ATTACHMENT 2 – CORRESPONDENCE FROM RAILCORP

NSW | Transport RailCorp

RailCorp Property
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12 May 2011

The General Manager
Liverpool City Council
Locked Bag 7064
Liverpool BC NSW 1871

ATTENTION: Janine McCarthy

Dear Sir/Madam,

STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007
DEVELOPMENT APPLICATION – DA-1281/2010
Lot 1 Speed Street, Liverpool

I refer to Council's letter dated 3 May 2011 seeking RailCorp's concurrence in accordance with clause 86(1) of the above SEPP.

RailCorp has undertaken an initial assessment of the relevant documentation as attached to the development application. RailCorp is not in a position to make a decision on the granting of concurrence until Geotechnical and Structural documentation that meets RailCorp's requirements are prepared and submitted to RailCorp for review. RailCorp's requirements are provided in the attached standard brief that the Applicant can use to prepare the required documentation. The purpose of the brief is to ensure that all risks are identified in order to ensure that the integrity of the Rail Corridor is not compromised through the physical activities of the development adjacent to the Rail Corridor.

Therefore, RailCorp advises that it must 'stop-the-clock' on the assessment of this proposal, until such time the following information is submitted:

1. Geotechnical report and Structural report that meets the requirements of the attached brief and confirms the method of shoring by a structural engineer.
2. Construction methodology with details pertaining to structural support during excavation.
3. Cross sectional drawings showing ground surface, rail tracks, sub soil profile, proposed basement excavation and structural design of sub ground support adjacent to the Rail Corridor. All distances measured from the rail corridor and rail infrastructure are to be confirmed as accurate by a Registered Surveyor.

The Applicant should also be advised to contact Project Coordinator Chris Bailey, of the Rail Corridor Management Group (RCMG) on 8922 4315 for any assistance on the above items.

RailCorp also requests that the above items and development application documentation package be forwarded in *pdf* format on CD to enable RailCorp to undertake the required internal review within the required statutory timeframe.

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It is requested that this information be referred to the Applicant and recommended that the Applicant consult with RailCorp before submitting revised or new documentation to Council. Should RailCorp not be presented with the aforementioned information within 1 month of this letter, RailCorp may chose to withhold its concurrence for the development proposal.

Should you wish to contact the writer at any time during normal working hours please call on 8922 1987.

Yours sincerely,

per
Jim Tsirimiagos
Manager Town Planning
RailCorp Property

Attachment:

A) Geotechnical and Structural Brief

BRIEF FOR REVIEW OF GEOTECHNICAL & STRUCTURAL DESIGN FOR DEVELOPMENTS ADJACENT TO OR ABOVE RAIL CORRIDOR FOR EXTERNAL THIRD PARTY WORKS PERFORMED UNDER THE NSW STATE ENVIRONMENT PLANNING POLICY (Infrastructure) 2007

INTRODUCTION

The NSW State Environment Planning Policy (Infrastructure) 2007 requires development applications for development within 25 metres of the Rail Corridor with ground penetrations greater than 2 metres to be referred to Rail Authority for review and concurrence before the consent authority consents to development applications.

The response period for RailCorp to reply from the date of receipt of a development application from a consent authority is 21 days. The consent authority may grant consent to a development without concurrence of the Chief Executive Officer of the Rail Authority if 21 days have passed since giving notice and the Chief Executive Officer has not granted or refused to grant concurrence.

If insufficient information is submitted with a notice from a consent authority for the rail authority to review the development application (**DA**), RailCorp will have 14 days to respond to the referring consent authority to request the process be stopped until the development applicant provides the requested information. This "stopping of the clock" can be enacted once only with each consent authority referral.

RailCorp's internal resources are limited and external professional service providers may be required to assist RailCorp in undertaking the review of the development application to identify deficiencies in the submitted development application.

SCOPE AND OBJECTIVES

The following brief is for geotechnical and structural engineering consultants to perform design reviews of geotechnical and structural reports which form part of the documentation submitted to RailCorp by a consent authority on behalf of development applicants.

The main task for the design reviewer will be to verify that the developer's design consultant has taken into account the column loads, determined the loads and pressures under the footings that may impact on rail tunnels and other infrastructure and to be satisfied that the loads and pressures are within approved limits.

In addition, the design reviewer is to verify that the developer's design consultant has conducted sufficient geotechnical investigation and analysis to determine what subsidence or displacement of rail infrastructure may occur due to the development and whether these movements are within approved limits.

The reviewing consultant will refer to the parameters set out within this brief to identify non compliance or detail omissions within the DA referral.

The following specific tasks are required to be undertaken by the reviewing consultant:

1. Liaison and initial briefing with RailCorp.
2. Preliminary review of all relevant documents associated with the DA to appreciate the intended work.
3. Site visit if necessary to appreciate the existing conditions and dimension of the intended work.
4. Detailed assessment of DA documents to:
    - Identify and establish relevant criteria for assessment of the proposal in addition to the information contained in this document.

- Identify what additional documents are required to be submitted by the Developer to enable full assessment of the proposal to be carried out.
- Identify issues of concern or non-compliance resulting from the detailed review of the proposal, in particular those related to loads on tunnels resulting from structures associated with the proposed development and stress relief due to excavation.
- Identify conditions of a geotechnical and structural nature to be included in the final list of consent conditions.

5. Prepare a report of the detailed assessment of the DA.

DOCUMENTS TO BE PROVIDED BY RAILCORP

RailCorp will provide all relevant documents in its possession associated with the DA. These documents will include some or all of the following where available:

1. Architectural and Engineering drawings related to the proposed development
2. Structural and geotechnical reports related to the proposed development
3. Services search information
4. Dilapidation reports of existing RailCorp infrastructure
5. Drawings of existing RailCorp infrastructure affected by the proposed development.

DOCUMENTATION TO BE SUBMITTED BY REVIEW CONSULTANT

1. The reviewer must provide a written report in the form of conditions for inclusion with the final list of conditions of concurrence in reply to development application referrals by consent authorities.
2. The reviewer is required to submit the aforementioned report to RailCorp **within 5 working days of receipt** to facilitate additional review by RailCorp personnel within the aforementioned 14 day period.

GUIDELINES FOR ASSESSMENT OF DEVELOPMENT APPLICATION

Outlined below are conditions associated with developments adjacent to or over RailCorp property or infrastructure. These conditions are to be considered by the reviewer in assessing the proposal and in developing consent conditions for the particular DA. The conditions are written in the form that may be directly inserted into a list of conditions.

The reviewer may modify and add to the conditions outlined below.

General Conditions

- As part of RailCorp's final approval of the project, a design review will be undertaken by RailCorp's Chief Engineer Bridges and Structures and Principal Geotechnical Engineer, or by a nominated Design Panel Member.
- Final approval will only be granted when signed detailed plans with final calculations and a copy of Council approval are submitted to Rail Corridor Management Group who will arrange for the appropriate reviews.

- The Developer is to employ a qualified registered surveyor to produce an accurate plan showing the location of the track centre lines, tunnel walls, cubicles, refuges, easements and other infrastructure in relation to the proposed development. Details of the track centreline can be obtained from Regional External Party Works Managers who can be contacted via the Rail Corridor Management Group.

- Using the detailed survey plan, the Developer's Structural Consultant is to plot the location of (to be signed off by a Registered Surveyor) and state the expected loads and resulting bearing pressures on the tunnel as well as any other part of the development that may impact on RailCorp property, infrastructure or operation..

- The need for demolition methodology of any existing structures is to be identified.

- Prior to commencement of work for the building foundations, it will be necessary for a dilapidation report of RailCorp tunnels and infrastructure to be carried out by a representative of the Developer and Contractor for the project with RailCorp's Regional External Party Works Manager.

- The developer will be required to submit a detailed work method statement outlining the proposed methods of excavation, construction and associated monitoring regimes.

- Three (3) sets of prints of the approved drawings of all piers, footings and excavation plans together with calculation and geotechnical reports are to be forwarded to Rail Corridor Management Group, for record and compliance purposes.

- When the work has been completed, three sets of executed relevant drawings are to be forwarded to RailCorp for record purposes. A full set of drawings is not necessary, only the "work as executed" structural and architectural general arrangement and elevations of the building be necessary.

- Should any adverse effect on the tunnels be observed during construction, it will be necessary to stop work until a suitable alternative solution is determined. The procedures to be adopted for this process are to be provided to RailCorp for review and approval prior to commencement of works. Any damage to the tunnels should be repaired immediately to the satisfaction of RailCorp. A detailed work method statement and safety management plan must be submitted and approved before construction is permitted to commence.

<u>Dilapidation Survey and Monitoring Plan</u>

- This survey would establish the extent of any existing cracks in the tunnel linings, have them suitably marked and identified to enable any deterioration in the lining during and after construction to be monitored. An appropriate monitoring regime, including installation of any necessary devices or instruments, will need to be reviewed and approved by RailCorp prior to commencement of works. Depending on the proposed works and methodologies, it may be necessary to carry out other dilapidation surveys at predetermined stages which will be identified during the review process.
- Specific defect limits and intervention levels are to be set for individual projects

<u>Geotechnical Investigation and Assessment</u>

1. The Developer would be required to carry out a very thorough geotechnical investigation of the rock strata above, alongside and below RailCorp's tunnels to obtain a clear indication of the locked up stresses in the rock mass, the location and inclination of bedding planes and joints in the rock and to work out measure to be adopted in the design to conform to conditions (4 and 5) below.

2. 3m of vertical cover is the minimum requirement; 6m is the desirable cover. 3.5m of sound rock at the sides is required to provide sound pillar support.

3. The Developer would be required to carry out 3D Finite Element Analysis (**FEA**) to satisfy RailCorp of the effects on the tunnel lining by the excavation for the proposed Development. The input data for the FEA would have to be approved by RailCorp engineers prior to running the programme.

4. There should be no new cracking of tunnel lining as a result of the development.

5. No existing crack to increase by more than 0.5mm in width.

Design Loads – General

- Any temporary or permanent works adjacent to the RailCorp boundary may be subject to the influence of train loading and must be assessed in accordance with AS5100 for live load surcharge. Parts of the structure so affected must be designed in accordance with ESC 360, ESC 370 and ESC 380.
- Permanent works adjacent to RailCorp Boundary must take into account design actions resulting from any proposed future construction within the rail corridor. This advice will be provided by RailCorp.
- The design may need to include derailment protection incorporating deflection walls.

Temporary Construction within or adjacent to RailCorp Property

- Only minor construction work will be permitted within the rail corridor.
  - Permanent or temporary soil or rock anchors extending into RailCorp property to stabilise excavation faces are not acceptable to RailCorp, unless there are demonstrable geotechnical and property development benefits to Rail.
  - Temporary components of shoring systems that are located such that their stability has the potential to affect the railway corridor shall have a minimum service life of 10 years excluding considerations of any support from the permanent structure. Shoring systems shall be designed by an approved design organisation and verified by a separate approved independent design organisation and certifications covering design and verification are to be provided to RailCorp.

Permanent Works within RailCorp Property

- No permanent work within RailCorp property shall be constructed without approval from RailCorp.

Demolition and Excavation

- All excavation and footing construction is to be carried out under the supervision and to the satisfaction of the relevant Regional External Party Works Manager in accordance with a pre-arranged program.
- No explosives shall be used for the splitting or removal of rock.

Drainage

- During construction over and adjacent to the tunnels, the Developer is to observe extreme care to prevent water from collecting on or adjacent to the tunnels and to ensure that the water proofing of the tunnels is not damaged.

- If water were to enter the tunnel, services would be interrupted. If this should happen, the Contractor shall be liable for the RailCorp expenditure involved with restoring or maintaining alternative services.
- In addition, should the flat top tunnels be exposed (with prior RailCorp approval) it is possible that leaks can occur due to faults in waterproof membrane. If this happens, the contractor shall provide additional waterproofing to the satisfaction of RailCorp.
- Seepage into the tunnel must not exceed the existing ambient range of flow rates.
- Fittings must not be adversely affected

Electrolysis

- Developers are to be advised of their responsibilities of ensuring that precautions are taken in the design of the project to eliminate potential electrolysis impact on the proposed construction from the operation of trains in the electrified rail corridor, if considered necessary. This will involve commissioning an Electrolysis Report by an appropriate Cathodic Protection Engineer. A list of such Engineers is available upon request from the Rail Corridor Management Group.

Acceptable Loads on Tunnels:

Two types of tunnel construction exist in the CBD area. Each type requires different design considerations.

A. Cut and Cover (Flat Top) Tunnels

The safe allowable design bearing pressure on the tunnel roof will have to be determined in the following manner:

1. Test bores are to be drilled outside the line of the tunnel walls to determine the bearing pressure of the rock at the bottom of the tunnel walls. Any drilling adjacent to the side of the tunnels is to be kept 1m clear of the outside of the tunnel and refuge walls using a methodology to be approved by RailCorp.
2. A site inspection is to be carried out inside the affected tunnels so as to establish the condition of the brickwork and tunnel roof and walls.
3. Test holes are be excavated on the property to expose the tunnel walls using a methodology to be approved by RailCorp. This will enable testing of the brickwork wall to be carried out. Tests on representative samples to be carried out on the brickwork by taking vertical cores and a safe F'm for the brickwork is to be determined.
4. The tunnel inspection is to be co-ordinated by the relevant Regional External Party Works Manager. Contact can be made through the Rail Corridor Management group.

   Details of the tests in 3 above and the assumptions made from them are to be forwarded to RailCorp for review and approval. The RailCorp Structural Engineer will then give the Developer the allowable pressures of loads over the tunnels.
5. No lateral surcharge loading from the Development footings is to be imposed on the tunnel walls. The level of any footing is to be below a line drawn at 45 degrees from the base of the footings to the base of the brick wall.

6. No uplift forces are to occur from wind loading at the underside of any footings which bear on top of the tunnel roof. Also no horizontal forces should be transferred to the tunnels in their current state.

7. Approval for item 6 above is subject to a visual evaluation on the condition of the top of the tunnel roof when exposed. The relevant Regional External Party Works Manager is to be involved.

8. Column footings which are located on top of the tunnel roof are to bear directly on top of bridging beams which shall be designed to transfer the column loads to the brick walls. No welding to the roof beams will be permitted due to the chemical composition of the Broad Flange Beams (**BFB**) used in the construction which makes it unsuitable for welding.

9. The waterproofing treatment for the top and side walls of the exposed tunnels is to be approved by RailCorp and effected in the very early stages to stop ingress of water into the tunnels.

10. The designer is to provide elevations of all walls showing what is to be constructed on top of the tunnel wall, indicating levels of proposed floor slabs, RailCorp's easements, location and value of load, size of footings, together with cross section, etc.

    These drawings in addition to indicating exactly what loading is being carried by each wall may be used by RailCorp and Developer as the basis of the Right of Support agreement to be drawn up between the two parties.

B. The Eastern Suburbs Tunnels (**ESR**)

- The loading over and adjacent to the ESR arch tunnels is to generally conform to the information contained in sketch (4) (copy attached). Additional information re: Design Requirements will be provided if proposed building is to be constructed over the ESR Tunnels.

C. Deep Excavations Adjacent to Arch Tunnels

If there is a deep excavation adjacent to the Arch Tunnel, then a detailed geotechnical investigation is to be carried out on the rock in the vicinity of the tunnels. RAILCORP will insist on the following procedures.

a. The rock face adjacent to the tunnels is to be progressively rock bolted as the excavation proceeds. Depending on the condition of the rock, additional precautions may be required.

b. The structure in the excavation is to be poured against the exposed rock face. A copy of the geotechnical report and the proposed rock supporting procedure is to be forwarded to .RAILCORP.

c. Before proceeding with the excavation, the Developer is to obtain RAILCORP approval.

d. The Geotechnical Engineer may require that the excavation is to be monitored by a Geotechnical Consultant employed by Developer. A nominated RAILCORP observer is to be involved with this monitoring on a part time basis. Also, in addition to tilt metres and inclinometers etc., an accurate survey check of the tunnel is to be maintained by the Developer.

Details of inclinometers and tilt metres to be obtained from Geotechnical Engineer.

e. The Geotechnical Engineer requires the following:

The excavation is to be geologically mapped by the Developers Geotechnical Engineer.

Developers' Geotechnical Engineer will be responsible for monitoring by instrumentation e.g. using borehole inclinometers, tilt meters and tape extensometer etc during the excavation.

In addition the Developer shall maintain an accurate survey check on the tunnel level and alignment.

A nominated RAILCORP representative will generally observe the mapping and excavation activities on a part time basis.

C. METROWEST, METROPITT and all other future rail tunnels (generally provided by Rail Development or Connell Wagner).

D. Airport tunnel – generally provided by Transfield or their representative.

E. BOX TUNNELS - ILLAWARRA RELIEF

The tunnel easement for Box Tunnels is generally 300mm above the top of the tunnel. The design loads on Box Tunnels are as follows:

1. UDL=150KPa on top of the tunnel at a strata 300mm above the external top surface of the tunnel or 6150mm above rail level whichever is greater. A raft footing slab would be deemed to satisfy the definition of a UDL.

2. Concentrated/Point loads if placed directly on the walls of the tunnel should be spread longitudinally on the walls by spreader beams so that the walls are not loaded in excess of the loading condition stated in (1).

3. Concentrated/Point loads located between tunnel walls should be bridged to transfer the load to the tunnel walls and then spread as described in (2) or the bridging beams may be supported on piles/bored piers located no closer than 3 metres from the tunnel wall and should be sleeved so that no lateral pressure is exerted on the tunnel

4. If construction as in (2) and (3) above is adopted and it is deemed desirable to remove the waterproofing and cover slab and cast the footings/spreader beams directly on the structural concrete of the walls, the waterproofing will have to be reinstated to RAILCORP satisfaction.

5. The footings of the building are not to be constructed over the construction joints of the tunnels and are not to be located less than 300mm from a construction joint.

6. The piles/piers as in (3) above may be located within 1 metre from the outside face of the tunnel to the nearest surface of the pile/pier provided that the external profile of the tunnel walls, refuges, cubicles etc. are exposed to ensure that the piles/piers are not located nearer than 1 metre.

7. The Developers attention is drawn to the fact that there will be vibration and noise from the rail operations transmitted into the structure. It is the Developers responsibility to take all necessary measures to attenuate this situation and the RAILCORP will not be responsible for any problems to the development arising from its current and future operations.

It is considered essential that the Developer must provide anti-vibration devices between the development structure and the tunnels.

8. Easements for the ESR Box Tunnels areas follow:

a. 6000mm to vertical plane measured horizontally from centre line of each track.

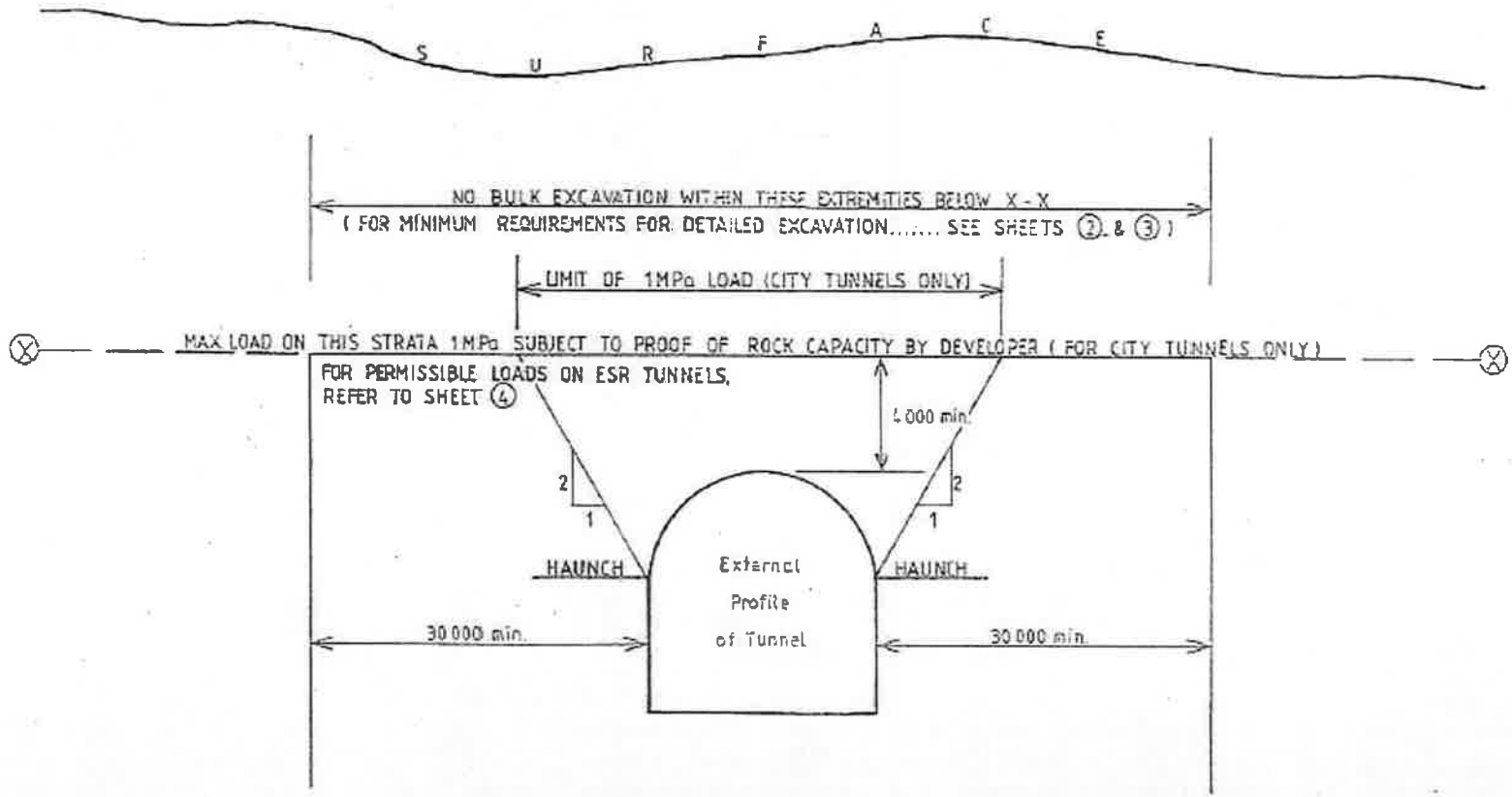
b. Below a horizontal plane measured 300mm above concrete tunnel roof. (i.e. 6150mm above rail level). A loading restriction of 150kpa will be required at this plane.

Note: Geotechnical reviews and reports will also be required in the case of proposed works associated with excavations over two metres in depth, bridges and other supported structures and construction works, earthworks, cutting and embankments as well as some under-bores and under track crossings.

RailCorp

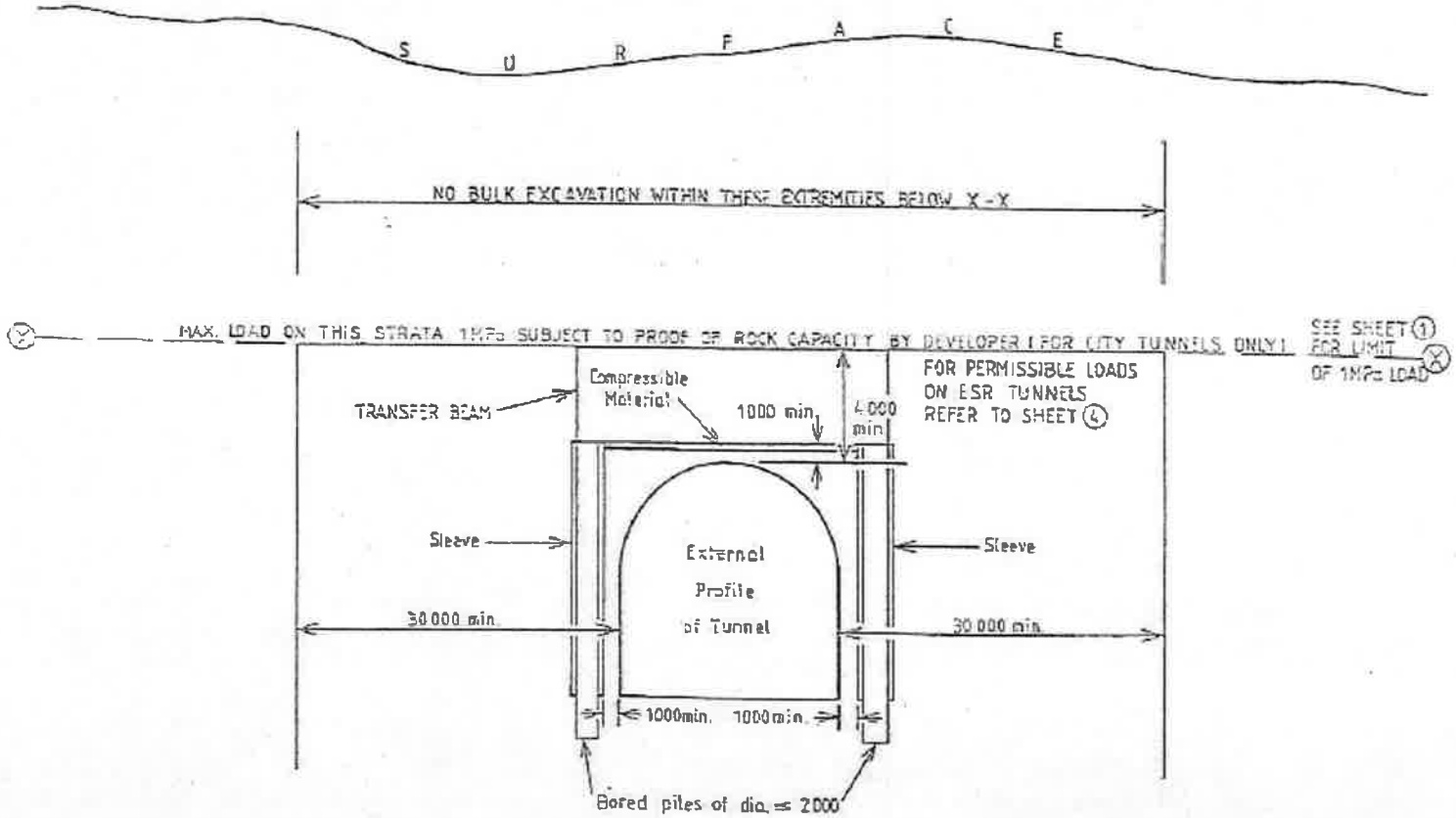
DEVELOPMENTS OVER AND ADJACENT TO SRA TUNNELS

PERMISSIBLE LOADS AND EXCAVATION SHEET ①



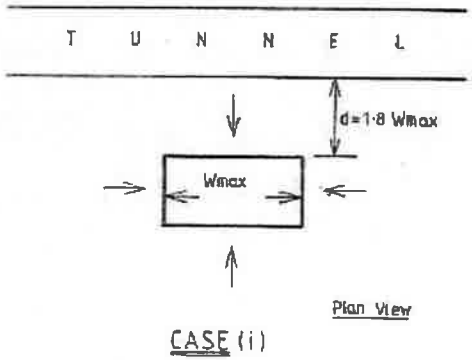
RailCorp

MINIMUM REQUIREMENTS FOR DETAILED EXCAVATION SHEET (2)

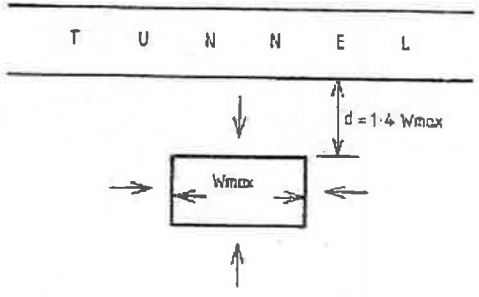


RailCorp

DEVELOPMENTS OVER AND ADJACENT TO SRA TUNNELS
MINIMUM REQUIREMENTS FOR DETAILED EXCAVATION SHEET③



CASE (i)



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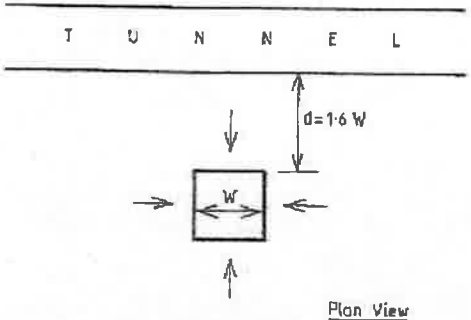
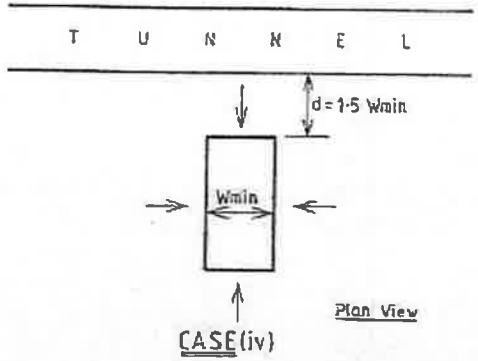
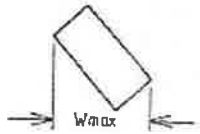


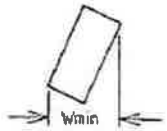
CASE (iii)

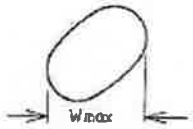


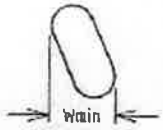
CASE (iv)

NOTE: For irregular shapes and orientation, use equivalent dimension.









RailCorp

PERMISSIBLE LOADS OVER ESR TUNNELS SHEET (4)

NOTE: DEFINITION OF:

CLOSE FOOTINGS: ARE THOSE IN WHICH THE STRESSED ZONES OF ADJACENT FOOTINGS ON A 1:2 DISTRIBUTION THROUGH ROCK, INTERSECT ABOVE THE EASEMENT.

CONCENTRATED LOADINGS: ARE THOSE IN WHICH THE STRESSED ZONES OF ADJACENT FOOTINGS DO NOT INTERSECT AT OR ABOVE THE EASEMENT ON A 1:2 DISTRIBUTION THROUGH ROCK.

FEATURE	SOUND ROCK COVER	UNIFORM LOADING Raft footing or close footings (SEE NOTE ABOVE)	CONCENTRATED LOADING Column or isolated footings of lift core etc. (SEE NOTE ABOVE)	TEMPORARY LOADING Construction Plant or Materials	
	m	kPa	kPa	Mass tonnes	Clearance between loads m
SINGLE TRACK TUNNEL	3	250	50	50	5
	6	500	200	50	5
SINGLE TRACK TUNNEL AT A SECTION WITH A CUBICLE AND REFUGE	3	100	10	50	5
	6	200	50	50	5

Transport RailCorp

RailCorp Property
PO Box K349
Haymarket NSW 1238
Tel: (02) 89221987 Fax: (02) 89224816
Email: jim.tsirimiagos@railcorp.nsw.gov.au

11 October 2011

The General Manager
Liverpool City Council
Locked Bag 7064
Liverpool BC NSW 1871

ATTENTION: Natalie Stewart

Dear Sir/Madam,

STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007
DEVELOPMENT APPLICATION – DA-1281/2010
Lot 1 Speed Street, Liverpool

I refer to Council's letter and additional information received by RailCorp on 7 October 2011 in relation to the above matter.

RailCorp has undertaken an adequacy test to ascertain whether the information provided now enables RailCorp to process the concurrence review. RailCorp has identified that the applicant has not provided all the information that was requested by RailCorp in its letter dated 12 May 2011.

In that letter RailCorp requested cross sectional drawings with measurements confirmed as accurate by a Registered Surveyor. The Interface Drawings provided as Appendix B to the Railway Impact Report dated 22 September do not provide the measurement confirmation as requested. Further, as RailCorp's property also abuts the development site on its northern side, a cross section drawing for this location is also required (please refer to Attachment A regarding approximately location for the cross section). Whilst this portion of land does not contain any tracks it is nonetheless part of the "rail corridor" as defined under State Environmental Planning Policy (Infrastructure) 2007.

RailCorp also notes that the additional information makes a reference that there will be no rock anchors into RailCorp's land along the south-eastern boundary of the development site. However, the submitted reports provide no information regarding rock anchors along the site's northern boundary which abuts RailCorp's land. RailCorp requests that confirmation be provided that there will be no rock anchors along this boundary as well.

RailCorp has identified that the proposal includes drainage works within RailCorp's land to which RailCorp approval has not been obtained (refer to Attachment B highlighting). RailCorp requests that these proposed drainage works be removed from the application.

NSW Transport RailCorp

RailCorp has also identified an anomaly between the drainage plans and the most recent drawings provided to RailCorp. The drainage plans indicate basement works abutting the common boundary on the south-eastern side of the site whereas the most recent cross sectional drawings indicate a setback of 2m. RailCorp requests that it be provided with the most recent correct drawings.

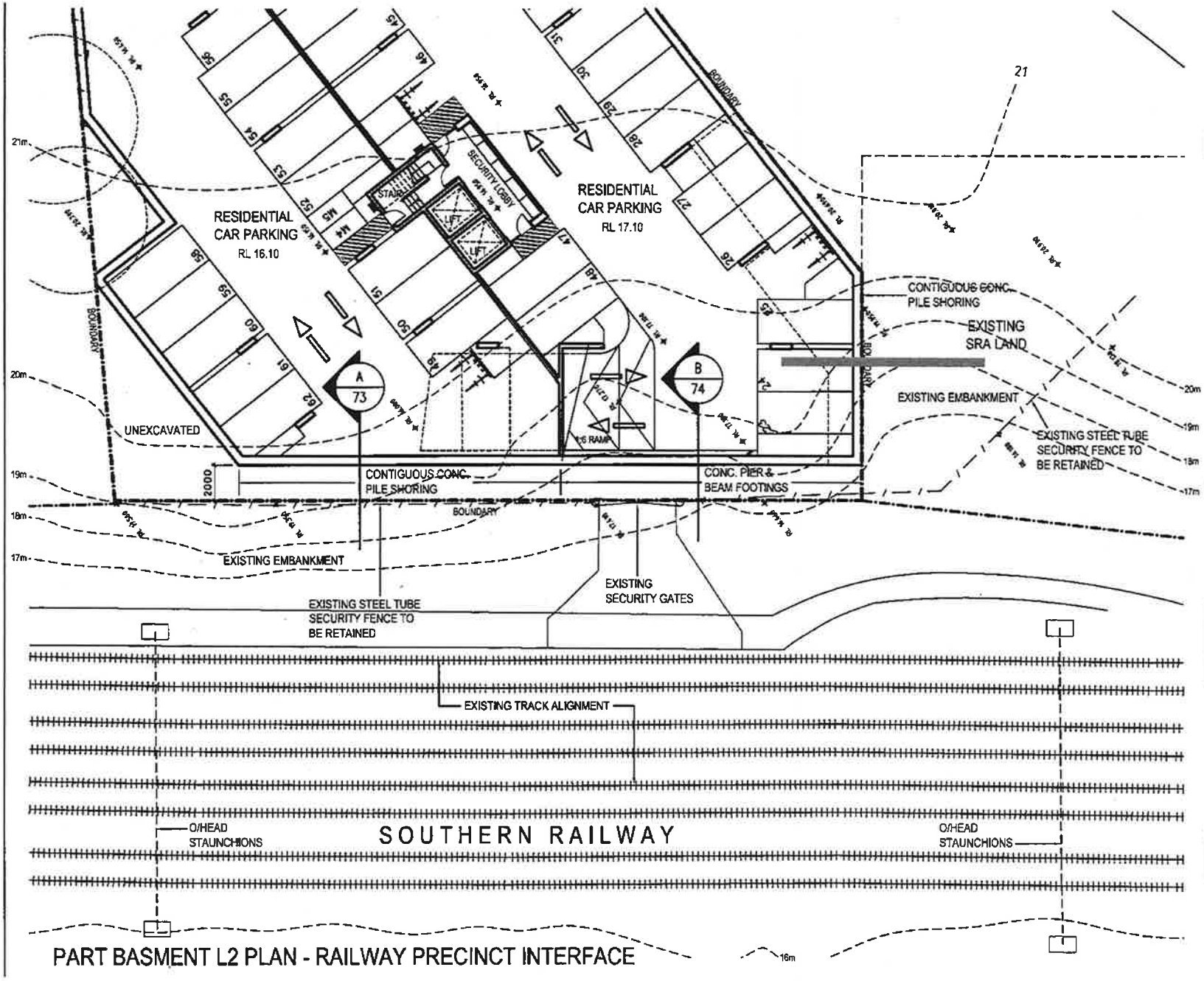
Given the above, RailCorp advises that it has not restarted "the clock" for the assessment of this development application, and will not be doing so until such time the above items are addressed. RailCorp also requests that Council also "stop the clock" until such time RailCorp has advised that it is satisfied with the submitted information.

Should you wish to contact the writer at any time during normal working hours please call on 8922 1987.

Yours sincerely,

Jim Tsirimiagos
Manager Town Planning
RailCorp Property

Attachment A



PART BASMENT L2 PLAN - RAILWAY PRECINCT INTERFACE

H H M A
Architects • Project Managers

No.	AMENDMENTS	Drawn	Date
HA	REVISED DA SUBMISSION	MPM	14.02.11

PROJECT
LIVERPOOL CITY DEVELOPMENT

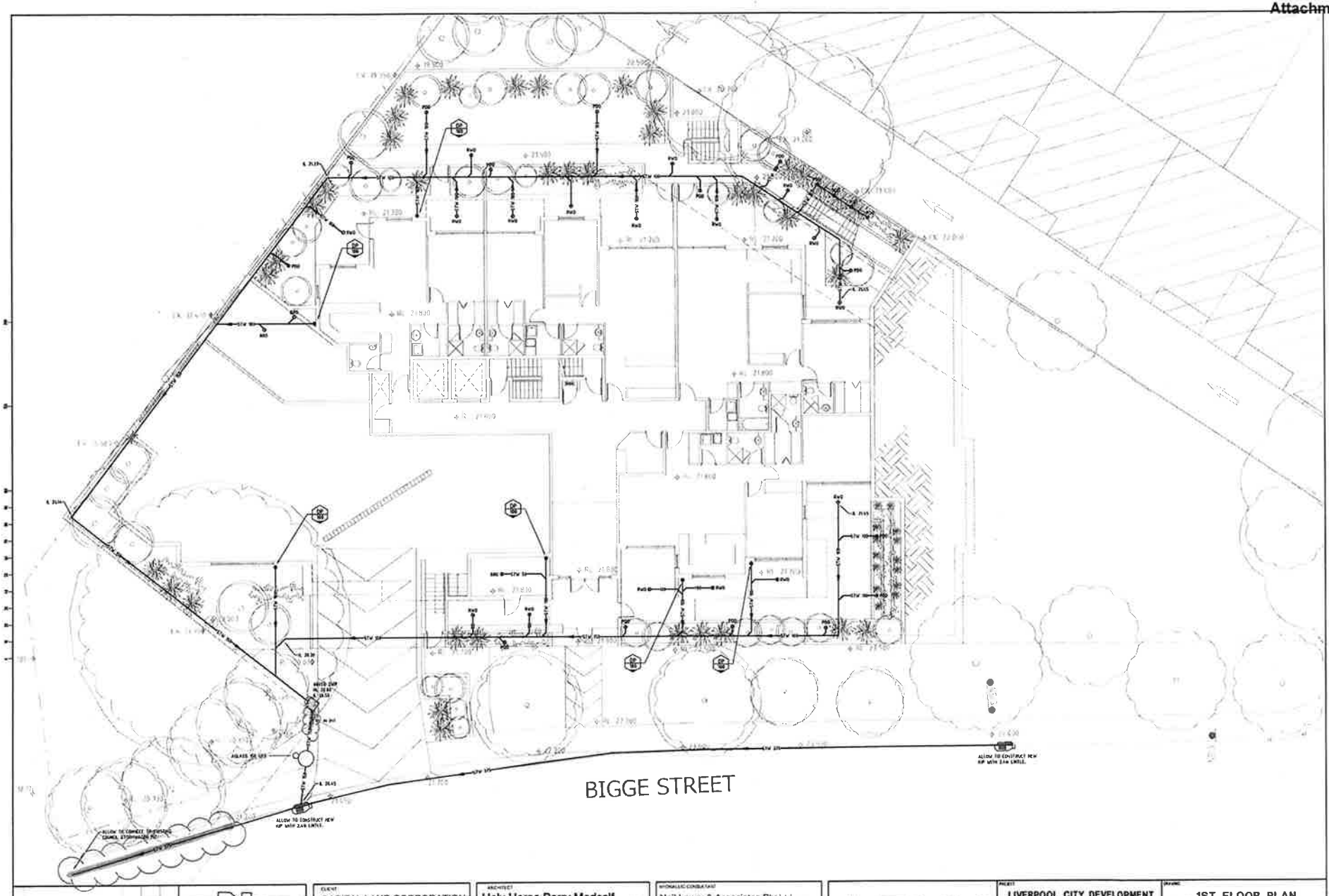
CLIENT
CAPITAL LAND CORPORATION

DRAWING
BASEMENT CARPARK L2 FLOOR PLAN

SCALE 1:200
DATE FEB 11
DRAWN MPM
CHECKED
APPROVED

PROJECT No. 973
DRAWING No. 070
ISSUE A

Hely Horne Medcalf Architects Pty. Ltd.
A.B.N. 20 316 463 707
Address: Level 1, 41 Thomas Street, McMahons Point 2060
Email: drawing@hhma.com.au
Telephone: (02) 9929 2600 Facsimile: (02) 9929 2611



DEVELOPMENT APPLICATION ISSUE

CAPITAL LAND CORPORATION

Holy Horne Perry Medcalf
Architects Pty. Ltd.

Neil Lowry & Associates Pty Ltd

LIVERPOOL CITY DEVELOPMENT
973 SPEED STREET
LIVERPOOL

1ST FLOOR PLAN
STORMWATER CONCEPT

NOV 09 | 1:100@A1

0556 | SC04 | A | DA ISSUE

KJ | NL | NL

A1 SHEET