THE STAR

MODIFICATION 13 PLANNING SUBMISSION

VERTICAL TRANSPORTATION SERVICES

PREPARED BY

WSP

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17.01.17	B	15	Draft Report Issue	Ryan Singh	Robert Holman	Ryan Singh	
01.03.17	C	15	Final Report Issue	Ryan Singh	Robert Holman	Ryan Singh	
17.03.17	D	33	Revised Final Report Issue	Ryan Singh	Robert Holman	Ryan Singh	
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1 EXECUTIVE SUMMARY

SEGL has commenced a five-year redevelopment journey to create a landmark, exemplar integrated resort. This proposed redevelopment will occur through the lodgment of two s75W modification applications to the original Major Project Approval (MP08_0098) with the Department of Planning and Environment (the Department).

Modification 14 was lodged with the Department in October 2016 and approved as a stand-alone modification application. Modification 14 proposes works and improvements across the site including improvements to access and circulation to and within the site and to generally improve the functioning, circulation and amenity of The Star. The proposed works will deliver an expansion of the Sovereign Resort and ancillary works, provide additional pre-function space to the Multi Use Events Facility, improve the arrival experience on Pirrama Road and a number of associated internal upgrade works. These works seek to enhance the attractiveness and functioning of The Star complex.

Modification 13, proposes the development of a new Ritz-Carlton Hotel and Residential Tower in the northern portion of the site with associated podium treatment, as well as other transport, retail, food and beverage improvements across the site. It is Modification 13 that is the subject of this report.

The proposed development has been assessed against all relevant standards/guidelines, including the following:

- Secretary's Environmental Assessment Requirements (SEARs); and
- National Construction Code 2016.

The Vertical Transportation design for the tower will be a key element in ensuring ease of access throughout with an efficient core size as possible. In order to achieve this a proprietary technology called the TWIN Elevator has been utilized. This system has allowed all areas of the tower to have adequate vertical transportation provisions with the smallest core footprint possible.

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MODIFICATION 13
PROPOSED WORKS

2 MODIFICATION 13 PROPOSED WORKS

Modification 13 includes the following proposed works:

2.1 PROPOSED RITZ CARLTON HOTEL AND RESIDENTIAL TOWER

New Ritz Carlton Hotel and residential tower includes:

- Demolition of part of the existing building in the northern portion of the site;
- Construction of a new 237 m AHD (approximate) tall hotel and residential tower including:
  - Residential across 35 levels, comprising:
    - 204 residential apartments located from Levels 05 to 06 and from Level 08 to 38 featuring a variety of one-bedroom, two-bedroom and three-bedroom unit types.
    - A residential lobby at Level 00 that is accessed from Jones Bay Road and a residential vehicular drop off lobby on level B2.
    - A residential communal space on Level 07 to be accessed via Level 08.
  - Hotel uses across 31 levels, comprising:
    - 220 hotel rooms located from Level 42 to 58 and Level 60 to 61;
    - A Hotel arrival lobby at Level B2 to be accessed from the new Ritz-Carlton Porte-Cochere along Pirrama Road.
    - A Hotel Sky Lobby located at Level 39 & 40 for Ritz-Carlton hotel guests to check-in, featuring a bar, restaurant and lounge;
    - A Ritz-Carlton Club Lounge located at Level 59.
    - A hotel spa and gym on Level 07
    - A VIP link to the Sovereign Room on Level 04 and 04 Mezzanine
    - Hotel staff end of trip facilities on Level B3
    - Hotel staff arrival point on Level 00
    - Hotel back-of-house and plant on Level B2, 02, 03, 05, 41 and 42
- A neighbourhood centre consisting of a café, library, learning/innovation hub and function centre.
- A new car-parking stacking system below the new porte-cochere of the Ritz-Carlton Hotel with a total capacity of 221 spaces to serve the new hotel and apartments
- Vertical transport associated with the tower and podium.
- A new drop-off/pick up area (short-term parking) on Jones Bay Road for the proposed apartments.

2.2 LEVEL 07

New level 07 includes:

- A 'ribbon' at Level 07 connecting the new hotel and residential tower to the existing Star complex along the Pirrama Road frontage, comprising two pools (one for new hotel, one for The Star), associated pool decks and two food & drink premises with associated store rooms and facilities;
- Lift access from Level 05 Terrace to Level 07
- Residential communal open space associated with the new residential apartments, comprising pool and landscaped terrace adjacent to Jones Bay Road;
- Gymnasium and associated change rooms and facilities for the residents;
- Gymnasium and associated change rooms and facilities for hotel guests; and
- Landscaping treatments.

2.3 LEVEL 05 TERRACE

New level 05 terrace includes:

- Food and drink premises with external areas;
- Completion of the Vertical Transportation drum to connect with Level 05 Terrace;

- Landscaping treatment.
- Designated event spaces on the Terrace
- New pool and pool deck upgrades for Astral Hotel and Residences.
- Link from the Tower (across Level 04 and Level 04 Mezzanine) to the Sovereign Resort and MUEF at Level 03, connected via Lift G4, Lift VIP 1 and escalators.
- New circular lift connecting Level 5 Sky Terrace to level 7 Pool Terrace
- Extension of the lift service to stop at Level 00, 01 and 05 in addition to Level 3, 4 and 4M.

2.4 LEVEL 03 SOVEREIGN COLUMN FAÇADE TREATMENT ALONG PIRRAMA ROAD

- New glazed detail to enclose exposed Level 03 Sovereign columns along the Pirrama Road façade.

2.5 VARIOUS RECONFIGURATION WORKS AROUND VERTICAL DRUM LEVEL 00 TO L5A

- Revolving door at L00 main entrance landing Pirrama Road end
- Sliding door at L00 landing at stairs from Light Rail
- Reconfiguring of existing L1 and 2 void edge
- New escalators from L2 to L3 due to revised landing at Level 3
- Infill of L2 atrium void to main entrance at Pirrama Road

2.6 FAÇADE INTEGRATION WORKS

Façade integration works includes:

- Pirrama Road/Jones Bay Road - Upgrades to the Pirrama Road and Jones Bay Road façades to integrate the new Ritz Carlton Hotel & Residential Tower and the 'Ribbon' with the existing building.

2.7 INFRASTRUCTURE UPGRADES

Infrastructure upgrades, including:

- A new plant room located within the podium over Levels 03, 04, 05, and 06 of the proposed Hotel and Residential Tower;
- The relocation of the current cooling towers and main switchboards to the L09 Plant room above the Level 06 plantroom adjacent to the Astral Hotel.
- New capstone microturbine units and associated flues in the proposed plant room at level 03, between the Darling Hotel and the Astral Residence Tower;
- New capstone microturbine units and associated flues in the new level 03 plant room at the base of the Tower;
- Relocation of the diesel generator flues to the side of the new Level 09 plantroom, adjacent to the Astral Hotel
- Relocation of the existing data recovery centre to the new plant room on Level B1 of the Darling Hotel;

2.8 LEVEL B02 TRANSPORT INTERCHANGE

Transport interchange includes:

- Upgrades to the Event Centre Loading Dock;
- Entry into Basement car stacker for the Tower apartments and Ritz-Carlton Hotel;
- New commuter bike parking and hire bike system;
- Upgrade of finishes to light rail station surrounds (but not within Light Rail corridor) and removal of existing wall barrier to the Pirrama Road frontage;

- Upgraded taxi-rank arrangements;
- Designated Star coach parking along Service Road in front of Light Rail station; and
- Realignment of kerbs and line-marking.

Note – no works to the Light Rail corridor

2.9 TRANSPORT IMPROVEMENTS

Transport improvements includes:

- Reconfiguration of existing median strips on Jones Bay Road and addition of new median strip on Pyrmont Street with associated line-marking to enable a new right-hand turning lane into the Astral Hotel Porte-Cochere;
- New Pyrmont Street carpark entry and exit, associated line marking, changes to internal circulation, and reconstruction of the pedestrian footpath along Pyrmont Street; and
- Relocation of existing taxi-rank from Jones Bay to the Level B02 transport interchange.

2.10 SITE WIDE LANDSCAPE AND PUBLIC DOMAIN UPGRADES

Site wide landscape and public domain upgrades, including:

- Upgrades to street frontages along Pirrama Road (for the Hotel Porte Cochere) and Jones Bay Road (for the residential entry);
- Upgrades to street frontage to Pyrmont Street, due to new car parking entry; and
- Entrance upgrade to the SELS building at the corner of Jones Bay Road and Pyrmont Street.

2.11 LEVEL 00-RESTAURANT STREET

- Creation of a new destination restaurant street incorporating existing Food & Drink premises on Level 00.
- Converting existing retail shops into new Food and Beverage tenancies

2.12 PIRRAMA ROAD AND JONES BAY ROAD - FOOD AND BEVERAGE TENANCIES

- A revised food and beverage tenancy at the existing Pizzaperta outlet along Pirrama Road;
- A new food & beverage tenancy at the Marquee street entry; and
- A small café outlet adjacent to the residential lift lobby at Jones Bay Road.
- A new food & beverage tenancy accessed off existing walkway from Jones Bay Road

2.13 FOOD AND BEVERAGE – OTHER LOCATIONS

- Reconfiguration of Harvest Buffet, including new escalators from Level 00 Food Court to Level 01; and
- Refurbishment of Bistro 80 into the interim Century tenancy. (Note: The Century tenancy post construction is proposed to be at the Jones Bay end of L00 – Restaurant Street

2.14 DARLING HOTEL CORNERS

- Upgrade of the corner plaza at the Union/Edward Street property entry to accommodate:
    - A new food and Beverage premises on Level 01 and 02;
    - A new entry foyer leading to the Food Court;
    - A relocated awning enclosure at street level;

- Upgrade of the corner plaza at the Union/Pyrmont Street property entry to accommodate:
  - A new awning enclosure at for the existing café;
  - New revolving door at entry to Darling Hotel
  - Eight (8) luxury display cases at Darling Hotel car park entry; and
  - Two car display areas at Darling Hotel car park entry.

2.15 SITE-WIDE ACOUSTIC STRATEGY

- A site-wide acoustic monitoring strategy applied to assess impact of potential noise generating sources in Mod13.

2.16 SITE-WIDE LIGHTING STRATEGY

- A site-wide lighting strategy integrating and improving the existing lighting across the precinct, with new lighting the proposed Tower, Podium and Ribbon, including:
  - Internal lighting of Hotel and Residential spaces;
  - Illuminated highlights at the Sky Lobby and Club Lounge levels;
  - Integrated lighting on the eastern and western vertical façade slots and angled roof profile;
  - Podium external illumination from awnings, and under retail and lobby colonnades;
  - Landscape lighting on Level 07 open terraces and pool decks;
  - Feature lighting accentuating the wing-like profile of the Ribbon and vertical element;
  - Internal and external lighting to Food and Beverage outlet at Union/Edward Street corner;
  - Façade LED lighting to the heritage SELS Building

2.17 SPECIAL LIGHTING EVENTS

- Approval for fifty-three (53) Special Lighting Event nights per year for the use of permanent installation of moving projector lights on the rooftop of the Astral Hotel

2.18 SIGNAGE UPGRADES

Signage upgrades includes:

- Consolidation of existing signage approvals and new signage, including:
  - Approved signs
  - Wayfinding signs;
  - Business identification (including for Food and Beverage outlets); and
  - Signage on the Tower and Podium.

2.19 STORMWATER UPGRADES

Storm water upgrades includes:

- Stormwater upgrade works, including increased pit inlets and pipe capacities at the low points along Pyrmont Street and Edward Street.

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INTRODUCTION AND BACKGROUND

3 INTRODUCTION AND BACKGROUND

This Vertical Transportation Services Report has been prepared by WSP for Star Entertainment Group Limited (SEGL) and outlines the initial concepts and proposed vertical transportation services strategies associated with the Modification 13 proposal, including:

- Design parameters;
- Scope of Vertical Transportation Services;
- Plant massing and spatial strategies; and
- Integration with the existing building.

3.1 DEFINITIONS

Unless the context otherwise requires, the following definitions apply.

AS	Australian Standard
AWT	Average Waiting Time
BCA	Building Council of Australia
BMS	Building Management System
DA	Development Approval
DCS	Destination Control Selection
ESD	Environmental Sustainable Development
HC	Handling Capacity
MRL	Machine Room Less
NCC	National Construction Code of Australia
NLA	Net Lettable Area
TWIN	Thyssen Krupp Proprietary Lift System
TKE	Thyssen Krupp Elevators
VT	Vertical Transportation

3.2 BASIS OF REPORT

This report is based upon the following information:

- Architectural drawings;
- Secretary's Environmental Assessment Requirements (SEARs);
- Ritz Carlton Design Guidelines; and
- Apartment Design Guide.

3.3 AUTHORITIES AND REGULATIONS

The following standards will be applicable throughout the project:

- National Construction Code Building Code of Australia 2016;
- NSW Statutory Regulations;
- Relevant Australian Standards including but not limited to AS 1735.1/2, AS 1735.12, AS 1668.2, AS 1428, AS 4254, AS 1432, AS 3000, AS 3008, AS 1170, AS 1677 etc.; and
- The requirements of the NSW Work Cover Authority.

3.4 LIMITATIONS

The design approach for the Vertical Transportation services is based upon the architectural layouts issued in June 2017. This document should be treated as concept only and should not be used for the basis of detailed pricing or tender. This report however, can be used to determine budget costs.

The design criteria and strategies outlined in this document should be considered to be in line with the current phase of the project, and will be further developed with the relevant stakeholders as the project progresses further into detailed design.

3.5 IMPACTS ON REST OF THE SITE

The vertical transportation provisions within the Modification 13 works are standalone and will not impact Modification 14 works. They will also have no impact on the other proposed modification works pertaining to the rest of Modification 13. [SR1]Modifications 1 through to 12 are also not impacted by the vertical transportation works in this modification.

3.6 BUILT FORM AND DESIGN EXCELLENCE

The design team has collectively explored various designs to ensure the best built form is being achieved for the tower. In particular, the vertical transportation design is utilizing innovative technologies to minimise the overall lift core requirements yet still providing a quality of service that is commensurate of premium mixed-use buildings.

3.7 AMENITY

The vertical transportation core has been centralised within the tower to minimise the impact on apartment and hotel floor layouts. This in turn has aided the architectural layout to maximise natural light and ventilation. The centralised core also allows all apartments and hotel rooms to have the best views available from that location.

The vertical transportation design for the apartment levels satisfies the design intent of the Apartment Design Guide.

3.8 ENVIRONMENTAL SUSTAINABLE DEVELOPMENT (ESD)

The vertical transportation provisions shall incorporate the latest ESD initiatives available within the industry. Measures to minimise energy consumption, use of volatile organic compounds (VOC), and minimise construction waste have all been considered in our design.

Through the use of an advanced control system such as Destination Control, and energy efficient regenerative drives and machines, the overall energy consumption of the vertical transportation system will be much less than a conventional system.

The implementation of a proprietary lift design called the TWIN has resulted in significantly less lift shafts and thus construction material to build the overall vertical transportation systems. The contractors shall also be asked to minimise construction waste where possible to align with the SEARs Issue 7 – Ecologically Sustainable Development (ESD)

Once the installation has been completed, the vertical transportation system shall learn the traffic patterns of the tower and adjust the quality of service accordingly. During periods of low use, some lifts and escalators will go into a standby (low power mode) to reduce energy consumption. The lifts shall also learn to position themselves at locations where they have minimal travel distances to reach calls.

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VERTICAL TRANSPORTATION SERVICES SCOPE

4 VERTICAL TRANSPORTATION SERVICES SCOPE

4.1 DESIGN CRITERIA

The design criteria presented herein will form the basis for the design of the works. It should be noted that this is subject to the receipt of the Ritz-Carlton design brief. All lift designs to be in line with AS 1735.12 DDA compliance.

4.1.1 General

Item	Design Criteria
Lift design Criteria	Use of Thyssen Krupp TWIN Elevators **Residential Apartments** 6 – 8 % HC 40 – 60 seconds AWT **Hotel** 12 – 15 % HC 25 – 35 seconds AWT Above criteria are based on peak two-way traffic movements
Back of House Lifts	Minimum of 2 dedicated back of house lifts
Scenic Lift	Bespoke scenic design
VIP Lift	Premium finishes
Escalators	Escalators commensurate of heavy duty use 24 hours a day 7 days a week for the ribbon.
Hotel Population	1.75 persons / key
Residential Population	1.5 persons / bedroom.

4.2 SIZING OF EQUIPMENT

Lifts shall be sized in accordance with below.

Parameter	Design Criteria
Minimum Load	21 person / 1600Kg
Minimum Speed	4.0 m/s

Scenic Lift

Parameter	Design Criteria
Minimum Load	21 person / 1600Kg
Minimum Speed	1.0 m/s

VIP Lift

Parameter	Design Criteria
Minimum Load	21 person / 1600Kg
Minimum Speed	0.63 m/s

All Escalators shall have the following minimum requirements:

Parameter	Design Criteria
Use	Heavy Duty 24 hours a day 7 days a week
Operating Speed	0.5m/s
Variable Speed	Required

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PROPOSED VERTICAL TRANSPORTATION STRATEGY

5 PROPOSED VERTICAL TRANSPORTATION STRATEGY

5.1 RITZ CARLTON HOTEL AND RESIDENTIAL TOWER

In order to reduce the core size and improve the overall Vertical Transportation efficiency a proprietary solution by Thyssen Krupp Elevators (TKE) was investigated. The proprietary solution by TKE is called the TWIN.

The TWIN lift system has two lifts arranged on top of each other in the same shaft. Each lift can travel independently of each other. To ensure they are working in an efficient manner, Destination Control Selection is used. This allows different zones of the building to be served using a single shaft. Six (6) TWIN lifts are proposed for the New Tower to provide:

- Hotel Guest service;
- Back of House service;
- Residential Apartment service; and
- Shuttle service between ground level entrance to Sky Lobby.

Within the six TWIN shafts there were the following cars:

	Shaft No.1	**Shaft No.2**	**Shaft No.3**	**Shaft No.4**	**Shaft No.5**	**Shaft No.6**
Upper Car	Back of House / Goods Lift No. 1	Hotel Guest Lift No. 1	Hotel Guest Lift No. 2	Hotel Guest Lift No. 3	Hotel Guest Lift No. 4	Hotel Guest Lift No. 5
Lower Car	Back of House / Goods Lift No. 2	Residential Lift No. 1	Residential Lift / Backup Goods Lift No. 3	Residential Lift No. 2	Shuttle Lift No.1	Shuttle Lift No.1

Should there be any main dining areas located directly above the main sky lobby, a separate lift should be provided to connect the main sky lobby and the dining areas. Access by any person who isn't a hotel guest, would be via this lift.

Hotel Lift Performance	**Ritz Carlton Benchmark**	**New Tower**
Handling Capacity (% of overall building population)	12%	12 - 13%
Average Waiting Time	45 seconds	35 - 38 seconds

Apartment Lift Performance	**Benchmark**	**New Tower**
Handling Capacity (% of overall building population)	5 - 7%	7%
Average Waiting Time	30 – 60 seconds	50 seconds

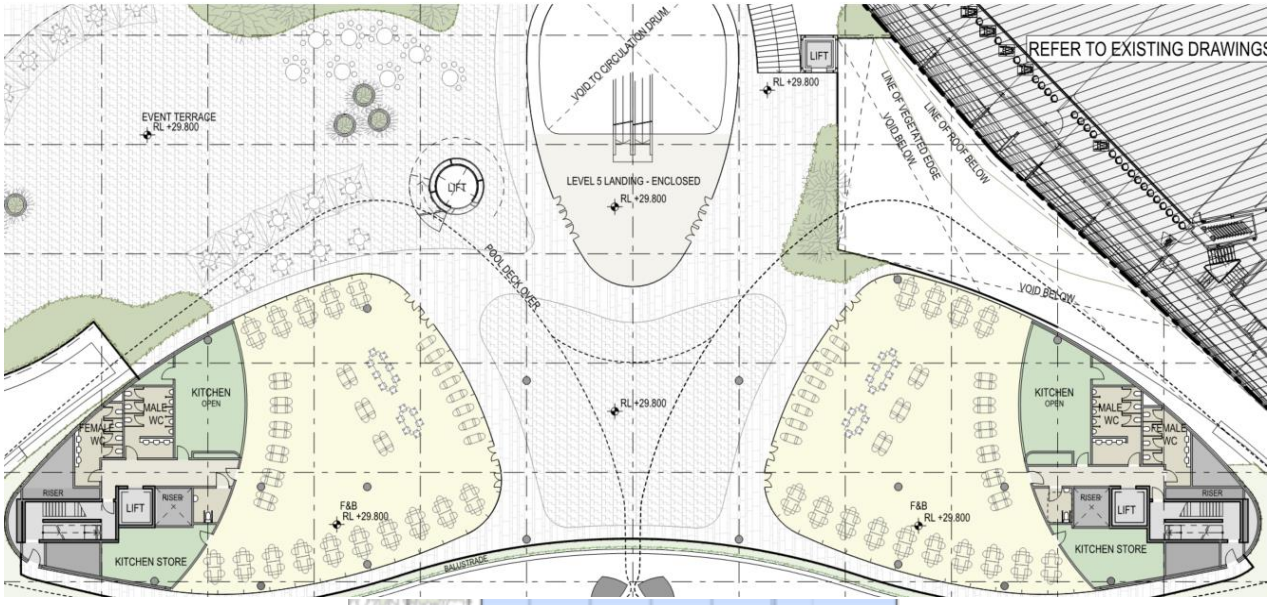
It can be seen that with the TWIN configurations, the quality of service provided to the apartments and the Hotel satisfy the target benchmarks. Should there be additional demand placed upon the lift system, then the performance would change.

5.2 THE 'RIBBON'

There are 2 new lifts provided within the ribbon to serve all the new levels. Along with these lifts there will be escalators connecting all the major levels. These lifts shall be machine room less lifts with permanent magnet machines and variable voltage variable frequency drives.

5.3 VERTICAL TRANSPORTATION DRUM

The Vertical Transportation Drum will extend up to Level 5 and it comprises of bi directional escalator pairs connecting between each level. These escalators will provide links between Level 00 and Level 1, Level 1 and Level 2, Level 2 and Level 3, Level 3 and Level 5.



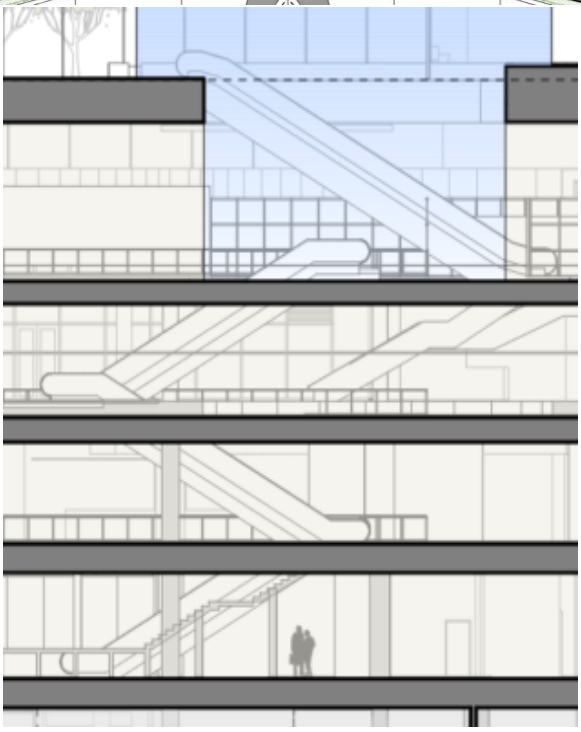


IMAGE 5.3 GENERAL SECTION OF DRUM AND LOCATION PLAN

The escalators will also be variable speed escalators to maximise energy efficiency. The escalators shall have glass balustrades, and protective barriers will be considered for the sides. Adequate flat step transitions will be provided to allow safe entry onto and exit from the escalators.

There will also be the addition of a bespoke scenic circular lift for access from level 05 to level 07, this lift is to be predominately glass in structure with premium finishes.

The VIP lift will transport VIP guests from level 03 and 04 where the VIP link is situated to level 05This lift is to have premium finishes.

5.4 LIFT DIMENSIONAL INFORMATION

This section in Image 5.4 below, shows the general lift shaft, pit depth, headroom and lift motor room dimensions for the lifts (refer also table 5.4).

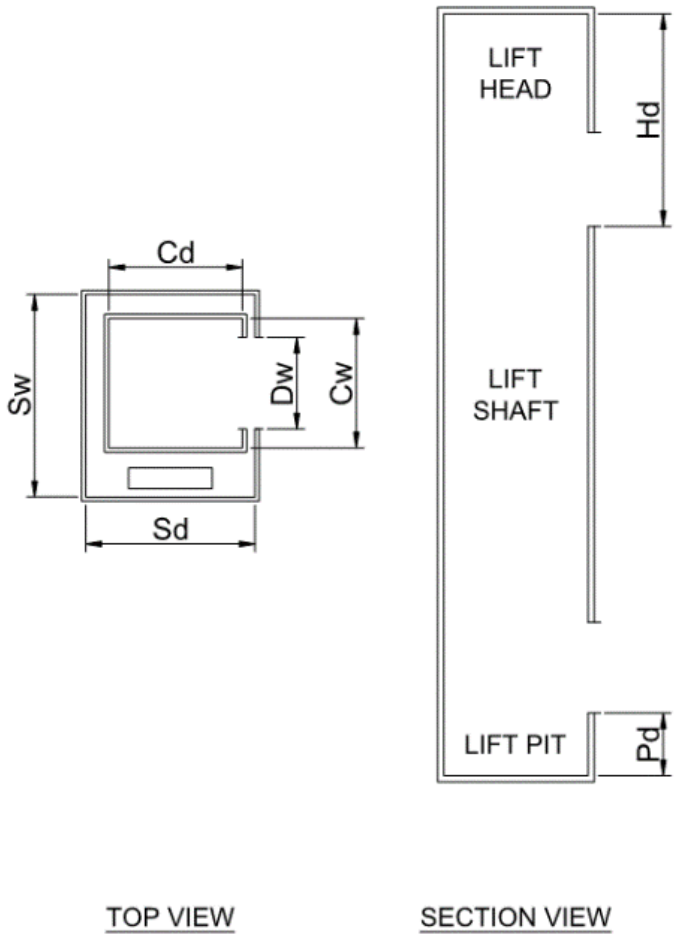


IMAGE 5.4 GENERAL LIFT SHAFT PLAN & SECTION

Individual TWIN Lift Shaft	C_w	C_d	S_w	S_d	D_w	H_d	P_d	Car Height
Shaft 1 Upper Car: Goods Lift Lower Car: Goods Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,600	2,100	3,100	3,000	1,300	7,800	6,200	2,900
Shaft 2 Upper Car: Hotel Guest Lift Lower Car: Residential Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,900	1,700	2,900	2,800	1,100	7,800	6,200	2,800
Shaft 3 Upper Car: Hotel Guest Lift Lower Car: Residential /Backup Goods Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,700	1,900	2,900	3,000	1,200	7,800	6,200	2,800
Shaft 4 Upper Car: Hotel Guest Lift Lower Car: Residential Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,900	1,700	2,900	2,800	1,100	7,800	6,200	2,800
Shaft 5 Upper Car: Hotel Guest Lift Lower Car: Hotel Shuttle Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,900	1,700	2,900	2,800	1,100	7,800	6,200	2,800
Shaft 6 Upper Car: Hotel Guest Lift Lower Car: Residential Lift Both lifts have following size and speed: 21 person / 1,600kg Lifts @ 5.0m/s	1,900	1,700	2,900	2,800	1,100	7,800	6,200	2,800

TABLE 5.4 LIFT DIMENSIONS PER SHAFT

5.5 LIFT TRAFFIC SIMULATIONS

This section notes the performance of the TWIN Lift solution based on the current design.

Page: 2 of 16
Job: FJMT
Job No:
Calculation Title: The Star New Tower
Made By: Ryan Singh
Check By: Matthew Revitt
File/Date: Hotel Apartment TWIN 170213 FJMT 20 Dec 2017 14:24:30

Elevate Version 8.24
WSP Australia Pty Ltd

ELEVATOR DATA

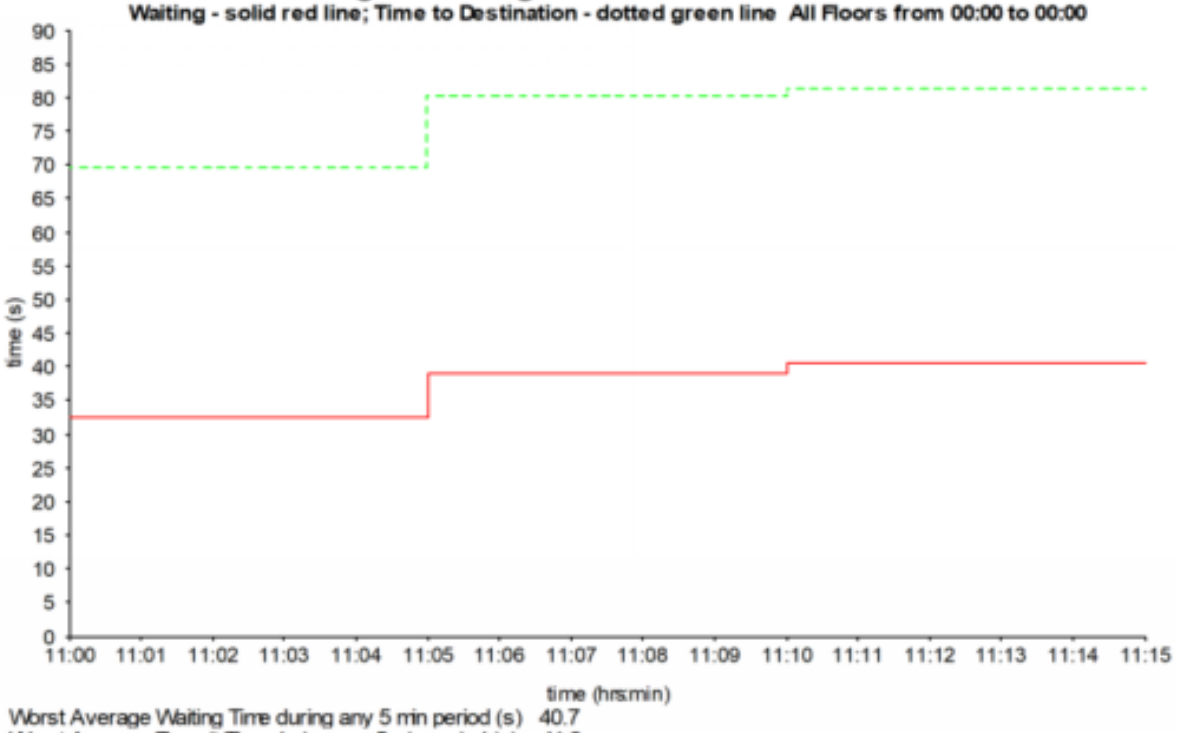
	Car 1	Car 2	Car 3	Car 4	Car 5	Car 6	Car 7	Car 8	Car 9	Car 10
Capacity (kg)	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600
Floor area (m²)	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56	3.56
Door Pre-opening Time (s)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Door Open Time (s)	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Door Close Time (s)	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
Home Door Dwell 1 (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Home Door Dwell 2 (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Door Dwell 1 (s)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Door Dwell 2 (s)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Speed (m/s)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Acceleration (m/s²)	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10	1.10
Jerk (m/s³)	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60	1.60
Start Delay (s)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Levelling Delay (s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Home Floor	Level 39	Ground (Resi)	Level 39	Ground (Resi)	Level 39	Ground (Resi)	Level 39	Ground (Shuttle)	Level 39	Ground (Shuttle)
Shut down time (s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restart time (s)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto	Auto

Floors served	Car 1	Car 2	Car 3	Car 4	Car 5	Car 6	Car 7	Car 8	Car 9	Car 10
Ground (Shuttle)	No	No	No	No	No	No	No	Yes	No	Yes
Ground (Resi)	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 7	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Level 9	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Level 10	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 11	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 12	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 13	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 14	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 15	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 16	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 17	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 18	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 19	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 20	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 21	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 22	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 23	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 24	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 25	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 26	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 27	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 28	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 29	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 30	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 31	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 32	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 33	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 34	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 35	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 36	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 37	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 38	No	Yes	No	Yes	No	Yes	No	No	No	No
Level 39	Yes	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes
Level 40	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 41	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 42	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 43	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 44	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 45	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 46	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 47	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 48	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 49	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 50	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 51	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 52	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 53	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 54	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 55	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Level 56	No	No	No	No	No	No	Yes	No	Yes	No
Level 57	No	No	No	No	No	No	Yes	No	Yes	No
Level 58	No	No	No	No	No	No	Yes	No	Yes	No

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line All Floors from 00:00 to 00:00

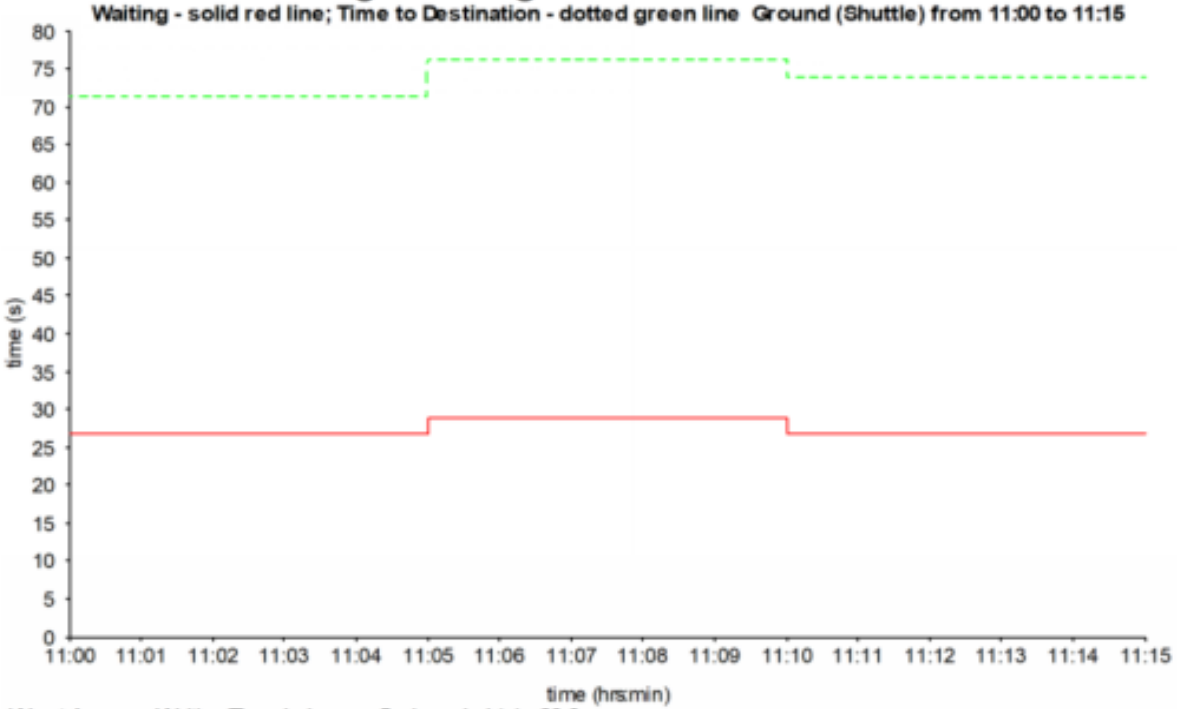


Worst Average Waiting Time during any 5 min period (s) 40.7
Worst Average Transit Time during any 5 min period (s) 41.2

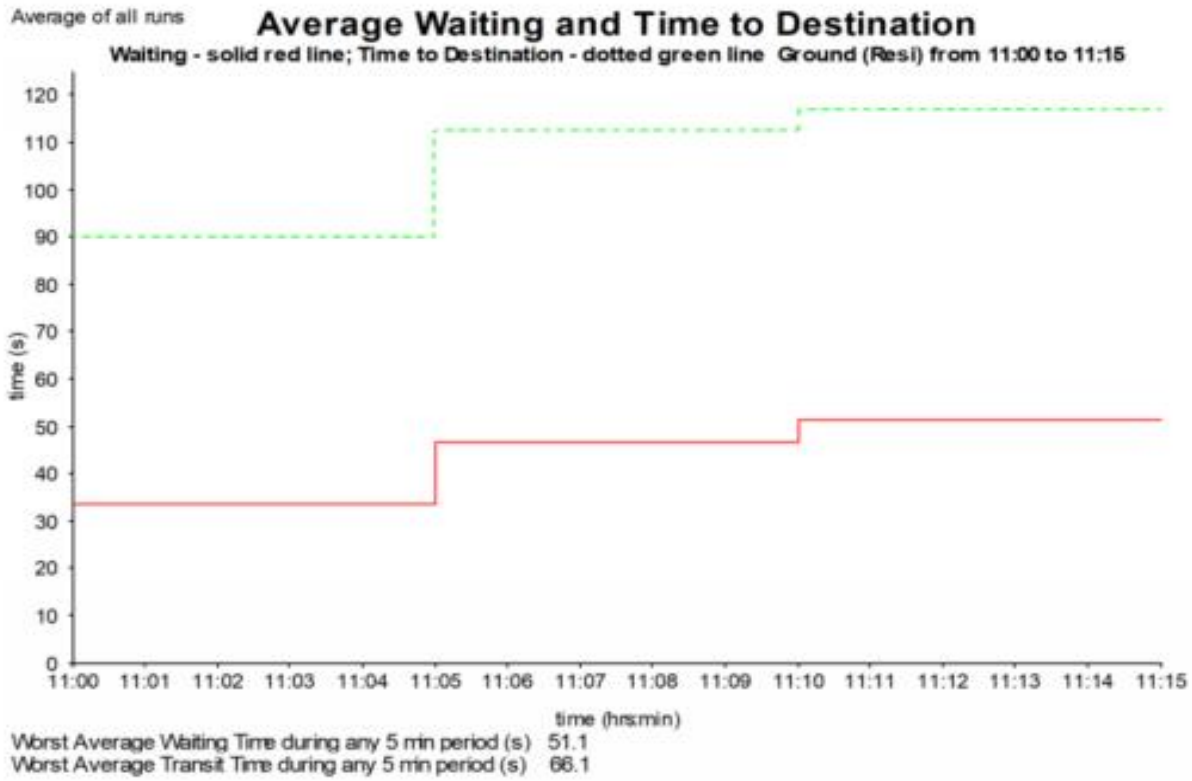
Average of all runs

Average Waiting and Time to Destination

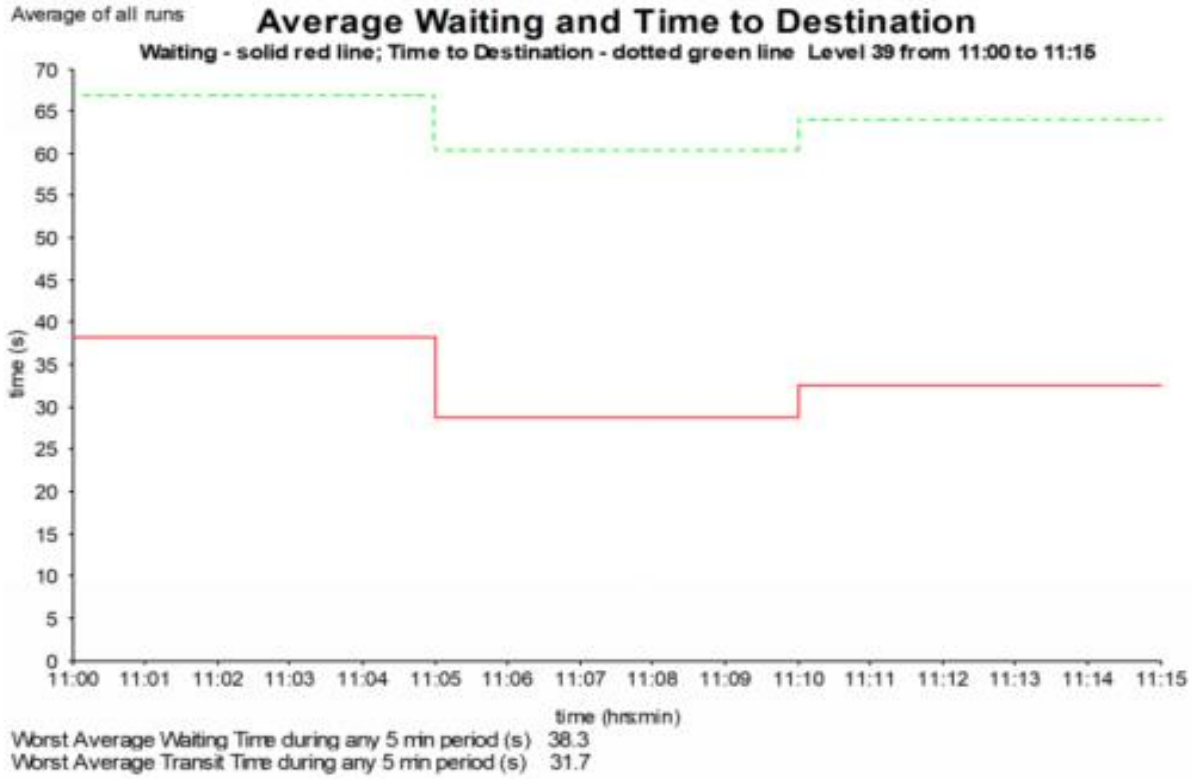
Waiting - solid red line; Time to Destination - dotted green line Ground (Shuttle) from 11:00 to 11:15



Worst Average Waiting Time during any 5 min period (s) 29.0
Worst Average Transit Time during any 5 min period (s) 47.2



Worst Average Waiting Time during any 5 min period (s) 51.1
Worst Average Transit Time during any 5 min period (s) 66.1

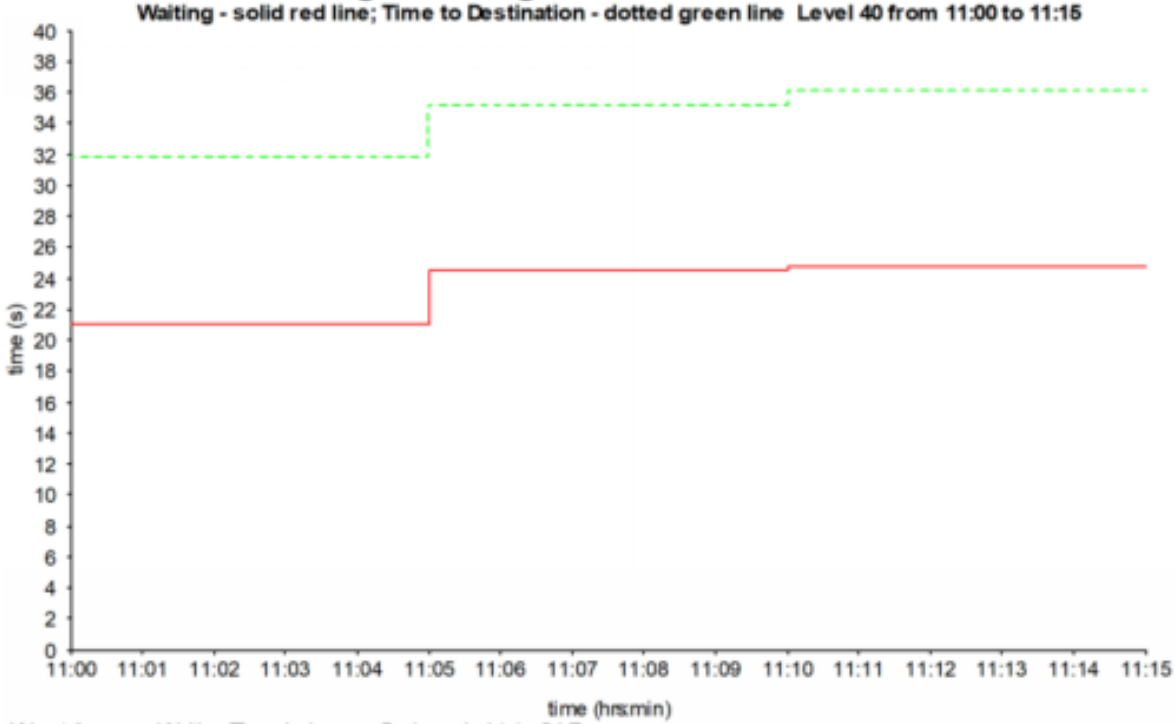


Worst Average Waiting Time during any 5 min period (s) 38.3
Worst Average Transit Time during any 5 min period (s) 31.7

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 40 from 11:00 to 11:15

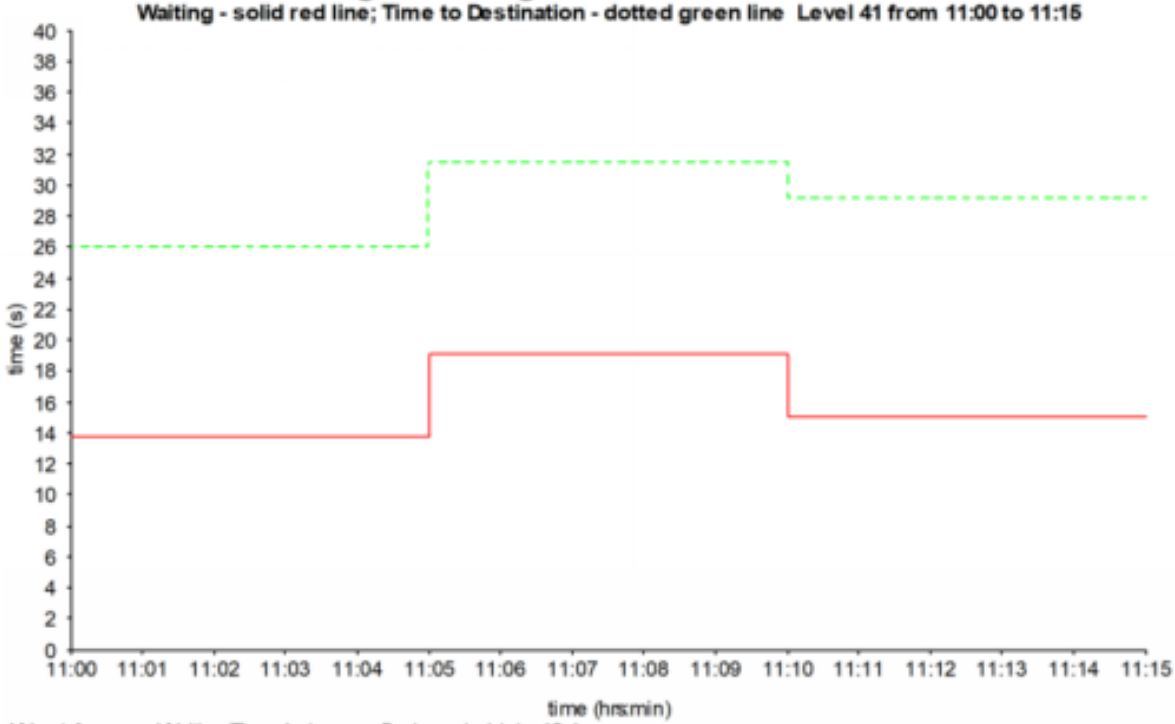


Worst Average Waiting Time during any 5 min period (s) 24.7
Worst Average Transit Time during any 5 min period (s) 11.4

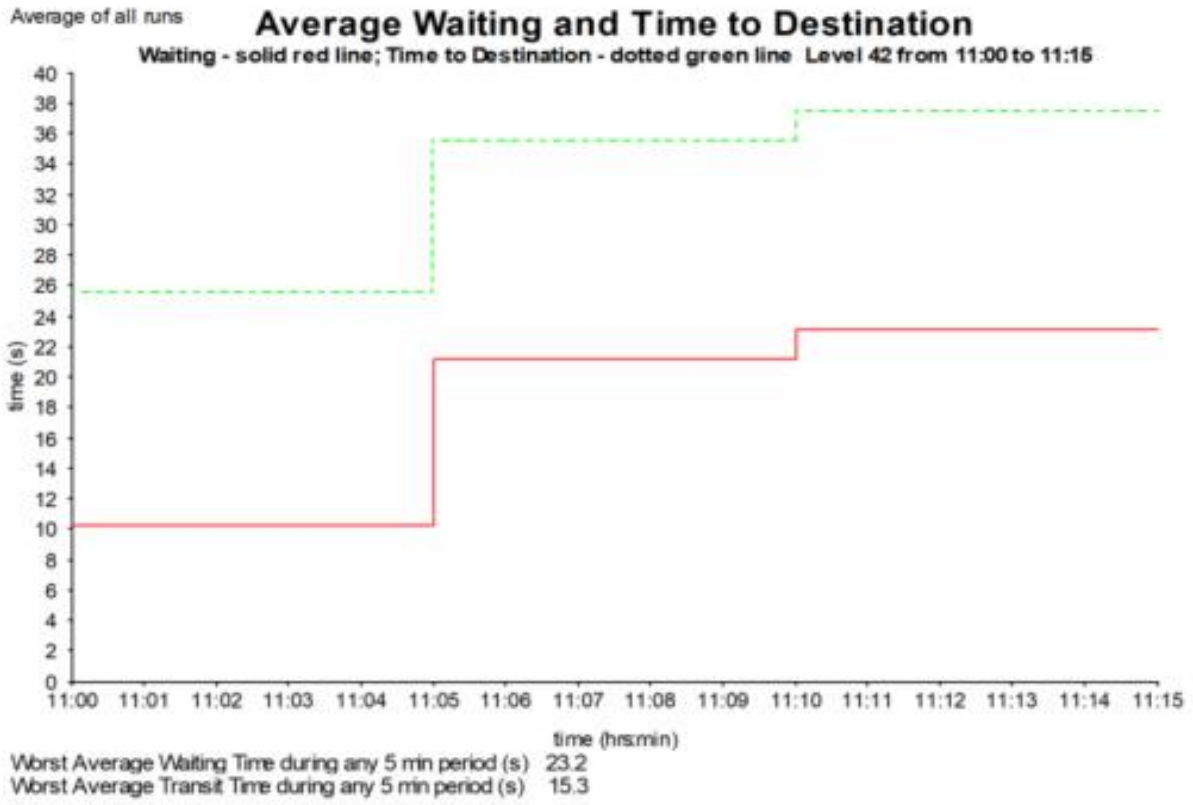
Average of all runs

Average Waiting and Time to Destination

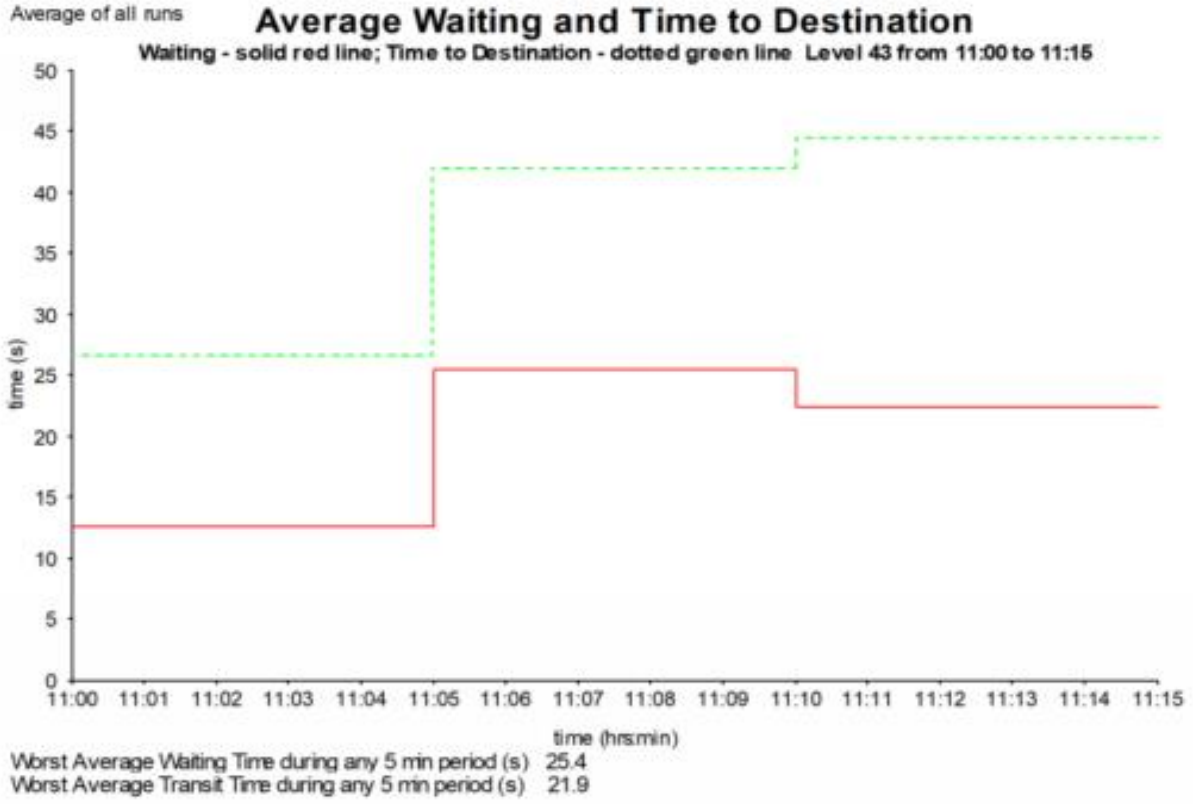
Waiting - solid red line; Time to Destination - dotted green line Level 41 from 11:00 to 11:15



Worst Average Waiting Time during any 5 min period (s) 19.1
Worst Average Transit Time during any 5 min period (s) 14.2



Worst Average Waiting Time during any 5 min period (s) 23.2
Worst Average Transit Time during any 5 min period (s) 15.3

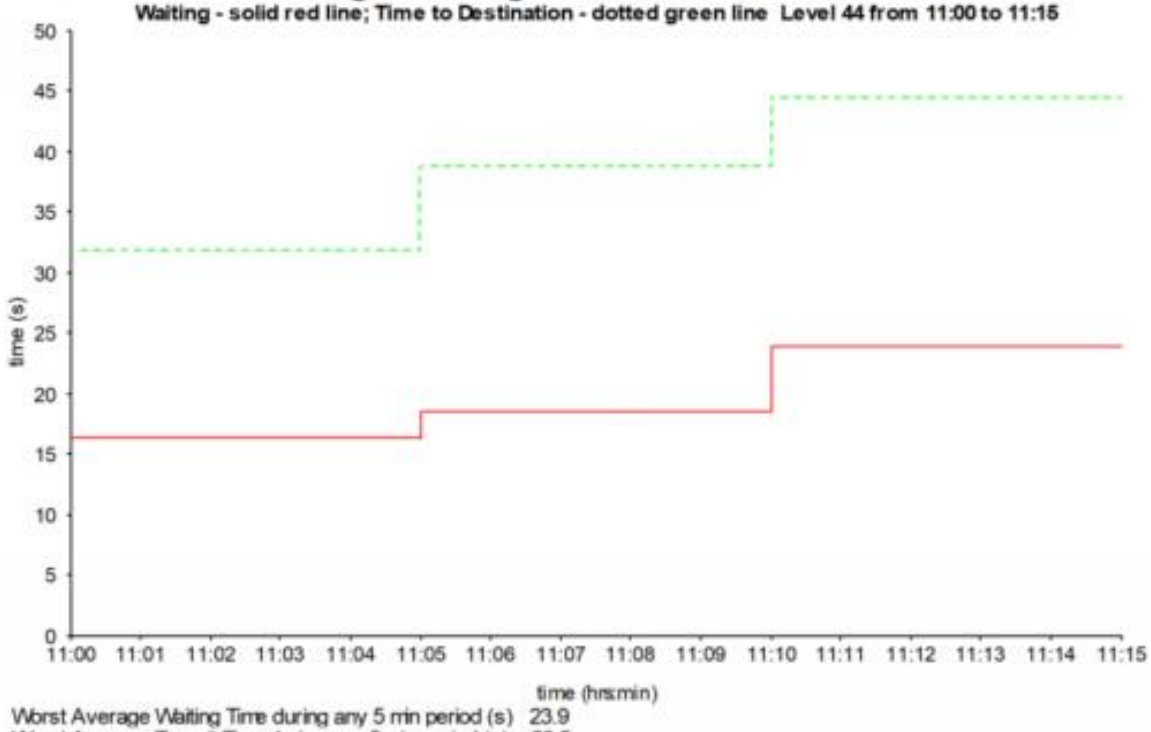


Worst Average Waiting Time during any 5 min period (s) 25.4
Worst Average Transit Time during any 5 min period (s) 21.9

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 44 from 11:00 to 11:15



Worst Average Waiting Time during any 5 min period (s) 23.9
Worst Average Transit Time during any 5 min period (s) 20.5

Average of all runs

Average Waiting and Time to Destination

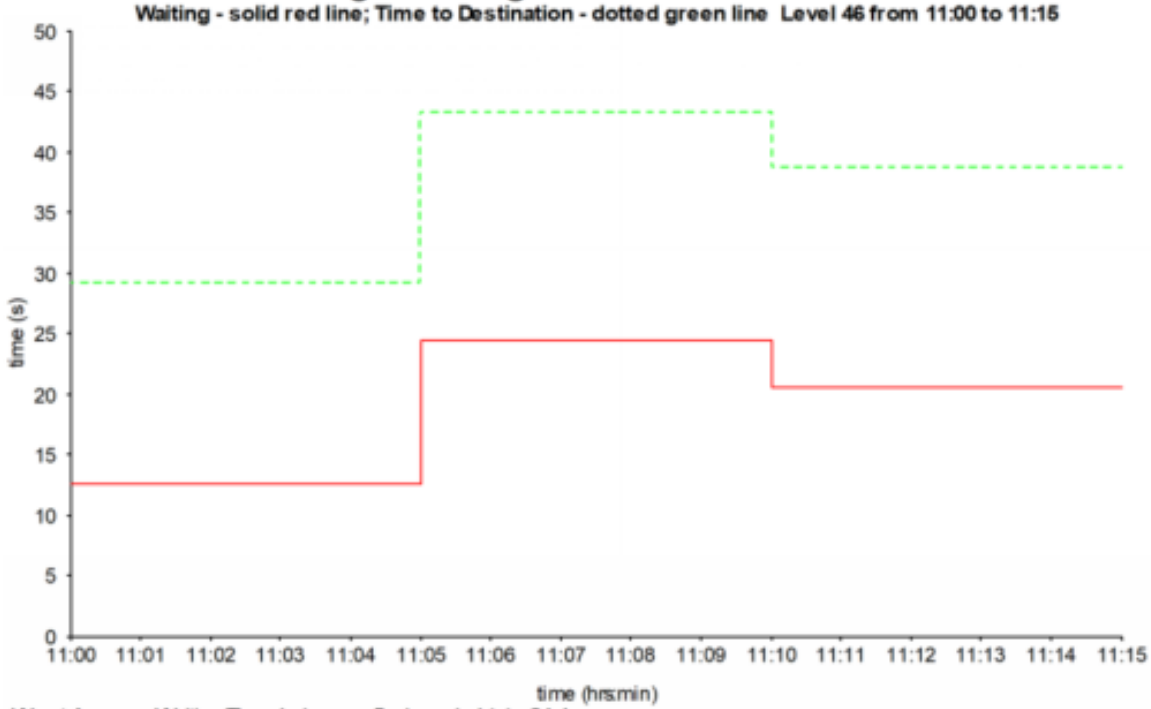
Waiting - solid red line; Time to Destination - dotted green line Level 45 from 11:00 to 11:15

Worst Average Waiting Time during any 5 min period (s) 19.2
Worst Average Transit Time during any 5 min period (s) 22.4

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 46 from 11:00 to 11:15



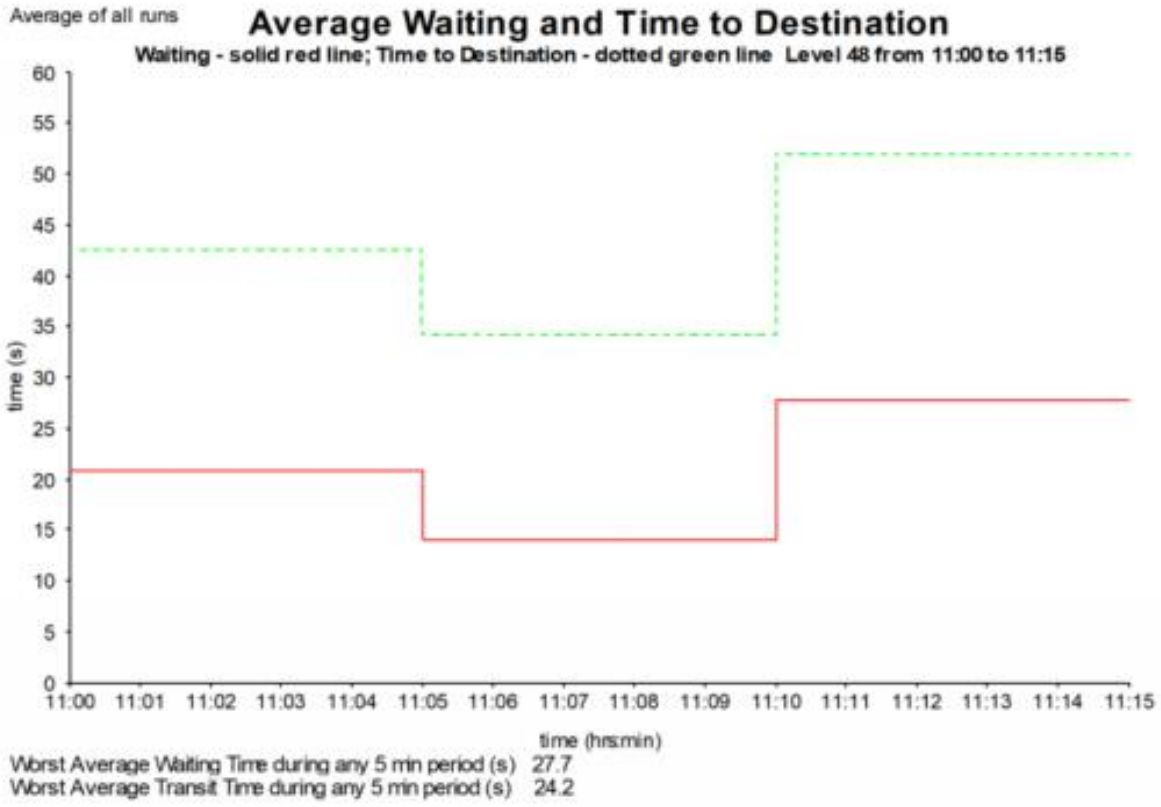
Worst Average Waiting Time during any 5 min period (s) 24.4
Worst Average Transit Time during any 5 min period (s) 18.9

Average of all runs

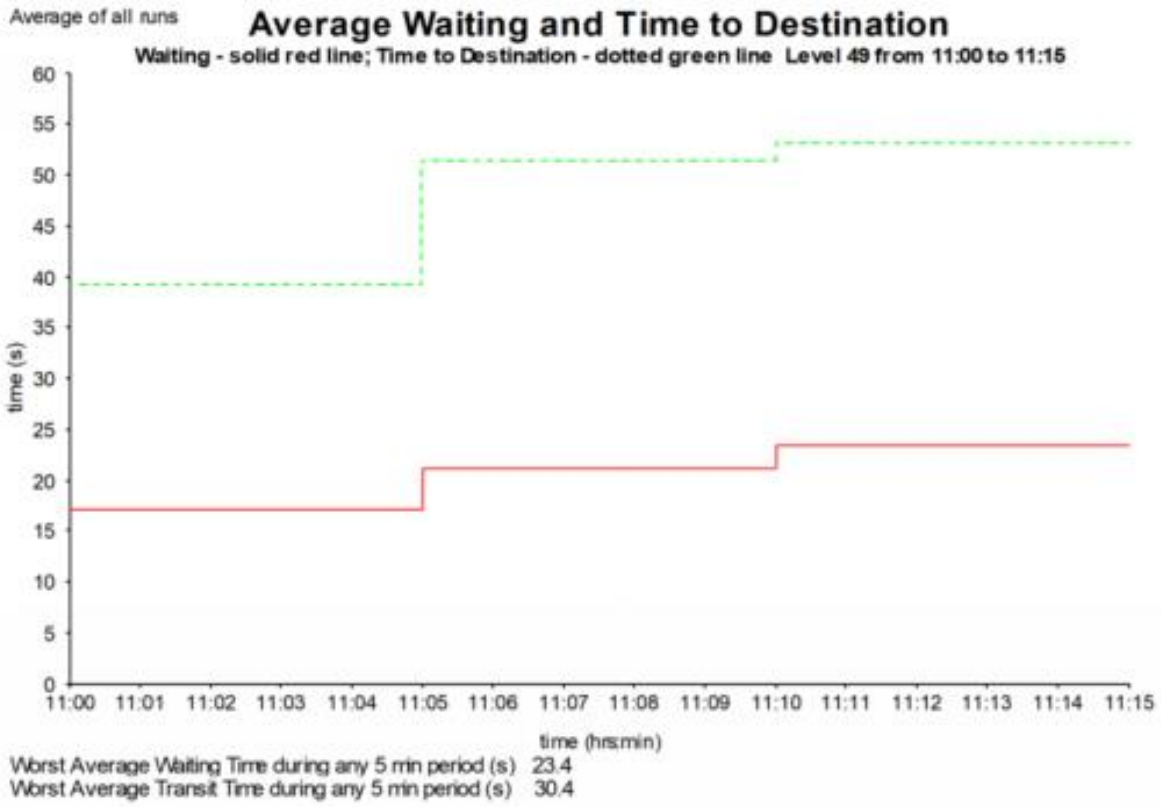
Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 47 from 11:00 to 11:15

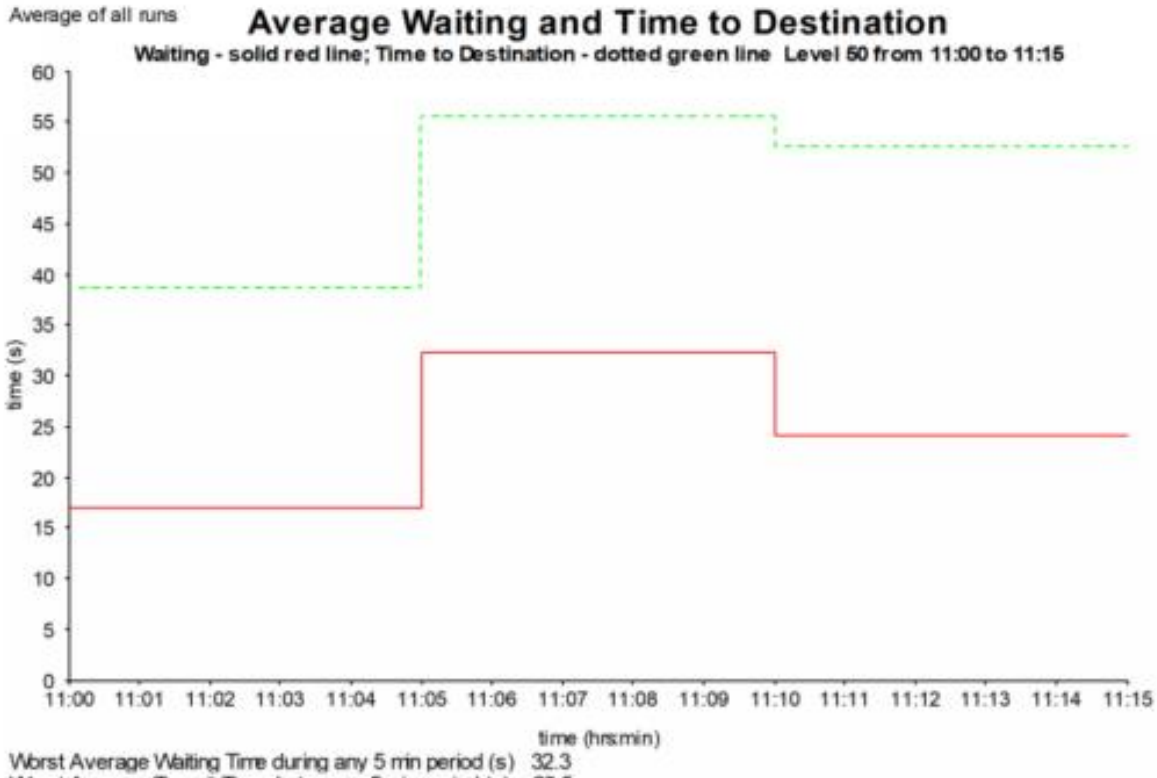
Worst Average Waiting Time during any 5 min period (s) 32.5
Worst Average Transit Time during any 5 min period (s) 27.0



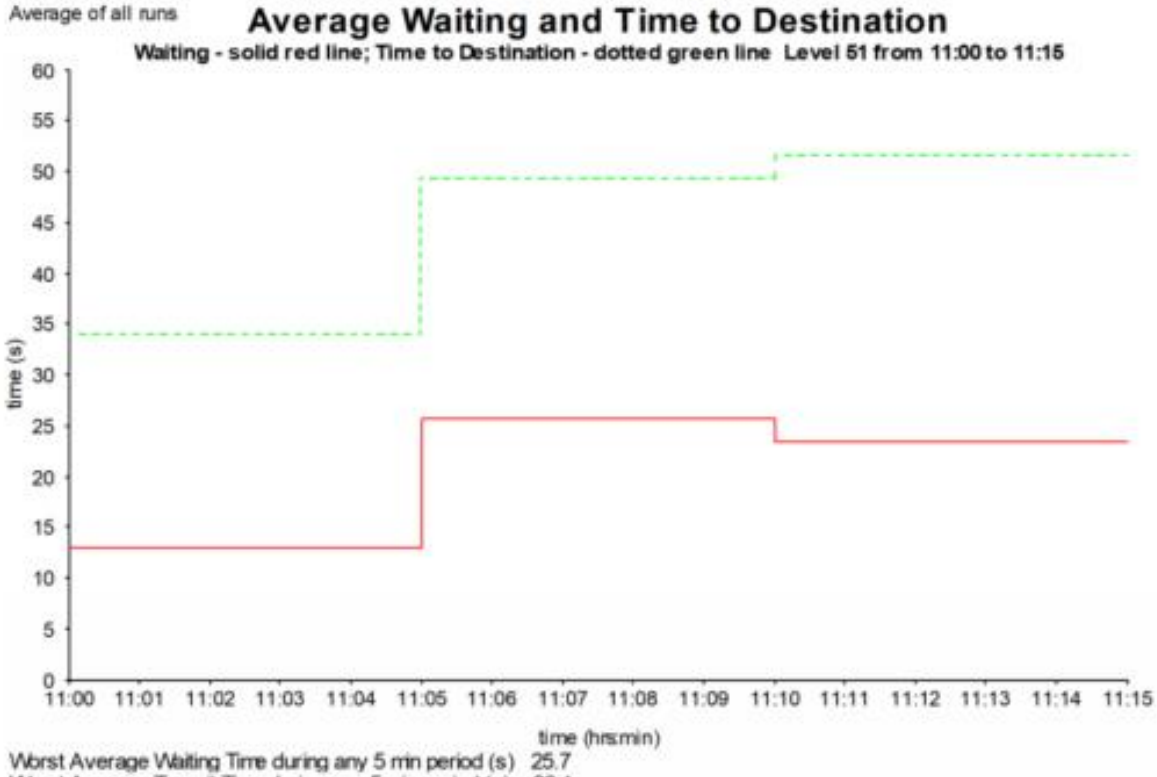
Worst Average Waiting Time during any 5 min period (s) 27.7
Worst Average Transit Time during any 5 min period (s) 24.2



Worst Average Waiting Time during any 5 min period (s) 23.4
Worst Average Transit Time during any 5 min period (s) 30.4



Worst Average Waiting Time during any 5 min period (s) 32.3
Worst Average Transit Time during any 5 min period (s) 28.5

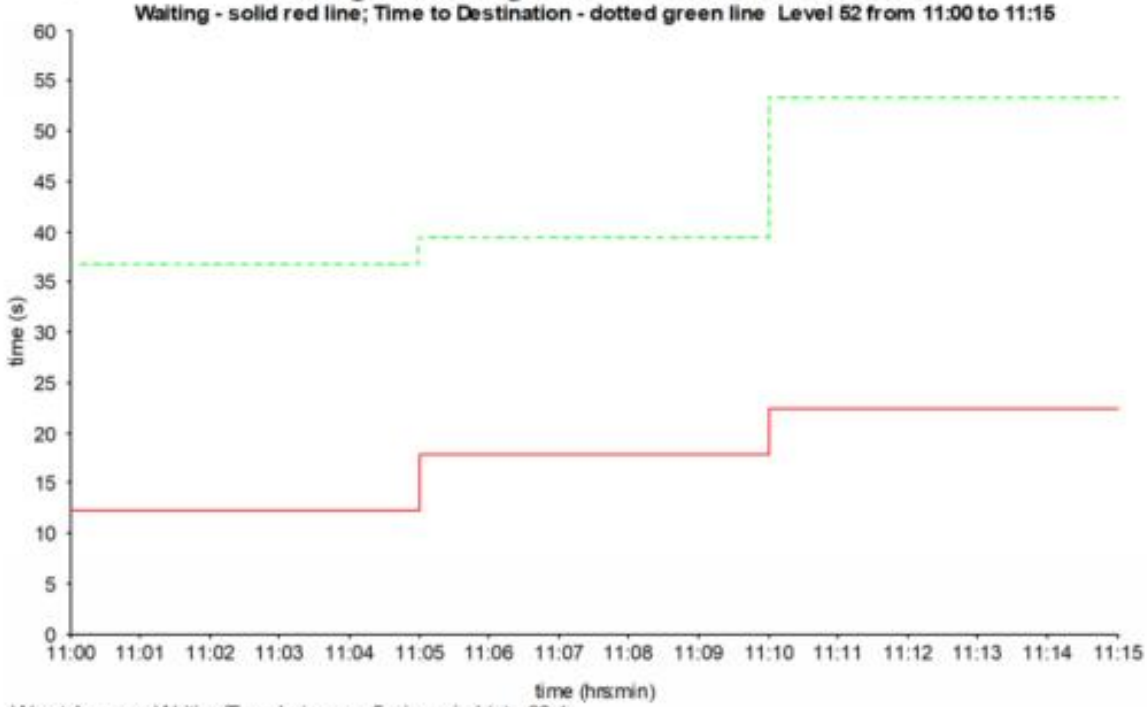


Worst Average Waiting Time during any 5 min period (s) 25.7
Worst Average Transit Time during any 5 min period (s) 28.1

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 52 from 11:00 to 11:15



Worst Average Waiting Time during any 5 min period (s) 22.4
Worst Average Transit Time during any 5 min period (s) 30.8

Average of all runs

Average Waiting and Time to Destination

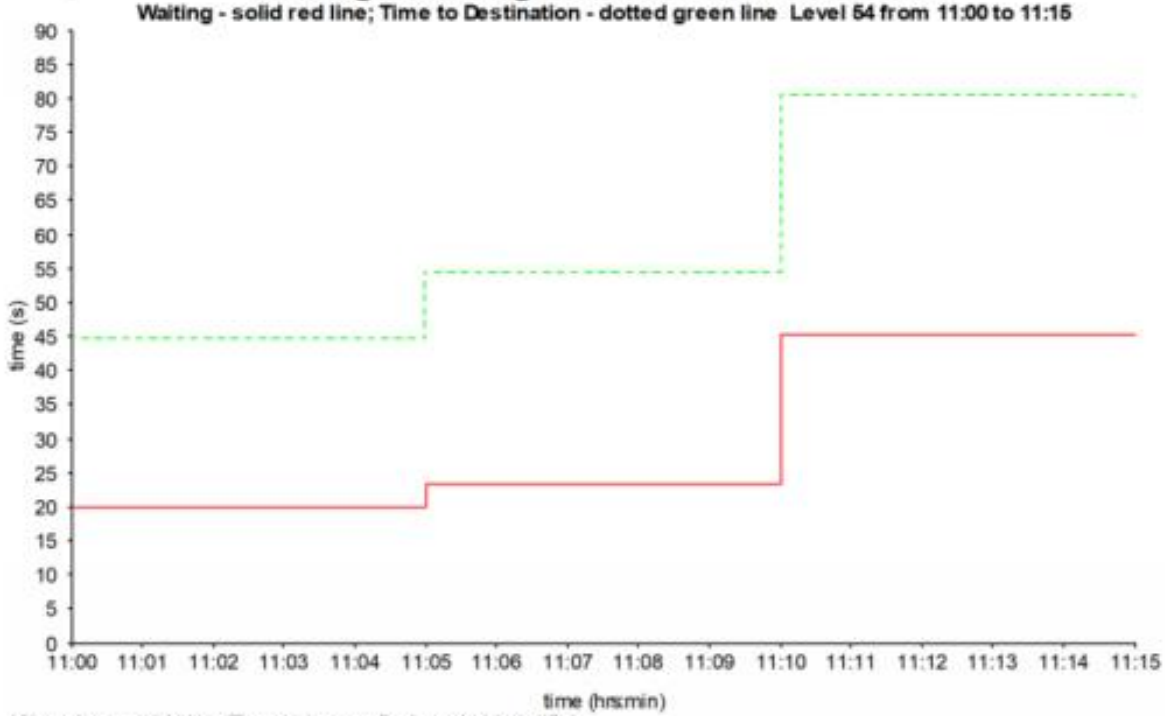
Waiting - solid red line; Time to Destination - dotted green line Level 53 from 11:00 to 11:15

Worst Average Waiting Time during any 5 min period (s) 23.1
Worst Average Transit Time during any 5 min period (s) 30.5

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 54 from 11:00 to 11:15

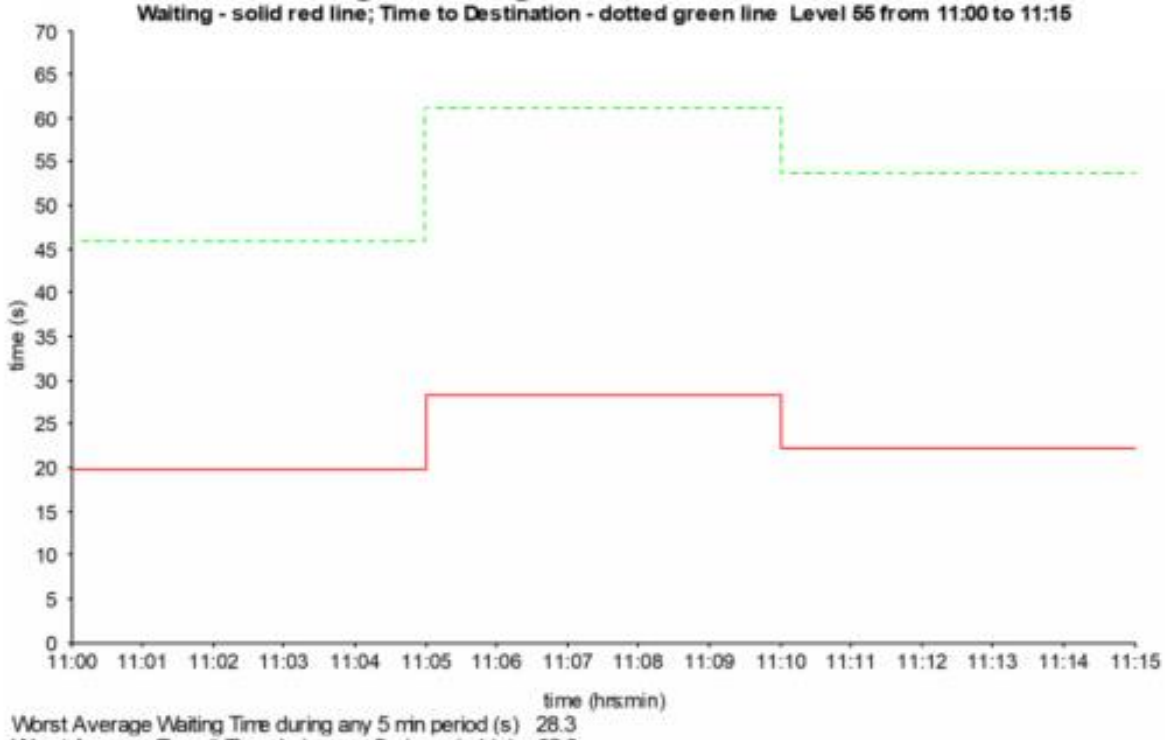


Worst Average Waiting Time during any 5 min period (s) 45.1
Worst Average Transit Time during any 5 min period (s) 35.0

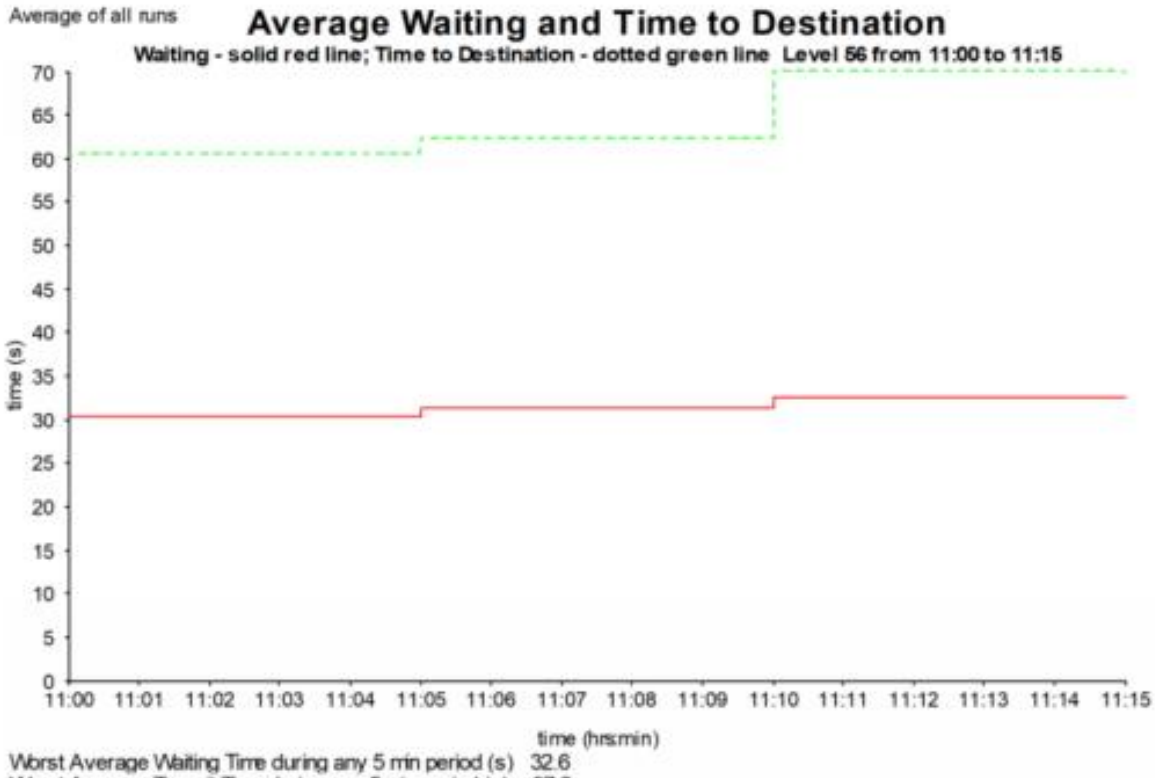
Average of all runs

Average Waiting and Time to Destination

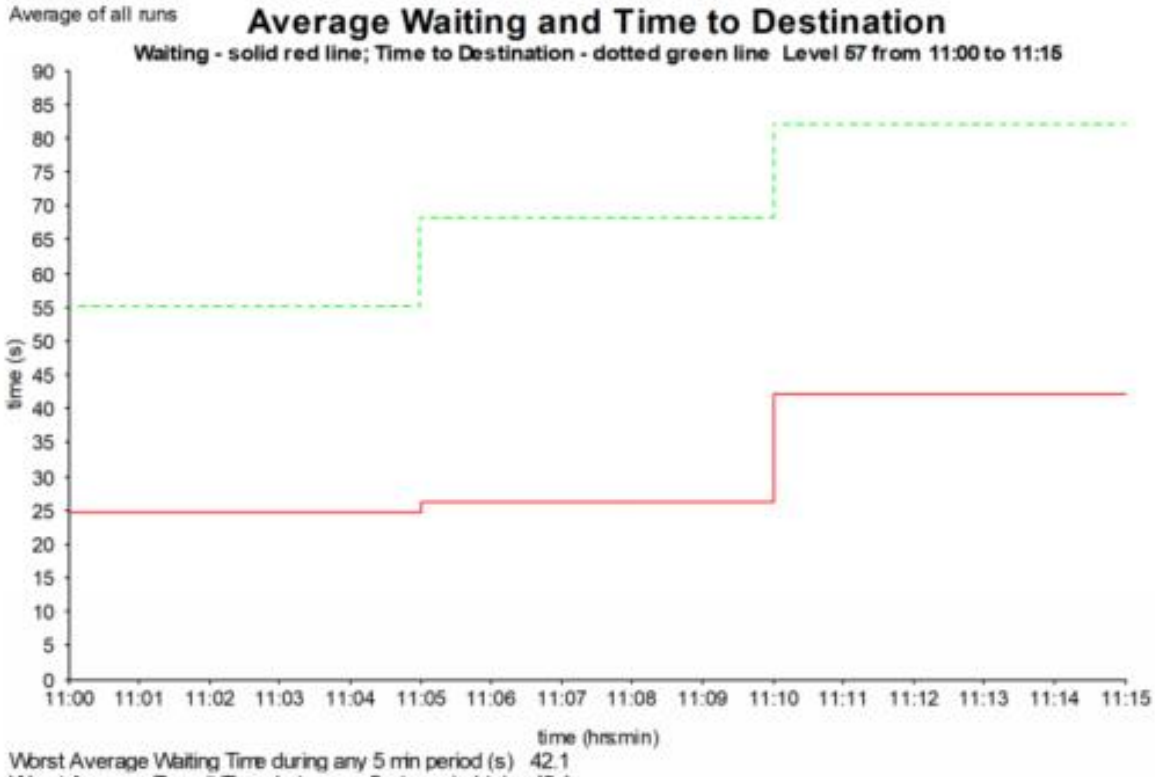
Waiting - solid red line; Time to Destination - dotted green line Level 55 from 11:00 to 11:15



Worst Average Waiting Time during any 5 min period (s) 28.3
Worst Average Transit Time during any 5 min period (s) 32.9



Worst Average Waiting Time during any 5 min period (s) 32.6
Worst Average Transit Time during any 5 min period (s) 37.2



Worst Average Waiting Time during any 5 min period (s) 42.1
Worst Average Transit Time during any 5 min period (s) 42.1

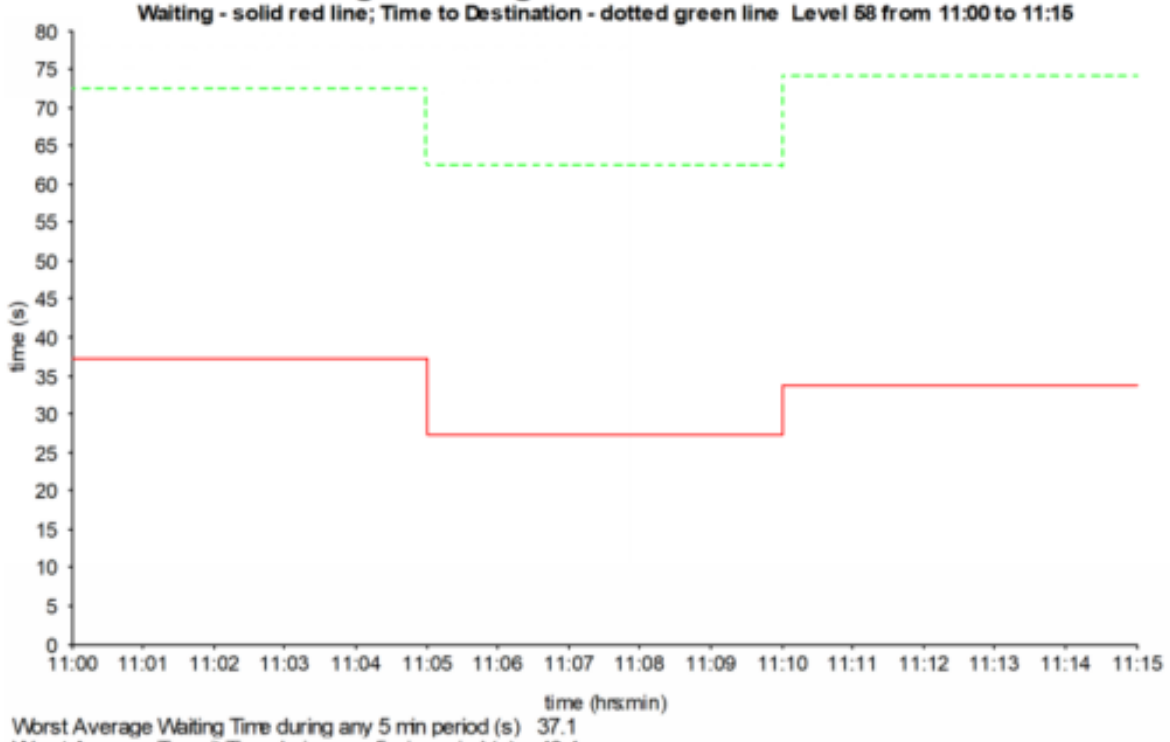
Page: 15 of 16
Job: FJMT
Job No:
Calculation Title: The Star New Tower
Made By: Ryan Singh
Check By: Matthew Revitt
File/Date: Hotel Apartment TWIN 170213 FJMT 20 Dec 2017 14:24:30

Elevate Version 8.24
WSP Australia Pty Ltd

Average of all runs

Average Waiting and Time to Destination

Waiting - solid red line; Time to Destination - dotted green line Level 58 from 11:00 to 11:15

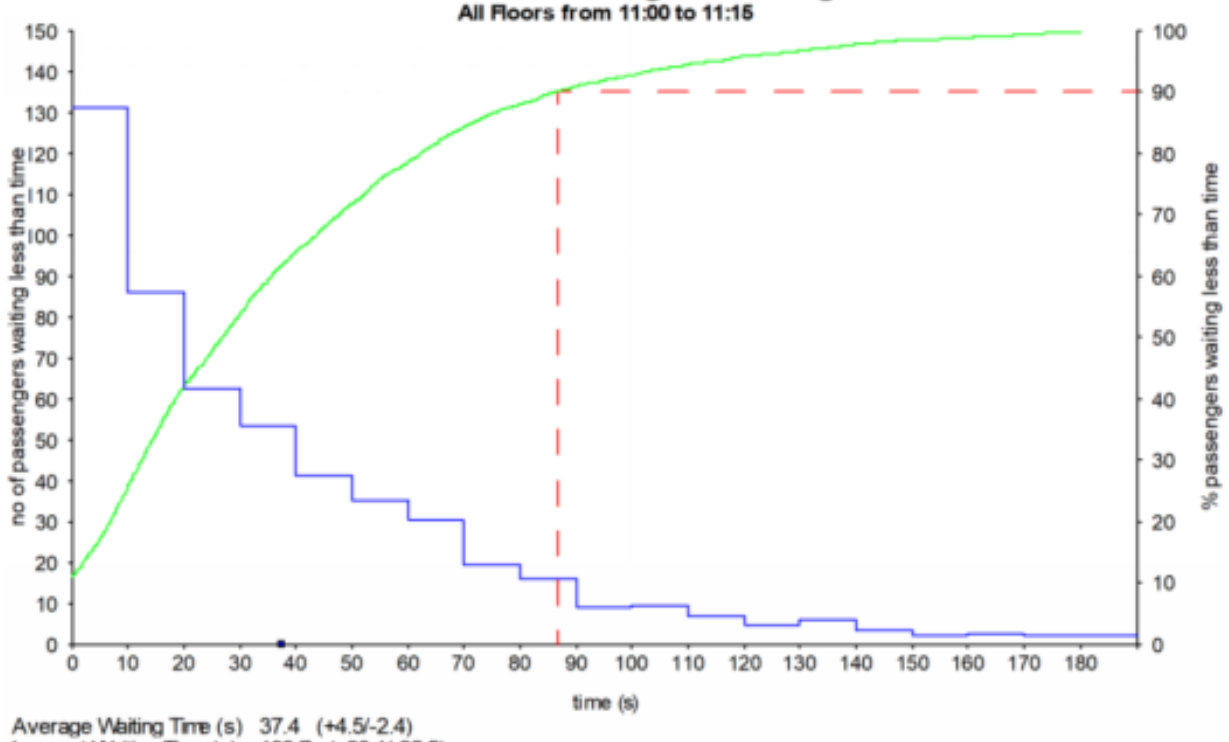


Worst Average Waiting Time during any 5 min period (s) 37.1
Worst Average Transit Time during any 5 min period (s) 40.4

Average of all runs

Distribution of Passenger Waiting Times

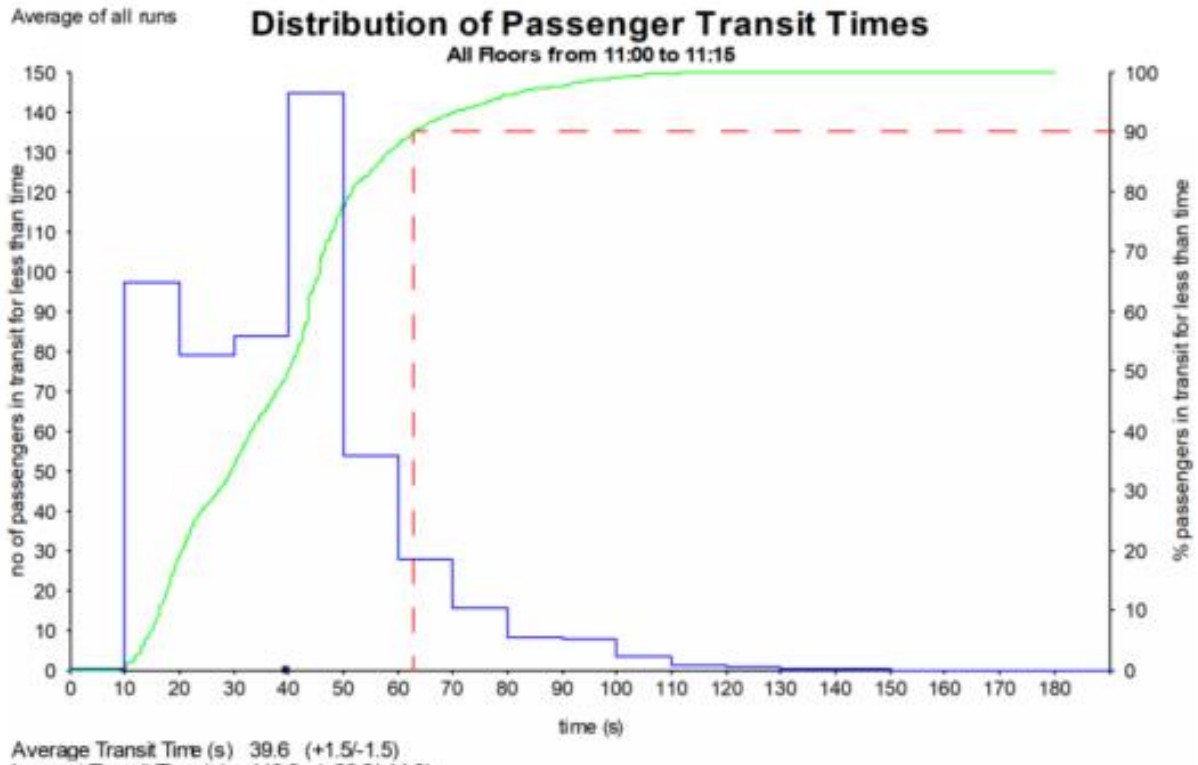
All Floors from 11:00 to 11:15



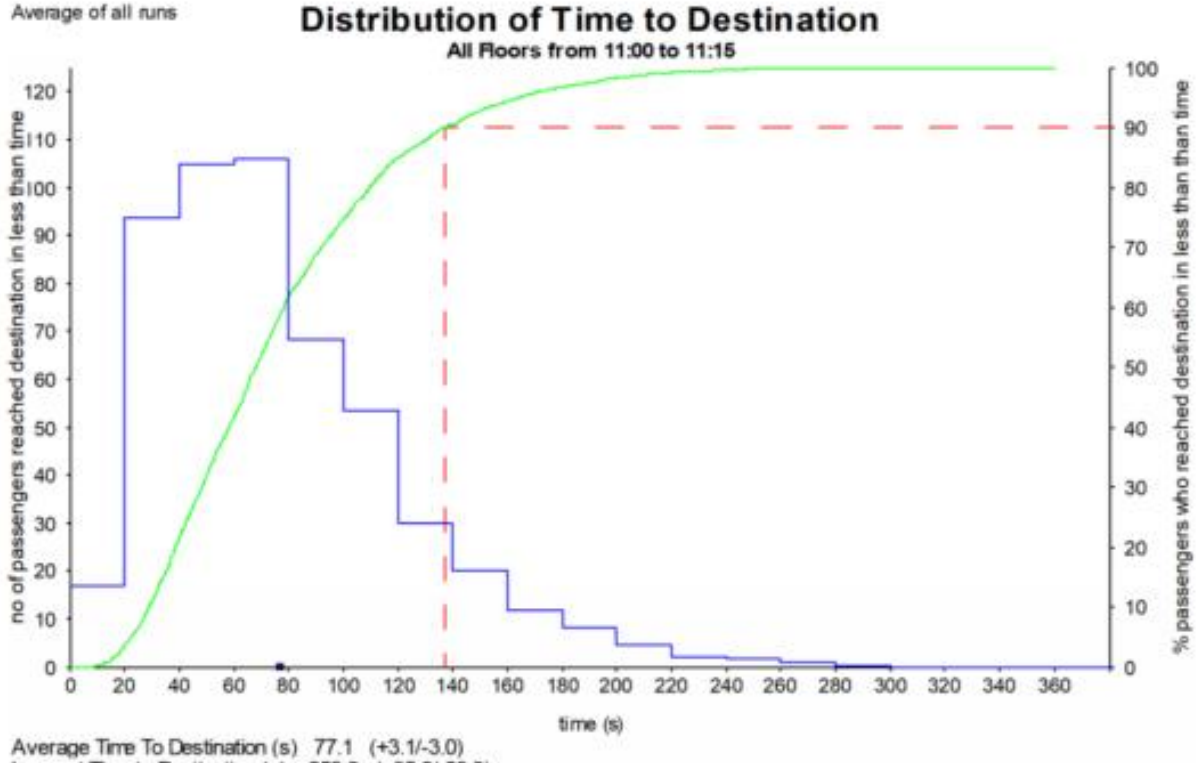
Average Waiting Time (s) 37.4 (+4.5/-2.4)
Longest Waiting Time (s) 198.7 (+26.1/-25.5)

Page:	16 of 16
Job:	FJMT
Job No:	
Calculation Title:	The Star New Tower
Made By:	Ryan Singh
Check By:	Matthew Revitt
File/Date:	Hotel Apartment TWIN 170213 FJMT 20 Dec 2017 14:24:30

Elevate Version 8.24
WSP Australia Pty Ltd



Average Transit Time (s) 39.6 (+1.5/-1.5)
Longest Transit Time (s) 119.9 (+23.2/-14.9)



Average Time To Destination (s) 77.1 (+3.1/-3.0)
Longest Time to Destination (s) 259.8 (+35.3/-20.3)

5.6 LIFT SCHEMATIC

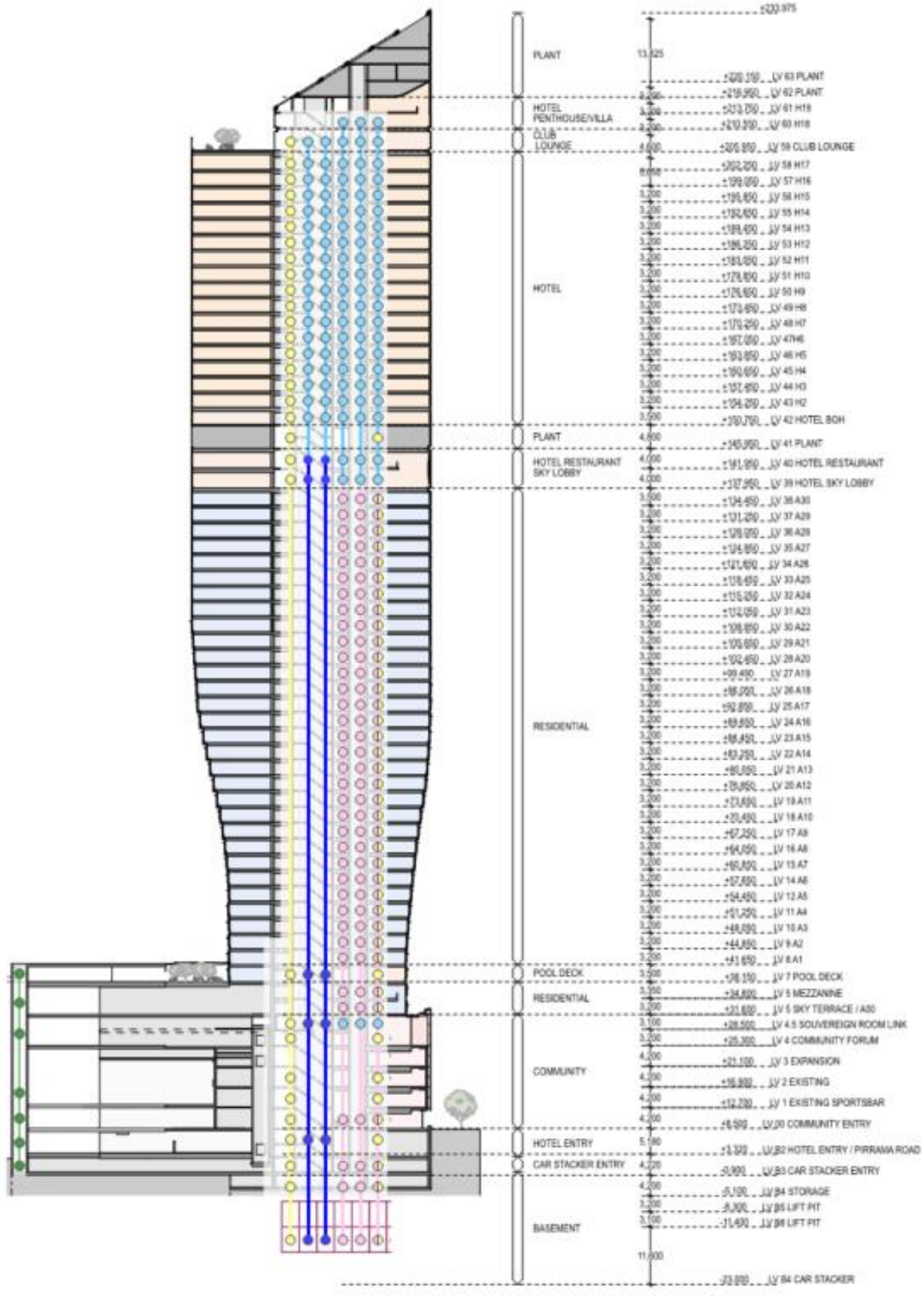


IMAGE 5.6 LIFT SCHEMATIC

THE STAR

CONCLUSION

6 CONCLUSION

The Vertical Transportation design for this tower is as unique as the look of the tower within the local skyline. The use of the proprietary TWIN Elevator, has allowed the building's core to be minimized, while also adequately serving all the different zones of the building. The Vertical Transportation design has been a critical element in enabling the tower to have the form that it currently has.

The flexibility of the TWIN Elevator system can allow the direct access to lower levels, from the Hotel and vice versa. Having shuttle lifts within the same shafts as the hotel guest lifts has minimized the lobby space on the Sky Lobby and maximized the usable area at that level. At the same time, residents on the apartment levels will be able to seamlessly use the lifts to access their desired levels.

The vertical transportation provisions within the Modification 13 works are standalone and will not impact any Modification 14 works taking place. They will also have no impact on the other proposed modification works pertaining to the rest of Modification 13. Modifications 1 through to 12 are also not impacted by the vertical transportation works within this modification or the whole site.

The design aligns with SEGL's goal of achieving the highest standard of built form outcomes for The Star by encouraging innovation and best practice approaches in order to achieve an environmentally sustainable development that positively contributes to the overall architecture of both Pyrmont and the City of Sydney.

The lift system as well as being unique in design meets all of the relevant Australian standards and Guidelines including the National Construction Code Building Code of Australia 2016, NSW Statuary Regulations and the requirements of the NSW Work Cover Authority.