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Structural & Civil Drawings

Prepared by Alan Reay and Associates

Executive Summary

The Henderson Station project calls for the completion of the Link Bridge structure that forms part of the Civic Centre project. Alan Reay Consultants have been engaged to carry out the Structural Engineering for this project.

In summary the Link Bridge structure is required to span the proposed double tracking with a minimum clearance to the underside of the bridge required for possible future electrification of the line. The structure to the top of the Link Bridge platform is predominantly a precast concrete system. The structure supporting the Link Bridge canopy is predominantly steel. A number of areas of the design are require review such as the possible future connection to Westfield shopping centre.

STRUCTURAL DESIGN FEATURES REPORT

HENDERSON STATION

Report Prepared for Architectus Auckland

by

Alan Reay Consultants Limited

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VERSION A

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1.0 INTRODUCTION

It is intended to provide a new Train Station for the Henderson area. The Design is led by Architectus. Alan Reay Consultants has been engaged to carry out Structural Engineering work for this project. The structure is in part the extension of the construction of the work carried out in for the Civic Centre. Work excluded includes the platform, platform covered way, future bridge access to Westfield Mall. The following reports outlines the proposed structural system and work carried out to date.

2.0 STRUCTURAL DESCRIPTION

Roof

- Design is under review. Concepts include either steel cladding over a freestanding steel cantilever roof structure, similar in design to the Civic Centre project.
- Covered ways to the escalators and stair structures are under review.

Floor Deck

- Suspended floors are proposed to be dycore proprietary floor system clear spanning each track with an insitu concrete topping. No edge beams are currently shown on SK1 attached, and therefore there are restrictions in loading from any future Westfield access bridge.
- Floors are to be supported on beams, columns, and wall, as shown on SK1.
- Stairs are proposed as precast concrete with insitu concrete landings.

Gravity System

- Option 1, as shown on drawing SK1, indicates walls, beams, and columns for gravity support. Option 2 is only an option should it be possible to locate the wall structures outside the 5000mm clearance line.

Lateral Load System

- It is proposed that the primary system in each principle direction of the building axis will be supported laterally by shear walls. These walls will be either separate or combined with the lift shaft. For Option 2, no allowance has been made for any wall within the 5000mm exclusion zone.

3.0 DESIGN LOADS

All loads calculated from NZS 4203:1992 "The New Zealand Loadings Code"

- Self Weights - To be calculated for each element
- Live Loads
 - Roof - Areas with no access 0.25 kPa
 - Floors - Foyer areas, public 5.00 kPa
 - Escalators - To be advised
- Snow Loads - Not applicable in Auckland
- Wind Loads - Basic wind speed 45m/s non directional
 - Shielding factor 1.00
 - Topographical factor 1.00
 - Structure risk factor 1.10
 - Design pressure ultimate 0.93 kPa
 - Design pressure serviceability 0.62 kPa
- Seismic Loads - Ductility between 1.25 and 3.00
 - Zone factor 0.60
 - Structural factor 0.67
 - Risk factor 1.20
 - Intermediate soil site

4.0 DESIGN CODE REFERENCES

Building Element	NZBC Reference	Loadings Code	Materials Code
Suspended Floors - Concrete	B1/VM1	4203: 1992	3101: 1995
Ground Floor - Concrete	B1/VM1	4203: 1992	3101: 1995
Walls - Concrete	B1/VM1	4203: 1992	3101: 1995
Frames - Steel	B1/VM1	4203: 1992	3404: 1997
- Concrete	B1/VM1	4203: 1992	3101: 1995
Columns & Beams - Steel	B1/VM1	4203: 1992	3404: 1997
- Concrete	B1/VM1	4203: 1992	3101: 1995
Foundations	B1/VM1	4203: 1992	All material types

5.0 FOUNDATIONS

Soils investigations have been undertaken by Tonkin and Taylor for the Civic Centre Site.

Based on this report, the building will be supported on piles to extend to the East Coast Bays Foundation Sandstone at an approximate depth of 11 metres below ground level.

In situ bored piles (cased during construction) are proposed. These piles are to extend a minimum of 3 pile diameters into the slightly weathered East Coast Bays Foundation Bedrock. A combination of side friction and end bearing provide the rated loads.

6.0 ELEMENTS UNDER REVIEW

- (i) Escalator design loads.
- (ii) Roof design.
- (iii) Impact of future Westfield access.
- (iv) Implications of column layout on SK1 for road and foot traffic under.
- (v) Covered structures for the stair and escalators.

CANTILEVER WITH CONCRETE SLAB, THIS SLAB
COULD TAPER IF REQUIRED TO ARCHITECTURE,
THICKNESS TO MATCH 300 D/CORSE + 100 TOPPING FLOOR.
FURTHER EXTENSION OF AIRBRIDGE TO WESTFIELD
(NOT PART OF T-S PROJECT)

OPTION TWO

ESCALATOR SUPPORT TRIMMER BEAMS
1000 WIDE 500 DEEP INCLUDING TOPPING.
ALL OVER 500 Ø WITHIN COLUMN.

CANTILEVER WITH CONCRETE SLAB, THIS SLAB
COULD TAPER IF REQUIRED TO ARCHITECTURE,
THICKNESS TO MATCH 300 D/CORSE + 100 TOPPING FLOOR.

ESCALATOR SUPPORT TRIMMER BEAMS
1000 WIDE 500 DEEP INCLUDING TOPPING.
ALL OVER 500 Ø WITHIN COLUMN.

PRECAST BEAM WITH WITHIN TOPPING.
1000 WIDE AND 500 DEEP OVERALL
INCLUDING TOPPING.

4 WITHIN TOPPING.
200 DEEP OVERALL

500 Ø WITHIN CONCRETE
COLUMNS TO UNDERSIDE OF
BRIDGE ONLY.

300mm DYCORSE BRIDGE SPANS, 100mm OF
WITHIN CONCRETE TOPPING. TOPPING TO
FAULS REFER ARCHITECT.

500 Ø CONCRETE COLUMN
WITHIN BELOW FLOOR STEEL ROOF
COLUMN ABOVE FLOOR.

200mm WITHIN CONCRETE LANOWGS

200mm WITHIN CONCRETE LANOWGS

5000
EXCUSION
ZONE ON
FAR SIDE OF
200 WALL.

WITHIN STRIP TO MIDDLE OF
BRIDGE, CAN BURY SERVICES
HERE.

200mm THICK WITHIN CONCRETE
LANOWGS. PRECAST CONCRETE
STAIR FLIGHTS WITH 200mm THICK

200mm THICK
PRECAST LIFT SHAFT
INCLUDING PRECAST BEAMS.

PRECAST BRIDGE BEAM
TOTAL THICKNESS INCLUDING TOPPING
500mm. 2400 WIDE. TOPPING TO
BEAM WITH CUT WITH
DYCORSE TOPPING.

RADIATING CANTILEVER LANOWG
SUPPORT BEAMS ON LINES OF 200mm
PRECAST LIFT SHAFT WALL.
BEAMS TOTAL DEPTH 600mm, 200mm
WIDE AT WALL FACE, COULD TAPER
TO EDGE IF REQUIRED

WITHIN TRIMMERS TO
SIDE OF D/CORSE

500 Ø CONCRETE COLUMN.
WITHIN BELOW FLOOR
STEEL BRIDGE ROOF COLUMN ABOVE

ESCALATORS BY OTHERS.
200mm THICK PRECAST LIFT
SHAFT INCLUDING PRECAST BEAMS.

300 DYCORSE BRIDGE SPANS
100mm OF WITHIN TOPPING TO DECK.
TOPPING TO FAULS READ IN CROSSSECTION
WITH THE ARCHITECTURE DRAWINGS.

175mm THICK SINGLE LEVEL
PRECAST WALL ON BORED PILE
FOUNDATIONS.

200 THICK PRECAST
CONCRETE FLIGHTS STAIR
OVER 500 Ø CONCRETE
COLUMNS.

PITS FOR ESCALATORS SIZE TO SUIT
1150 DEEP MINIMUM. 200mm BASE CONCRETE
FLOOR. WALLS 200mm THICK

THIS WALL PART OF
GRAVITY RESISTING STRUCTURE
THEREFORE ALTER GEOMETRY
TO ENSURE IT IS CLEAR OF
5000 EXCUSION ZONE.

OPTION ONE



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Henderson Station | Developed Design

STRUCTURAL CONCEPT CONCRETE WORK. SKI 7854 6-11-04.

05 NOVEMBER 2004 | Prepared for WAITAKERE CITY

Drawing AIRBRIDGE PLAN

Scale 1:200

@ A3

Job no 0355

Drawing no SD-03

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Issue