m thickness overlying clayey sands. As depth increases, the clay content decreases and gradually grades to silty sands and sands.

Commonly encountered within the clayey and silty sands of this formation are zones of iron-cemented sands. Standard penetration tests (SPTs) conducted on these cemented sand zones will produce high N value results, which may mislead and inflate the overall density and strength of the soil.

Previous soil testing in the St Kilda Road area, which lies parallel to Queens Road approximately 200 m in the north-east direction, indicate the following soil characteristics and strength parameters are likely to be expected:

Upper Sandy Clays

The upper sandy clays, which may be up to 6 m thick from the surface, ranges from low to high plasticity with a plasticity index ranging from 6 to 54. The sandy clays were also found to be expansive, thus, they

are susceptible to cracking and swelling as a result of changes to the moisture content of the clay. Strength of the sandy clays can vary widely based on the fissuring and jointing within the clay. Shear strength (S_u) at 2.6 m depth was found to be 250 kPa, which increased to 690 kPa at a depth of 4.1 m. Apparent cohesion (c_u) has been found to be between 40 to 350 kPa and permeability within the clays has been found to be less than 10^{-6} cm/sec.

Clayey Sands

Generally, from a depth of 6 to 10 m, clayey sands with interbedded sandy clays are encountered. The clayey sands have been found to display dense to very dense consistency, high bearing capacity and low compressibility. However, soil strength may significantly change with the presence of groundwater. The clay content, when above the water table, acts to strengthen the sand and increase the unconfined strength; however, when saturated (i.e. below the water table), the clay can become unstable and reduce overall soil strength. Average shear strength (S_u) has been found to be around 800 kPa. At 6 m below surface level, the allowable bearing capacity for piers has been found to be up to 2500 kPa. Strongly iron- cemented zones have been frequently encountered in areas close to the footbridge site, but are generally less than a metre thick and a few metres wide.

Permeability in this soil stratum has been found to be variable; however, groundwater in excavations up to 2 m below the groundwater table can often be managed by pumping from sumps. However, the variable clay content in the soil may greatly affect the permeability of the soil and thus the rate of discharge of groundwater.

Sands and Silty Sands

From a depth of 10 m and below, the fines content generally reduces as the soil gradually transitions to silty sands and sands. The plasticity index of sands at this depth is found to be below 5 indicating little clay content.

The sands are found to range from medium dense to very dense. SPT results recorded blow counts of 24 to over 50 per 300 mm penetration. Permeability in the sands may be within the range of 0.3×10^{-4} to 8×10^{-4} cm/sec.

5.4 Anticipated Ground Conditions

Historic borehole logs located close to the site area were found in the Groundwater Monitoring System database, operated by the Department of Sustainability and Environment. These logs have been inspected to provide indications of the likely ground conditions to be encountered specific to the region in which the site is located and to confirm the regional geological setting.

Four historic boreholes were found to be located within 400 m of Queens Road: two are located to the west of Queens Road within Albert Park (borehole site ID: 78444 and 78445) and two are located to the east of St Kilda Road (borehole site ID: 144489 and S9031776/1).

The borehole logs show the subsurface profile of the region as primarily interbedded layers of sand and clay. Boreholes 78444 and S9031776/1 recorded bedrock at around 60 m, which borehole S9031776/1 showed to be hard granite.

Borehole 78445 recorded sandy clay to a depth of 14 m, overlying a 10 m thick layer of sand. Dark brown lignite clay was observed from 23 m until the borehole was terminated at 30.5 m depth. Coarse gravels were also recorded at two different depths in the log.

Borehole 144489 recorded alternating layers of clayey sand and stiff to hard clay, between 3 to 5 m thick, to a depth of 35 m. An exception would be a thick layer of clay sand recorded from a depth of 21 m to 32 m.

Groundwater levels were not noted in any of the four historic borehole records.

Melbourne Water's borehole database may hold information of the ground conditions at our site area, but time restrictions in the preparation of this report meant that the pursuit of these records were omitted from the investigation, but should be considered for future investigations.

5.5 Discussion

Based on the available information collected, the anticipated ground condition at the footbridge site is expected to consist of alternating layers of clayey sands and clays to a depth of around 15 m, overlying a soil matrix of predominantly sand. Bedrock is expected to be reached at around a depth of 60 m.

Due to the high clay content expected within the soil, especially near the surface, soil strength may vary significantly depending on the groundwater level. Although no groundwater records were found during the investigation, groundwater level at the site can be expected to be shallow given that the Albert Park Lake, a sizeable body of water, is located within 500 m to the east of the proposed site. As such, friction piles are a viable option to utilise the cohesive nature of the clay soil.

In the absence of detailed site specific information, the following parameters are recommended for preliminary design of piled foundations:

Table 1 Preliminary Design Parameters for Piled Foundation Design

Geological Unit	Depth	Ultimate Skin friction	Ultimate End Bearing
Upper sandy clays	0 to 6 m	40 kPa	
Clayey sands	6 to 10 m	35 kPa	2000 kPa
Sands and silty sands or clay	10 m and below	60 kPa	4000 kPa

Considering the difficulty in ensuring a well cleaned hole below the groundwater table, the end bearing contribution to pile capacity should be heavily discounted in determination of pile embedment length to ensure adequate performance criteria. In addition, appropriate factors of safety should be applied to determine the pile's working load, commensurate with the level of confidence in the ground information.

6. Architecture

As well as providing much needed pedestrian and cycling access, the bridges over Queens Road positioned at either Hanna or Arthur Street provide an opportunity to enhance the character and urban design of Queens road.

The bridges have been positioned in order to have minimal impact on existing services and adjacent buildings, while maximising the use of perceived desire lines and existing pedestrian infrastructure. The ramps leading up to the bridge on the park side will be directly aligned with existing pedestrian paths, currently used by golfers. This would minimise the number of trees to be potentially removed and will capitalise existing park infrastructure.

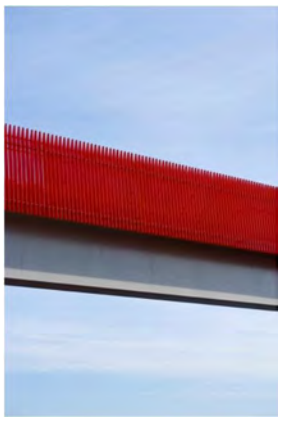
The position of the ramps within the confines of existing trees would in turn elevate pedestrians up into the tree canopy. Once at canopy level, a viewing platform in the form of small, open ended 'ramp to nowhere' provides bridge users with a view over Albert Park Lake. Meanwhile, when approaching from the opposite direction, this view will be framed by the sides of the bridge as pedestrians travel across it.

The coloured metal fins making up the balustrades lining the open ramps will provide both colour as well as a transparency from various viewpoints, this will serve to provide views to the park while creating a vibrant insertion of colour within the park.

The four bridge design options vary, but all exude a strong structural and sculptural presence, coupled with a palate intended to enhance the place-making qualities of each bridge.

Option 1 utilises a dark balustrade, which as a result, recedes to draw attention to the blue steel plate girder bridge, designed to be seen as a single, floating object piercing the green space of the park.
Option 2, an open truss design takes on a more foreign colour scheme which in turn is framed within its structural truss. At either end of the truss, two tall columns provide structural support, which in turn become small gateways to the par. (Option 3 would mimic this design but use a closed truss.)
Option 4 is a catenary version of the truss design and evokes the strong yet elegant imagery of bridges such as the Golden Gate Bridge and the Firth of Forth Bridge as well as referencing the city's tradition of celebratory arches. In this regard, the bridge would take on the role of a place making object celebrating Albert Park and by extension, the entrance to the City of Port Phillip.
(Option 5 would constitute a pure engineering solution without any architectural input)

The chosen locations for the bridges provide a number of constraints and opportunities. Arthur street is well placed in regard to existing pedestrian infrastructure, however the non-park side ramp would restrict light and views to the apartment block at 17 Queens Road. Hanna street on the other hand, is well placed, being close to the equidistance of the existing Queens Road crossing points, it is also close to the current position of the temporary formula one pedestrian bridge, which should be seen as a predecessor to this project. The Hanna street bridge has fewer over-shadowing constraints, with only the albert Reserve Tennis Centre Courts being affected.






7. Structural Engineering

7.1 Design Criteria

The key elements of the design criteria are:

- Bridge design in accordance with AS5100 with 100 years design life;
- Bridge to cater for pedestrians and cyclists, and be DDA compliant.

Use of anti-throw barriers on the bridge was requested by Council and is adopted on some bridges using primary or secondary members. These barriers were not provided on the plate girder bridge, T-Roff beam bridge or curved truss bridge.

7.2 Structure Options

Three steel truss variations were considered: curved upper chord truss, parallel truss and closed truss. A steel plate girder option and a reinforced concrete T-Roff beam were also considered to provide range of structural solutions for the new bridge.

A cast in-situ reinforced concrete deck is assumed for all bridge structures, but a precast deck should be explored during preliminary design. A consistent option was adopted for all ramps as it is known to provide a cost effective ramping system.

Protection barriers to the main bridge piers are required as they are located within the VicRoads specified 9.0m clear zone width.

Details of the superstructure and substructure for each structure option and the ramps used for all bridge options are provided in Table 2.

Table 2 Details of Structure Options

Option	Superstructure	Substructure
Curved Truss Bridge	Steel curved upper chord truss with parallel U-frame structure, comprising steel hollow section members. The curved top chord height varies from 4.3 m at the end to 1.1 m at midspan. 150 mm thick cast in-situ concrete deck slab cast on a steel metal decking.	Bridge piers consist of two 900 mm square concrete columns supported on a cast in-situ concrete pile cap with two rows of 600 mm dia. bored piles. Piles are assumed to be 12 m to 14 m in depth.
Parallel Truss Bridge	A rectangular parallel truss with a straight parallel U-frame, comprising steel hollow section members. The truss is about 3 m high. 150 mm thick cast in-situ concrete deck slab cast on a steel metal decking.	Bridge piers consist of two 900 mm square concrete columns supported on a cast in-situ concrete pile cap with two rows of 600 mm dia. bored piles. Piles are assumed to be 12 m to 14 m in depth.
Closed Truss Bridge	Rectangular parallel truss with closed top. The basic truss is a straight parallel U-frame with steel hollow section members. The top chord is restrained transversely by a structural member to minimise the size. 150 mm thick cast in-situ concrete deck slab is proposed cast on a steel metal decking.	Bridge piers consist of two 900 mm square concrete columns supported on a cast in-situ concrete pile cap with two rows of 600 mm dia. bored piles. Piles are assumed to be 12 m to 14 m in depth.
Steel Plate Girder Bridge	A 2.4 m high steel box girder with a trapezoidal shape with added architectural features. 150 mm thick cast in-situ concrete deck slab is proposed cast on a steel metal decking.	Bridge piers consist of a single 1200 mm dia. concrete pier column. Each pier is supported by a single large diameter bored pile to eliminate the need for cast in-situ pile cap. Alternatively, option for smaller diameter bored piles as proposed for the other concepts with in-situ pile cap.
T-Roff Beam Bridge	3.0 m wide and 1.0 m deep prestressed closed top T-Roff girder. The parapet height, as defined in AS5100, is at least 1100 mm for pedestrians, or 1300 mm where cyclists may use the bridge. It is proposed to provide a simple, durable galvanised 1300 mm high steel parapet with vertical balusters for the safety of children to meet the current design standard requirements.	Bridge piers consist of two 900 mm square concrete columns supported on a cast in-situ concrete pile cap with two rows of 600 mm dia. bored piles. Piles are assumed to be 12 m to 14 m in depth.
Ramp Structure - Typical	Precast reinforced concrete ramps are proposed for the ramps for all options. The ramp spans about 10.2 m, supported by a cantilever beam on either side of the pier.	Ramp piers consist of a single 900 mm dia. concrete pier column supported by a single 1050 mm bored pile. Piles are assumed to be 12 m to 14 m in depth.

A comparison of the five bridge structures considered in the structural analysis is provided in Table 3. The use of steel trusses or girder allows incorporation of artwork to create an aesthetically pleasing structure than with the T-Roff beam structure, but is more expensive in construction cost and maintenance than the T-Roff beam structure.

Table 3 Comparison of Bridge Structure Options

Option	Benefits	Disbenefits
Curved Truss	Artwork can be incorporated and creates aesthetic pleasing structures	More expensive than T-Roff option Higher maintenance cost than T-Roff option
Parallel Truss	Lighter than concrete to assist erection	
Closed Truss	Manufactured components reduce on site construction and increase quality	
Steel Plate Girder	Increased durability with shop applied protection finishes	
	Minimises height of deck above road	
T-Roff Beam	Economical construction	Increased height of deck about road due to beam depth
	Shorter construction period	Increased length of ramps due to higher bridge deck
	Minimal maintenance	
	More robust and flexible compared to steel truss and girder	

8. Cost Estimate

8.1 Cost Estimate

The cost estimate is based on current practices and costs for design and construction of pedestrian bridges across major roads. The cost estimate for each option is presented in Table 4 and includes an allowance for a 20% contingency and escalation of 4% pa over two years. The contingency allows for changes to items, quantities and cost rates that may occur as the design progresses in the delivery process and for unknown items that occur during construction. A detailed cost plan for each option is provided in Appendix F.

Table 4 Cost Estimate for Options ($)

Option	Bridge Cost	Ramp Cost	Total
Curved Truss Bridge	1,095,593	3,143,447	4,239,040
Parallel Truss Bridge	1,105,285	3,143,447	4,248,732
Closed Truss Bridge	1,056,829	3,143,447	4,200,275
Steel Plate girder Bridge	1,744,324	3,226,791	4,971,115
T-Roff beam	838,873	3,437,672	4,276,545
Extra cost for stairs – west side	-	-	116,295

9. Conclusion

The assessment of sites along Queens Road at the intersections between Roy and Arthur Streets determined that none of the sites within the mid-section along Queens Road between the existing signalised intersections offer significantly improved benefits compared to the other sites. All of the sites provide a reasonable level of connectivity with existing pedestrian and cycling facilities.

Concept designs were developed for a pedestrian bridge over Queens Road at Hanna Street and Arthur Street. The bridge caters for pedestrians and cyclists and is DDA compliant. Three structural forms were considered in developing options for the bridge.

The impact of the bridge on the golf course operations and the need to protect pedestrians and cyclists from errant golf balls, and golfers form wayward pedestrians is an important consideration. A new pathway in the golf course along Queens Road would minimise the impact on the golf course operations and could extend along the full length of Queens Road.

The preferred site for the pedestrian bridge is on the south side of Hanna Street, as it has no residential buildings on either side of the intersection and would be located adjacent to tennis courts. The site at Arthur Street has a residential building with limited setback and would overlook the ramps for the bridge, which is likely to cause concern to residents.

The project cost to design and construct the pedestrian bridge at either site is between $4.2 to $5.0 million (approximately) and includes a contingency of 20% and an allowance for inflation over 2 years. The indicated cost estimates do not include any additional costs that may be required with any associated civil/road works, contract administration and service relocation works.

Appendix A

Drawings

LEGEND

- EXISTING PEDESTRIAN LINKS
- EXISTING AT GRADE CROSSINGS
- EXISTING BRIDGE CROSSINGS
- STANDARD TRAM STOP
- TRAM SUPER STOP
- EXISTING CONTRAFLOW GANTRIES
- POTENTIAL SHARED USE PATH LINK
- POTENTIAL PROTECTION BARRIER
- MAJOR EAST-WEST MOVEMENT
- PUBLIC / INSTITUTIONAL USE
- RESIDENTIAL / COMMERCIAL USE

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

LOCATION ANALYSIS DIGRAM

WOOD / MARSH PTY LTD ARCHITECTURE
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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

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QUEENS ROAD

ARTHUR STREET

ST KILDA ROAD

EXISTING CONNECTIONS

PROPOSED CONNECTIONS

EXISTING CROSSINGS

TRAM STOPS

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST
PEDESTRIAN CONNECTIONS

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ARTHUR ST CONSTRAINTS

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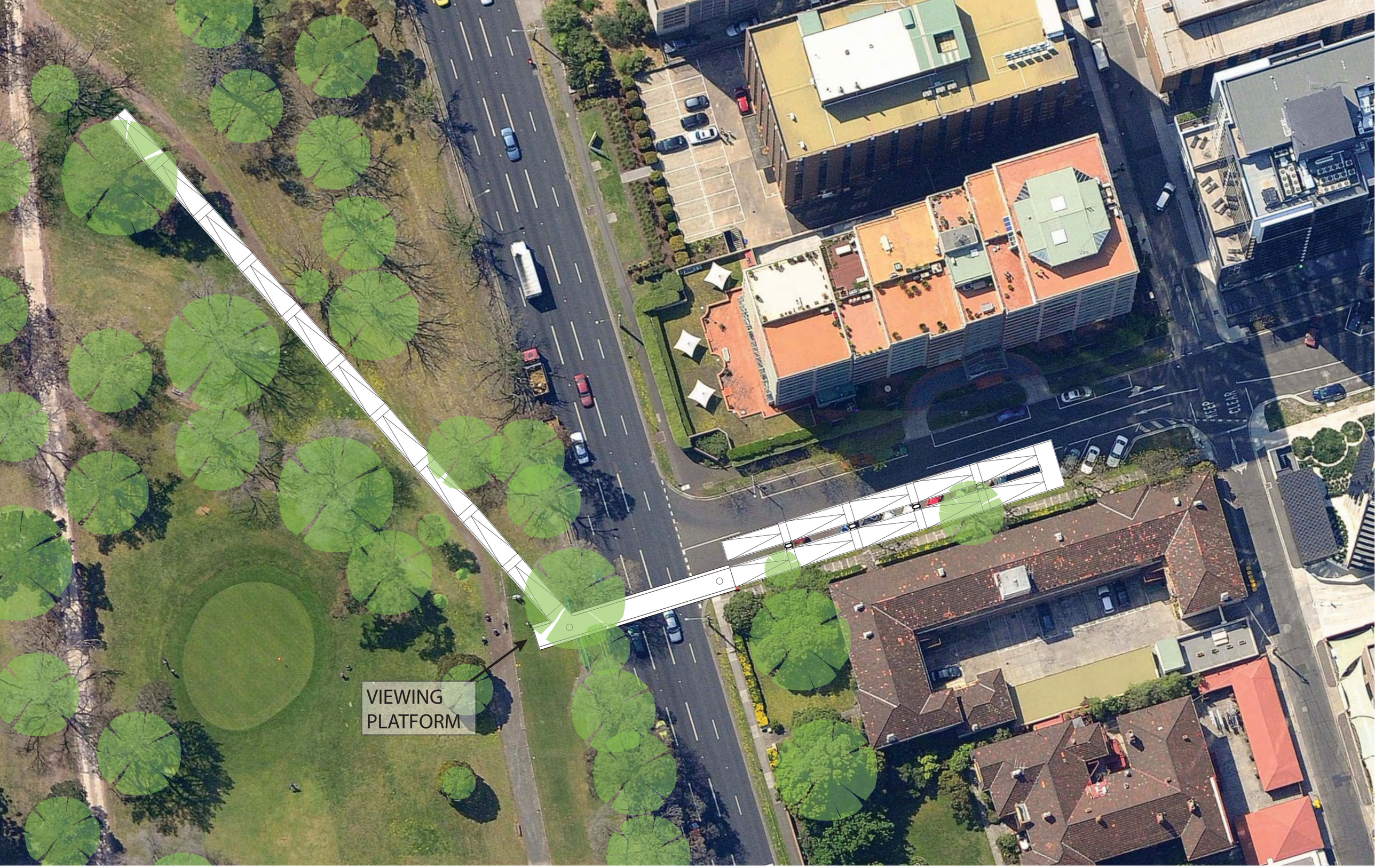

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1
PLAN 1:500

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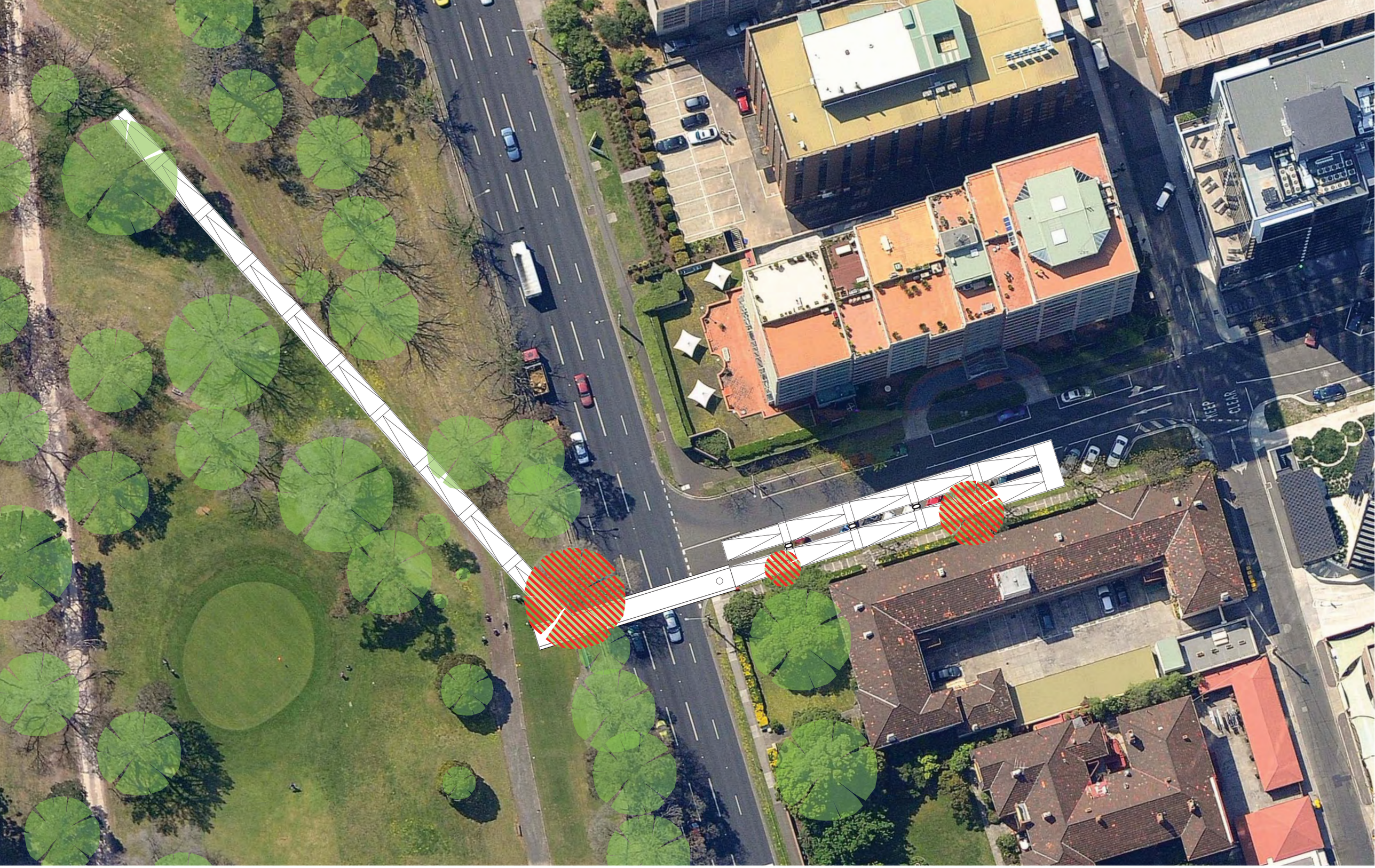

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
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ARTHUR ST, OPTION 1
PLAN 1:500. Tree Removal

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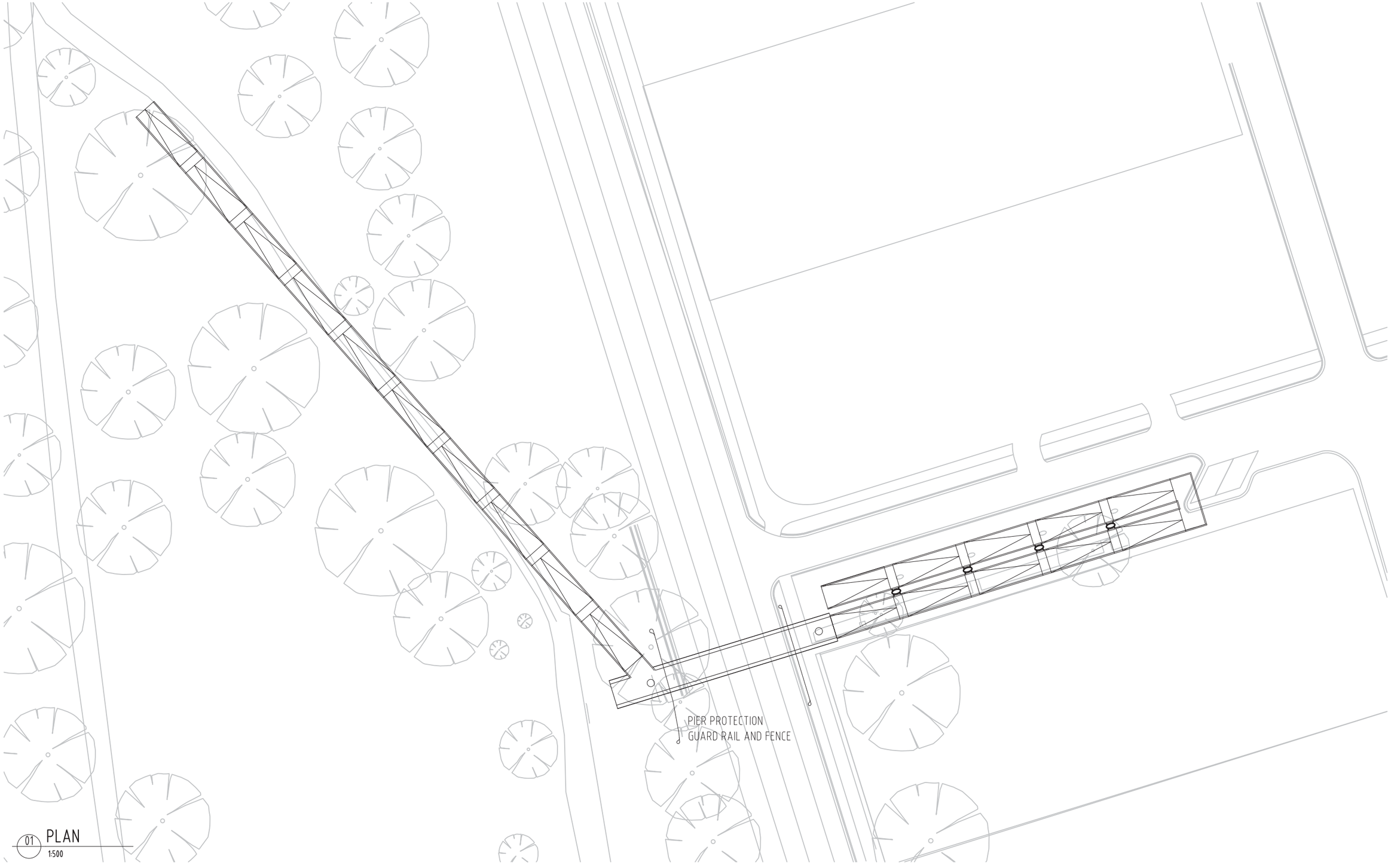

01 PLAN
1:500

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1
PLAN 1:500

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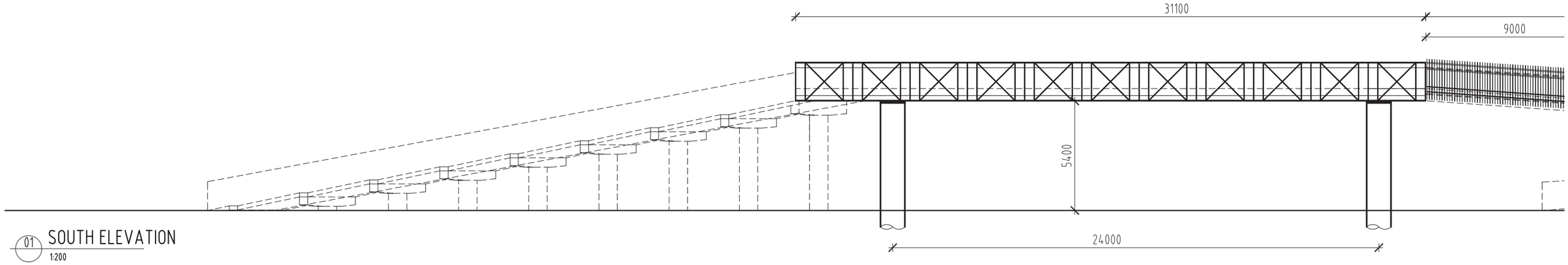

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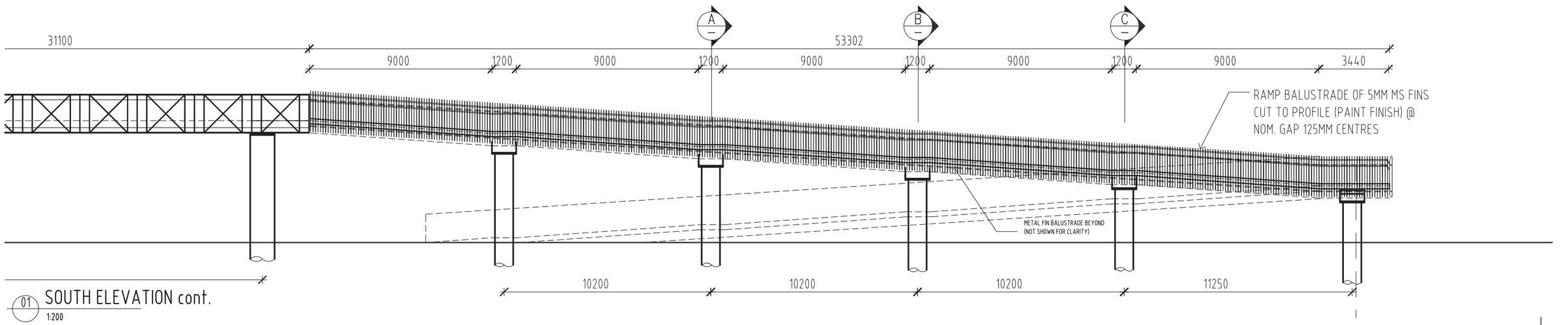

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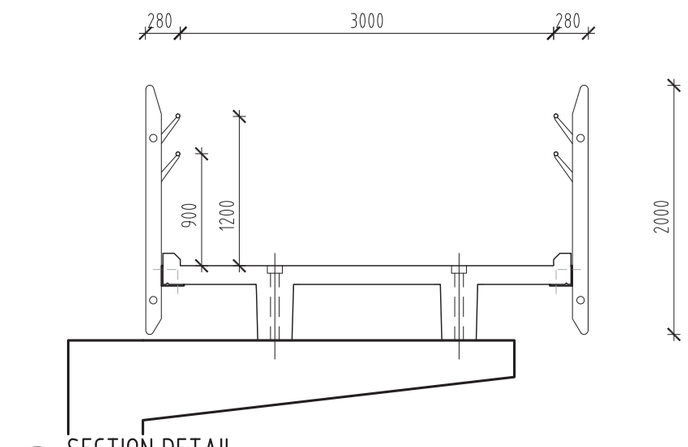

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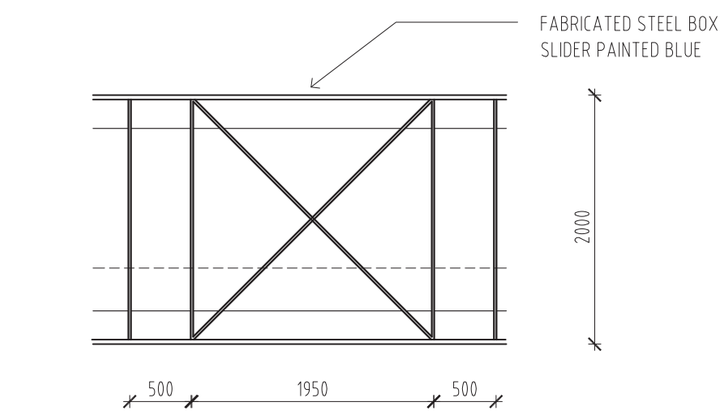

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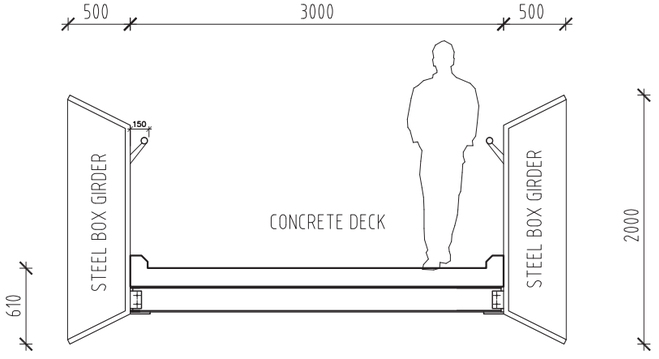

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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1
ELEVATION AND SECTIONS

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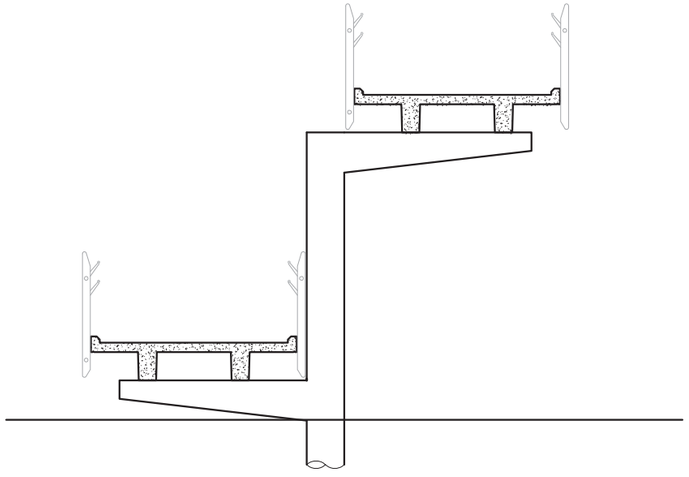
04 DETAIL



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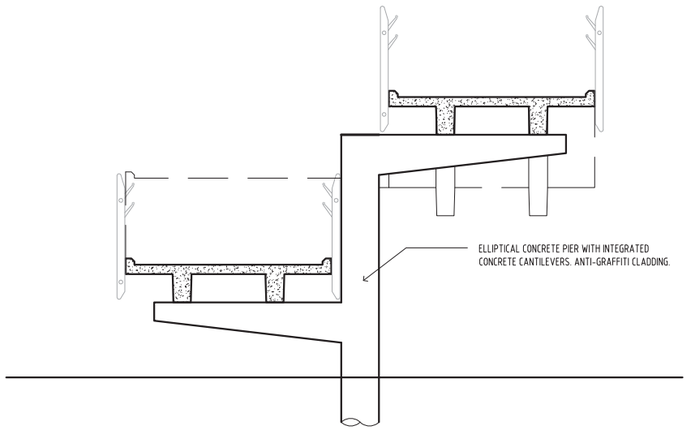

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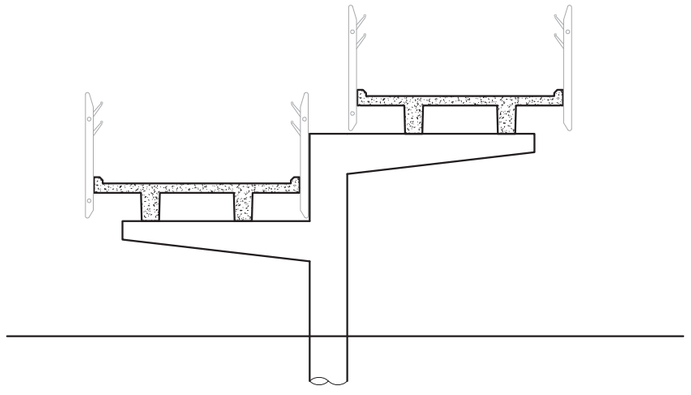

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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1
RAMP SECTIONS

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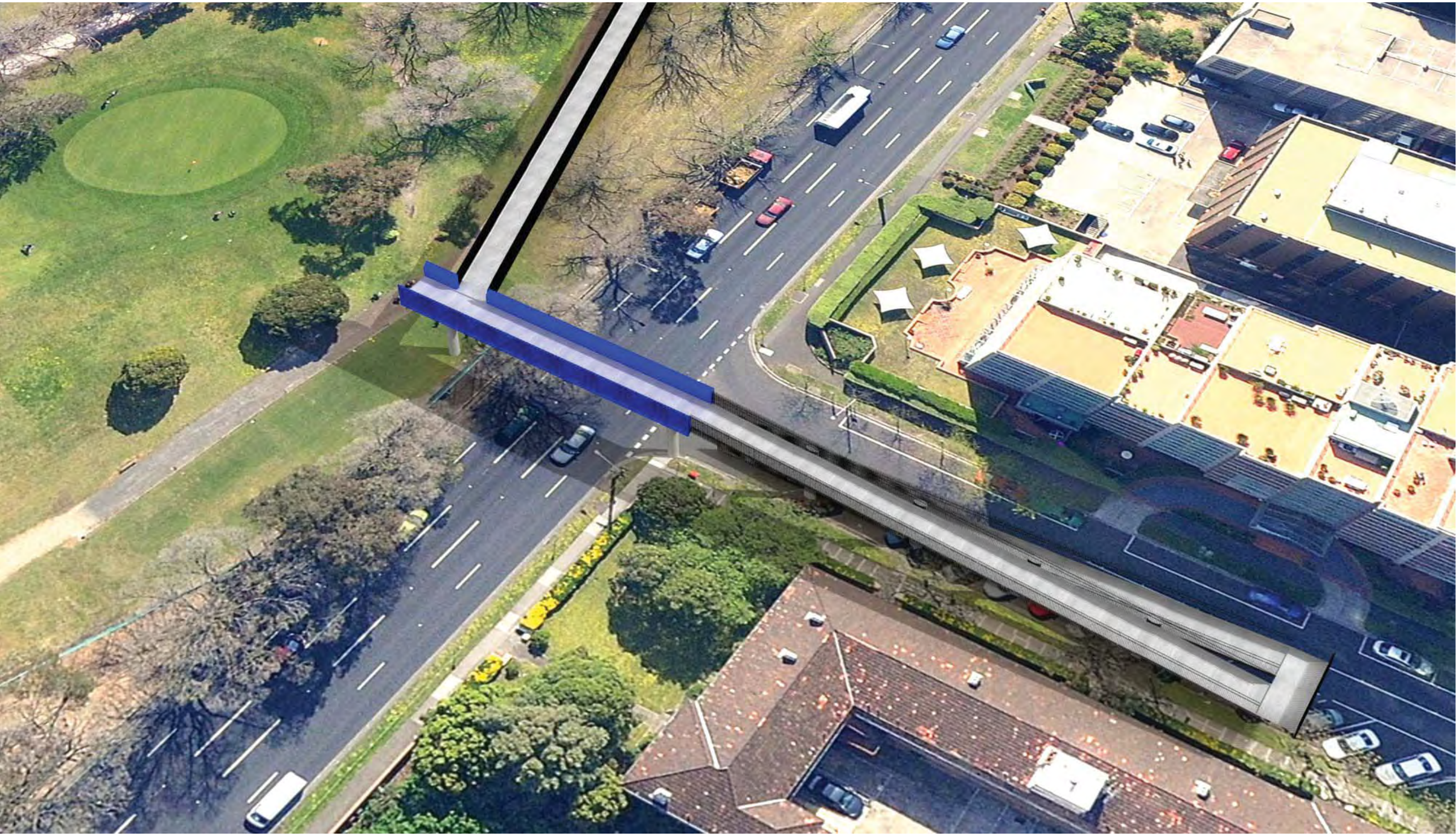

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1

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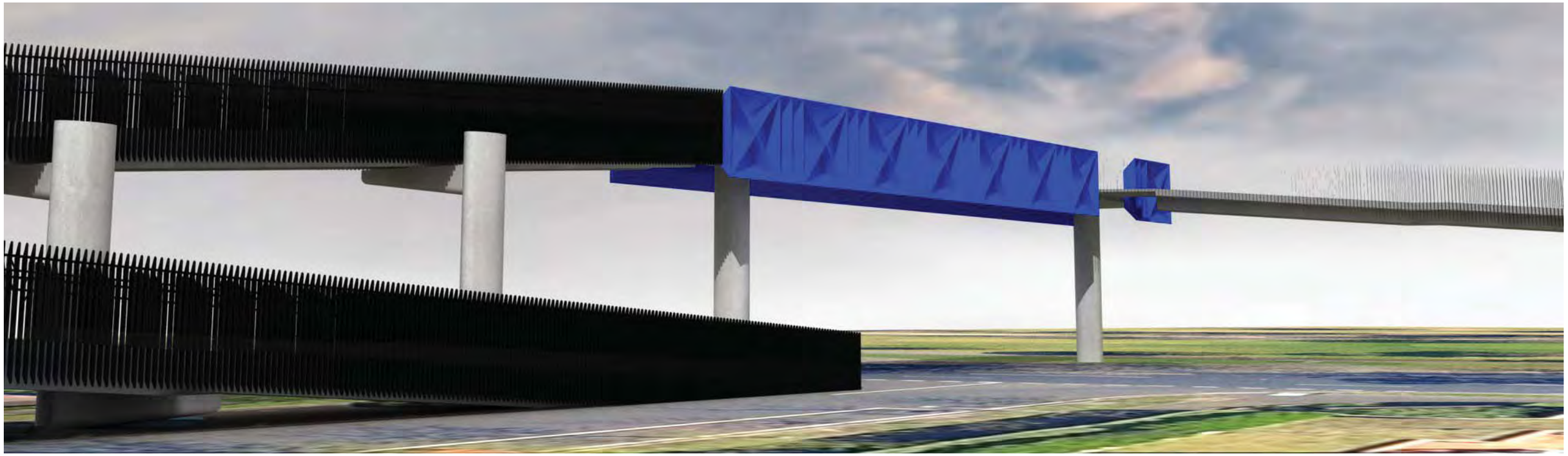

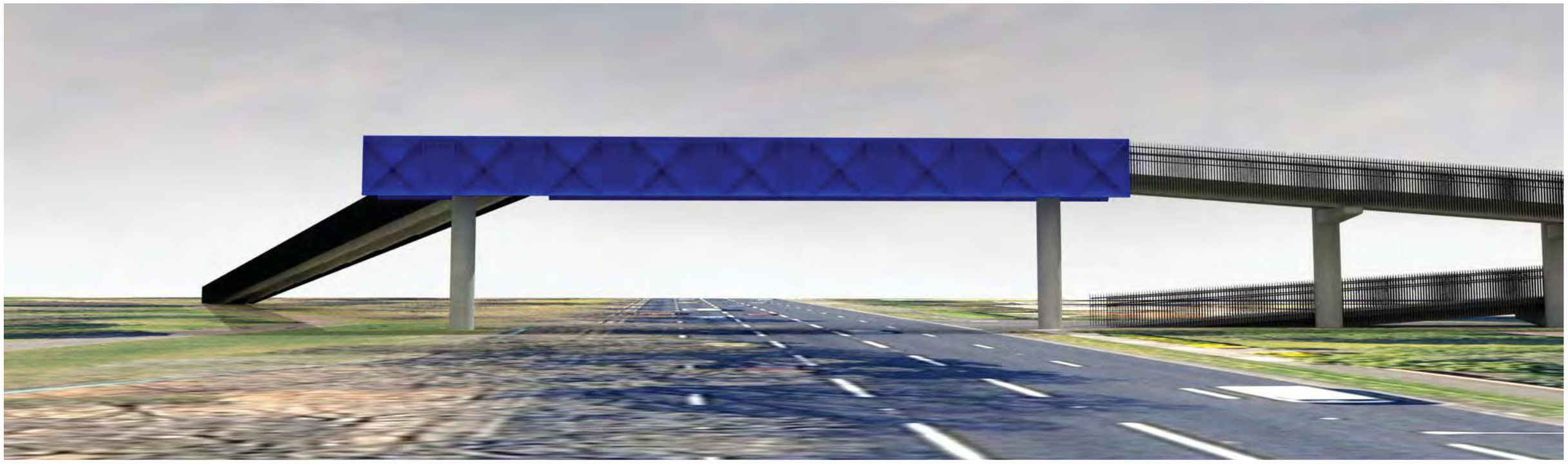

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1

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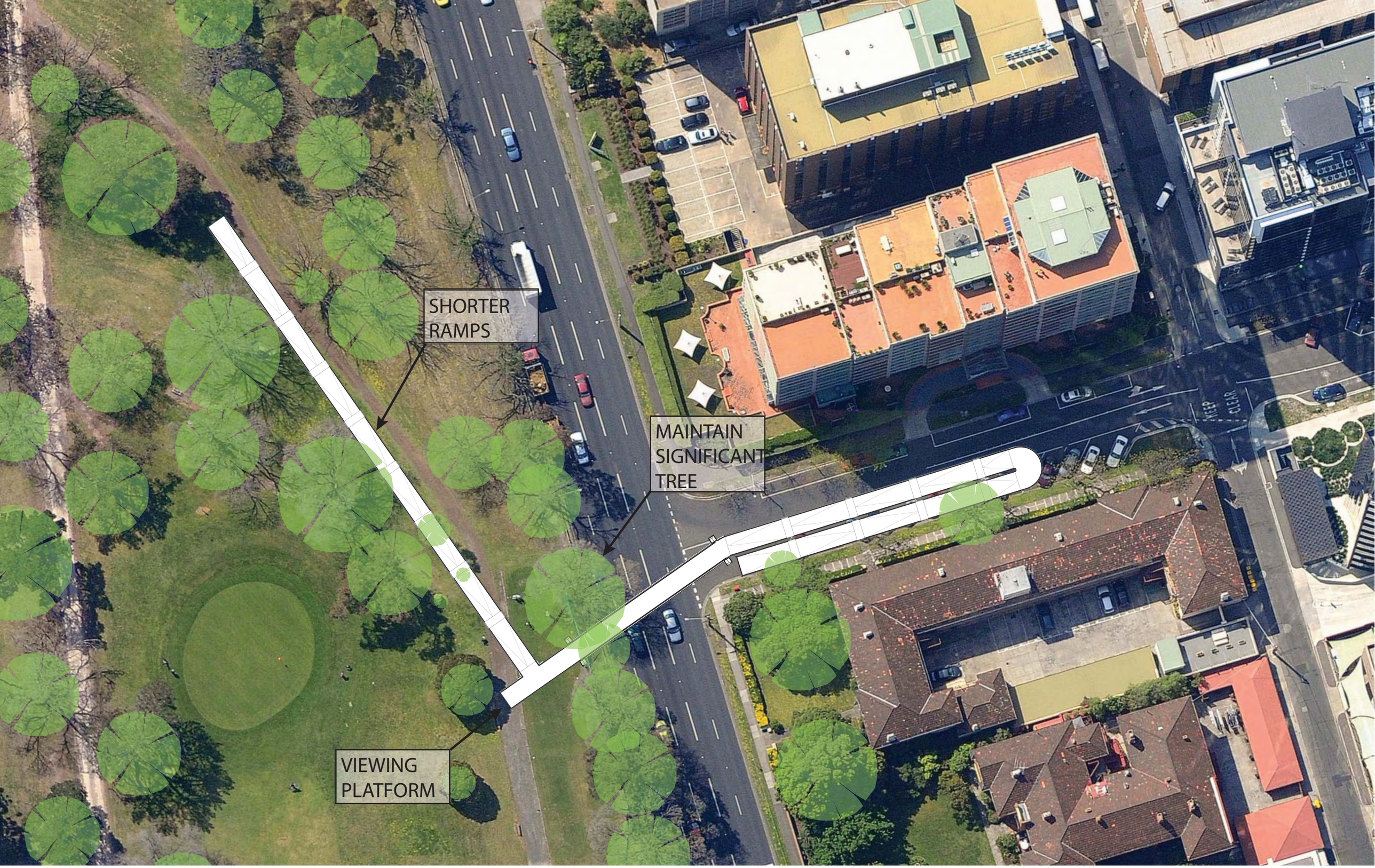

QUEENS ROAD PEDESTRIAN BRIDGE
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ARTHUR ST, OPTION 2 and 3
PLAN 1:500

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PLAN 1:500. Tree Removal

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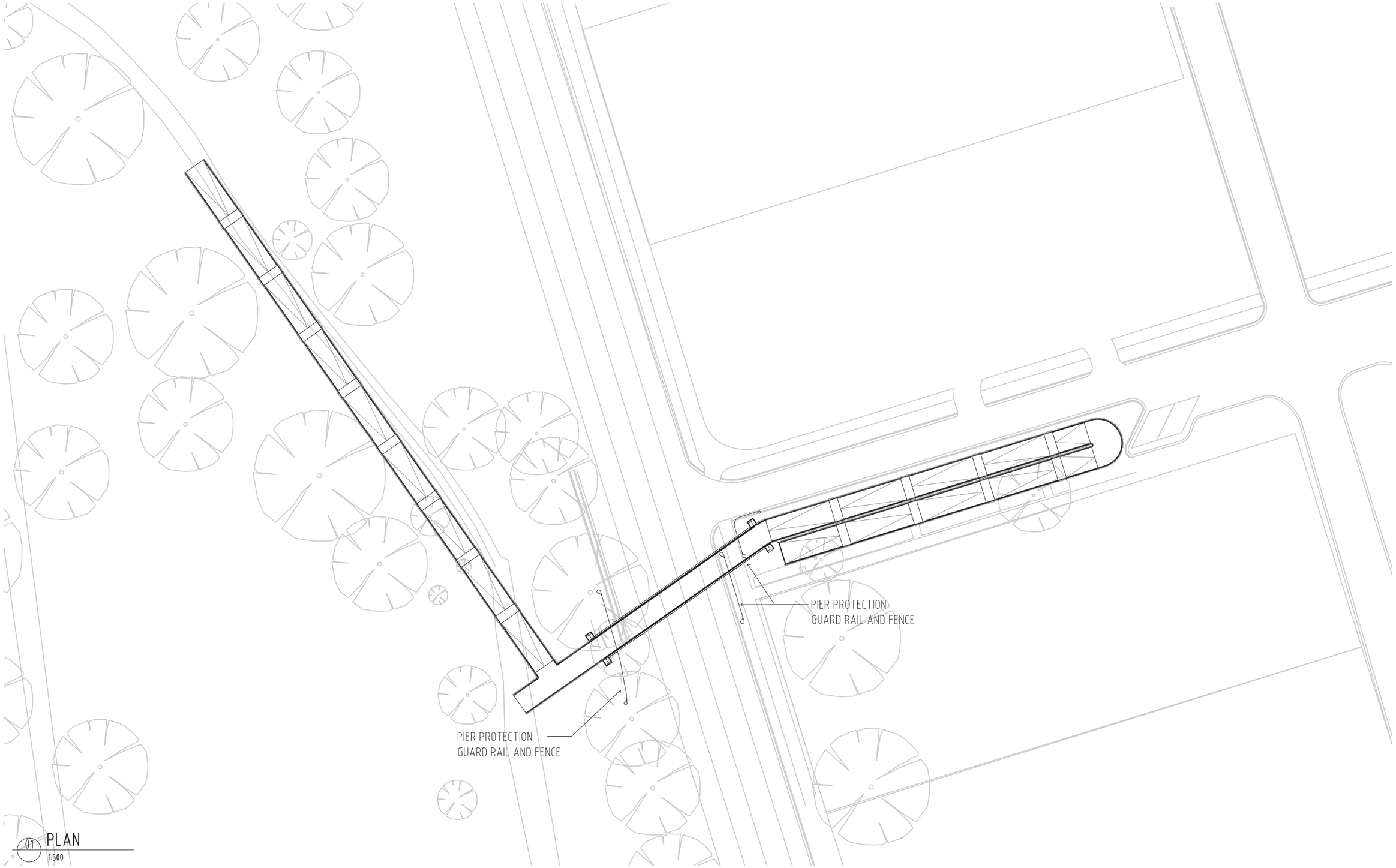

01 PLAN
1:500

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 2
PLAN 1:500

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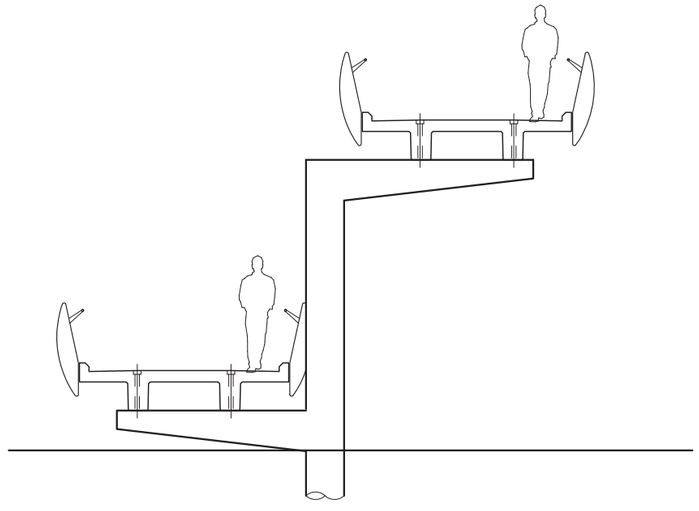
04 DETAIL



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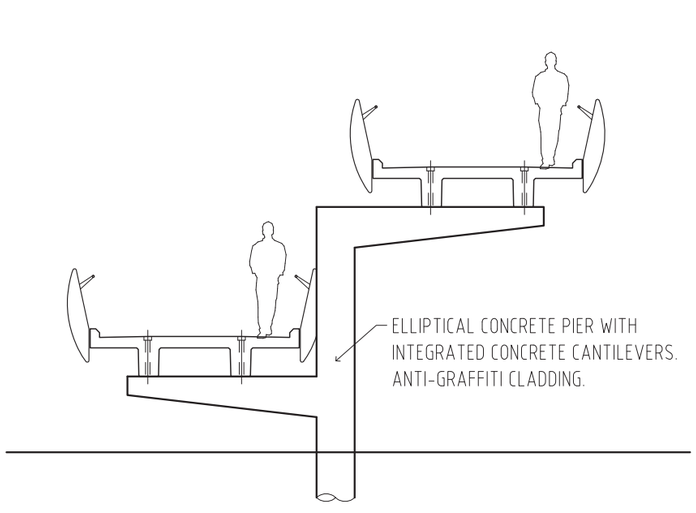

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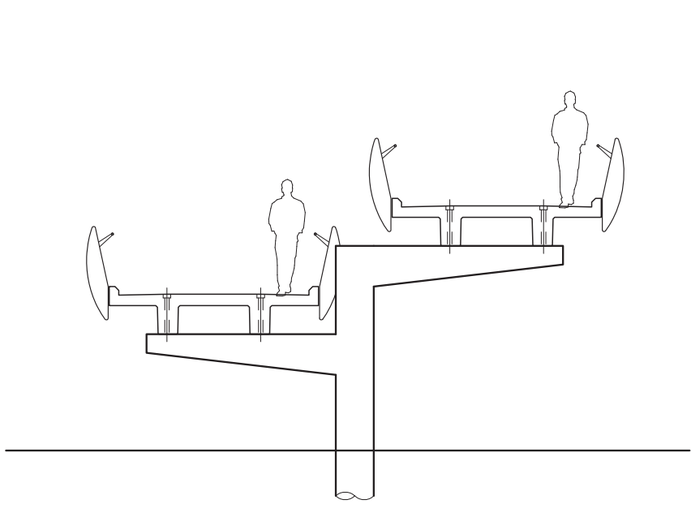

01 SECTION C
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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 2 and 3
RAMP SECTIONS

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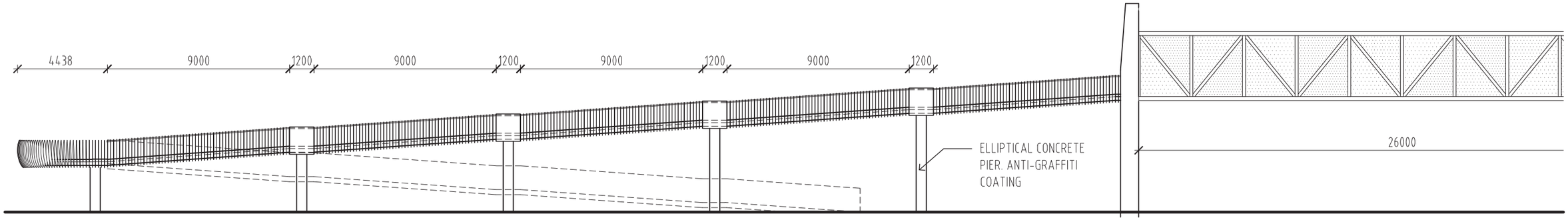

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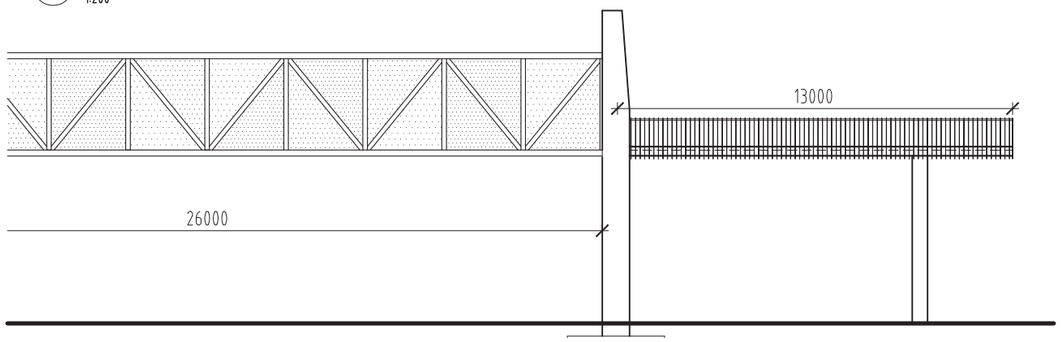
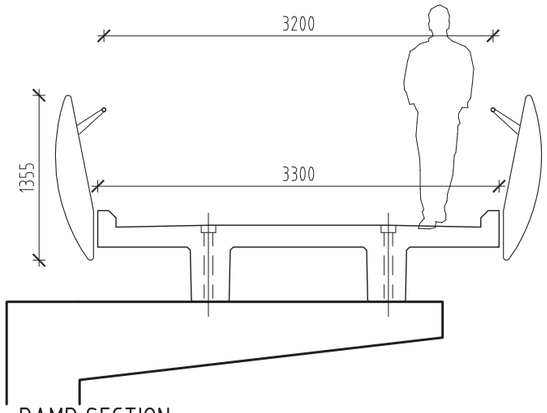
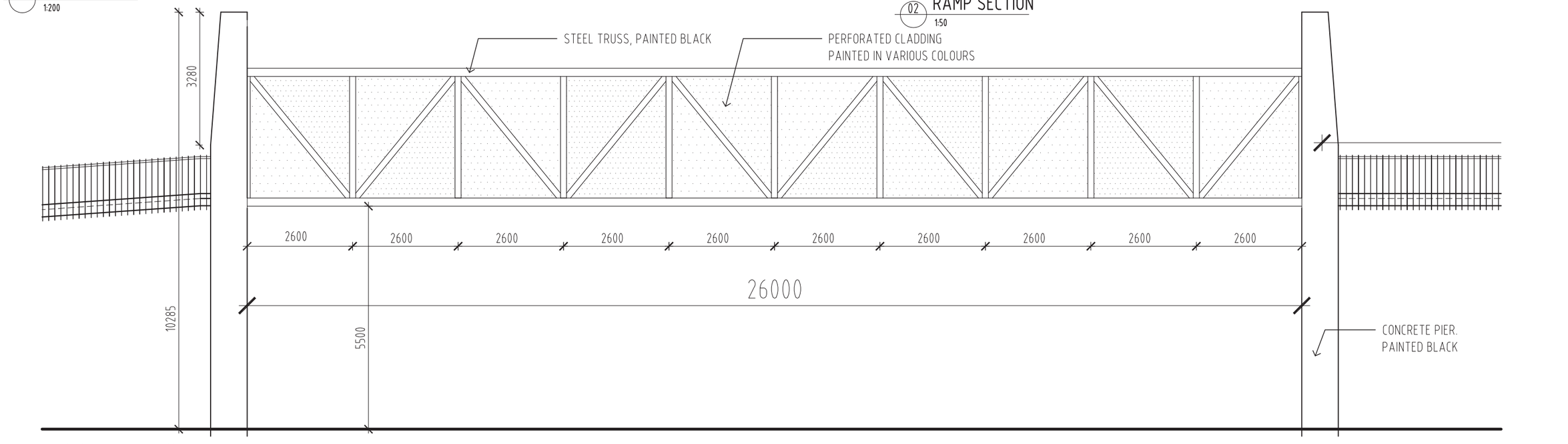




02 RAMP SECTION
1:50

02 NORTH ELEVATION cont.
1:200



03 NORTH ELEVATION
1:100

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 2
ELEVATIONS

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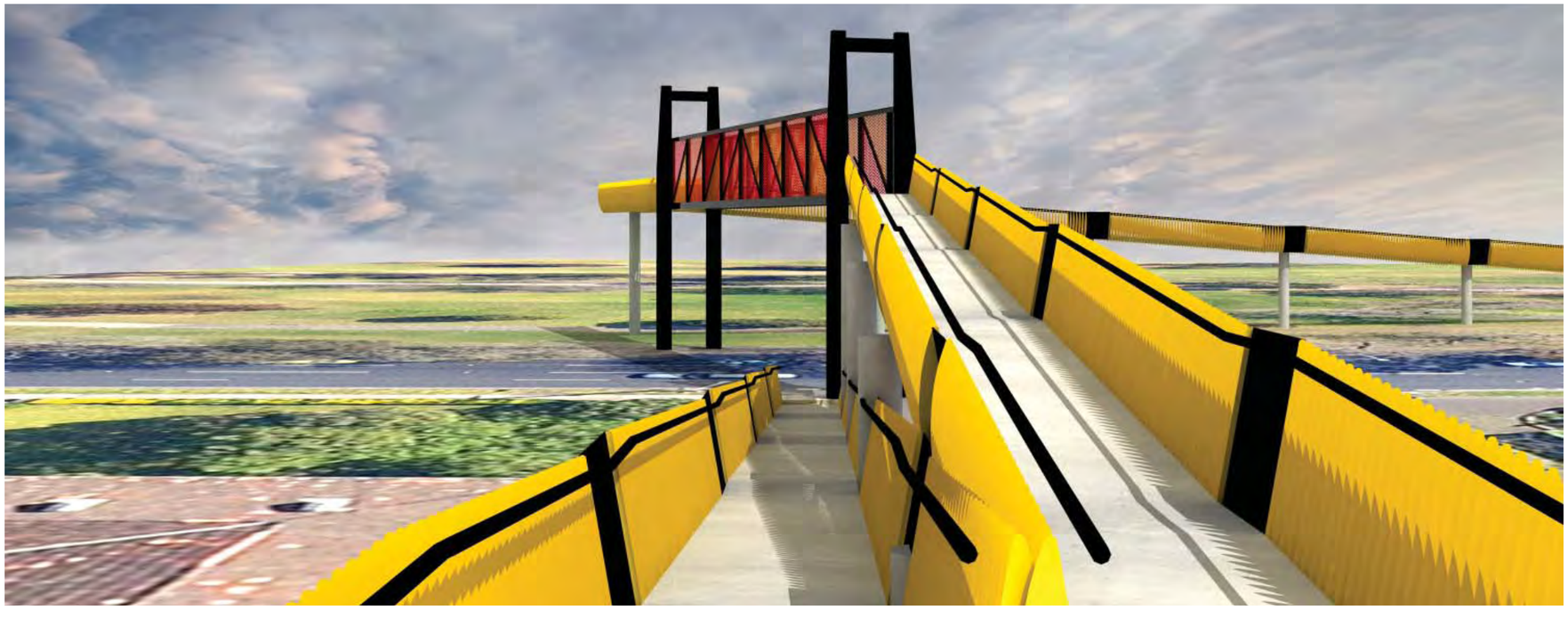

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 2

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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 2

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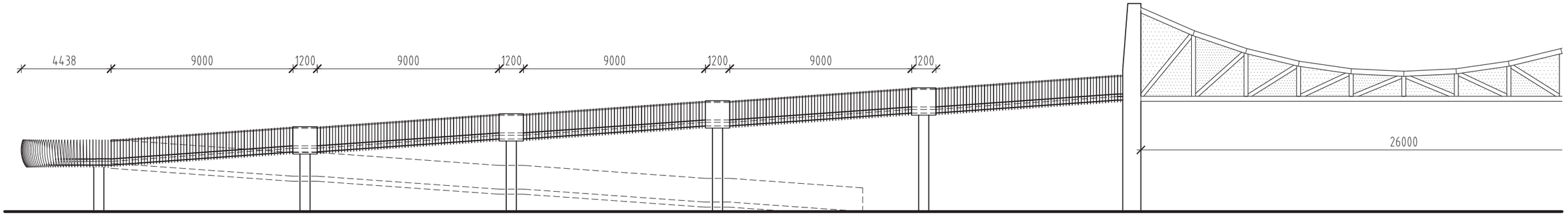
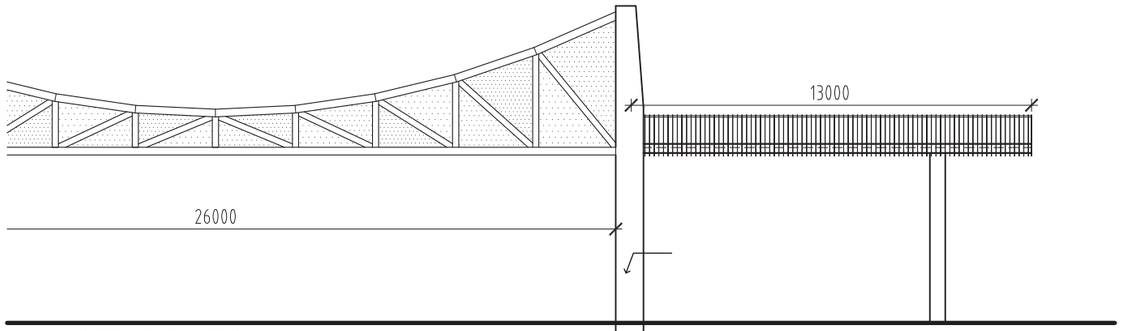


01 xxx NORTH ELEVATION
1:200



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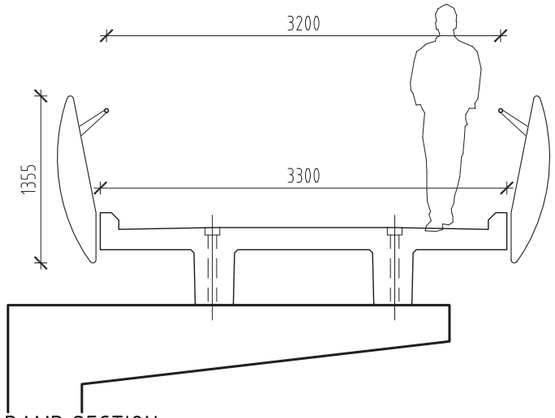
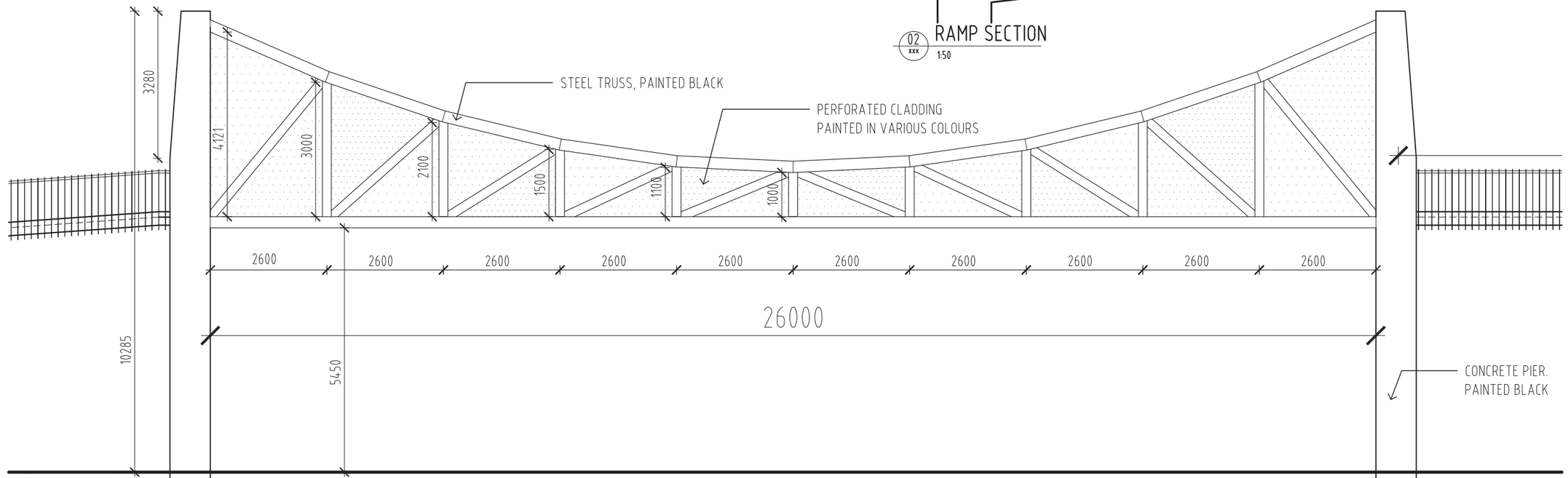


02 xxx RAMP SECTION
1:50



03 xxx NORTH ELEVATION
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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 3
ELEVATIONS AND SECTIONS

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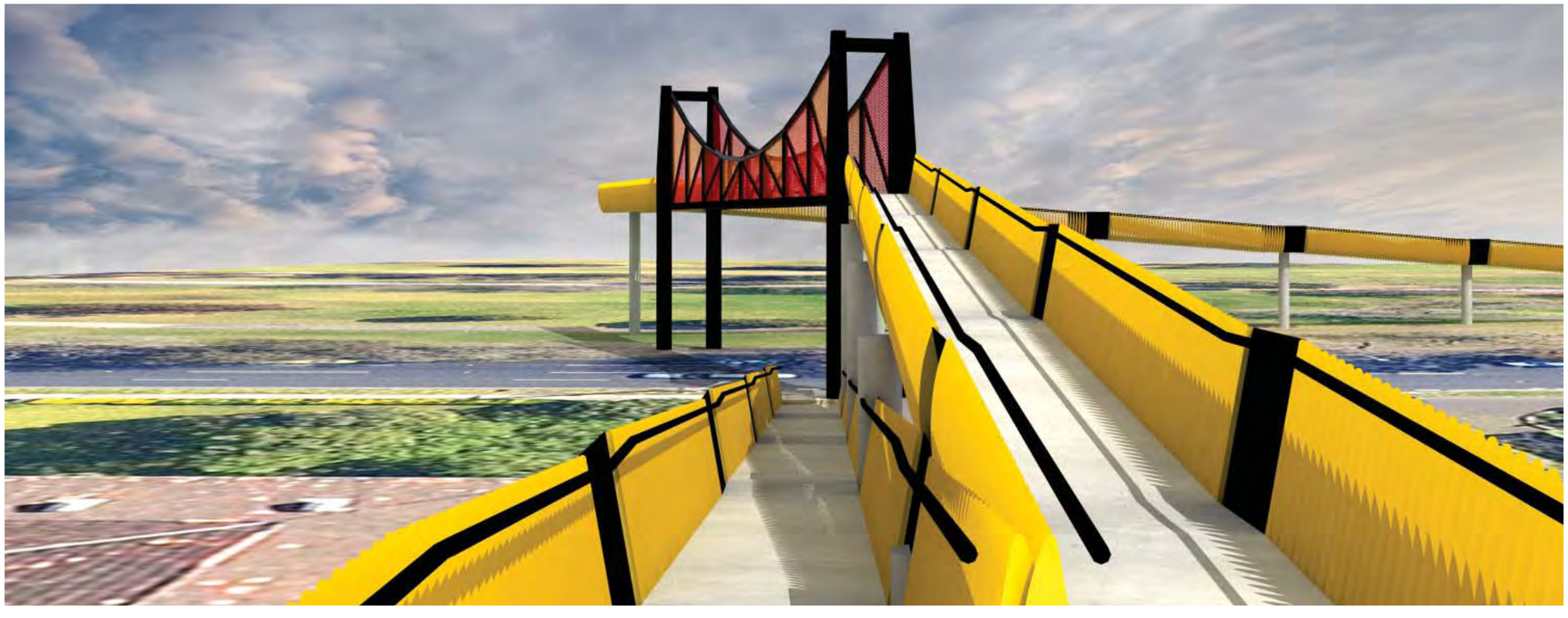

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 3

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FEASIBILITY STUDY
AUGUST 2011

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HANNA STREET

QUEENS ROAD

EXISTING CONNECTIONS

PROPOSED CONNECTIONS

EXISTING CROSSINGS

TRAM STOPS

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

HANNA ST,
PEDESTRIAN CONNECTIONS

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HANNA ST CONSTRAINTS

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QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

HANNA ST, OPTION 1
PLAN 1:500

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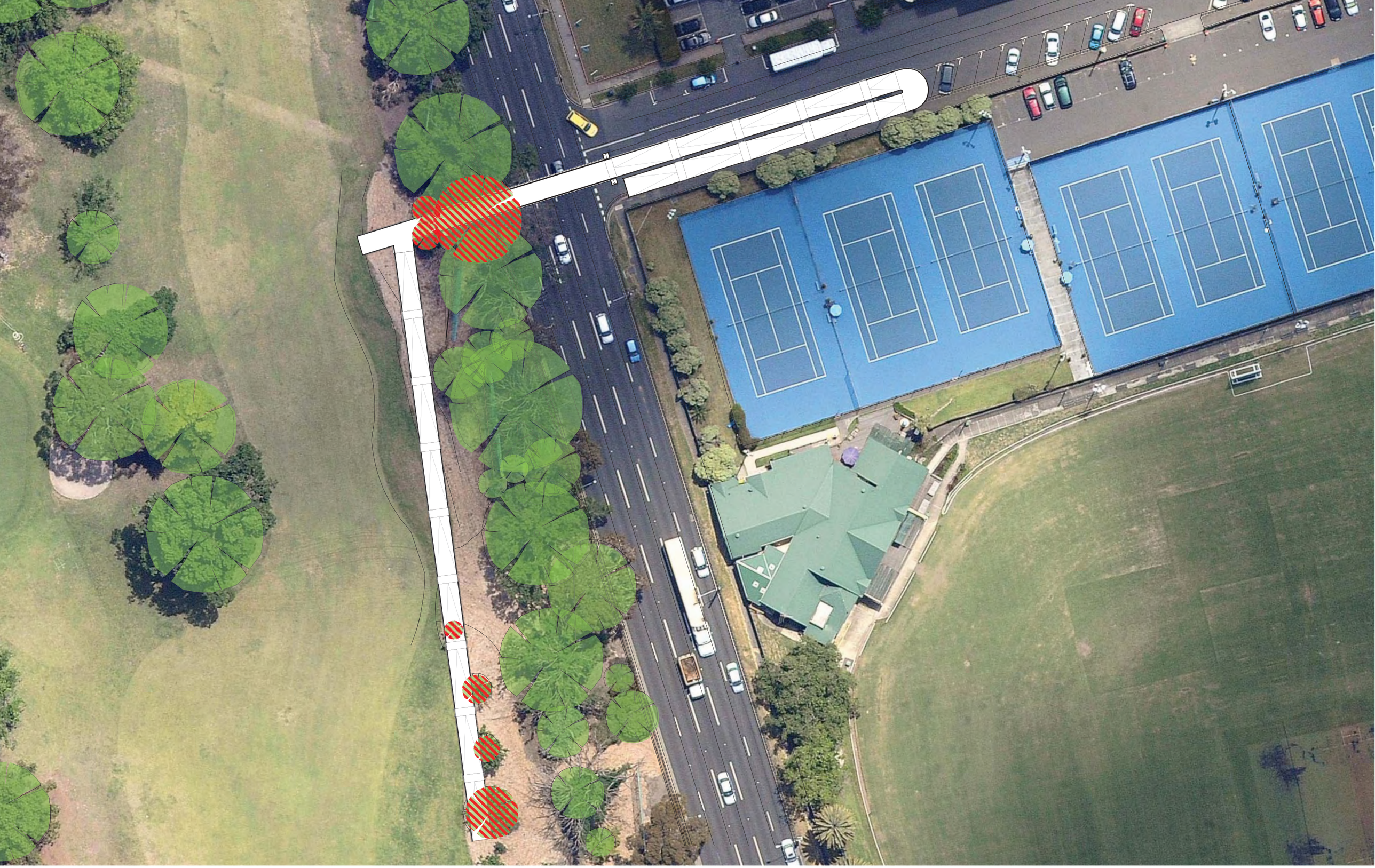

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

ARTHUR ST, OPTION 1
PLAN 1:500. Tree Removal

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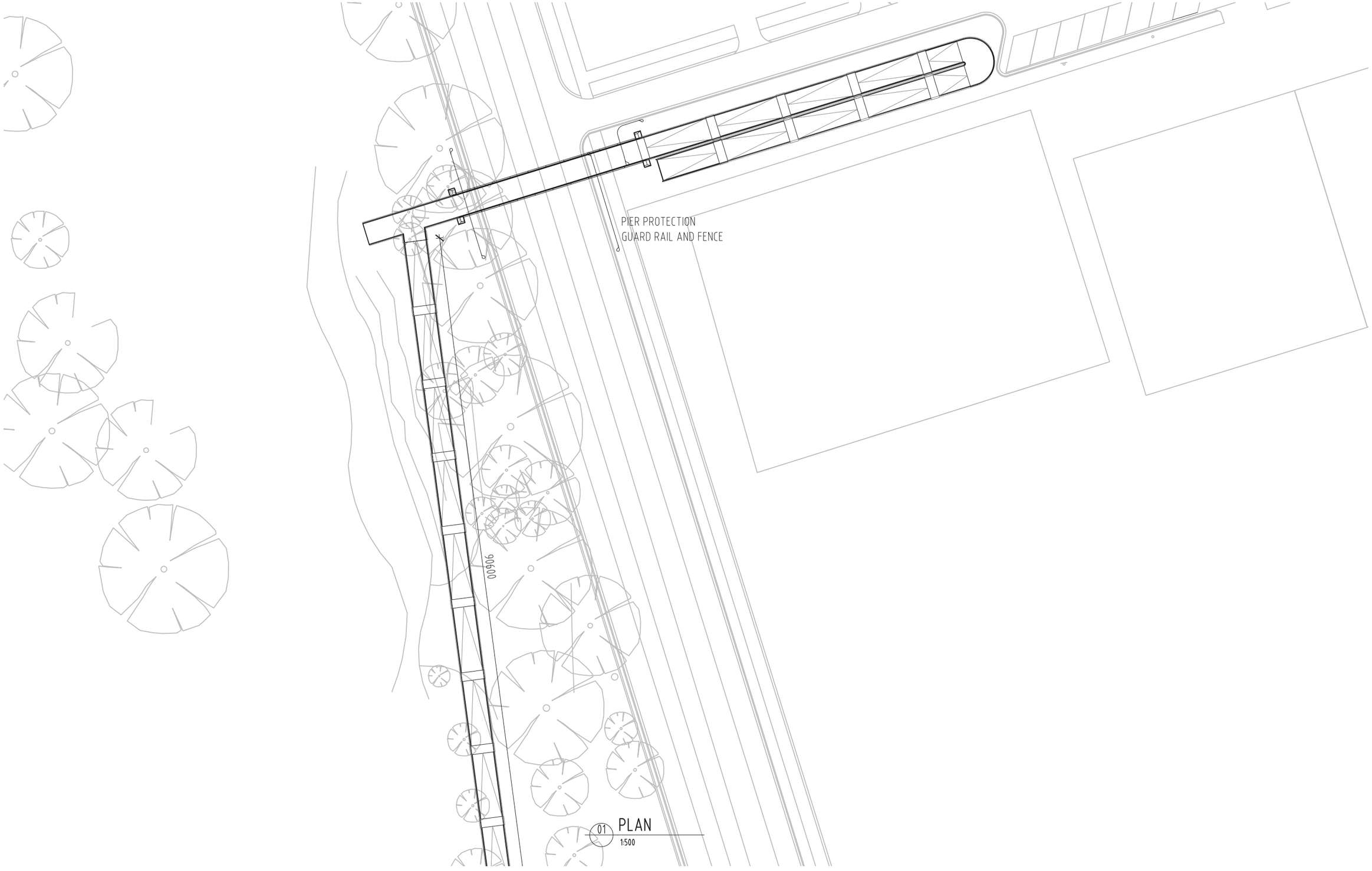

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

HANNA ST, OPTION 1
PLAN 1:500

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FEASIBILITY STUDY
AUGUST 2011

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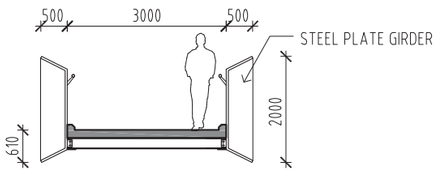
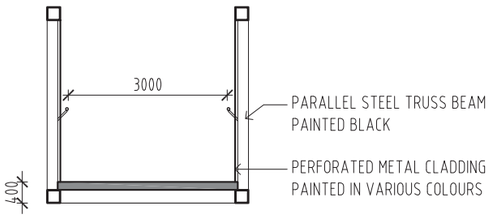
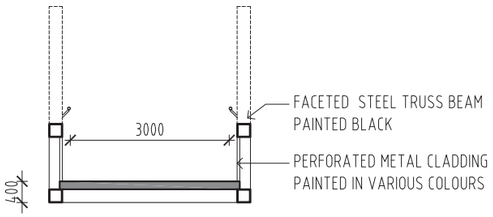
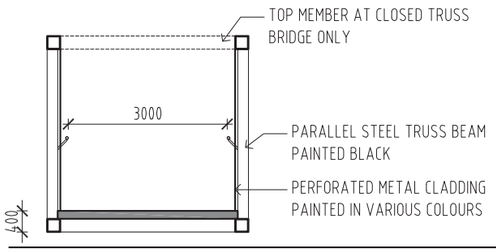
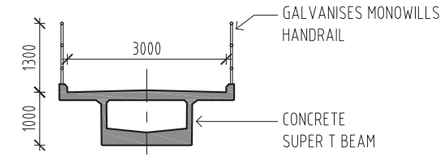
BRIDGE OPTION	STRUCTURAL DEPTH	RAMP LENGTH	BRIDGE COST	RAMP COST	TOTAL COST
OPTION 1 - STEEL PLATE GIRDER 	610 MM	93 M	$ 1,744,324.00	$ 3,226,791.00	**$ 4,971,115.00**
OPTION 2 - STEEL PARALLEL TRUSS 	400 MM	88.3 M	$ 1,105,285.00	$ 3,143,447.00	**$ 4,248,732.00**
OPTION 3 - STEEL CURVED UPPER CHORD TRUSS 	400 MM	88.3 M	$ 1,095,593.00	$ 3,143,447.00	**$ 4,239,040.00**
OPTION 4 - STEEL PARALLEL THROUGH TRUSS 	400 MM	88.3 M	$ 1,056,829.00	$ 3,143,447.00	**$ 4,200,275.00**
OPTION 5 - CONCRETE "SUPER T" / "T-ROFF' 	1000 MM	99.2 M	$ 838,873.00	$ 3,437,673.00	**$ 4,276,545.00**

QUEENS ROAD PEDESTRIAN BRIDGE
FEASIBILITY STUDY
AUGUST 2011

OPTION OVERVIEW AND COST COMPARISON

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Appendix B

Geotechnical Investigation

HISTORIC BOREHOLE LOGS
Source: Groundwater Monitoring System database, Department of Sustainability & Environment

SITE	START DATE	DEPTH FROM m	DEPTH TO m	MATERIAL ENCOUNTERED
78444	18.12.1972	0	13.72	SANDY CLAY
78444	18.12.1972	13.72	14.02	YELLOW IRONSTONE
78444	18.12.1972	14.02	21.94	CLAY WITH LAYERS OF SAND
78444	18.12.1972	21.94	25.29	LIGNEOUS (BLACK WOOD)
78444	18.12.1972	25.29	64	SOFT MUDSTONE
78444	18.12.1972	64	70.1	ROCK
78445	28.12.1972	0	0.3	TOPSOIL
78445	28.12.1972	0.3	1.52	YELLOW SANDY CLAY
78445	28.12.1972	1.52	3.05	YELLOW SANDY CLAY AND COARSE GRAVEL
78445	28.12.1972	3.05	13.72	LIGHT YELLOW SANDY CLAY
78445	28.12.1972	13.72	22.86	LIGHT YELLOW BROWN SAND WITH TRACES OF COARSE SAND
78445	28.12.1972	22.86	25.91	DARK BROWN LIGNITE CLAY WITH TRACES OF QUARTZ GRAVEL
78445	28.12.1972	25.91	30.48	DARK BROWN LIGNITE CLAY
144489	03.06.2001	0	1.5	TOP SOIL
144489	03.06.2001	1.5	6.3	GREY CLAYEY SAND
144489	03.06.2001	6.3	9	HARD CLAY
144489	03.06.2001	9	12.71	BROWN SAND
144489	03.06.2001	12.71	18.5	STIFF GREY CLAY
144489	03.06.2001	18.5	21	STIFF GREY BROWN SILTY CLAY
144489	03.06.2001	21	32	BROWN CLAY SAND
144489	03.06.2001	32	35	STIFF GREY SANDY CLAY
S9031776/1	26.04.2008	0	0.5	SAND LOAM
S9031776/1	26.04.2008	0.5	4	DRY SAND
S9031776/1	26.04.2008	4	61	CLAY BOUND GRANITIC SAND
S9031776/1	26.04.2008	61	94	BLACK & WHITE GRANITE HARD


SOUTHBANK
115375
145084
145083
145082
RICHMOND
CREMORNE
140240
SOUTH MELBOURNE
144489
PORT MELBOURNE
SOUTH YARRA
ALBERT PARK
S9034169/1
78460
78462
S9035319/1
S9031776/1
S9037348/1
MIDDLE PARK
78445
78444
PRAHRAN

Appendix C

Site Assessment

LEGEND

- EXISTING PEDESTRIAN LINKS
- EXISTING AT GRADE CROSSINGS
- EXISTING BRIDGE CROSSINGS
- STANDARD TRAM STOP
- TRAM SUPER STOP
- EXISTING CONTRAFLOW GANTRIES
- POTENTIAL SHARED USE PATH LINK
- POTENTIAL PROTECTION BARRIER
- MAJOR EAST-WEST MOVEMENT
- PUBLIC / INSTITUTIONAL USE
- RESIDENTIAL / COMMERCIAL USE

QUEENS ROAD FOOTBRIDGE

CITY OF PORT PHILLIP

LOCATION ANALYSIS DIAGRAM

DECEMBER 2010

GHD

WOOD / MARSH PTY LTD ARCHITECTURE

Table 1 Summary of Bridge Location Assessment

Location		Urban Design	Access East Side	Access West Side	Other Constraints
Roy Street	General		Good access to tram stop and ped/bike traffic from Commercial Road Underground electricity cables Located close to existing signalised intersection and well away from mid point along Queens Road	Very good access to golf course then proceed south along protected area near boundary fence. Existing footings for temporary bridge provided in area with no trees	
	North	MCC cricket ground car park and entry reserve	Widened lanes due to angle car parking		Driveway into on site parking and difficult to relocate
	South	Potential overlooking issues with new upmarket apartments at south eastern side.			Drainage pipe on southern traffic lane
Hanna Street	General		Very good access to Super Tram stop and ped/bike traffic from Commercial Road Located close to third point along Queens Road Underground electricity cables	Very good access to golf course then proceed south along protected area near boundary fence	Trees along fence are stressed and need lopping of top branches Overhead electrical cables
	North	Standford office building is key architectural building but has sufficient set back from the boundary			Driveway into on site parking for tennis courts sufficiently set back from Queens Road intersection (approx. 90m)
	South	Tennis courts – no overlooking issues	Widened lanes due to angle car parking		

Louise Street	General		Good access to Super Tram Stop Located close to mid point along Queens Road	Difficult to connect to existing path network, but could create a new path within the golf course along Queens Road	Overhead electrical cables
	North	Apartment buildings with reasonable setback	Widened lanes due to angle car parking		Driveway into on site parking and difficult to relocate (approx. 30m to intersection)
	South	Apartment buildings with narrow setback			
Leopold Street	General		Good connection to Fawkner Park Located close to mid point along Queens Road	Difficult to connect to existing path network, but could create a new path within the golf course along Queens Road	Overhead electrical cables
	North	Apartment buildings with reasonable setback	Widened lanes due to angle car parking		Drainage pipe on southern traffic lane Driveway into on-site parking and difficult to relocate (approx. 25m to intersection)
	South	Apartment buildings with narrow setback			
Arthur Street	General		Good connection to Fawkner Park Good access to tram stop Located close to existing signalised intersection and well away from mid point along Queens Road	Very good access to golf course then proceed north along protected area near boundary fence.	Overhead electrical cables
	North	Apartment buildings with narrow setback			Drainage pipe on southern traffic lane Driveway into on-site parking and impossible to relocate (approx. 35m to intersection)
	South	Apartment buildings with narrow setback	Widened lanes due to angle car parking		Drainage pipe on southern traffic lane

GHD

www.ghd.com.au
Tel. (03) 8687 8000 Fax. (03) 8687 8111
180 Lonsdale Street Melbourne Vic 3000

Queens Road Footbridge
Qualitative Assessment of Bridge Locations
Table 2.

Factor	Comment	Arthur St	Leopold St	Louise St	Hanna St	Roy St
1. Optimising Proximity to Crossing Location	Minimum walking length to cross Queens Road	1	3	3	2	1
		Close to existing at-grade crossing	Close to midpoint between existing at-grade crossings	Close to midpoint between existing at-grade crossings	Reasonably close to midpoint between existing at-grade crossings	Close to existing at-grade crossing
2. Cyclist Access and Movement	Access from east of target area	3	3	2	2	2
		Good access to Fawkner Park and northbound/southbound cycle lanes on St Kilda Road. Poor access for legal cycle trips originating from within the study area due to Queens Lane being one-way.	Good access to Fawkner Park and northbound/southbound cycle lanes on St Kilda Road. Poor access for legal cycle trips originating from within the study area due to Queens Lane being one-way.	Poor access to southbound cycle lane on St Kilda Road. Poor access for legal cycle trips originating from within the study area due to Queens Lane being one-way.	Poor access to southbound cycle lane on St Kilda Road. Poor access for legal cycle trips originating from within the study area due to Queens Lane being one-way.	Poor access to southbound cycle lane on St Kilda Road. Poor access for legal cycle trips originating from within the study area due to Queens Lane being one-way.
3. Connectivity to North of Lake [2]	Higher access requirement expected to north	3	2	1	1	1
		Closest location to north travel	Good location to north travel	Poor as south of mid point between intersections	Poor as south of mid point between intersections	Poor as south of mid point between intersections
4. Connectivity to South of Lake [2]	Access to south of lake and Grand Prix events	1	1	2	2	3
		Poor as north of mid point between intersections	Poor as north of mid point between intersections	Good as south of mid point between intersections	Good as south of mid point between intersections and close to grandstands for Grand Prix	Very good as close to south end of golf course and close to grandstands for Grand Prix
5. Set back of Adjacent Buildings	Residents with low setback may reject bridge	1	1	1	3	1
		Low setback to residential buildings	Low setback to residential buildings	Low setback to residential buildings	No setback issues as adjacent to tennis courts	Low setback to residential buildings
6. Lack of Heritage Issues	National and Council listed buildings	3	1	1	1	3
		None	Former Bendigonia on north side - Heritage Victoria protecfted property	Stamford Building on south side - Heritage Victoria protected property. Council Heritage Control on south side	Stamford Building on south north side - Heritage Victoria protected property.	None
7. Connectivity with Existing Golf Course Paths	Extent of new path required within golf course	3	1	1	1	2
		Good connection to north-south patth but protection from golf balls requiried	Path required within golf course adjancent to Queens Road. Protection from golf balls required	Path required within golf course adjancent to Queens Road. Protection from golf balls required	Path required within golf course adjancent to Queens Road. Protection from golf balls required	Path required within golf course adjancent to Queens Road. Protection from golf balls required
8. East - West Connection for Future Proofing	Maximum opportunity for possible redevelopment	1	2	3	3	2
	of golf course and bridge over lake	Poor access for long term connectivity	Good access for long term connectivity	Very good access for long term connectivity	Very good access for long term connectivity	Good access for long term connectivity
Total		16	14	14	15	15

Notes
1. Bridge located on south side of intersection as existing driveways assumed to prevent bridge location on north side
2. Pathway in golf course constructed for shortest length to connect with existing pathways
3. Primary target population is residents between Queens Road and St Kilda Road
4. Assumes equal weighting for each factor

Scoring 1 - Poor, 2 - Good, 3 - Very Good

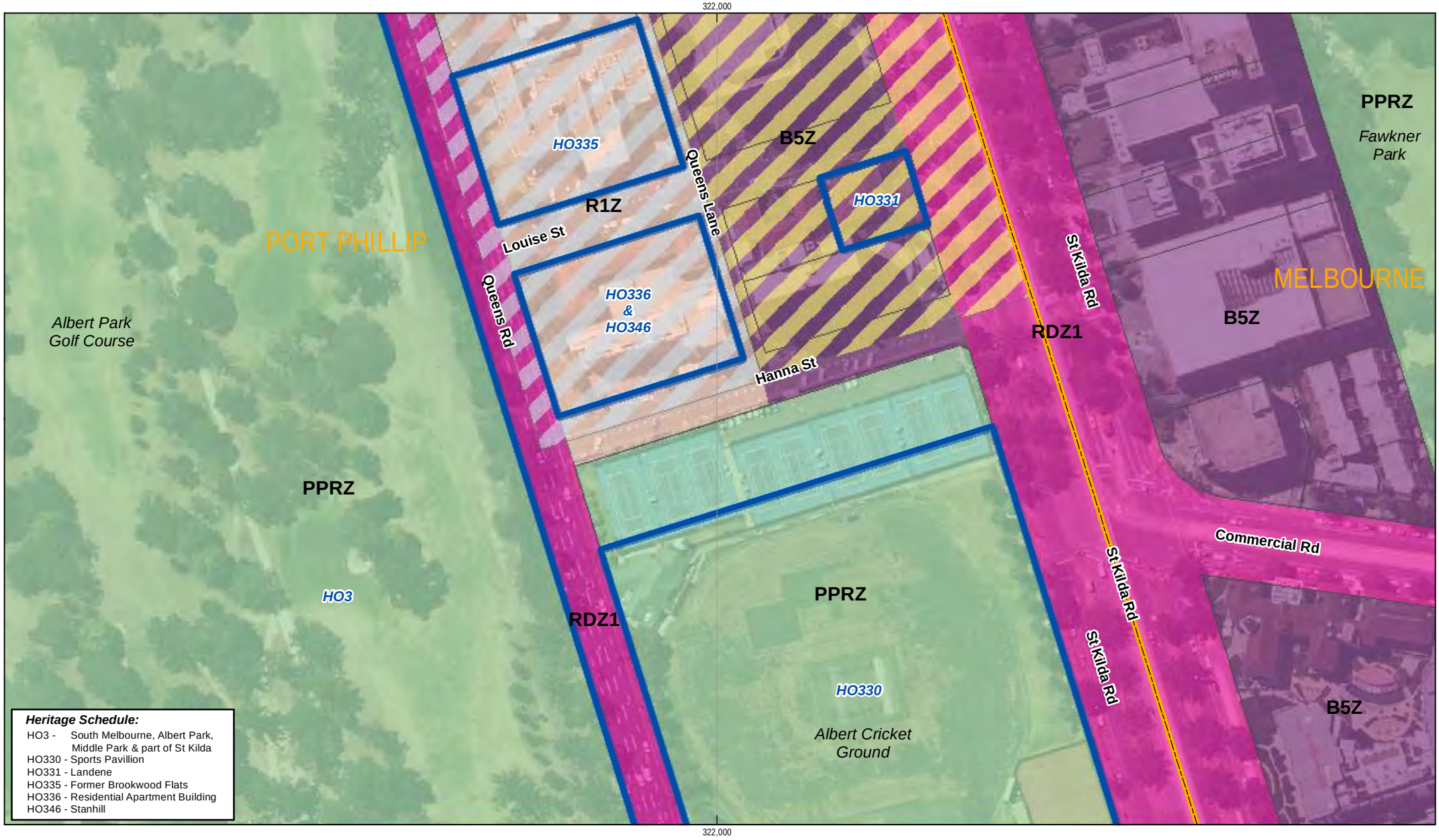
QUEENS ROAD FOOTBRIDGE
Key Risk Overview of Bridge Locations
Table 3

Bridge Site	Key Risk	Possible Mitigation Measures
All Sites	Pedestrians will choose at-grade crossing instead of bridge	Locate bridge midway between at-grade crossings Prepare study to determine pedestrian demand, travel destinations and likely behaviour
	Cyclists will choose at-grade crossing instead of bridge	Locate bridge away from alternative crossing points and use single section ramps instead of 2 or 3 ramp sections Prepare study to determine cyclist demand, travel destinations and likely behaviour
	Public reject provision of bridge	Develop case for benefits of bridge
	Golf course does not allow access for the public when using the bridge	Obtain Parks Victoria agreement to allow public access in golf course.
	Public concern for safety when using paths within golf course	Provide barriers to prevent errant golf balls hitting the public
	Cyclists riding illegally on footpaths as a result of new bridge and Queens Way being one way	Consider options for providing improved cycle accessibility in study area
	VicRoads rejects provision of bridge over Queens Road	Conduct early consultation with VicRoads
	Bridge does not connect with suitable pedestrian and cycle facilities	Provide good connections to suitable facilities
Hanna and Roy Streets	Cyclists do not use the bridge due to poor access for southbound cycle land on St Kilda Road	
Arthur, Leopold, Louise and Roy Streets	Residents reject provision of bridge in close proximity to residential buildings	Locate bridge at Hanna Street to avoid locating the bridge next to residents
Leopold, Louise and Hanna Street	Construction of bridge adjacent to heritage listed buildings to site is not permitted by the relevant agencies	Conduct early consultation with relevant organisations
Hanna Street	Bridge causes excessive overshadowing to tennis course	Assess bridge overshadowing during concept design to minimise overshadowing. Consult early with tennis club

Arthur, Leopold and Louise Streets	Visitors for Grand Prix do not use bridge	Locate the bridge at Hanna or Roy Street to allow good access to grandstands
Arthur and Leopold Streets	Government rejects provision of bridge as poor connection with DDA compliant tram stops	Locate the bridge at Louise, Hanna or Roy Streets. Investigate the feasibility of tram stop upgrades
Arthur, Leopold and Roy Streets	Government rejects provision of bridge as does not sufficiently allow for possible redevelopment of Albert Park and cross-lake connections	Locate the bridge at Louise, Hanna or Roy Streets

Appendix D

Town Planning & Heritage



Heritage Schedule:

HO3 - South Melbourne, Albert Park, Middle Park & part of St Kilda
HO330 - Sports Pavillion
HO331 - Landene
HO335 - Former Brookwood Flats
HO336 - Residential Apartment Building
HO346 - Stanhill

Scale: 1:2000 @ A4

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Local Government Boundary

Zones
- Residential 1
- Business 5
- Public Park and Recreation
- Road – Category 1

Overlays
- Design & Development 4-2
- Design & Development 4-5
- Heritage (See Schedule)

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City of Port Phillip
Queens Road Footbridge

Job Number 31-27086
Revision A
Date 16 Aug 2011

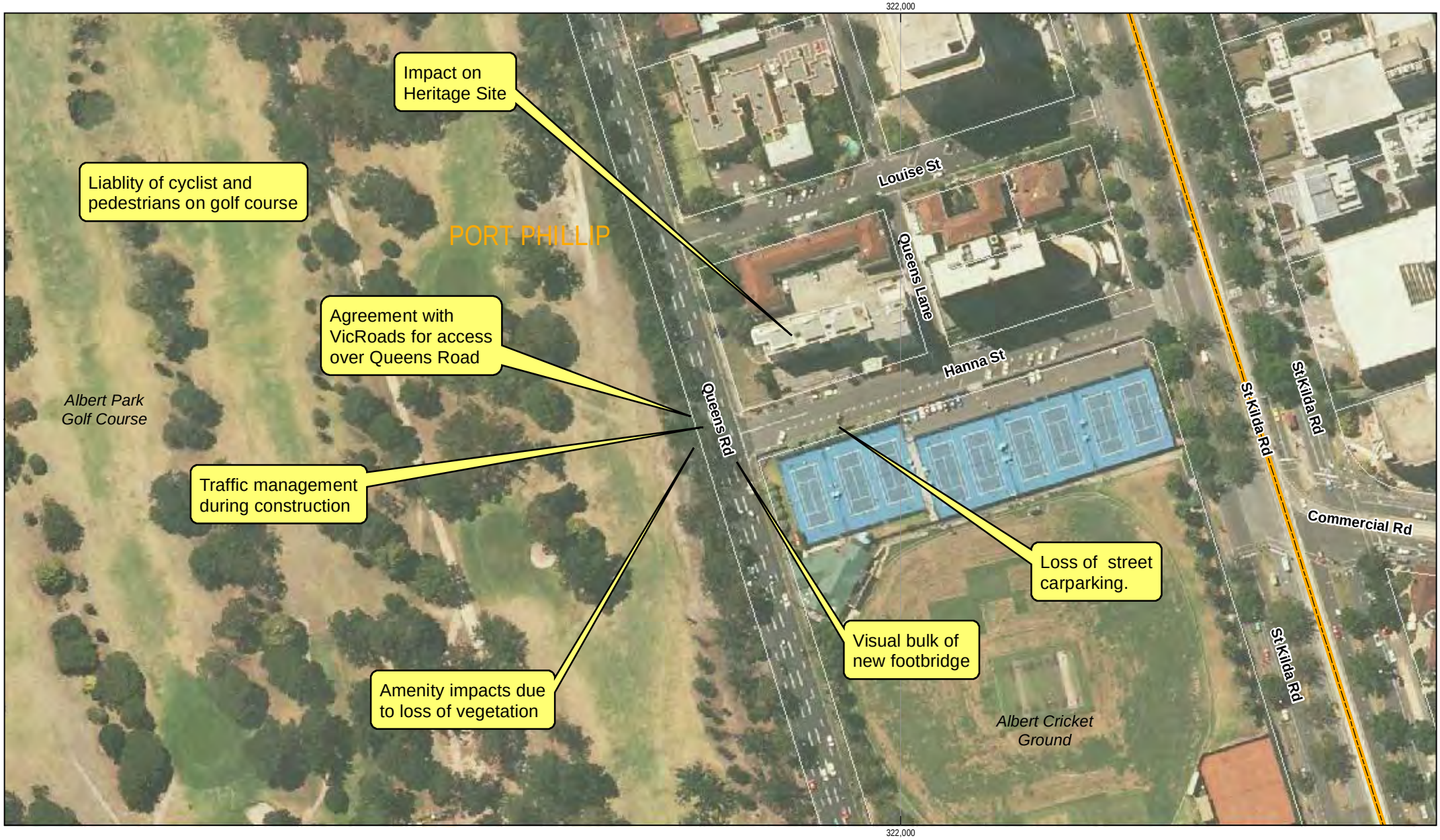
Hanna Street
Zones and Overlays

Figure 1

G:\31\27086\GIS\Maps\Working\Planning\Hanna Street\Zones and Overlays.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Data source: DSE and VicNap 2011 with permission. Created by:lrsmith



Scale: 1:2000 @ A4

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Local Government Boundary

GHD

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City of Port Phillip
Queens Road Footbridge

Hanna Street
Constraints Map

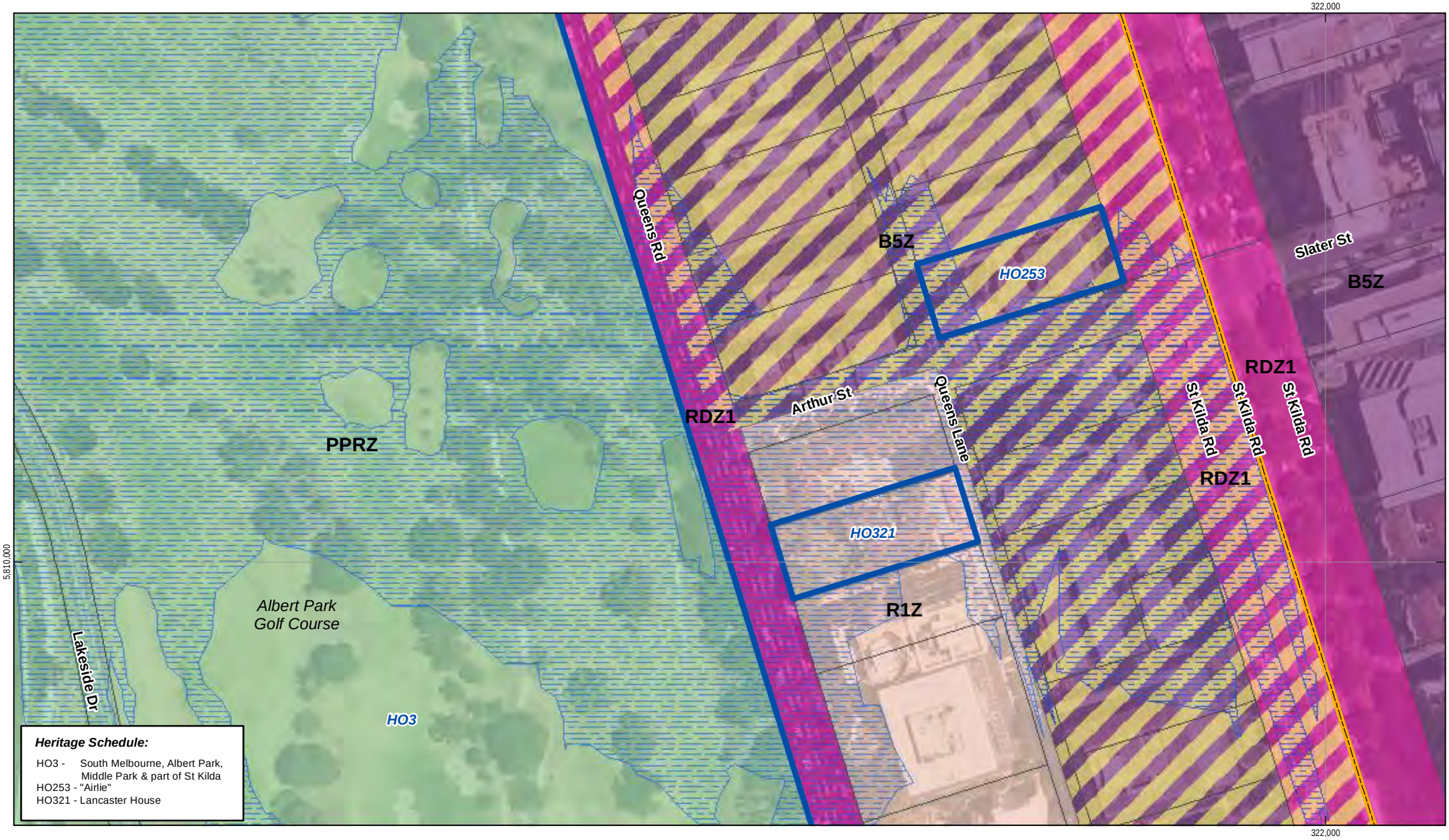
Job Number	31-27086
Revision	A
Date	16 Aug 2011

Figure 2

G:\31\27086\GIS\Maps\Working\Planning\Hanna Street\Constraints map.mxd

180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Data source: DSE and VicNap 2011 with permission. Created by:lrsmith



Scale: 1:2000 @ A4

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Zones
- Local Government Boundary
- Residential 1
- Business 5
- Public Park and Recreation
- Road – Category 1

Overlays
- Design & Development 4-2
- Special Building
- Heritage (See Schedule)

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City of Port Phillip
Queens Road Footbridge

Job Number 31-27086
Revision A
Date 16 Aug 2011

Arthur Street
Zones and Overlays

Figure 3

G:\31\27086\GIS\Maps\Working\Planning\Arthur Street\Zones and Overlays.mxd

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Data source: DSE and VicNap 2011 with permission. Created by:lrsmith

Scale: 1:2000 @ A4

0 10 20 40 60 80

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

Local Government Boundary

CLIENTS | PEOPLE | PERFORMANCE

City of Port Phillip
Queens Road Footbridge

Job Number 31-27086
Revision A
Date 16 Aug 2011

Arthur Street
Constraints Map

Figure 4

G:\31\27086\GIS\Maps\Working\Planning\Arthur Street\Constraints map.mxd

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Appendix E

Contamination Assessment

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City of Port Phillip

Queens Road Bridge

Preliminary Desktop Contamination Study

August 2011

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

Contents

Table Index

Figure Index

Appendices

1. Introduction

1.1 Background

GHD Pty Ltd (GHD) was engaged by the Port Phillip City Council to provide a concept design for a footbridge at two (2) locations over Queens Road, Albert Park to link the residential area adjacent to St Kilda Road with the Albert Park amenities and the rest of the municipality. As part of the pre-design stage GHD is required to undertake a preliminary desktop contamination study of the land located on the corner of Queens Road and Arthur Street (herein referred to as Site 1) and Queens Road and Hanna Street (herein referred to as Site 2), Albert Park. The site locations are shown in Figure 1.

1.2 Objective

The objective of the preliminary desktop contamination study was to gain an understanding of the potential for contamination, with a view to considering what restrictions this may pose to construction of the proposed bridge.

1.3 Scope of Work

The scope of work for the preliminary desktop contamination study was:

- Completion of a desktop documentation review; and
- Preparation of a preliminary desktop contamination study report.

2. Data Review

This section presents a summary of the documentation reviewed as part of the desktop documentation review.

2.1 Historical Aerial Photograph Review

Eight (8) historical aerial photographs dating from 1931 to 2011 were reviewed. The Aerials were obtained from the Aerial Photography Register, Victorian Records Office, DSE and Google Earth Pro. The historical aerial photograph review is presented below in Table 1. The historical aerial photographs have been provided in Appendix A.

Table 1 Review of Historical Aerial Photographs

Documentation Identification	Date	Information
Run: 14 Film: 60 Photo: 2761 Scale: 1:18860	November 1931	**Site Observations** Buildings were present on both sites. The now Albert Park Reserve was present on Site 2 (south of Hanna St). Minimal vegetation was observed at the sites. **Site Surrounds Observations** Dense residential allotments were apparent to the north. Albert Park Lake was located to the west of the sites and Fawkner Park to the east of the sites. Trees evenly spaced along Queens Road.
Run: 19E and 20 Film: 178 and 179 Photo: 58304 and 58424 Scale: 1:6000	December 1945	**Site Observations** No apparent changes to both sites. **Site Surrounds Observations** Three large buildings were apparent next to Albert Park Lake to the north-west of the sites. Road apparent along Albert Park Lake.
Run: 17 and 18 Film: 1417 and 1424 Photo: 90 and 45 Scale: 1:12000	January 1951	**Site Observations** No apparent changes to Site 1. Site 2 had undergone further development with the addition of a building and the reduction of vegetation. **Site Surrounds Observations** No significant changes to the nearby surrounds.
Run: 15 Film: 1833 Photo: 56 Scale: 1:9600	April 1963	**Site Observations** Site 1 had undergone further development with the addition of a building. No apparent changes to Site 2. **Site Surrounds Observations** No significant changes to the nearby surrounds.
Run: 39 Film: 2926 Photo: 147 Scale: 1:10000	March 1975	**Site Observations** Changes to Site 1 building layout. **Site Surrounds Observations** Car park constructed alongside the three large buildings next to Albert Park Lake.
Run: 6 Film: 3998 Photo: 151 Scale: 1:10000	January 1986	**Site Observations** No apparent changes to both sites. **Site Surrounds Observations** Apparent expansion of Queens Road.
©2011 Google Earth	2011	**Site Observations**

Documentation Identification	Date	Information
Image © 2011 DigitalGlobe		No apparent changes to both sites. **Site Surrounds Observations** Apparent track running through golf course, Albert Park. Removal of the three large buildings next to Albert Pak Lake. Removal of possible sporting oval and reduction in vegetation north-west of the sites.

The review of aerial photographs indicated that to the east of Queens Road:

- Site 1 has remained predominantly covered by residential and/or commercial buildings with minor changes to the layout since at least 1931 to the present; and
- At Site 2, Albert Park Reserve has remained to the south of Hanna St since at least 1931 to the present. To the north of Hanna St, this site has been covered by residential and/or commercial buildings.

To the west of Queens Road, the land use has remained public open space / recreation reserve at both sites since at least 1931.

2.2 Geological Map Review

The 1:63 360 Geological Survey of Victoria Map – Melbourne Map Sheet SJ 55-1 indicated that both sites are located on Tertiary-aged fluvial deposits, as outlined in Table 2.

Table 2 Regional Geology

Period	Sub Period	Formation	Description
Tertiary	Pliocene	Sedimentary	Sand, red-brown, yellow and white, well bedded to cross-bedded; silty sand, minor gravel, sometimes including clay balls.

The area around Albert Park Lake was formerly a swamp and there is potential for acid sulphate soils to be present.

2.3 Royal Historical Society of Victoria Review

A historical search of the sites was conducted by the Royal Historical Society of Victoria (RHSV) on the 25 of July 2011. The RHSV search has been provided in Appendix B.

The search by the RHSV indicated the following:

- Queens Road was first listed in the Sands and McDougall Directories of Victoria in the late 1890s;
- Albert Park and Albert Park Lake were part of a reserve set aside in 1855, first known as the South Melbourne Park Reserve and then after the death of Prince Albert in 1862 as the Albert Reserve;
- The Warehouseman's Cricket Ground now known as the Albert Cricket Ground was established between Hanna Street and Roy Street (Albert Reserve). Adjacent to the cricket ground on Hanna Street was the Albert Reserve Tennis Centre, where in 1905 the first Australian Open tennis tournament was held;

- In 1885 approximately 200 acres of the original Albert Reserve on the eastern boundary was sold for private residential development, creating Queens Road and side streets connecting to St Kilda Road;
- Large private residences were established on the eastern side of Queens Road during the 1880s;
- Street numbers were assigned early in the twentieth century. Large private residences were present at number 14 and 17 Queens Rd (at the junction with Arthur Street) and at number 33 and 34 Queens Rd (at the junction with Hanna Street);
- During the period between 1940 and 1960 the large private residences were converted to flats;
- In 1960 number 15 Queens Rd, on the northern corner of Arthur Street, was turned into a commercial building, housing an advertising company in 1962;
- The directory ceased publications in 1974 and according to RHSV no available resources provide details over the past 30 years; and
- RHSV has confirmed that to the east of Queens Rd:
  - Site 1 is currently occupied by residential flats at number 17 Queens Rd and a large serviced apartment hotel complex at 15 Queens Road; and
  - Site 2 is currently occupied by residential flats at 33 and 34 Queens Rd, with a tennis club and cricket ground Located to the south of Hanna Street.

2.4 EPA Priority Sites Register Search

Priority Sites are sites for which EPA has issues a Clean-up Notice pursuant to section 62A, or a Pollution Abatement Notice pursuant to section 31A or 31B (relevant to land and/or groundwater) of the Environment Protection Act 1970. Typically these sites are sites where pollution of land and/or groundwater presents an unacceptable risk to human health or to the environment.

On 20 July 2011, GHD conducted a search of the Register. The search indicated that both sites are not listed on, and are not in the immediate vicinity of a site listed on the Register.

3. Discussion

3.1 Summary

Based on the scope of work completed as part of this preliminary desktop contamination study, and subject to the limitations provided in Section 10 the following conclusions are made in relation to the Queens Road sites:

- Aerial photographs of the sites indicate that they have been occupied by residential and/or commercial buildings to the east of Queens Road and recreation reserves to the west of Queens Road, since at least 1931 when the first historical aerial photograph was available;
- The site history review did not indicate any obvious historical activities at the sites with the potential to have caused contamination;
- Imported soils may have been used for levelling sites during development and depending on the source of this material, such historic filling has the potential to contain contaminants (such as heavy metals); and
- The local area was formerly a swamp and there is potential for acid sulphate soils to be present.

Overall the sites would be considered to have a low risk of contamination as a result of past and current land uses. As a result of the low risk of contamination, the potential restrictions on future development with regards to contamination would also be considered low subject to the sensitive nature of any proposed development.

3.2 Recommendations

Should the construction of the bridge occur at either of the sites, the following recommendation is provided for the Port Phillip City Council's consideration:

- If future activities at the site include excavation, it would be recommended that any soil excavated be inspected by a suitably experienced environmental professional to assess whether there is likely to be imported soils present on site, and to observe for indicators of contamination or the potential for acid sulphate soils; and
- If any soils are to be removed from site they should be tested, classified and transported in accordance with the relevant Industrial Waste Resource Guidelines published by the Environmental Protection Authority Victoria.

4. Limitations

This Queens Road Bridge Preliminary Desktop Contamination Study ("Report"):

1. Has been prepared by GHD Pty Ltd ("GHD") for Port Phillip City Council;
2. May only be used and relied on by Port Phillip City Council;
3. Must not be copied to, used by, or relied on by any person other than Port Phillip City Council without the prior written consent of GHD and subject always to the next paragraph; and
4. May only be used for the purpose as stated in section 1.2 of the Report (and must not be used for any other purpose).

GHD and its servants, employees and officers otherwise expressly disclaim responsibility to any person other than Port Phillip City Council arising from or in connection with this Report.

To the maximum extent permitted by law, all implied warranties and conditions in relation to the services provided by GHD and the Report are excluded unless they are expressly stated to apply in this Report.

The services undertaken by GHD in connection with preparing this Report:

- Were limited to those specifically detailed in section 1.3 of this Report and GHD proposal dated 12 November 2010, document number G:\31\27086\Proposal\189187;
- Were undertaken in accordance with current professional practice and by reference to relevant environmental regulatory authority and industry standards, guidelines and assessment criteria in existence as at the date of this Report; and
- Did not include the collection of samples for the purpose of laboratory analysis or verification of information obtained from the site history review.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD when undertaking the services mentioned above and preparing the Report ("Assumptions"), as specified throughout this Report.

GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with any of the Assumptions being incorrect.

Subject to the paragraphs in this section of the Report, the opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the time of preparation of this Report and are relevant until such times as the site conditions and/or relevant legislations changes, at which time, GHD expressly disclaims responsibility for any error in, or omission from, this Report arising from or in connection with those opinions, conclusions and any recommendations.

GHD has prepared this Report on the basis of information provided by Port Phillip City Council (and others who provided information to GHD including Government authorities, which GHD has not independently verified or checked ("Unverified Information") beyond the agreed scope of work.

GHD expressly disclaims responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the Report, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

The opinions, conclusions and any recommendations in this Report are based on information obtained from available information sources as specified in Section 5 of the Report.

Except as otherwise expressly stated in this Report, GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or material from such buildings disposed of on the site, the site may contain asbestos or ACM.

Except as otherwise expressly stated in this Report, GHD makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.

These Disclaimers should be read in conjunction with the entire Report and no excerpts are taken to be representative of the findings of this Report.

5. References

Geological Survey of Victoria, Melbourne Sheet Scale, 1: 63 360, Sheet SJ55-1.

Figures

LEGEND

Paper Size A4

0 55 110 220 330 440

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

O

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City of Port Phillip
Queens Road Bridge

Site Location Plan

Job Number 31-27086
Revision A
Date 01 Aug 2011

Figure 1

G:\31\27086\GIS\Maps\Deliverables\Phase ESA 1\3127086_001_Site Location_A4P.mxd

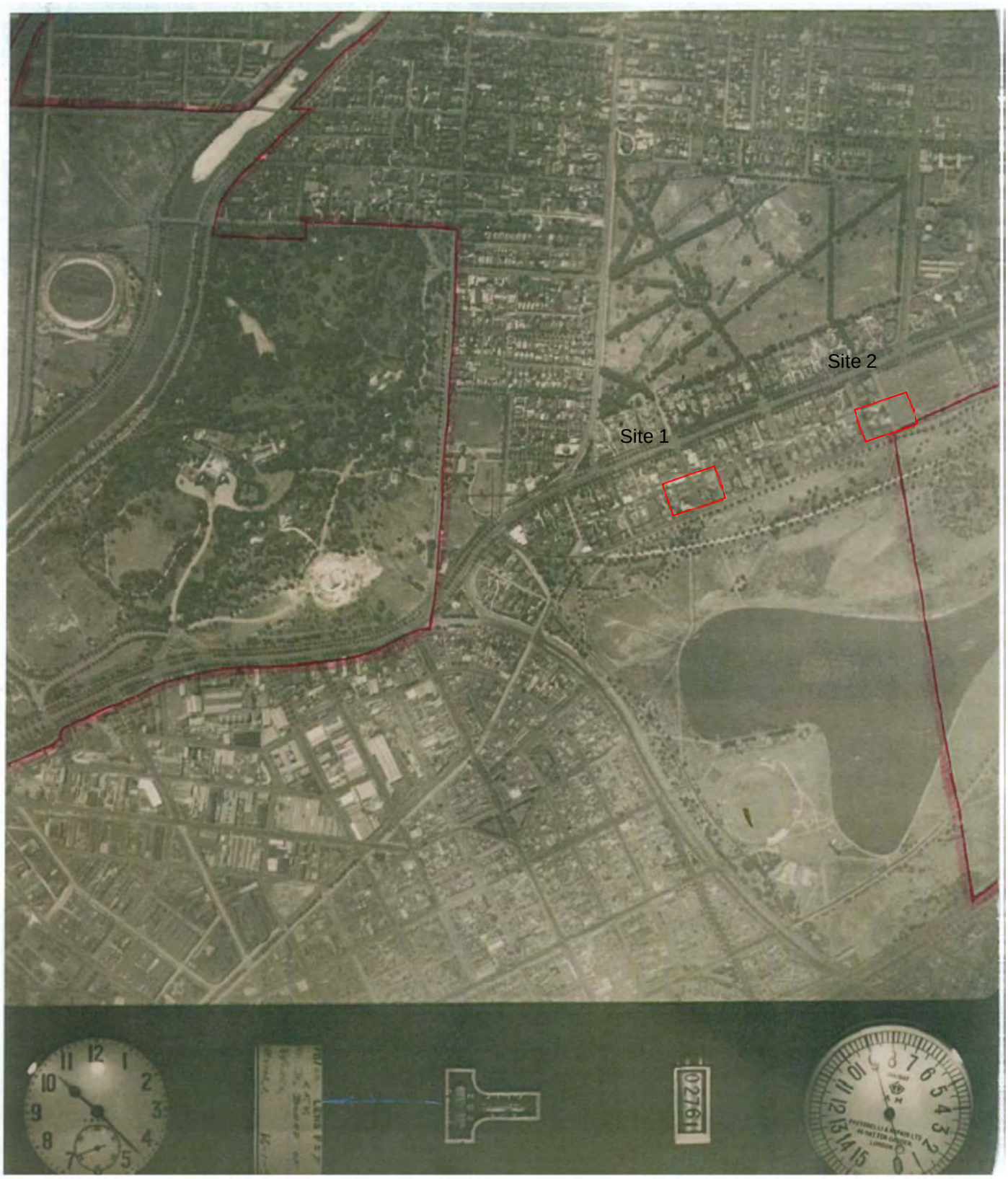
180 Lonsdale Street Melbourne VIC 3000 Australia T 61 3 8687 8000 F 61 3 8687 8111 E melmail@ghd.com W www.ghd.com

Data source: Melway Ed35, Client GHD. Created by:scampbell2

Appendix A

Historical Aerial Photographs

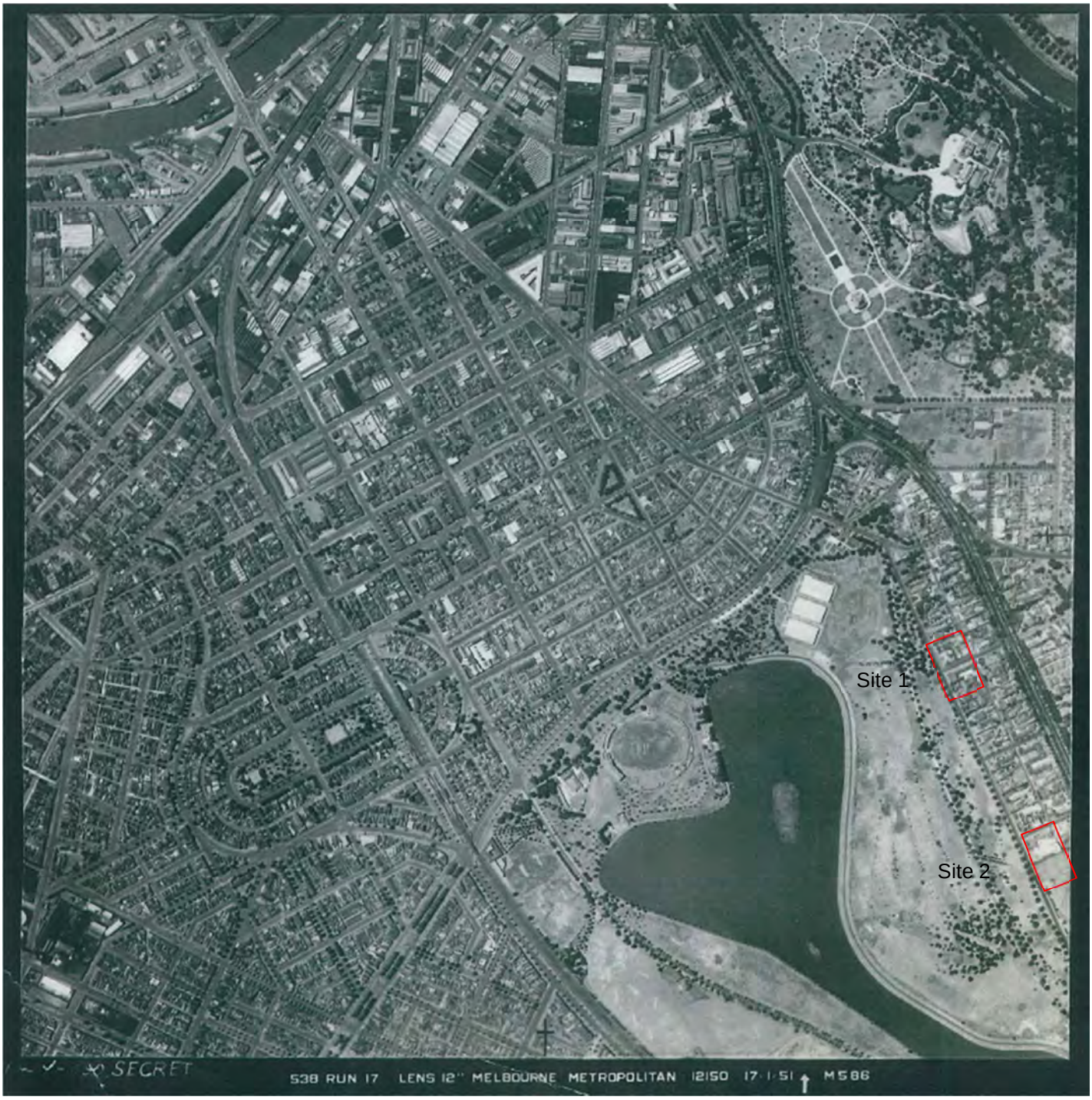
November 1931



December 1945

December 1945

January 1951



January 1951

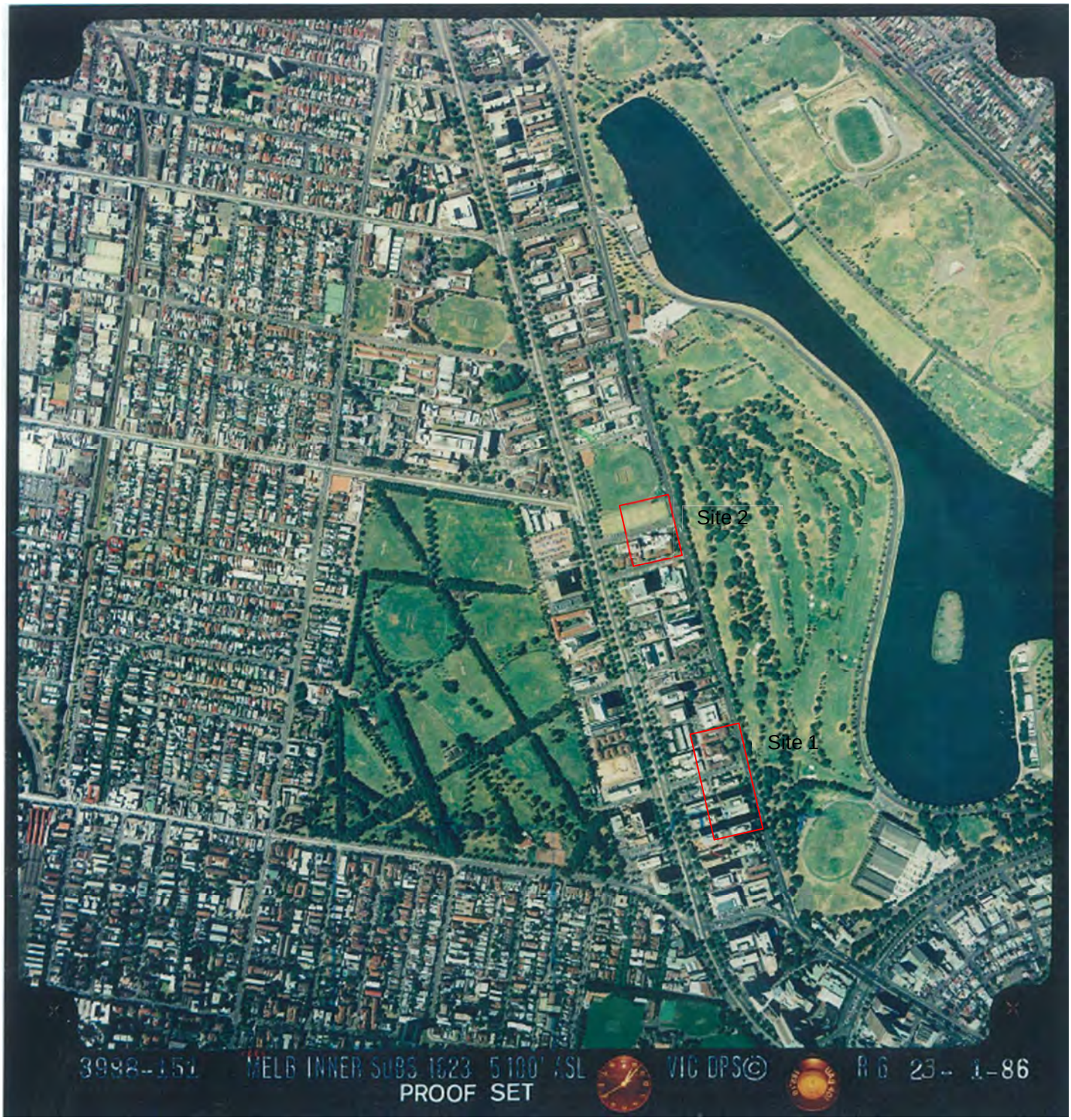
April 1963


Site 2
Site 1
Vic.
1833
56
MELBOURNE 1963 PROJECT RUN 15 3·3·64 LENS 205 152·70 M/M 5.150

March 1975


Site 2
Site 1
VIC
2926
147
DEPARTMENT OF CROWN LANDS
AND SURVEY, VICTORIA. ©
MELBOURNE 1974 PROJECT NO. 1148
RUN 39
19.11.74
5250' ASL

January 1986



July 2011


Site 1
Site 2
Albert Park Lake
Gunn Island
Reed Bed Islands
Albert Park Golf Course
Albert Park Public Golf Course
Albert Reserve
Tennis World
The Academy of Interactive Entertainment
Fawkner Park
Alfred Hospital
Chevron Hotel
Italian Consulate
United States Consulate General Melbourne
Ormond Hall
Lakeside Drive
Queens Rd
St Kilda Rd
Commercial Rd
Albert Rd
Kings Way
Toorak Rd West
Hope St
Millswyn St
Little Park St
Mason St
Leopold St
Louise St
Roy St
Slater St
Armadale St
Arthur St
Queens Ln
Albert Park Drive
Raglan St
Thomson St
Moray St
Camden St
Adams St
Marne
Leopo
Alt 1
26
3

Appendix B

Royal Historical Society of Victoria Search

ROYAL HISTORICAL SOCIETY OF VICTORIA INC.
239 A'Beckett Street, Melbourne 3000

Date: **25 July 2011**

Attention: **Shannon Campbell**

Company: **GHD**

From: **Gerardine Horgan (Administrative Officer)**

SITE SEARCH: Cnr of Hannah Street and Queens Road Melbourne; Cnr Arthur Street and Queens Road Melbourne.

The sites investigated are located on the eastern side of Queens Road and form the north and south corners at the junctions of Arthur Street and Hannah Street with Queens Road.

Queens Road is first listed in the Sands and McDougall Directories of Victoria in the late 1890's. Albert Park and Albert Park Lake was part of a reserve set aside in 1855 and known first as the South Melbourne Park Reserve and then after the death of Prince Albert in 1862 as the Albert Reserve.

Amongst the earliest sporting grounds established in the Reserve was the Warehouseman's Cricket Ground now known as the Albert Cricket Ground and located between Hannah Street and Roy Street to the south. The land adjacent to the cricket ground and forming the southern corner of the Hannah Street and Queens Road junction is the home of the Albert Reserve Tennis Centre. In 1905 as part of the Warehouseman's Cricket Reserve the tennis centre held the first Australian (then Australasian) Tennis Open tournament .

Some 200 acres of the original Albert Reserve on the eastern boundary was excised and sold for private residential development in 1875. This created Queens Road and the various side streets that connect it to St Kilda Road.

The Sands Directories indicate that residential development during the 1880's resulted in only a few, though large private residences, established on the eastern side of Queen's Road. Once street numbers were assigned in the early

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Email: office@historyvictoria.org.au ABN 36 520 675 471 Reg. No: A2529
Find out more about us on our website: www.historyvictoria.org.au

twentieth century it is possible to determine that the northern corner of the junction with Arthur Street housed a large private residence at number 14. The southern junction of this intersection was again a large house at number 17. The north corner of the junction with Hanna Street formed numbers 33 and 34 and again these were private residences.

Over the intervening years these large houses were converted to flats. Number 14 is still a private residence in 1950 but by 1955 is referred to as "reception rooms". In 1948 number 17 was flats. Number 33 was the Lenshurst flats by 1950 and by 1960 number 34 was listed as the Stanhill flats.

During the 1960's the original houses made way for commercial buildings. One such appears as number 15 on the northern corner with Arthur Street. The office block was built adjacent to the large house at number 14 that by 1962 housed an advertising firm.

The directories ceased publication in 1974 and at that time number 14 housed the Royal Caledonian Society, number 15 was an office building known as Rigby House and number 17 housed flats. On the Hannah Street corner both sites are still listed as flats.

Resources available to the Society have not provided details over the past 30 years. An internet search confirms the presence of flats at 33 and 34, the Tennis club and cricket ground, flats at number 17 and a large serviced apartment hotel complex at number 15.

Research by Christine Cooze, Sandra Torpey

guarantee, warranty or promise, express or implied, concerning the accuracy, completeness or authenticity of the content of the report. If any liability may not be excluded by operation of the Trade Practices Act 1974, at the RHSV's option, liability is strictly limited to the supplying of the services again or the payment of the cost of having the services supplied again. To the fullest extent permitted by law, the RHSV does not accept any liability or responsibility to any person for the information (or the use of such information) which is provided in this report or incorporated into it by reference.The RHSV expressly disclaims all and any liability and responsibility to any person in respect of the consequences of anything done or omitted to be done by such person in reliance, whether wholly or partially, of this report. The information in the report is provided on the basis that all persons accessing the report undertake responsibility for making their own inquiries with respect to the relevance and accuracy of its content.

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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
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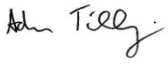
0	T Santwyk-Anderson	A Tilling		A Tammesild		2/8/11

Appendix F

Cost Estimate

SUMMARY OF OPTIONS

	Bridge Cost	Ramp Cost	Total Cost
OPTION 1 - T ROFF	838,873	3,437,673	4,276,545
OPTION 2 - STEEL PLATE	1,744,324	3,226,791	4,971,115
OPTION 3 - STEEL PARALLEL TRUSS	1,105,285	3,143,447	4,248,732
OPTION 4 - STEEL CURVED UPPER CHORD TRUSS	1,095,593	3,143,447	4,239,040
OPTION 5 - STEEL PARALLEL THROUGH TRUSS	1,056,829	3,143,447	4,200,275
EXTRA COST FOR STAIRS - WEST SIDE			116,295

QUEENS ROAD PEDESTRIAN BRIDGE 5.4M CLEARANCE X 26M SPAN - OPTION 1 SUPER T BEAM

Environmental management	1	Item	10,000	10,000	
Traffic management Queens Road West Side					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management Queens Road Side 2					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management - Lifting 26M beam	8	Hrs	1000	8,000	
					110,000
Piers					
Mobilise/demob pile equipment	1	Item	5000	5,000	
Piles 600mm diam x 12M - 8 No	96	M	300	28,800	
Concrete to pile caps	30	M3	1000	30,000	
Concrete to piers 900mm x 900mm x 6M	23	M3	2000	46,000	
Concrete to beams	5	M3	2,500	12,500	
					122,300
Deck Structure					
Supply super T beam 26M 850mm depth 58T	1	No	50,000	50,000	
Supply & install bearings	2	No	2,000	4,000	
Install girder	1	No	15,000	15,000	
Concrete overlay to deck	78	M2	250	19,500	
Handrail	52	M	1,000	52,000	
				0	140,500
Containment barriers 2 No x 12M	24	M	2,500	60,000	
					60,000
Total Direct Cost - Rate/M2	5,549				432,800
Contractor's Supervision & site overheads	20%				86,560
Contractor's HO Overhead & profit	10%				51,936
Contractor's Estimate					571,296
Engineering & architect, incl geotech & proof engineering	10%				57,130
Project management	3%				18,853
Escalation - 2 years @4%	8%				51,782
Contingency	20%				139,812
Total Budget Estimate					838,873

QUEENS ROAD PEDESTRIAN BRIDGE 5.4M CLEARANCE X 26M SPAN - OPTION 2 STEEL PLATE

Environmental management	1	Item	10,000	10,000	
Traffic management Queens Road West Side					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management Queens Road Side 2					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management - Lifting 26M beam	8	Hrs	1000	8,000	
				0	110,000
Piers				0	
Concrete to bored piles 1300mm diam x 15M	30	M	1200	36,000	
Concrete to columns	13	M3	3000	39,000	
Concrete to cross beam	14	M3	3500	49,000	
					124,000
Bridge Deck					
Supply steel plate girder	55	T	10,000	550,000	
Install girder	1	No	10,000	10,000	
Supply & install bearings	4	No	1,500	6,000	
Supply & install steel deck form	93	M2	150	13,950	
Concrete to deck	13	M3	1000	13,000	
Handrail	52	M	250	13,000	
					605,950
Containment barriers 2 No x 12M	24	M	2,500	60,000	
					60,000
Total Direct Cost - Rate/M2	11,538				899,950
Contractor's Supervision & site overheads	20%				179,990
Contractor's HO Overhead & profit	10%				107,994
Contractor's Estimate					1,187,934
Engineering & architect, incl geotech & proof engineering	10%				118,793
Project management	3%				39,202
Escalation - 2 years @4%	8%				107,674
Contingency	20%				290,721
Total Budget Estimate					1,744,324

QUEENS ROAD PEDESTRIAN BRIDGE 5.4M CLEARANCE X 26M SPAN - OPTION 3 STEEL PARALLEL TRUSS

Environmental management	1	Item	10,000	10,000	
Traffic management Queens Road West Side					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management Queens Road Side 2					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management - Lifting 26M beam	8	Hrs	1000	8,000	
					110,000
Piers					
Mobilise/demob pile equipment	1	Item	5000	5,000	
Piles 600mm diam x 12M - 8 No	96	M	300	28,800	
Concrete to pile caps	30	M3	1000	30,000	
Concrete to piers 900mm x 900mm x 6M	23	M3	2000	46,000	
Concrete to beams	5	M3	2,500	12,500	
					122,300
Deck					
Supply steel parallel trusses	20	T	10,000	200,000	
Assemble on site	4	Days	5,000	20,000	
Install trusses	1	No	10,000	10,000	
Supply & install bearings	4	No	2,000	8,000	
Supply & install steel deck form	93	M2	150	13,950	
Concrete to deck	13	M3	1000	13,000	
Handrail	52	M	250	13,000	
					277,950
Containment barriers 2 No x 12M	24	M	2,500	60,000	
					60,000
Total Direct Cost - Rate/M2	7,311				570,250
Contractor's Supervision & site overheads	20%				114,050
Contractor's HO Overhead & profit	10%				68,430
Contractor's Estimate					752,730
Engineering & architect, incl geotech & proof engineering	10%				75,273
Project management	3%				24,840
Escalation - 2 years @4%	8%				68,227
Contingency	20%				184,214
Total Budget Estimate					1,105,285

QUEENS ROAD PEDESTRIAN BRIDGE 5.4M CLEARANCE X 26M SPAN - OPTION 4 STEEL CURVED UPPER CHORD TRUSS

Environmental management	1	Item	10,000	10,000	
Traffic management Queens Road West Side					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management Queens Road Side 2					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management - Lifting 26M beam	8	Hrs	1000	8,000	
					110,000
Piers					
Mobilise/demob pile equipment	1	Item	5000	5,000	
Piles 600mm diam x 12M - 8 No	96	M	300	28,800	
Concrete to pile caps	30	M3	1000	30,000	
Concrete to piers 900mm x 900mm x 6M	23	M3	2000	46,000	
Concrete to beams	5	M3	2,500	12,500	
					122,300
Deck					
Supply steel parallel trusses 26T x .4T/M	19	T	10,000	190,000	
Assemble on site	5	Days	5,000	25,000	
Install trusses	1	No	10,000	10,000	
Supply & install bearings	4	No	2,000	8,000	
Supply & install steel deck form	93	M2	150	13,950	
Concrete to deck	13	M3	1000	13,000	
Handrail	52	M	250	13,000	
					272,950
Containment barriers 2 No x 12M	24	M	2,500	60,000	
					60,000
Total Direct Cost - Rate/M2	7,247				565,250
Contractor's Supervision & site overheads	20%				113,050
Contractor's HO Overhead & profit	10%				67,830
Contractor's Estimate					746,130
Engineering & architect, incl geotech & proof engineering	10%				74,613
Project management	3%				24,622
Escalation - 2 years @4%	8%				67,629
Contingency	20%				182,599
Total Budget Estimate					1,095,593

QUEENS ROAD PEDESTRIAN BRIDGE 5.4M CLEARANCE X 26M SPAN - OPTION 5 STEEL PARALLEL THROUGH TRUSS

Environmental management	1	Item	10,000	10,000	
Traffic management Queens Road West Side					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management Queens Road Side 2					
Hire NJB - 100M	8	Weeks	500	4,000	
Install & remove NJB	100	M	100	10,000	
Advance warning signs	8	Weeks	1000	8,000	
Attendance	8	Weeks	3000	24,000	
Traffic management - Lifting 26M beam	8	Hrs	1000	8,000	
					110,000
Piers					
Mobilise/demob pile equipment	1	Item	5000	5,000	
Piles 600mm diam x 12M - 8 No	96	M	300	28,800	
Concrete to pile caps	30	M3	1000	30,000	
Concrete to piers 900mm x 900mm x 6M	23	M3	2000	46,000	
Concrete to beams	5	M3	2,500	12,500	
					122,300
Deck					
Supply steel parallel trusses 26T x .4T/M	17	T	10,000	170,000	
Assemble on site	5	Days	5,000	25,000	
Install trusses	1	No	10,000	10,000	
Supply & install bearings	4	No	2,000	8,000	
Supply & install steel deck form	93	M2	150	13,950	
Concrete to deck	13	M3	1000	13,000	
Handrail	52	M	250	13,000	
					252,950
Containment barriers 2 No x 12M	24	M	2,500	60,000	
					60,000
Total Direct Cost - Rate/M2	6,990				545,250
Contractor's Supervision & site overheads	20%				109,050
Contractor's HO Overhead & profit	10%				65,430
Contractor's Estimate					719,730
Engineering & architect, incl geotech & proof engineering	10%				71,973
Project management	3%				23,751
Escalation - 2 years @4%	8%				65,236
Contingency	20%				176,138
Total Budget Estimate					1,056,829

RAMPS - Typical

Environmental management	1	Item	10000	10,000	
Traffic management incl in bridge					
Security fencing	400	M	100	40,000	
					50,000
East Side - 106M length, 5 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 5 No x 12 M	60	M	300	18,000	
Concrete to piers .7M3/M	74	M3	2500	185,000	
Concrete to beams 8M3/pier	40	M3	3000	120,000	
Supply precast ramp section 1M3/M	106	M3	2100	222,600	
Install ramp sections 26T ea.	10	No	2500	25,000	
Handrail	212	M	1,000	212,000	
Rate/M2	2244				785,100
West Side - 102M - 10 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 10 No x 12 M	120	M	300	36,000	
Concrete to piers .7M3/M	74	M3	2500	185,000	
Concrete to beams 4M3/pier	40	M3	3000	120,000	
Supply precast ramp section 1M3/M	102	M3	2100	214,200	
Install ramp sections 26T ea.	10	No	2500	25,000	
Handrail	204	M	1,000	204,000	
					786,700
Total Direct Cost					1,621,800
Contractor's Supervision & site overheads	20%				324,360
Contractor's HO Overhead & profit	10%				194,616
Contractor's Estimate					2,140,776
Engineering & architect, incl geotech & proof engi	10%				214,078
Project management	3%				70,646
Escalation - 2 years @4%	8%				194,040
Contingency	20%				523,908
Total Budget Estimate					3,143,447
Extra Direct Cost for Stairs - West side	6	M	10000	60,000	
Incl Overheads and Oncosts as above					116,295

RAMPS for Steel Plate Girder

Environmental management	1	Item	10000	10,000	
Traffic management incl in bridge					
Security fencing	400	M	100	40,000	
					50,000
East Side - 106M length, 5 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 5 No x 12 M	72	M	300	21,600	
Concrete to piers .7M3/M	77	M3	2500	193,500	
Concrete to beams 8M3/pier	44	M3	3000	132,000	
Supply precast ramp section 1M3/M	110	M3	2100	231,000	
Install ramp sections 26T ea.	11	No	2500	27,500	
Handrail	220	M	1,000	220,000	
Rate/M2	2367				828,100
West Side - 102M - 10 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 10 No x 12 M	120	M	300	36,000	
Concrete to piers .7M3/M	74	M3	2500	185,000	
Concrete to beams 4M3/pier	40	M3	3000	120,000	
Supply precast ramp section 1M3/M	102	M3	2100	214,200	
Install ramp sections 26T ea.	10	No	2500	25,000	
Handrail	204	M	1,000	204,000	
					786,700
Total Direct Cost					1,664,800
Contractor's Supervision & site overheads	20%				332,960
Contractor's HO Overhead & profit	10%				199,776
Contractor's Estimate					2,197,536
Engineering & architect, incl geotech & proof engin	10%				219,754
Project management	3%				72,519
Escalation - 2 years @4%	8%				199,185
Contingency	20%				537,799
Total Budget Estimate					3,226,791
Extra Direct Cost for Stairs - West side	6	M	10000	60,000	
Incl Overheads and Oncosts as above					116,295

RAMPS for T-Roff

Environmental management	1	Item	10000	10,000	
Traffic management incl in bridge					
Security fencing	400	M	100	40,000	
					50,000
East Side - 115M length, 6 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 6 No x 12 M	72	M	300	21,600	
Concrete to piers .7M3/M	81.4	M3	2500	203,500	
Concrete to beams 8M3/pier	45.6	M3	3000	136,800	
Supply precast ramp section 1M3/M	115	M3	2100	241,500	
Install ramp sections 26T ea.	11	No	2500	27,500	
Handrail	230	M	1,000	230,000	
Rate/M2	2468				863,400
West Side - 111M - 11 No piers					
Mobilise demob rig	1	Item	2500	2,500	
Piles - 11 No x 12 M	132	M	300	39,600	
Concrete to piers .7M3/M	81.4	M3	2500	203,500	
Concrete to beams 4M3/pier	44	M3	3000	132,000	
Supply precast ramp section 1M3/M	111	M3	2100	233,100	
Install ramp sections 26T ea.	11	No	2500	27,500	
Handrail	222	M	1,000	222,000	
					860,200
Total Direct Cost					1,773,600
Contractor's Supervision & site overheads	20%				354,720
Contractor's HO Overhead & profit	10%				212,832
Contractor's Estimate					2,341,152
Engineering & architect, incl geotech & proof engi	10%				234,115
Project management	3%				77,258
Escalation - 2 years @4%	8%				212,202
Contingency	20%				572,945
Total Budget Estimate					3,437,673
Extra Direct Cost for Stairs - West side	6	M	10000	60,000	
Incl Overheads and Oncosts as above					116,295

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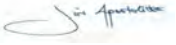
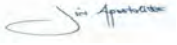
0	A. Tammesild	J. Apostolides		J. Apostolides		23/08/11