Toll Enterprise

Materials Handling System for the Sydney Fashion Distribution Centre

System Specification

34 Yarrunga Street, Prestons, NSW

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A	2016-12-19	DBo	All	Release for customer review

Referenced Documents

Ref	Document Reference	Rev	Source	Document Name
1.	S16953	20150610	Dematic	Contract / Proposal
2.	1609 Toll Enterprise FDS	①	DAI	Functional Design Specification (FDS)
3.	1609 Toll Enterprise HIS	①	DAI	WMS / WCS Interface Specification
4.	P06418_SE_HS	A	Dematic	Computer Hardware & Network Requirements
5.	P06418_SE_BS	②	Dematic	Barcode Label Specification
6.	P06418_CE_FS1	②	Dematic	Conveyor Controls Functional Specification
7.	P06418_CE_FS2	②	Dematic	DirectorView Functional Specification
8.	P06418L001	E	Dematic	Facility Layout drawing (Ground Floor)
9.	P06418L002	D	Dematic	Facility Layout drawing (Mezzanine Level)
10.	P06418L003	A	Dematic	Carton Dimensions & Licence Plate Location
11.	P06418L500	②	Dematic	Garment On Hanger (GOH) Layout drawing

① This reference document is currently under development and is in the process of being reviewed and approved by Toll.

② This reference document has yet to be developed, and will be available for review and approval at a later time.

Approvals

Dematic Approvals

Name   Richard Masters

Title   Project Director

Company   Dematic

Signature   _____

Date   _____

Customer Approvals

Name   Leon Land

Title   Project Manager

Company   Toll

Signature   _____

Date   _____

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1   Introduction

The diagram below shows the various steps involved with taking a customer's requirements and producing a system that fulfils them. Each step in the process is targeted at a different group within the system implementation.

Figure 1   Systems Integration
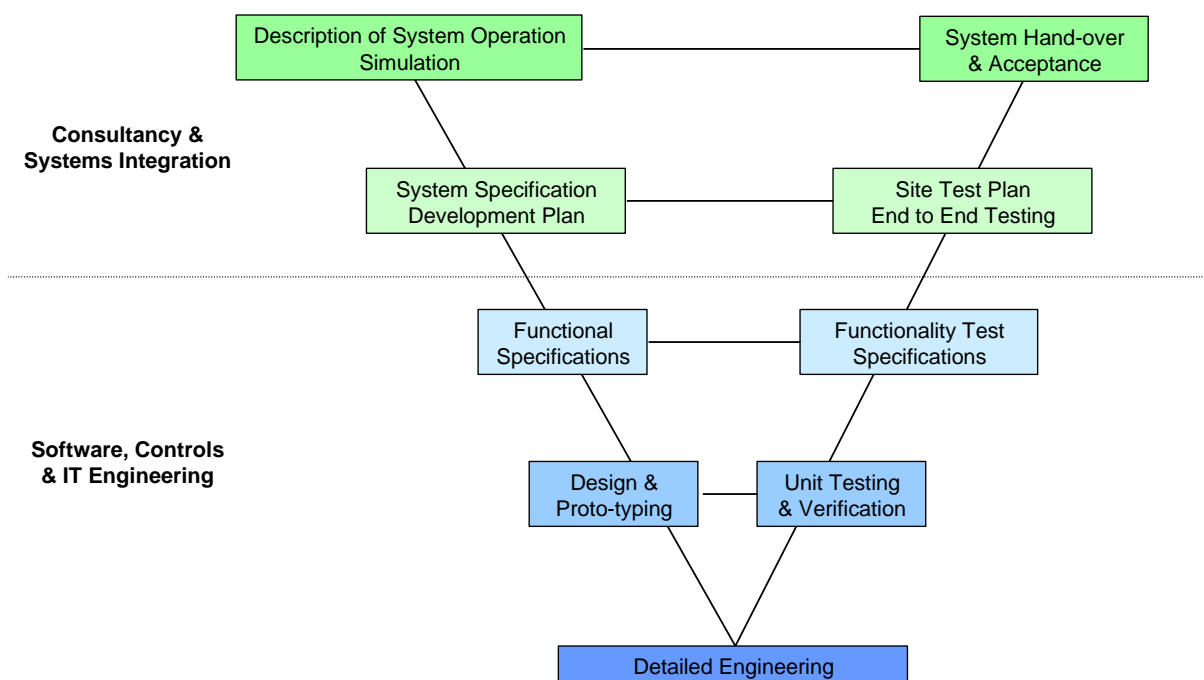
Through the adoption of this system engineering process Business requirements are captured within the Description of System Operation, these requirements are then documented and uniquely defined in the System Specification. The Sub-system or functional specifications then ensure the elements of the system combine to fulfil these specific requirements.

The system specification is also the source document to map the required test strategy and quality gates as implemented through the Integration and System Test plans designed to evolve the system via a highly structured methodology into a fully functioning system. This is validated progressively through the use of simulator sensitivity analysis, test scripts and operationally modelled scenarios leading ultimately to a System Acceptance Test and live operational deployment.

1.1 Scope and Purpose

This document is the System Specification for the Materials Handling System for the Sydney Fashion Distribution Centre to be supplied by Dematic to Toll at 34 Yarrunga Street, Prestons, NSW.

This document identifies the Material Handling Equipment to be supplied by Dematic, as well as describing the overall structure of the Materials Handling System for the Sydney Fashion Distribution Centre and the manner in which its subsystems interact in order to provide an operational solution. The functional and operational specifications of these subsystems shall be covered in detail within the specifications listed as "Referenced Documents".

The System Specification does not discuss either the operation of the Toll Warehouse Management System (WMS), nor the associated operational procedures implemented within the facility. Notwithstanding, this System Specification summarizes the interaction between WMS and the Materials Handling System for the Sydney Fashion Distribution Centre.

The intention of the System Specification is to identify the Dematic scope of supply, which includes the identification of the subsystems that constitute the Dematic deliverables. The System Specification examines the interactions that occur between these subsystems and the relevant external entities in order to ensure that Dematic will provide an operational solution to Toll. The details of these interactions will be provided in the appropriate functional specifications and drawings.

1.2 Intended Readers

- Toll
    - Project Manager
    - Project Team
- Dematic
    - Project Director
    - Project Manager
    - Project Engineering Team
    - Installation and Commissioning Team
    - Service Department
- Digital Applications International
    - Project Manager
    - Project Engineering Team
    - Installation and Commissioning Team

1.3 Abbreviations and Definitions

Term or Expression	Meaning
AS	**A**ustralian **S**tandard
CCS	**C**onveyor **C**ontrol **S**ystem
DAI	**D**igital **A**pplications **I**nternational (i.e. WCS supplier)
DC	**D**istribution **C**entre
DirectorView	Dematic's Supervisory Control And Data Acquisition (SCADA) system
FIFO	**F**irst **I**n **F**irst **O**ut allocation principal
GTP	**G**oods **T**o **P**erson
Host	Toll's Warehouse Management System (WMS)
LAN	**L**ocal **A**rea **N**etwork
LOI	**L**ocal **O**perator **I**nterface
LPA	**L**abel **P**rinter **A**pplicator
MHE	**M**aterials **H**andling **E**quipment
MHS	**M**aterials **H**andling **S**ystem
OMW	**O**perations **M**anagement **W**orkstation
P&D	**P**ick-and-**D**rop station
Partition	Subdivision of a Product Tote used to separate materials in a tray. Each partition has a unique storage address (i.e. Bin).
PC	**P**ersonal **C**omputer (Intel based)
PE	**P**roduct **E**xamination (see 'QA')
PLC	**P**rogrammable **L**ogic **C**ontroller
QA	**Q**uality **A**ssurance
Red Prairie	Toll's Warehouse Management System (WMS) … see Host
RF	**R**adio **F**requency
SKU	**S**tock **K**eeping **U**nit
SWAP	**S**can, **W**eight **a**nd **P**rofile
UL	**U**nit **L**oad – generic term for either a carton, tote or pallet
ULID	Unique **U**nit **L**oad **ID**entifier
WCS	**W**arehouse **C**ontrol **S**ystem
WMS	**W**arehouse **M**anagement **S**ystem (see Host)
WS	**W**ork **S**tation

2 Materials Handling Equipment

This section provides an overview of the Dematic scope of supply of the Materials Handling System for the Sydney Fashion Distribution Centre to Toll at 34 Yarrunga Street, Prestons, NSW.

The layout drawing P06418L001 outlines the building and identifies the placement of the static Materials Handling Equipment (MHE) within the facility. The building and its related services are supplied by others.

The static Materials Handling Equipment to be supplied by Dematic is itemised below. Details of the design and placement of the static Materials Handling Equipment are provided in the layout and mechanical drawings.

2.1 Customer Supply

2.1.1 Consumables

Toll is required to supply all consumables including, but not restricted to:

- Automatic Document Inserter
  - ink / toner cartridges
  - paper stock (for VAS printing)
  - form stock (for Returns printing)
- Label Printer Applicator
  - label stock and thermal transfer print ribbon, or
  - thermal sensitive label stock
- [Satchel] Packing Station
  - Auto Bagger
    - thermal transfer print ribbon
    - satchel [rolls] (of appropriate size)
  - Label Printer
    - label stock and thermal transfer print ribbon, or
    - thermal sensitive label stock
  - Desktop Printer
    - ink / toner cartridges
    - paper stock (for VAS printing)

- o   form stock (for Returns printing)
- ● Order Carton
  - ■ blanks (of each size)
  - ■ lids
  - ■ sealing glue
- ● Report Printer
  - ■ label stock
  - ■ ink / toner cartridges
- ● Pre-printed labels for the following Licence Plates (LPs)
  - ■ Receiving Case
  - ■ GOH Trolley
  - ■ Receiving Indent
  - ■ Putaway Storage Pallet
  - ■ Replenishment [to pickface]
  - ■ Picking Trolley
  - ■ Picking operation
  - ■ Despatch
    - o Ipec Priority Satchels cage
    - o Auspost Satchels cage
    - o Seko Satchels cage
    - o Despatch Pallet (i.e. loading parent)

2.1.2   Location Identification

Toll is responsible for the design, placement, supply and mounting of all location labels within the facility at 34 Yarrunga Street, Prestons, NSW.

The content and presentation of location labels that relate to the operation of the Materials Handling System for the Sydney Fashion Distribution Centre include, but are not restricted to:

- ● Hanging Garments Double Level Rail locations;
- ● Hanging Garments Single Level Rail locations;
- ● Hanging Garment Trolley Bins;
- ● Narrow Aisle Carton Storage locations;
- ● Narrow Aisle Pallet Racking locations;
- ● Wide Aisle Carton Storage locations;

- Wide Aisle Pallet Racking locations; and

- Pick & Drop (P&D) station locations.

NOTE : The above mentioned locations are the locations used by Warehouse Control System to transfer stock / pallets throughout the Materials Handling System for the Sydney Fashion Distribution Centre.

In consultation with Toll, the location labels that are applicable to the domain of the Warehouse Control System are identified in the Barcode Label Specification (see reference document 5).

2.1.3   Miscellaneous

Other items that are outside the scope of supply for Dematic include, but are not restricted to, the following:

- Any Wheeled Equipment such as Turret Trucks, Powered Pallet Movers (PPMs), High Level Order Pickers (HLOPs) etc, or guides such as rails or wires required for any wheeled equipment

- ARMCO Barriers (other than the ~110 m of Forklift Barrier Guarding within the scope of supply for Dematic).

- BCA consultancy

- Building design, works, interface, services including but not limited to fire protection, sprinklers, air-conditioning, lighting, etc.

- Certification of weight scale for "weight & measures"

- Coloured marking for pallet positions

- Fencing off/Separating work areas required for Dematic to install the equipment from the areas used for operation. No cost for material (such as barriers or temporary fencing) or labour has been allowed

- Local Authority Approvals

- Packing/Controls benches (other than those listed in Section 2.2.16)

- Safety equipment such as fencing, bollards, safety barriers (other than show on the layout drawings)

- Servers, client PC workstations (including operating system, 3rd party software licences, bar code scanners). Dematic will assist in the specification of the computer hardware and software.

- Spare parts

- Trash compactor(s) / trash management

- Uninterruptible Power Supply (UPS)

2.1.4   Networking

Toll is responsible for complying with the network requirements for the operation of the Materials Handling System for the Sydney Fashion Distribution Centre specified in the Hardware and Network Requirements (see reference document 4). This responsibility includes the supply of, but not being restricted to:

- Switches, cabling, routers, interconnecting data cables, communication patch cords, etc.
- Network isolation / segregation design and implementation
- Wireless network design and implementation
- Radio frequency equipment

2.1.5   Unit Loads

The Materials Handling System for the Sydney Fashion Distribution Centre is designed to transport rigid cuboidal Full-Case Cartons in accordance with the characteristics given below.

Any other types of product or product packaging will need to be specified and tested before confirming its suitability to be handled by the Materials Handling System for the Sydney Fashion Distribution Centre.

2.1.5.1   Full-Case Carton

The applicability of these Full-Case Cartons to the Materials Handling System for the Sydney Fashion Distrbution Centre is restricted to the manual load-on conveyor associated with the Despatch Sorter (see Section 2.2.5.4) which can handle cartons within the following range.

Table 1   Full-Case Carton Conveying Specification

	Length	Width	Height	Weight	Comment
Maximum	580 mm	380 mm	365 mm	16 kg	
Minimum	380 mm	280 mm	300 mm	1 kg	

Manually loaded cartons are to have despatch labels manually applied to the top of the carton. These labels are to be located in compliance with the Barcode Label Specification (see reference document 5).

2.1.5.2   Order Carton
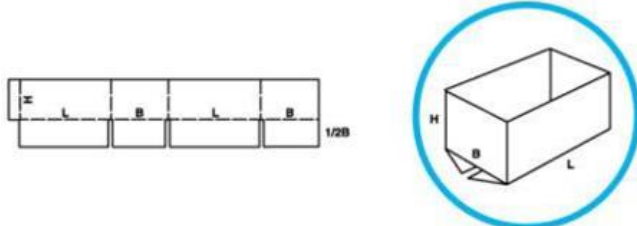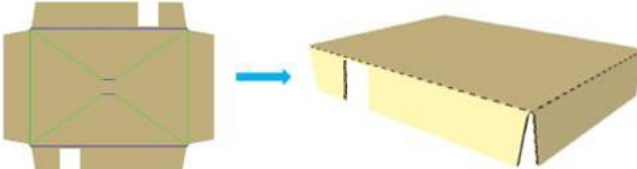
The Order Cartons are to be constructed by Carton Erectors (see Section 2.2.2). Toll is responsible for the supply of Carton blanks and Lid blanks (see Section 2.2.3) as follows:

Table 2   Order Carton Characteristics

Type	Length (L)	Width (W)	Height (H)	Weight
Large	580 mm	380 mm	365 mm	16 kg (max.)
Medium	490 mm	360 mm	365 mm	16 kg (max.)
Small ①	300 mm	200 mm	200 mm	16 kg (max.)

①   Small Order Cartons may be erected manually at a Packing Station and conveyed on the satchel takeaway conveyor system. These small Order Cartons will not be uniquely identified by a Licence Plate (LP) but may be identified by a Despatch Label.

Table 3   Large/Medium Order Carton Design Specification

Parameter	Value	Qualifier
Design	FEFCO 0200 (half slotted carton with no flaps on top)	
Lid ①	Glued Flap	

①   The cut-out within the lid design is to ensure that the Order Carton Licence Plate barcode is not obscured once the lid is glued in place.

Each Large/Medium Order Carton is required to be uniquely identified by barcodes contained within labels affixed to the Order Carton. The labels are affixed to each carton by Label Printer Applicators (see Section 2.2.10). The conveying system includes barcode scanners that identify and route each carton to its specific destinations on the Materials Handling System for the Sydney Fashion Distribution Centre. The placement of labels on Order Cartons, including the relationship of the above mentioned cut-out in the lid with the Order Carton Licence Plate, is illustrated in Figure 2. The characteristics of these barcodes and labels, and their placement on the Order Carton, is are given in the Barcode Label Specification (see Reference Document 5).

Figure 2   Order Cartons
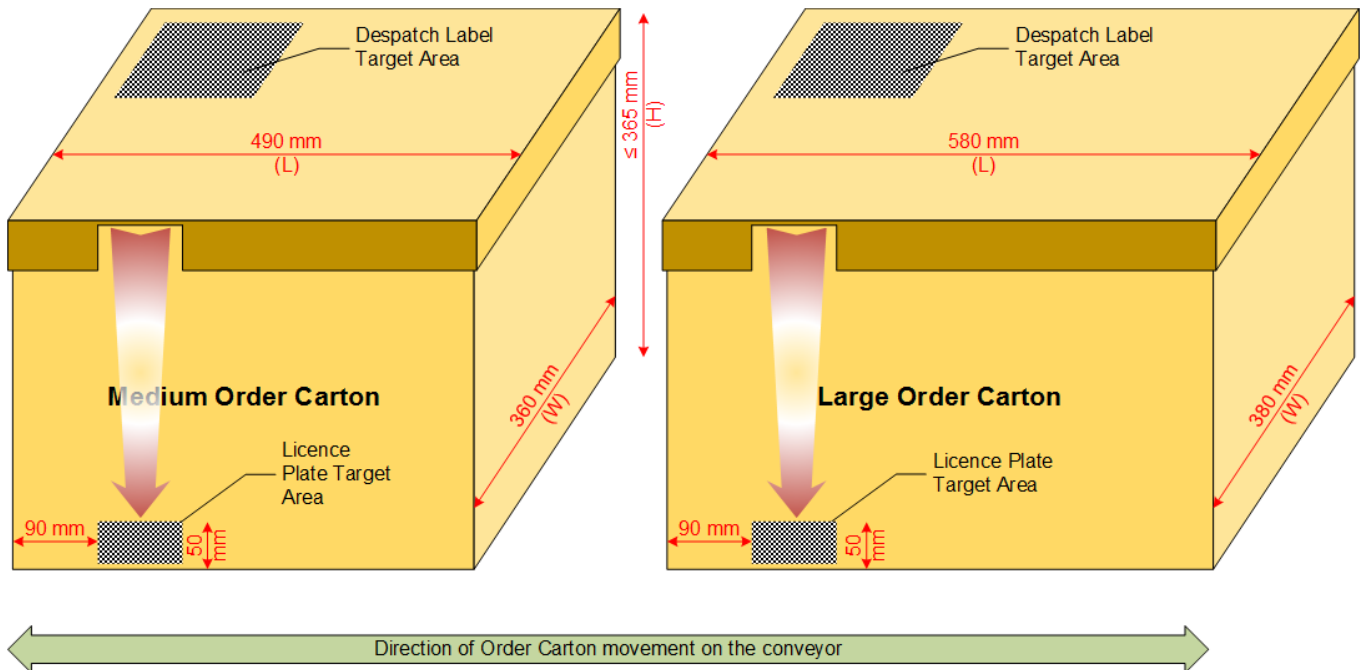
The conveying system is designed based on the following criteria:

- A maximum moving load of 20 kgs per metre over the full length of the conveyor

- Accumulation conveyors are designed to give satisfactory operation for a minimum load of 0.5 kg.

- All Order Cartons are to be handled with the Length (i.e. longest dimension) parallel to the direction of travel and the Height (i.e. shortest dimension) perpendicular to the conveying surface.

- The Order Cartons must be in a condition to permit proper handling, such as conveyor loading, transportation on conveyors, sorter loading and offloading.

- The surface of the Order Cartons must be dry, flat, and free of distortions and contaminants, have a sufficient friction surface to allow conveyability, be firm and of sufficient strength to support its own weight when supported on rollers at 76mm centres.

- All Order Cartons to be free of loose flaps, strings, cords or loose stretch wrap materials or any other material which would be reflective and cause problems to any optical sensors.

- Contents of Order Cartons must be stable and have their centre of gravity within the centre 1/3 of the base of the container.

- No product overhang.
  Performance may be hampered if product overhangs the Order Carton.

- Angles of all incline/decline conveyors are designed to a maximum 18°. All Order Cartons must be stable and the bottom surface must permit handling at this angle.

- The Order Cartons should be loaded to maintain the centre of gravity reasonably central and the load equally distributed. The load must not be subject to shifting.

NOTE: The height of the centre of gravity has to be lower than the height of the geometric centre of all product conveyed on the Materials Handling System for the Sydney Fashion Distribution Centre.
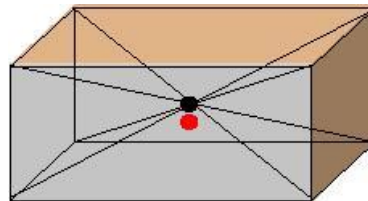
- Geometric centre (black ball)

- Gravity centre (red ball)

2.1.5.3 Pallet

Pallet loads to be handled by the Materials Handling System for the Sydney Fashion Distribution Centre, are to be compliant with the details shown below.

Table 4   Pallet Load Parameters

Aspect	Parameter	Value
Pallet Base	Dimensions	Australian Pallet Standard AS 4068 – 1993
	Length / Width	1165 mm ± 10 mm
	Height	150 mm (max.)
	Runner Width	865 mm ± 10 mm
	Tunnel Width	215 mm (min.)
	Tunnel Height	30 mm (max.)
	Load Deflection	15 mm (max.)
Load (max.)	Weight … including base	1000 kg (1.2m pallet) 750kg (0.9m pallet)
	Length / Width	1170 mm
	Height… including base	1200 mm (1.2m pallet) 900 mm (0.9m pallet)
	Overhang	0 mm

NOTE: Dematic is not responsible for operational limitations created by Pallets whose height exceeds 1200 mm.

Figure 3   Australian Standard Pallet Dimensions
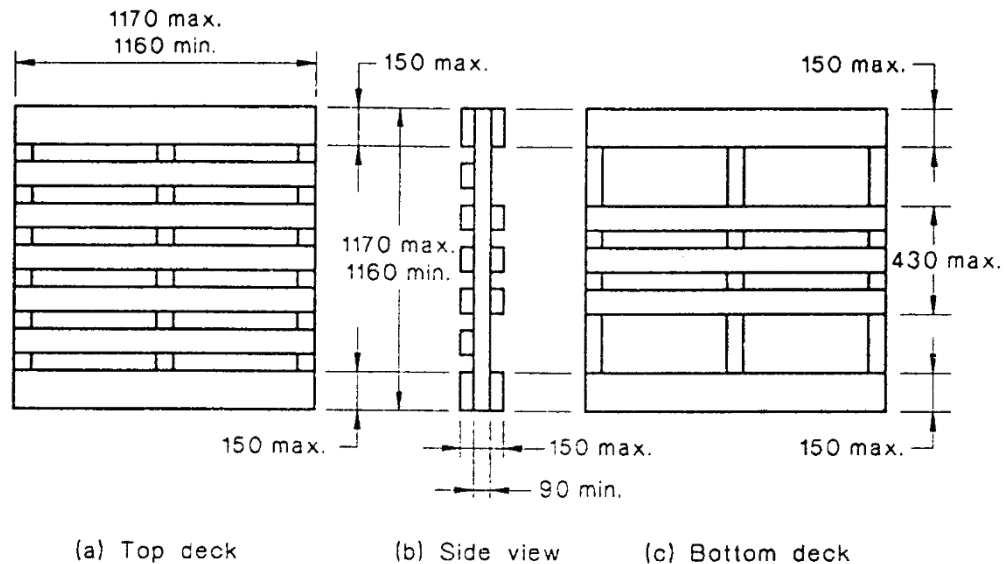
NOTE: Cross-sections of deck boards are as follows:
(a) Top and bottom intermediate boards .... 95 min. width × 22 min. thick.
(b) Top and bottom entry boards .... 150 max. width × 22 min. thick.

DIMENSIONS IN MILLIMETRES

Each Pallet load is to be of minimum quality as follows:

- The Pallet is to be of sound construction, capable of supporting its self weight (Pallet and product) when supported on the edges of the Pallet.

- The Pallet must not have any boards, bearers or other components loose or missing from their construction.

- The Pallet must not have any protruding nails or other fixing hardware such as screws.

- Independent of the thickness, the boards are able to handle the maximum load when stored on selective racking.

- There is not to be any significant product overhang or protrusions such as loose nails, binding materials or loose boards. Performance may be hampered if product overhangs the Pallets such that product from one Pallet interferes with materials handling equipment or other Pallets.

- The maximum Pallet height including the actual pallet is 1200 mm. Due to the building constraints there are limitations to the maximum height of various Pallet positions within the racking, in particular for the top level Pallet positions toward the south of the building.

- The maximum weight of a Pallet including the actual pallet is 1000 kg. This includes the Pallet weight specification for the single deep racking areas.

● Bottom runner boards can be recessed up to 8 mm from the edge of the bearer boards and therefore cannot be relied upon to align the pallets.

2.1.6   Workstations and Peripherals

Toll is responsible for supplying the computer and peripheral hardware specified in the System Hardware Specification (see Reference Document 4).

The placement of Workstations and Peripherals within the facility are summarised below.

Table 5   Workstations and Peripherals Placement

Location	Equipment ①								Comment
	DV	LOI	LP	MIS	OMW	RP	UPS	WCS	
Control Room	3				1	1			
Decant Station		16							one LOI per station
Operations Room	1				1	1			
Full-Case Pick		1	1						e.g. Indent
Full-Pallet Pick		1	1						
Packing Station		18	6 ②			18			one LOI / RP per station one LP per manual station
Picking Trolley		1	1 ?						mobile operation per trolley
Put Station		24							one LOI per station
QA Station					4				one OMW per station
Server Room ③				1			1	2	
Other	5				tbc	tbc			

①   Equipment mnemonics are as follows:

DV := DirectorView Server / Client

LOI := Local Operator Interface

LP := Label Printer

MIS := Management Information System Server

OMW := Operations Management Workstation

RP := Report Printer

UPS := Uninterruptible Power Supply

WCS := Warehouse Control System Server

②   These printers are located at those Packing Stations that are not fitted with an Auto Bagger.

③   It is expected that the Server Room will be a secure location that restricts physical access to authorised personnel.

2.2   Dematic Supply

The layout drawing P06418L001 outlines the building and identifies the placement of the static Materials Handling Equipment (MHE) and the conveying systems on the Ground Floor within the facility.

The layout drawing P06418L002 outlines the building and identifies the placement of the static Materials Handling Equipment (MHE) and the conveying systems on the Mezzanine Level within the facility.

2.2.1   Boom Conveyor

Boom Conveyors will be supplied at two (2) areas of the facility.

The Boom Conveyors will be supplied with the following characteristics.

Table 6   Boom Conveyor Characteristics

Characteristic	Value / Quantity		Comment
	Inbound	Outbound	
Belt Width	600 mm		
Boom Conveyors	2	4	
Compressed Length	8000 mm		
Roller Shutter Doors (Docks Serviced) ①	7 .. 10 (4)		traversing boom conveyors with tile and uplift
		22 .. 25 (4)	fixed boom conveyors without tilt or uplift
Extended Length	23000 mm	22000 mm	

① The juxtaposition of each Roller Shutter Door (RSD) is shown in Figure 9.

2.2.2   Carton Erector

Three (3) Carton Erectors are supplied to construct Order Cartons as required by the Warehouse Control System. Each Carton Erector is capable of constructing two (2) carton size. These carton sizes which are the large and/or medium sizes stated in Section 2.1.5.2.

The required size of carton to be erected will be managed by the Warehouse Control System. Once erected, each Order Carton will be labelled with a unique Unit Load Identifier (see Section 2.2.12.1).

Any Order Carton that fails to be erected and labelled correctly will be rejected. The rejection of a carton requires the rejected carton, as well as those between the Carton Erector and the Label Printer Applicator, to be manually removed from the conveyor system.

2.2.3 Carton Height Reducing Lid Applicator

Three (3) Order Carton height reducing lid applicator machines will be supplied. Future allowance has been made to add a fourth height reducing lid applicator machine. Prior to the application of the lid, the void within the Order Carton will be minimised by detecting the fill level then external scoring-and-folding the vertical sides of the carton. The amount of reduction will be limited to ensure that the unique Order Carton Licence Plate (LP) barcode identifier is not obscured by the application of the lid. The lid incorporates a cut-out that will maintain the readability of the Order Carton LP identifier.

The Order Carton height reducing lid applicator machines will be supplied with the following characteristics.

Table 7　Carton Height Reducing Lid Applicator Characteristics

Characteristic	Value / Quantity ①		Comment
	Fixed	**Variable**	
Control	PLC		
Design	double action		
HMI	Touch Panel		
Lid affixing	Glue		
Lid stack height	75 cm		maximum height
Lid stack weight	30 kg		maximum weight
Magazines	2 ②	1 ③	
Throughput	1,350 tph		totes per hour across all machines

① One (1) 'fixed' machine will operate on large Order Cartons; One (1) 'fixed' machine will operate on medium Order Cartons; The 'variable' machine will operate on either large or medium Order Cartons, but will be supplied and commissioned to operate on large Order Cartons.

② One magazine will be populated with lids that will be applied to Click To Collect Order Cartons, whilst the other magazine will be populated with lids that will be applied to Store Order Cartons.

③ A manual change-over procedure will be defined for the purpose of re-configuring the 'variable' lid applicator in order to operate on the alternate Order Carton size.

2.2.4 Compressor & Associated Piping

The compressor and associated piping are supplied by Dematic. The pressure, condition and delivery rates for the compressed air supplying the conveying system are stipulated in the Conveyor Controls Functional Specification (see reference document 6).

2.2.5 Conveyor [Sub-]System

The Materials Handling System for the Sydney Fashion Distribution Centre contains a network of conveyors that interconnect all relevant points within the Automated Warehouse System.

All conveyors will be supplied with appropriate:

- Conveyor controls (e.g. photo-eyes, emergency stops etc.); and

- Conveyor safety signage

The following table lists the available routes for the transportation of Unit Loads within the Automated Warehouse System, where details of each Conveyor subsystem is provided in the following sub-sections.

Table 8   Reachable Conveyor Sub-systems

Conveyor Source	Conveyor Destination							Reference
	Inbound Boom	Order Carton	Order Finishing	Outbound	Packing	Product Tote	Garment On Hangar	
Inbound Boom								Section 2.2.5.1
Order Carton		✓	✓		✓			Section 2.2.5.2
Order Finishing			✓	✓				Section 2.2.5.3
Outbound				✓				Section 2.2.5.4
Packing		✓	✓		✓			Section 2.2.5.5
Product Tote		✓ ①				✓		Section 2.2.5.6
Garment On Hangar							✓	Section 2.2.17.1

①   Product Totes and Order Cartons are not transported on the same conveyors.
The intersection between these Unit Loads is restricted to the GTP Station operation.

2.2.5.1   Inbound Boom Conveyor

Inbound Boom Conveyors with the following characteristics will be supplied.

Table 9   Inbound Boom Conveyor Sub-System Characteristics

Characteristic	Quantity	Comment	Reference
Boom Conveyor	2	for container unloading	Section 2.2.1
Flexible Gravity Conveyor	2	for manual palletising	

Table 9   Inbound Boom Conveyor Sub-System Characteristics

Characteristic	Quantity	Comment	Reference
Peak Rate	1,000 cph	per unit	

2.2.5.2   Order Carton Conveyor

Order Carton Conveyors with the following equipment will be supplied.

Table 10   Order Carton Conveyor Sub-System Characteristics

Equipment	Quantity	Comment	Reference
Carton Erector	3	2 sizes per machine with large hoppers for glue storage	Section 2.2.2
Document Inserter	2	last carton documentation	Section 2.2.7
GOH Pick Station	1		
Label Print Applicator	6	unique identifier labelling	Section 2.2.12.1
Order Buffer	3		Section 2.2.17.2
QA Station	1	Order Carton QA	Section 2.2.15
RapidPick Station	24	Goods To Person (GTP)	Section 2.2.11

The layout for the Order Carton Conveyors and the associated conveyor system are shown in drawings P06418L110 and P06418L111. An overview of the Order Carton Conveyors is shown in Figure 4.

Figure 4   Order Carton Conveyor Overview

2.2.5.3   Order Finishing Conveyor

Order Finishing Conveyors with the following equipment will be supplied.

Table 11   Order Finishing Conveyor Sub-System Characteristics

Equipment	Quantity	Comment	Reference
Carton Lidder	3	carton optimisation, large hoppers for glue storage	Section 2.2.3
Document Inserter	1	last carton documentation	Section 2.2.7
Inline Weigh-Scale	1		Section 2.2.19
Label Print Applicator	2	Despatch label top apply	Section 2.2.12
	2	Information label top apply	
Packing Station	6	manual	Section 2.2.14
	12	Auto Bagging	
QA Station	1	Finishing QA	Section 2.2.15

The layout for the Order Finishing Conveyors and the associated conveyor system are shown in drawings P06418L120 and P06418L130. An overview of the Order Finishing Conveyors is shown in Figure 5.

Figure 5   Order Finishing Conveyor Overview

2.2.5.4   Outbound Conveyor

Outbound Boom Conveyors with the following equipment will be supplied.

Table 12   Outbound Conveyor Sub-System Characteristics

Equipment	Quantity	Comment	Reference
Boom Conveyor Lane	4	fixed	Section 2.2.1
Palletising Lane	5	manual operation	
Reject Lane	1	+ order consolidation	
Full-Case Carton Infeed	1		
SWAP station	1	①	
Despatch Buffer	1	12,844 locations	Section 2.2.17.2

①   A full Scan Weigh And Profile (SWAP) station was added as a result of variation VAR.06418-16 (refer to Appendix A).

The layout for the Outbound Boom Conveyors and the associated conveyor system are shown in drawing P06418L140. An overview of the Outbound Boom Conveyors is shown in Figure 5.

Figure 6   Outbound Boom Conveyor Overview
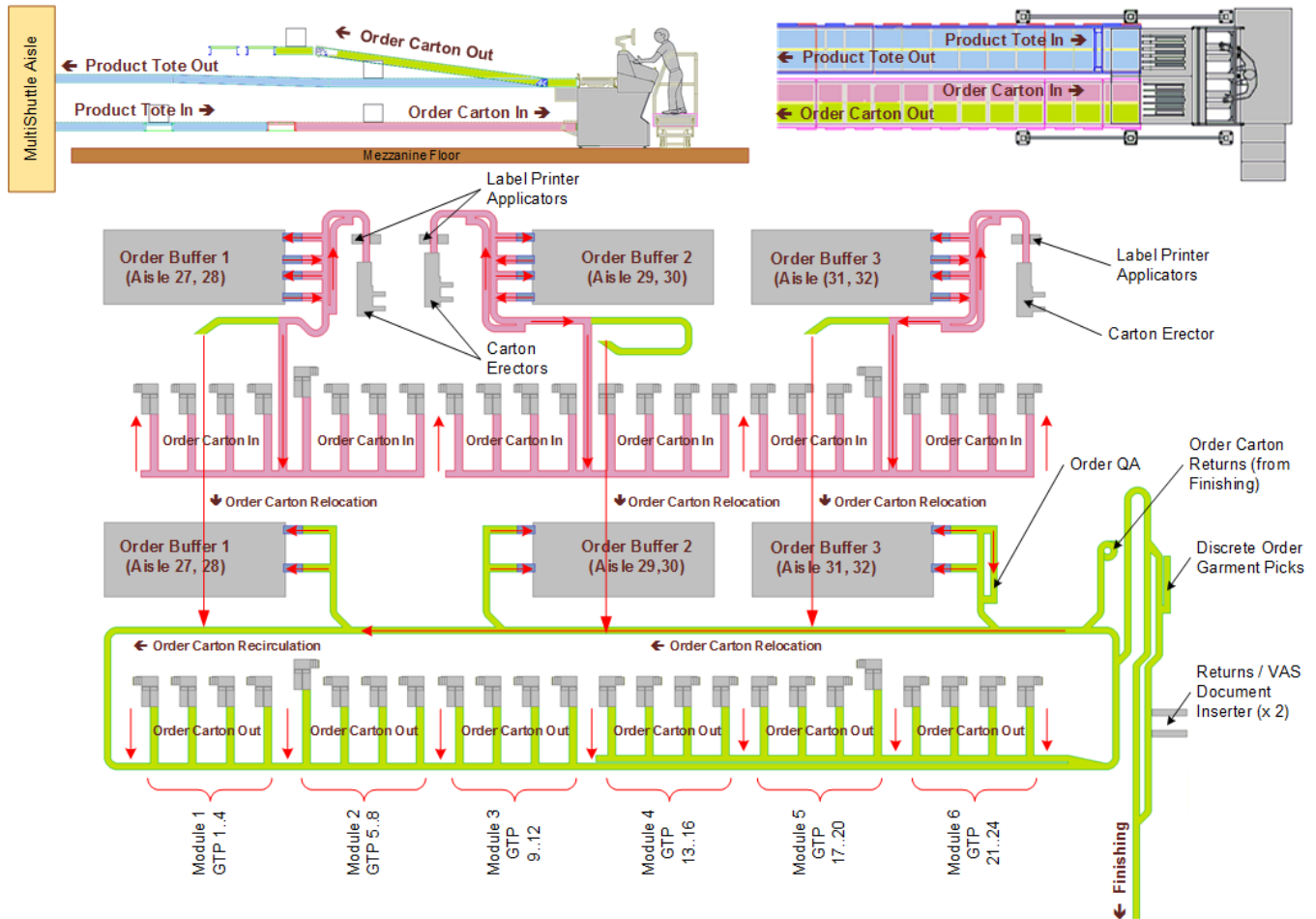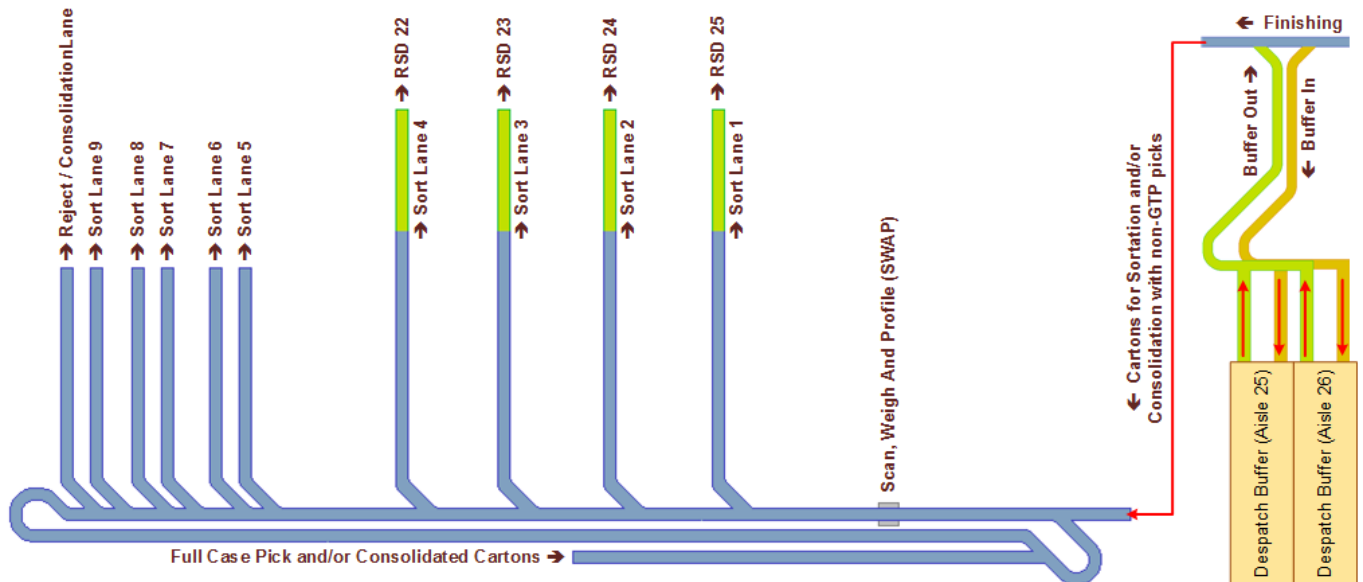

2.2.5.5   Packing Conveyor

Packing Conveyors with the following equipment will be supplied.

Table 13   Packing Conveyor Sub-System Characteristics

Equipment	Quantity	Comment	Reference
Automated Bagging	12	semi-automated	Section 2.2.14
Manual Bagging	6		
Satchel Sorting	1	manual operation	

The layout for the Packing Conveyors and the associated conveyor system are shown in drawing P06418L120. An overview of the Packing Conveyors is shown in Figure 7.

Figure 7   Packing Conveyors Overview
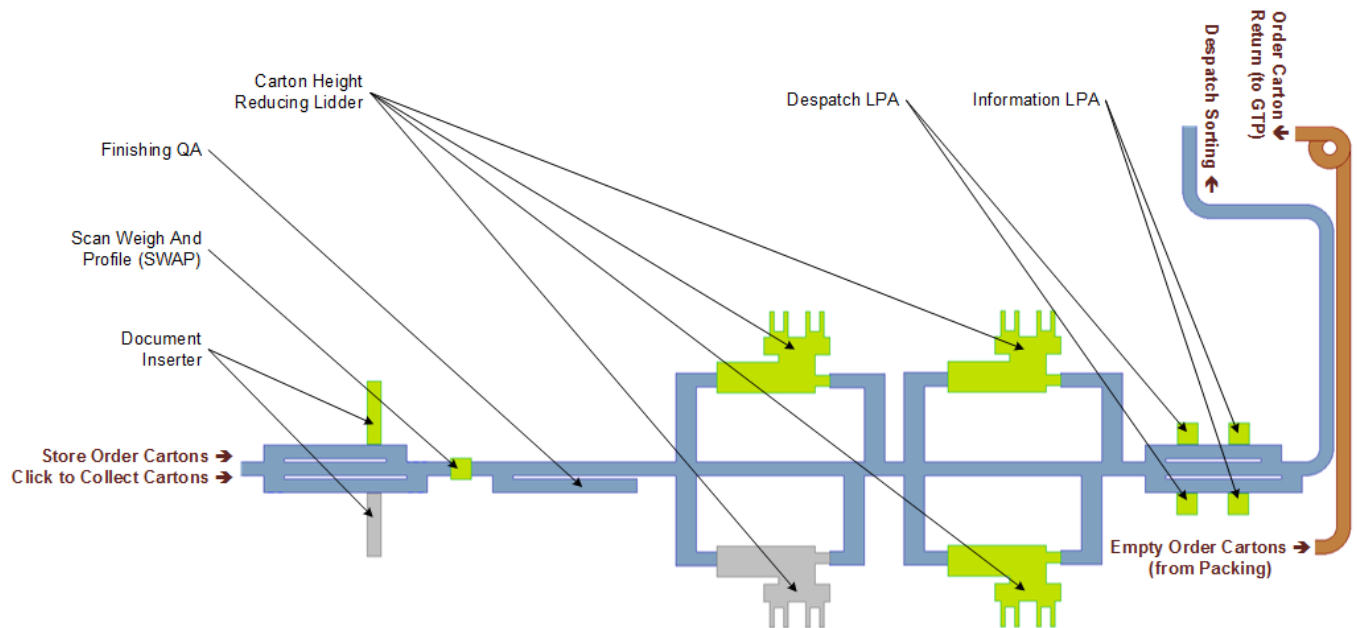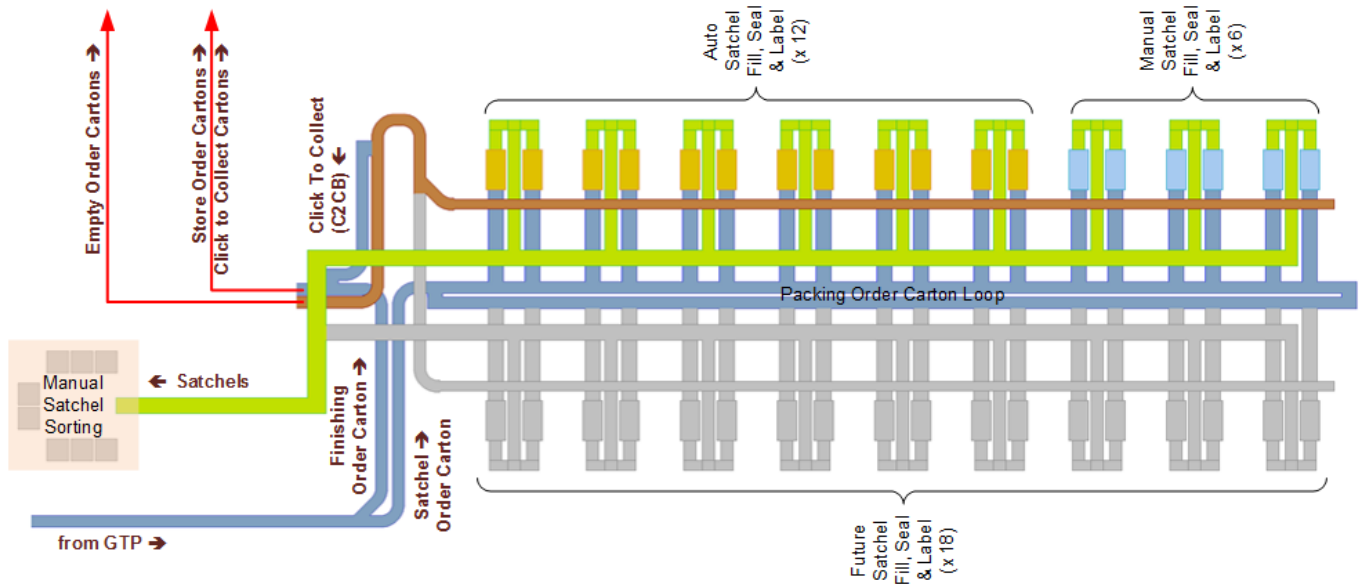

2.2.5.6   Product Tote Conveyor

Product Tote Conveyors with the following equipment will be supplied.

Table 14   Product Tote Conveyor Sub-System Characteristics

Equipment	Quantity	Comment	Reference
Decant Pallet Position	32	2 positions per station	Section 2.2.6
Decant Station	16		
Decant SWAP	1	Scan, Weigh And Profile	Section 2.2.19
QA Station	1	Decant QA	Section 2.2.15
	1	Product Tote QA	

The layout for the Product Tote Conveyors and the associated conveyor system are shown in drawings P06418L100, P06418L101, P06418L110 and P06418L112. An overview of the Product Tote Conveyors is shown in Figure 7.

Figure 8   Product Tote Conveyor Overview
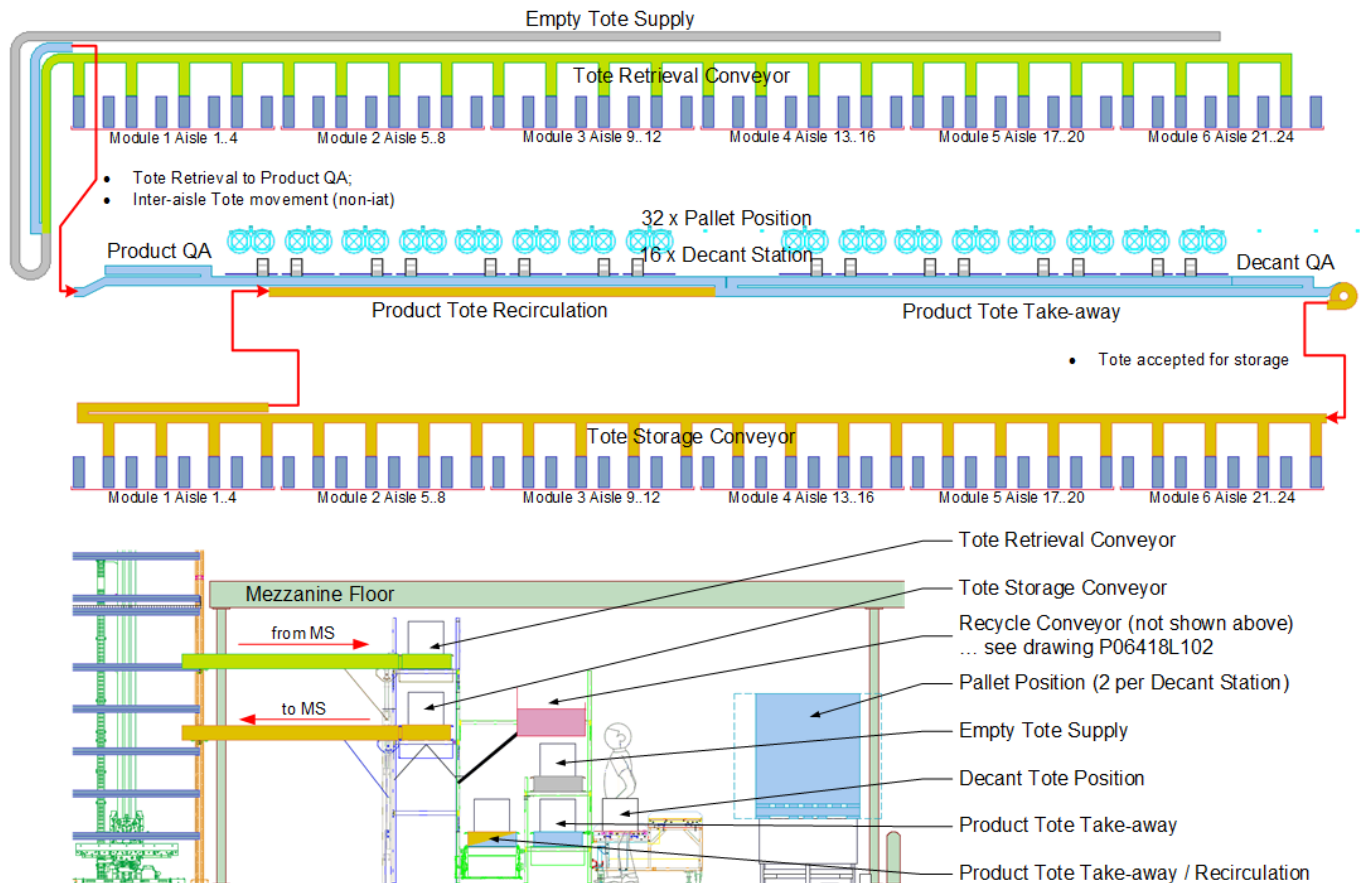
2.2.6   Decant Station

Sixteen (16) Decant Stations will be provided by Dematic. The purpose of the Decant Stations is to facilitate the manual transfer quantities of product from cartons on pallets into Product Totes, and the consequential association of that product with the Product Tote. The layout for the Decant Stations and the associated conveyor system is shown in drawings P06418L100 and P06418L101.

Each Decant Station requires the following equipment.

Table 15   Decant Station Characteristics

Equipment	Quantity	Supplier	Comment
Barcode Hand Scanner	1	Toll	non-tethered connection
Local Operator Interface	1	Toll	hardware & OS
Pal-Lifts	2	Dematic	spring loaded
Weigh-Scale	0 ①	Dematic	stand-alone device
Work table	1	Dematic	gravity conveyor

Table 15   Decant Station Characteristics

Equipment	Quantity	Supplier	Comment

①   Refer to variation VAR.06418-7 in Appendix A.

The Local Operator Interface is used by the Warehouse Control System to direct the manual operations at the Decant Station. The details for these operations are given in the WCS Functional Design Specification (see Reference Document 2).

2.2.7   Document Inserter

Three (3) automated Document insertion mechanisms will be supplied with the following characteristics.

Table 16   Document Inserter Characteristics

Characteristic	Quantity per Location ①		Comment
	Finishing	Mezzanine	
Packing / VAS Document	1		last store order carton
Returns / VAS Document		2	online order cartons ②
Printing	Simplex Monochrome		
Document Folding	Short-edge 2-Fold		
Plain A4 stock Drawers	4	2 ③	500 sheets per drawer
Forms stock Drawers		2 ③	500 sheets per drawer
Print-and-Insert Rate	20	25	typical cartons per minute
	25		peak cartons per minute
	3 sheets per carton		maximum (typically 1)

①   The third Document Inserter, and the reposition of an original Document Inserter, was implemented as a result of variation VAR.06418-9 (refer to Appendix A).

②   Batch picked online orders will have the Returns document inserted per order at a Packing Station.

③   One (1) drawer is being depleted at a time, and when empty then the alternate drawer will be used. The empty drawer can be re-filled without affecting the live operation of the equipment.

2.2.8   DirectorView System

The functionality provided by the Supervisory Control And Data Acquisition (SCADA) visualisation system is specified in the Visualisation Functional Specification (see reference document 7). The provision of the DirectorView computers is within the scope of supply for Toll and is stated within the Computer Hardware & Network Requirements document (see reference document 4).

Dematic will supply Licencing as follows:

- 1 off Master licence

- 6 off Client licences

2.2.9   Empty Carton Recycle Conveyor

The Decant Station operators have access to an overhead Empty Carton
Recycle Conveyor. This conveyor is accessible from all Decant Stations, and will
merge and discharge into a compactor (supplied by others). See the
P06418L102 drawing for details.

2.2.10   Forklift Barrier Guarding

Forklift Barrier Guarding is to be provided by Dematic, which equates to ~110m
of equipment. See the P06418L001 drawing for details.

Any other Armco or bollard requirements are to be provided by others.

2.2.11   Goods-To-Person (GTP) Station

The layout for the Order Carton Conveyors and the associated conveyor system
are shown in drawings P06418L110 and P06418L111.

Twenty four (24) GTP Stations will be provided by Dematic, each being realised
as a 1:1 RapidPick module. Each RapidPick module will be supplied with the
following characteristics.

Table 17   Goods-To-Person (GTP) Station Characteristics

Equipment	Quantity	Supplier	Comment
Local Operator Interface	1	Dematic	hardware & OS
Pick To Light (PTL) Device	1	Dematic	MaxiPick
Product Tote Pick Position	1	Dematic	
Order Carton Put Position	1	Dematic	
Operator Platform	1	Dematic	ergonomic height

The purpose of each GTP Station is to facilitate the manual transfer of product
quantities from a Product Tote into an Order Carton. Under direction of the
Warehouse Control System, the operator will pick those items that are required
to fulfil the order(s) contained within the Order Carton.

The premise is that picks into the same Order Carton will be performed from
sequential Product Totes from the coupled MultiShuttle aisle. The Product Totes
are delivered to the station in a manner that realises a picking sequence
according to pre-agreed product group sequencing requirements. The
sequencing of Product Totes from the MultiSuttle aisle will be under the control
of the Warehouse Control System.

The retrieval of Order Cartons from the Order Buffer(s) will be under the control of the Warehouse Control System. An Order Carton may be required to visit multiple GTP Stations in order to fulfil the order(s) contained therein. Online orders that require a Hanging Garment pick will visit the GOH pick station. The delivery of the Hanging Garment pick to the GOH pick station in advance of the pick will be orchestrated by the Warehouse Control System.

Once all picks are complete, the Order Carton will be delivered to an appropriate Packing Station, or the Finishing Area. In order to prevent blockade conditions into the Packing Station Area, excess Order Cartons are to be temporarily stored in an Order Buffer.

Details are provided in the Functional Design Specification (see reference document 2).

2.2.12   Label Printer Applicators

Label Printer Applicators operate on new Order Cartons and conditionally on Order Cartons that have completed all available picks.

The performance requirement for each pair of Label Printer Applicators, including verification, is a minimum of ten (10) cartons per minute.

2.2.12.1   New Order Cartons

Each Order Carton is to be uniquely identified by a Unit Load Identifier (ULID), which is to be represented on two (2) permanently affixed labels. Both labels are to comply with the design given in the Barcode Label Specification (see reference document 5), and have the same ULID encoded both in the barcode and human-readable text. Under direction of the Warehouse Control System, these labels are printed and applied immediately after each Order Carton is erected (see Section 2.2.2).

2.2.12.2   Picked Order Cartons

Under direction of the Warehouse Control System, once an Order Carton is lidded (see Section 2.2.3), the Order Carton will require a Despatch Label top-applied onto the lid. Conditionally, the Order Carton may also require an Information Label top-applied onto the lid.

- Each Despatch Label is specific to the Carrier that will deliver the Order Carton to its destination.

- Each Despatch Label has a barcode which will be used by the system to deliver the Order Carton to the appropriate Sort Lane.

- Any Order Carton that fails to be labelled correctly will be rejected.

  - The rejection of a carton requires the rejected carton to be manually removed from the conveyor system.

- These cartons should be re-introduced onto the conveyor system upstream of the Label Printer Applicators.

● Order Cartons that do not have a Despatch Label will be delivered to the Reject Lane.

● The Information Label does not have a barcode and its successful application cannot be automatically verified.

● Each Information Label will contain one of the following mutually exclusive text

- "Signature Required" … only for specific online orders

- "Packing List Enclosed"

2.2.13 Mezzanine Floor

The Mezzanine Floor illustrated in Figure 9 has the following characteristics.

Table 18 Mezzanine Floor Characteristics

Parameter	Value	Comment
Area	~5,400 m^2	
Flooring	Plywood	
Working Height	3,420 m	relative to ground floor
Pallet Gate	1	

2.2.14 Packing Station

Sixteen (16) Packing Stations will be provided by Dematic. The purpose of each Packing Station is to facilitate the manual transfer quantities of online order picked product from Order Cartons into satchels. The layout for the Packing Stations and the associated conveyor system are shown in drawing P06418L120.

Typically the content of an Order Carton fulfils a single online order, so the contents of the Order Carton is transferred to a single satchel. If this is not practical due the volumetrics or the shape of the picked items, then the Warehouse Control System is notified and the Order Carton is returned to the conveyor for routing through Finishing (i.e. lidding, labelling and despatch).

NOTE: If Warehouse Control System recognises in advance that the contents of an Order Carton will not fit into a single satchel, then the Order Carton will be delivered to Finishing instead of a Packing Station.

Multiple Single Line Single Unit (SLSU) online orders may be batch picked into a single Order Carton where each picked item fulfils a single online order. The operation at a Packing Station for such an Order Carton is, under Warehouse Control System direction, to transfer each item into a separate satchel.

A total of eighteen (18) Packing Stations are being supplied, with the capability of adding a future eighteen (18) Packing Stations. 'Auto' and 'Manual' Packing Stations are supported, where each Packing Station requires the following equipment.

Table 19   Packing Station Characteristics

Equipment	Quantity		Supplier	Comment
	Manual	Auto		
Barcode Hand Scanner	1		Toll	
Local Operator Interface	1		Toll	hardware & OS
Report Printer	1		Toll	VAS document
Barcode Printer	1		Toll	incl. printing of Despatch Label
Satchel Bagger		1	Dematic	
Satchel Bagger Rate		450 bph	Dematic	typical
		891 bph	Dematic	peak
Satchel Size	5 kg		Toll	①

①   The conceptual range of satchel sizes was 3kg, 5kg and 7kg. Toll have deemed that a single 5kg size will be applicable to all Packing Stations.

2.2.15 QA Station

The QA Station is expected to be equipped with the following items:

- One (1) bench to process work;

- One (1) Operations Management Workstation (hardware provided by Toll) for instruction and control through WCS; and

- WMS terminal (by Toll).

The principal operation performed at the QA Station relate to the validation of the product associated within a tote during the Decant operation. Once a tote leaves a Decant Station, it is presented to a Scan, Weigh and Profile (SWAP) station, where the ULID is read, the gross weight of the tote is measured, and any items protruding above the tote is detected. The tote will be directed to the QA Station for appropriate [corrective] action of the following conditions:

- A ULID cannot be read, and/or

- The two ULID on the tote are not the same, and/or

- The gross weight of the tote is outside tolerance, and/or

- An over-height condition is detected, and/or

- The tote contains product flagged for QA checking.

Totes may also be delivered to the QA Station for the purpose of quality audits. Such totes can originate from a PUT Station or from Tote Storage.

Since the operations performed at the QA Station may include interaction with other systems, the actions are expected to be covered by a Toll Standard Operating Procedure (SOP).The WCS information made available at the QA Station to support these SOPs are identified in the WCS Functional Design Specification.

2.2.16 Receiving Bench

Benches will be supplied with the following characteristics.

Table 20   Receiving Bench Characteristics

Characteristic	Quantity / Value	Comment
Bench Depth	840 mm	
Bench Height	900 mm	
Bench Length	2,000 mm	
Bench Top	plywood	
Quantity	8	total benches

2.2.17 Storage & Racking

The Storage & Racking capabilities of the Materials Handling System for the Sydney Fashion Distribution Centre are illustrated in the following drawing.

Figure 9   Storage & Racking Layout
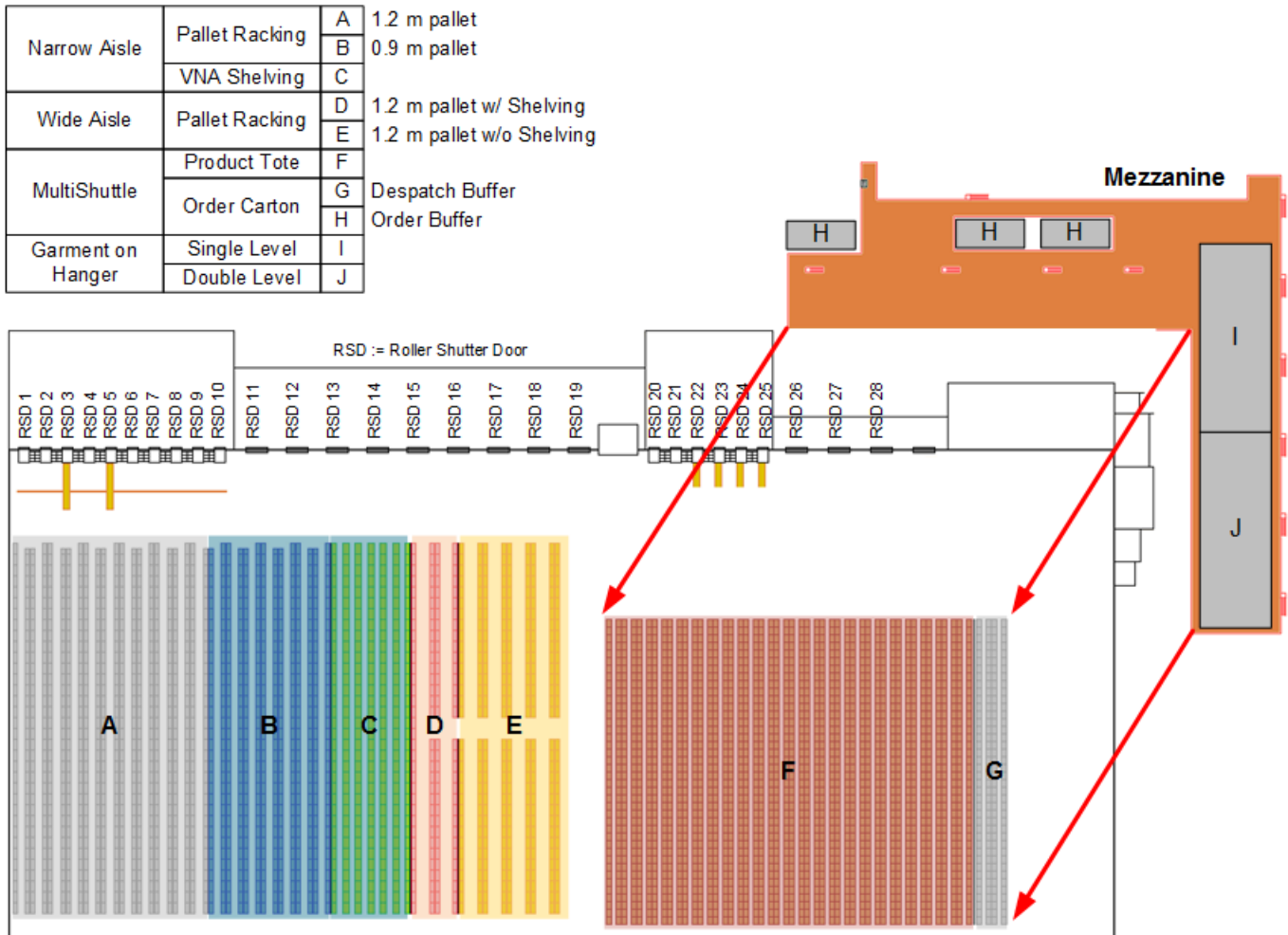
All Storage & Racking subsystems will be supplied with appropriate:

- Fall Protection Fencing on single sided racks;
- Rack end protection;
- Rack upright protection; and
- Safe Loading signage.

Details of each Storage & Racking subsystem is provided in below.

2.2.17.1   Garment On Hanger (GOH) Storage

A Garment On Hangar (GOH) system with the following equipment will be supplied.

Table 21 Garment On Hangar (GOH) Storage Characteristics

Parameter	Quantity	Comment
Single Level Storage Rail	~720 m	full-length storage rail
Double Level Storage Rail	~630 m	half-length storage rail
Manual Transport Rail	~1440 m	
Powered Conveyors	2	to and from mezzanine level
Order Carton Staging	1	online GOH item picks
GOH Boom Conveyors	4	shared between inbound & outbound
Trolley	200	T1 trolleys (i.e. 1 m)
Garment Bagging	2	semi-automated

The layout for the GOH system is shown in drawing P06418L500 (see reference document 11). An overview of the GOH system is shown in Figure 10.

Figure 10   Garment On Hanger (GOH) Layout
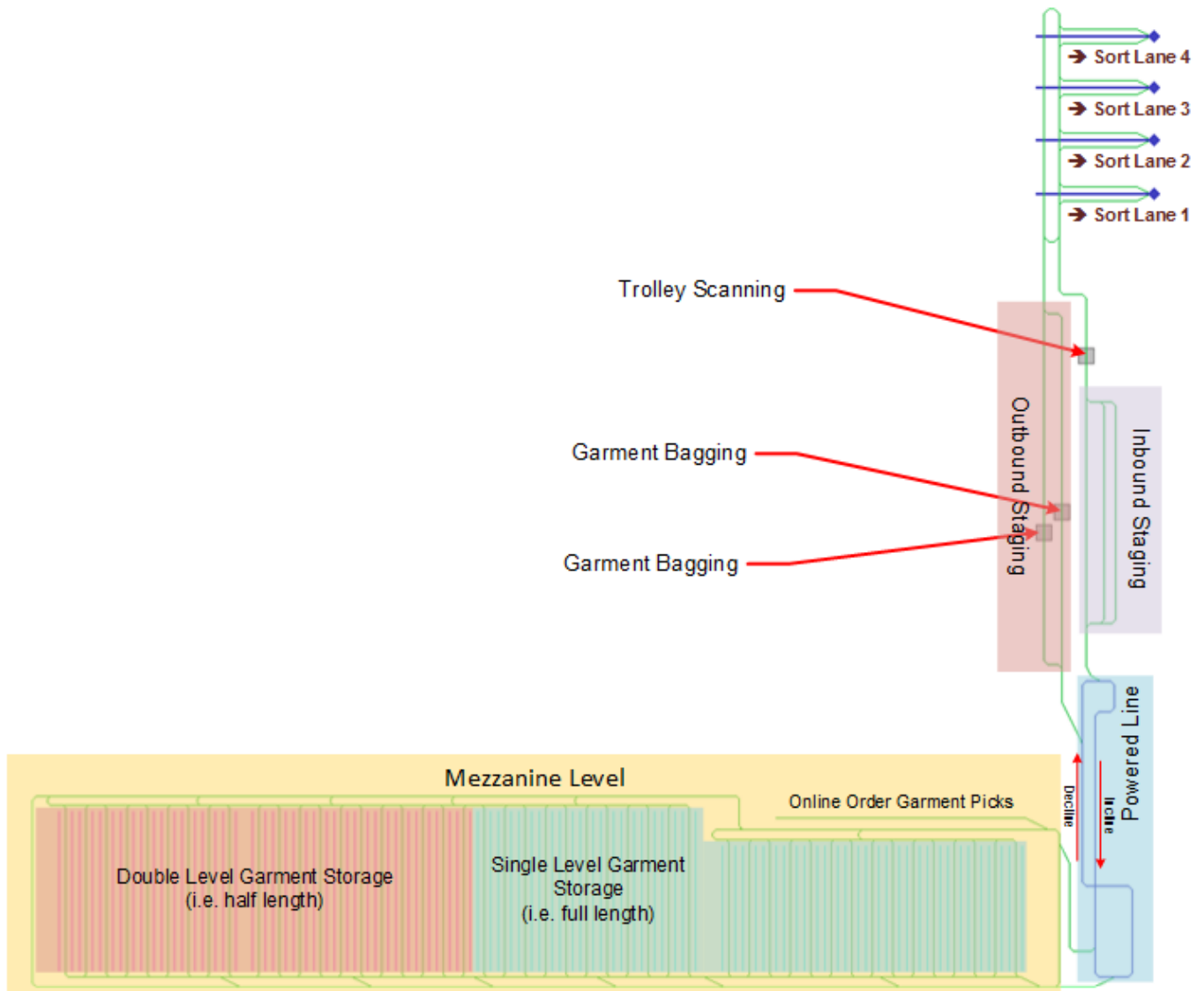
2.2.17.2   MultiShuttle Storage

Within the Materials Handling System for the Sydney Fashion Distribution Centre, the MultiShuttle Storage is utilised for the storage of:

- Product Totes in the Product Buffer (see drawing P06418L360)
- Order Cartons in the Order Buffers (see drawing P06418L300)
- Order Cartons in the Despatch Buffer (see drawing P06418L330)

MultiShuttle Storage is supplied with the following characteristics.

Table 22   MultiShuttle Storage Characteristics

Parameter	Value / Quantity			Comment
	Product	Order	Despatch	
Aisles	24	6	2	
Bays (long)	24	4	26	
Configuration	Captive			
Depth	Double		Double ①	
Ledgers per position	2	3	4	
Levels	12	8	13	storage
	2	2	2	access
Lifts	48	12	4	Gen II model
Locations (physical)	138,432 ②	3,840	13,390	
Locations (storage)	131,510 ③	3,456 ④	12,720 ③	double deep
Positions per Bay	5			
Rack Conveyors	576	96	52	
Retrieval Hoists	6	3	1	
Shuttles	264	48	26 (flex)	Gen II model
Sides per Aisle	2			
Tote Weight (max.)	25kg			w/ tote

①   Toll changes to the dimensions of the Order Carton have the implication of
      not facilitating triple deep storage within the Despatch Buffer.

②   The physical locations may be reduced from the figures quoted in the
      contract due to the juxtaposition of building columns, iAT transfer positions,
      etc.

③   In order to facilitate shuffling and other maintenance / housekeeping
      activities, the locations used for tote storage is 95% of the physical
      locations.

④   In order to facilitate shuffling and other maintenance / housekeeping
      activities, the locations used for tote storage is 90% of the physical
      locations.

2.2.17.3   Narrow Aisle Racking

Narrow Aisle Racking storage is supplied with the following characteristics.

Table 23   Narrow Aisle Racking Characteristics

Parameter	Value / Quantity			Comment
	1.2m Pallet	0.9m Pallet	Carton	
Bays	737	469	<see ↓>	full width
	11	7		half width

Table 23   Narrow Aisle Racking Characteristics

Parameter	Value / Quantity			Comment
	1.2m Pallet	**0.9m Pallet**	**Carton**	**Comment**
	full width		64	single deep
			166	double deep
	half width		4	single deep
			4	double deep
Bay Load (max.)	14000 kg	13500 kg	6750 kg	single sided
			13500 kg	double sided
Beam Depth	100 mm	90 mm	n/a	
Beam Length	2590 mm			
Beam Levels	7	9	n/a	
Beam Load (Pair max.)	2000 kg	1500 kg	n/a	
Frame Height	10275 mm		9975 mm	
Levels	8	10	9	full width
Mesh Decks per Level	n/a		2	
Pallet Height (max.)	1200 mm	900 mm	n/a	w/ pallet base
	600 mm ①	450 mm ①		
Pallet Positions per bay	16	20	n/a	
Positions	11,880	9,450		pallet positions
	n/a		3,552 ①	650 mm deep
Shelf Beam Depth	n/a		90 mm	
Shelf Load (max.)	n/a		750 kg	single sided
			1500 kg	double sided
Shelves per Bay	0		9	
Type	Selective Rack		Mesh Decks	

①   Due to minimum sprinkler clearance, the reduced pallets per bay height applies to the top-most level for the last six (6) bays of each aisle on the southern end of the rack and the first bay of each aisle on the north end of he rack.

2.2.17.4   Wide Aisle Racking

Wide Aisle Racking storage is supplied with the following characteristics.

Table 24   Wide Aisle Racking storage Characteristics

Parameter	Value / Quantity		Comment
	1.2m Pallet	**Carton**	**Comment**
Bays	280	126	full width
	8	4	half width

Table 24   Wide Aisle Racking storage Characteristics

Parameter	Value / Quantity		Comment
	1.2m Pallet	Carton	
Bay Load (max.)	12000 kg	14250 kg	
Beam Length	2590 mm		
Beam Depth	100 mm		
Beam Levels	6		
Beam Load (Pair max.)	2000 kg		
Frame Height	9375 mm		
Levels	7	0	w/o shelves
	6	3	w/ shelves
Pallet Height (max.)	1200 mm		w/ pallet base
Positions	5,471		
Positions per bay	14	12	
Shelf Beam Depth	n/a	90 mm	
Shelf Load (max.)	n/a	750 kg	per shelf
Shelves		375	
Shelves per Bay	0	3	
Type	Selective Rack	Mesh Decks	

2.2.18   Unit Loads

2.2.18.1   Online Order Carton

The Online Order Carton blanks are supplied by Toll (see Section 2.1.5.2), constructed by a Carton Erector (see Section 2.2.2), and uniquely identified by Label Printer Applicators (see Section 2.2.11).

Each Online Order Carton will be identified by a unique identifier, which will be presented as a barcoded value on each side of the Online Order Carton. Warehouse Control System will manage and allocate the unique Online Order Carton identifier. The design and placement of the barcodes is defined in the Barcode Label Specification (see Reference Document 5).

The identity of each Online Order Carton will be verified, and if successful will be available for storage into an Order Buffer and/or directed to a Goods To Person station for the fulfilment of an order.

An Online Order Carton can be used to fulfil

● a Replenishment Order to a store;

● an Online Order; or

  ● multiple Single Line Single Unit (SLSU) orders as a batch pick.

2.2.18.2 Online Order Tote (n/a)

Online Order Totes are intended to satisfy online orders that are directed to a
Packing Station where the contents are repacked into small cartons (see Section
2.1.5.2) or an appropriately sized satchel. Each Online Order Tote has the
external dimensions stated below.

Table 25 Online Order Tote Characteristics

Tote	Length (L)	Width (W)	Height (H)	Weight	Quantity
Order	600 mm	400 mm	200 mm	16 kg (max.)	0 ①

 ① Project variation VAR.06418-6 (see Appendix A) states that the 1,000
    Online Order Totes will be excluded from the Dematic deliverables.
    Instead quantities of Order Cartons will be erected to meet the needs of
    both Replenishment Orders and Online Orders. Order Cartons will be
    returned from a Packing Station as long as the Order Carton is deemed
    fit for purpose by the operator.

2.2.18.3 Product Tote

Product Totes are intended to transport products between the Multishuttle
Storage and the operations performed at Decanting and GTP stations. Each
Product Tote has the external dimensions stated below.

Table 26 Product Tote Characteristics

Tote	Length (L)	Width (W)	Height (H)	Weight	Quantity
Product	600 mm	400 mm	365 mm	25 kg (max.)	130,000
Dividers ①					13,000

 ① Product Tote Dividers facilitate the partitioning of a Product Tote into equally
    sized compartments as shown in Figure 11.

The detailed design of each Product Tote is given in drawings P06418L321 and
P06418L322.

Each Product Tote will be identified by unique identifier. This identifier plus a
side indicator will be present as barcoded values on each side of the Product
Tote. The side indicator is used to define the orientation of the Product Tote on
the conveyor. The design and placement of the barcodes is defined in the
Barcode Label Specification (see Reference Document 5).

Figure 11   Product Tote Compartments
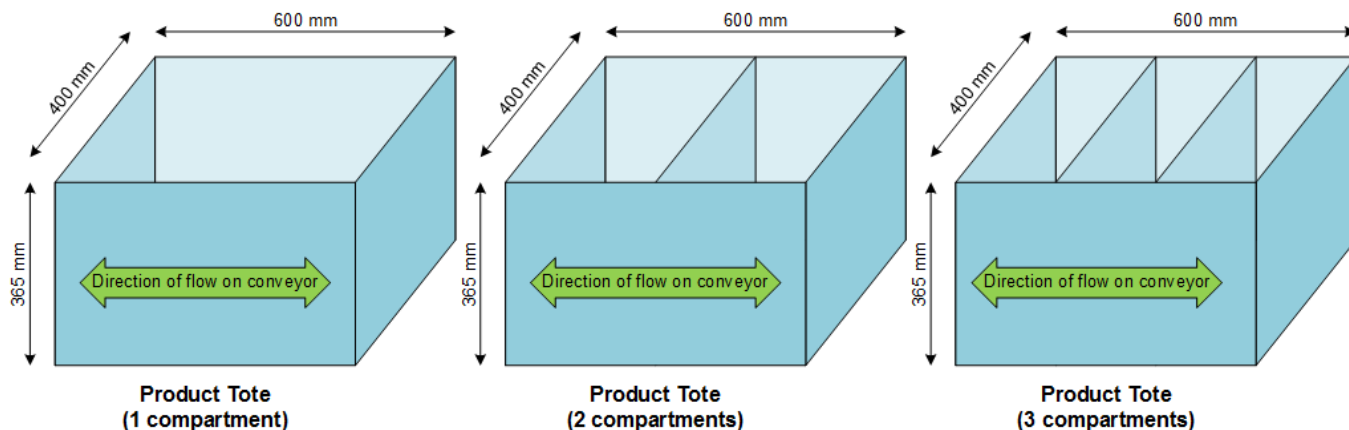
NOTE: It is expected that partitioning of Product Totes into compartments will not be actioned within the facility. However the Warehouse Control System will incorporate this capability in order to facilitate the ability of a Product Tote to be split into a maximum of two (2) compartments.

2.2.19   Weigh-Scale - Inline

Weigh-Scales will be supplied at three (3) positions within the conveying system. The Weigh-Scales will be supplied with the following characteristics.

Table 27   Inline Weigh-Scale Characteristics

Characteristic	Quantity / Value		Comment
	Decant	Finishing	
Control Panel	1		per unit
Controller	1		per unit
Load Cells	4		per unit
Peak Rate	35 tpm	30 cpm	
Tolerance	± 20 grams	± 20 grams	resolution
Unit Load	Product Tote	Order Carton	

NOTE: The provision of the third inline weigh-scale is part of Project variation VAR.06418-16 (see Appendix A) which relates to the inclusion of a dimensioning and weighing capability within the Despatch Sorter.

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3 System Operation

3.1 Scope Of Influence

Within the context of this document, the major systems within the Materials Handling System for the Sydney Fashion Distribution Centre are identified below. These systems interact in order to provide an operational solution to Toll. There are many functions that are required to be performed within the facility, which include but are not restricted to:

- The Warehouse Management System (WMS) i.e. Red Prairie
    - Interfacing to all client logistic systems
    - Dock management
    - Product Returns
    - Order processing, invoicing, scheduling, management and repairs
    - Stock write-off
    - Sales forecasting
- The Warehouse Control System (WCS)
    - Receiving of product into the facility
    - Inventory put-away, management and allocation
    - Order consolidation, picking, finishing and marshalling / despatch
    - Pick-face product replenishment
    - MultiShuttle product replenishment
- Operations
    - Staff management
    - Manual loading / unloading of trucks and vans
    - Resource allocation
    - Trask management
    - Empty pallet management
    - Order Quality Assurance (QA)
    - Preventative maintenance

The operations described herein focus on the operation of the Warehouse Control System. Details are provide in the Functional Design Specification (see reference document 2).

3.2 Operation Overview

The Materials Handling System for the Sydney Fashion Distribution Centre is required to:

1. Process product that has been unloaded from trucks onto the dock area;

   NOTE: The inclusion of the Receiving process within the Warehouse Control System scope was implemented as a result of variation VAR.06418-14 (refer to Appendix A). This scope excludes any Returns processing.

2. Consolidate the above mentioned product onto pallets and the delivery of the product to:

   a. Garment On Hangar (GOH) (see Section 2.2.17.1)

   b. MultiShuttle Product Storage (see Section 2.2.17.2)

   c. Narrow Aisle Racking (see Section 2.2.17.3)

   d. Wide Aisle Racking (see Section 2.2.17.4)

   e. Garment flat-packs for external processing

3. Replenishment of product into:

   a. MultiShuttle Product Storage via Decant Stations (see Section 2.2.6)

   NOTE: The placement of Product Tote within the MultiShuttle Product Storage aisles is subject to a product slotting guidelines. These guidelines are yet to be defined. The Warehouse Control System will include the ability to allocate specific brands to specific modules, and to randomise / group / spread styles and then SKUs within those modules.

   b. Carton shelving within Wide Aisle Racking

4. Fulfilment of Store Orders and Online Orders by orchestrating manual pick operations within:

   a. Wide / Narrow Aisle Racking

   b. MultiShuttle Product Storage via Goods-To-Person Stations (see Section 2.2.11)

   c. Garment On Hangar (GOH)

   d. Consolidation of Order Carton picks and Carton shelving picks.

   NOTE: The ability of an operator to manually pick from the Wide / Narrow Aisle Racking is dependent upon the type of equipment available to the operator (e.g. Turret Truck, HLOP, Trolley, etc.).

5. Construction of shipper Order Cartons and/or Satchels where each is closed, sealed and labelled in accordance with the carrier requirements,

6. Associating each shipper with a container cage / dock, and the logical despatch of the container to a carrier.

> **NOTE:** The inclusion of the Despatch process within the Warehouse Control System scope was implemented as a result of variation VAR.06418-15 (refer to Appendix A).

Figure 12 and Figure 13 summarise the flow of materials with respect to the operations being performed and [where appropriate] the mechanism required to perform the operation. The legend shown in Figure 12 applies to Figure 13.

Figure 12   Garment Operations Flow
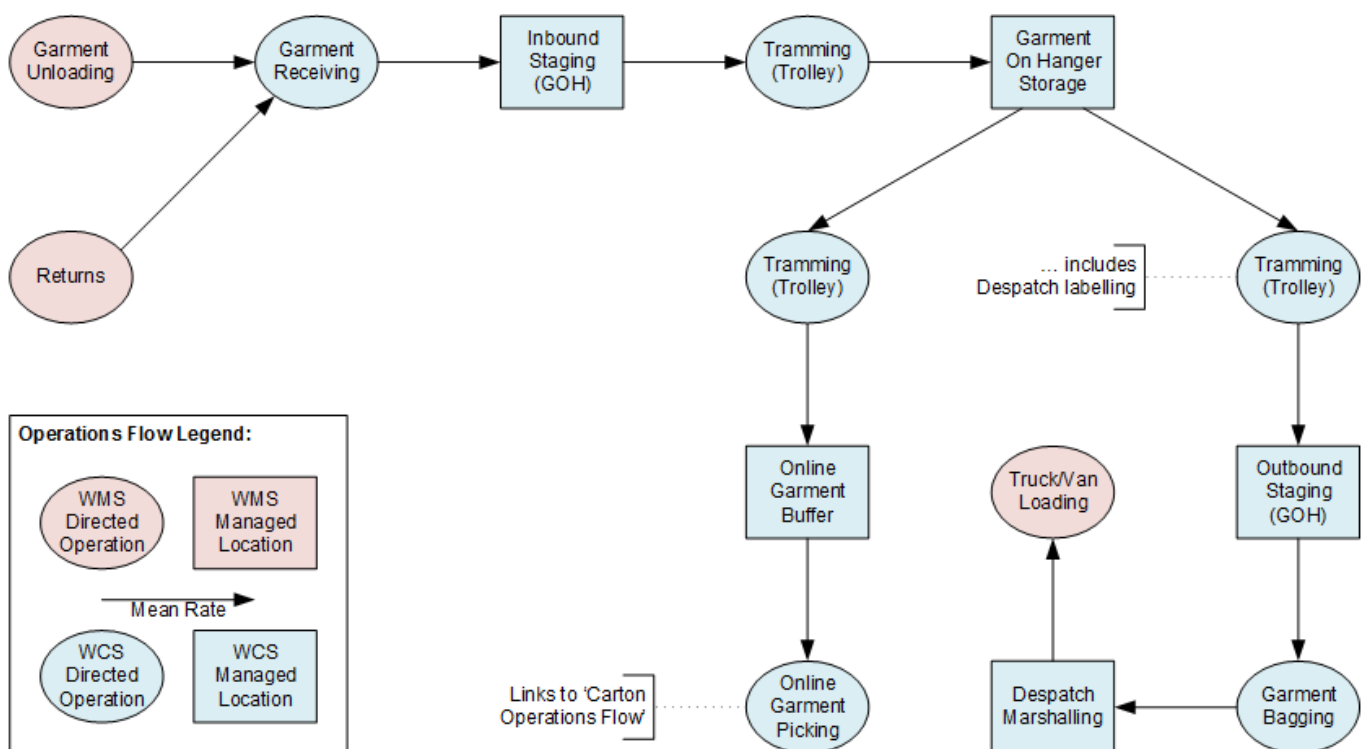
The Garment On Hangar (GOH) layout is shown in Figure 10, where the mechanism used by operators to move product is by the use of the T1 trolleys (see Section 2.2.17.1). Apart from the powered inclinator and declinator, the movement of product throughout the GOH sub-system is a manual operation. Similarly, the storage and retrieval (i.e. picking) of product within the GOH sub-system is a manual operation.

The movement of cartonised product within the Bulk Store (i.e. Narrow Aisle Racking and Wide Aisle Racking) is a manual operation using appropriate machinery. These dependencies are identified below.

Table 28   Bulk Store Machine Dependency

Bulk Store		Inbound		Outbound (i.e. Picking / Replenishing)			
		Forklift	Turret	Forklift	HLOP	Trolley	Turret
Narrow Aisle	0.9m Pallet		✓		✓ ①		✓ ②
	1.2m Pallet		✓		✓ ①		✓ ②
	Shelving	✓		✓ ③		✓ ④	
Wide Aisle	1.2m Pallet		✓		✓ ①		✓ ②
	Shelving	✓		✓ ③		✓ ④	

①   High Level Order Pickers consolidate carton picks onto a pallet.

②   The use of Turret Trucks during retrievals from the Bulk Store is limited to pallet picks.

③   A Forklift Truck is used to replenish the shelving (i.e. Pick Face) from its Reserve Storage.

④   Trolleys are used to pick non-GTP items from Pick Faces into an Order Carton.

Figure 13   Carton Operations Flow

> **NOTE:** In the future, the delivery of pallets to the Decant P&D stations may be actioned by Automated Guided Vehicles (AGV).

3.3 Order Types

There are a number of order types issued by Red Prairie to the Warehouse Control System, whose response is summarised below. Within the context of this overview, the GOH processing area is excluded since it is a manually operated processing area whose operation is loosely coupled to the alternate processing areas (see Section 3.3.5).

Table 29   Order Type Responses

Order Type		Consolidation			Storage					Processing					
		Batch	Order	Pick	Despatch	GOH	GTP	Pallet	Shelving	Finishing	GTP	Packing	Pick Face	Receiving	Sorting
Online	C2C	✓		✓	✓	✓	✓		✓	✓	✓		✓		✓
Online	C2CB	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓		✓
Online	Direct	✓		✓		✓	✓		✓		✓	✓	✓		
Store	Indent		✓		✓	✓		✓	✓	✓			✓		✓
Store	Replen		✓	✓	✓	✓	✓		✓	✓	✓		✓		✓
Purchase						✓	✓	✓	✓					✓	
Internal ①							✓	✓	✓						

① The 'Internal' Order Type is a set of Warehouse Control System operations which includes, but is not restricted to, the following:
- The top-up the GTP Processing stock level with product from Bulk Storage
- The top-up a Pick Face with product from Reserve Storage; and
- The extraction of Product from GTP Storage into Shelving Storage (see Section 3.3.8).

An overview of each WCS response is given in the following sub-sections.

3.3.1 Batch Consolidation

Batch Consolidation is the ability to consolidate multiple Single Line Single Unit (SLSU) orders into individual Order Cartons. Batch Consolidated can only be consolidated within the same Order Type, and are realised as Batch Picks.

The premise of Batch Consolidation is as follows:

● An Order Carton will contain the SLSU item for multiple orders;

● The pick quantity at each GTP station is maximised; and

● The number of Order Cartons required to fulfil the orders is minimised.

NOTE: Batch Picking on Online Orders from a Pick Face will require each Order Carton to be manually delivered to a Packing Station.

3.3.2 Order Consolidation

A Consignment Number is assigned by Red Prairie for each order based on appropriate business rules for the intended Carrier. Order Consolidation is the ability to artificially combine multiple orders with the same destination and the same Consignment Number. Order Consolidation can only be performed within the same Order Type.

The premise of Order Consolidation is as follows:

● The number of Order Cartons required to fulfil the Store Order is minimised; and

● The sequencing of picks (see Section 3.3.10) spans all line items destined for the Store.

NOTE: Even though individual Orders are consolidated into a larger Pick Order, the Warehouse Control System will reports the order progress and/or status to Red Prairie per individual Order.

Further, the fulfilment of orders can be delayed as follows:

● If an Order Carton is <80% full for a Replen Order and no Click-to-Collect Orders exist for the same consignment then the order can be delayed for up to 3 days.

● If an Order Carton is <80% full for a Click-to-Collect Order and no Replen Orders exists for the same consignment, then the order can be delayed for up to 3 days.

● If a Click-to-Collect Order and a Replen Order exist for the same consignment, then they must be shipped on that day regardless of carton fill levels.

3.3.3 Pick Consolidation

Pick Consolidation is the ability to combine Order Cartons that are picked from the GTP and the Pick Face for the same online order and/or consolidated order. The last GTP Order Carton will bypass the Finishing Process (see Section 3.3.9) and will be delivered to the Consolidation sort lane. Under direction of Warehouse Control System, the GTP Order Carton will be loaded onto a Trolley, then manual picks added to GTP Order Carton on the Trolley. If the GTP Order Carton becomes full, then it will be replaced by an Order Carton so as to complete the order.

The Warehouse Control System will orchestrate the combining of the Pick Face Order Carton and the GTP Order Carton. The resultant Order Carton(s) will be

individually labelled and documented in order to mimic the bypassed Finishing Process. The Order Carton(s) are liable to be inducted onto the sorter via the full-case line.

> **NOTE:** It is an operator decision as to whether the Pick Face Order Carton and the GTP Order Carton can be successfully combined and/or optimised into a larger/smaller/non-standard Order Carton.

3.3.4 Despatch Storage

The Despatch Buffer is available for the temporary storage of those orders that are required to be delivered to the Despatch Sorter (see Section 2.2.5.4). Such orders exclude GTP Order Cartons that require Pick Consolidation (see Section 3.3.3). The Warehouse Control System will automatically divert-and-store the appropriate Order Cartons into the Despatch Buffer.

The intent of the Despatch Buffer is to coordinate the availability of Carrier transport vehicles with the presentation of the Order Cartons for immediate loading into the vehicle.

The trucks management, schedule and dock allocation is outside the scope of supply for Dematic. The release of the Order Cartons to specific Sort Lanes is a manual operation orchestrated by Toll operations staff.

3.3.5 GOH Storage

The Garment On Hangar (GOH) Storage (see Section 2.2.17.1) is a manually operated sub-system. GOH items are received into the facility, and despatched from the facility, via Sort Lane 1 .. 4.

GOH items are manually transported within the GOH Storage by use of Trolleys as follows:

● from a Sort Lane to Inbound Staging

● from Inbound Staging to Garment Storage (via the powered inclinator)

● from Garment Storage to Outbound Staging (via the powered declinator)

● from Outbound Staging to a Sort Lane

● from Garment Storage to Online Order Garment Pick zone.

The placement of Garments within the GOH Storage is directed by the Warehouse Control System but the Toll operator has the capability to override each Warehouse Control System directive.

The Online Order Garment Pick zone is used exclusively to facilitate the picking of Garment items into Online Order Cartons. It is expected that the Garment item(s) will be picked in advance of the Online Order Carton arrival at the Online Order Garment Pick zone.

3.3.6   GTP Storage

The GTP Storage (see Section 2.2.17.2) is exclusively for the movement of Product Totes between the Decant Stations (see Sections 2.2.6 and 3.3.6.1) and the Goods-To-Person (GTP) Stations (see Sections 2.2.11 and 3.3.10). Once inducted, all Product Totes are captive within the GTP Storage. The movement of the Product Totes within the GTP Storage is managed by the Warehouse Control System.

3.3.6.1   Decant Station Operation

The purpose of each Decant Station is to facilitate the manual transfer of product quantities from pallets into Product Tote, and the association of that product with the Product Tote. Empty Product Totes will be made available to the Decant Station from the Empty Tote Buffer (see Section 2.2.5.6).

The movement of pallets into the P&D positions juxtaposed with each Decant Station, is orchestrated by the Warehouse Control System. All the product on each pallet is expected to be consumed during the Decant operation, and the resultant empty pallet will be removed by the forklift operators that service the Decant P&D positions.

The Decant Operation is directed by the Warehouse Control System by use of a Local Operator Interface (LOI). Once the Product Tote is placed on the take-away conveyor, it is identity is verified and its gross weight is measured. If acceptable, the Product Tote is stored into GTP Storage in accordance with the Product Slotting requirements (see Section 3.3.6.3). Otherwise it is delivered to the Decant QA station for investigation and/or corrective action.

3.3.6.2   Empty Tote Loading

Part of the initial activity by Toll will be loading the 130,000 Empty Product Totes into GOH Storage. The Warehouse Control System will treat any 'unknown' Product Tote that is presented at the Decant Scan Weigh And Profile (SWAP) station as an Empty Product Tote. Nominally the Empty Product Tote will be delivered to the Empty Tote Buffer (see Section 3.3.6.1), but if it is full then the Empty Product Tote will be stored into GTP Storage. As the Decant operation consumes Empty Product Totes, the Warehouse Control System will replenish the Empty Tote Buffer with Empty Product Totes retrieved from GOH Storage

Further, the Warehouse Control System will allow the Decant Operation to use unknown Product Totes (i.e. Product Tote not retrieved from the Empty Tote Buffer). The Empty Product Totes will be made available to each Decant Station at one of the associated P&D positions.

The movement of Empty Product Tote pallets into the P&D positions is orchestrated by the Warehouse Control System. All the Empty Product Totes on each pallet is expected to be consumed during the Decant operation, and the resultant empty pallet will be removed by the forklift operators that service the Decant P&D positions.

3.3.6.3 Product Slotting

Product Slotting is closely coupled to the requirement to sequence GTP picks in a manner that is dictated by each Client. The GTP picking sequence, and the Product Slotting, is based on combinations of the product properties including, but not restricted to, the following:

1. Division
2. Brand
3. Department
4. Product Group
5. Class
6. Style
7. Colour
8. Size (i.e. UPC product barcode)

These product properties are specified by Red Prairie as each product definition is downloaded to the Warehouse Control System.

NOTE: The algorithm for defining the Product Slotting across the twenty four (24) GTP Storage aisles and/or the six (6) GTP modules, is yet to be defined.

3.3.7 Pallet Storage

The Pallet Storage (see Sections 2.2.17.3 and 2.2.17.4) are exclusively for the storage-and-retrieval of pallets compliant with the Australian Pallet Standard AS 4068 – 1993 (see Section 2.1.5.3).

Each pallet within Pallet Storage nominally has Product Cartons associated with it. The premise being that, with the exception of Indent Cartons, each Product Carton is uniquely identified and is associated the unique identifier of the pallet. Indent Cartons are not uniquely identified, but a quantity of Indent Cartons is associated with the unique pallet identifier.

NOTE: The unique identifiers mentioned above are dynamic in that they are allocated during the Receiving Process. Individual pallets do not have static / permanent identifiers and the allocated identifiers are affixed to one of the carton loads.

Movement of a pallet within the facility implies that the cartons associated with that pallet are moved with the pallet. The pallets are not captive to the facility. It is feasible for a pallet to be used for consolidation of Finished Order Cartons where the pallet is the transport mechanism for the Carrier.

NOTE: In most cases, Order Cartons will be loose loaded into the Carrier transport vehicle.

The supply and distribution of empty pallets within the facility is managed by Toll Operations. The Warehouse Control System will give directives for the retrieval of empty pallets from Decant P&D positions, but the subsequent distribution of these pallets within the facility is outside the domain of the Warehouse Control System.

3.3.8   Shelving Storage

Shelving is provided within the Bulk Store (see Sections 2.2.17.3 and 2.2.17.4). This shelving is nominally used for the storage of Product Cartons that are disassociated from a pallet.

Product Cartons located in the shelving includes, but is not restricted to, the following:

● Product that is not suitable for transport on conveyors;

● Product that is required to fulfil Online / Store Orders;

● Product whose forecast pick quantity is below a pre-defined threshold; and

● Product that has been extracted from GTP Storage.

Product located within the Shelving is nominally replenished from appropriate Reserve Storage, and is presented as a Pick Face for the fulfilment of Online / Store Orders from the Bulk Store.

3.3.9   Finishing Processing

The equipment provided to facilitate Finishing Processing is identified in Section 2.2.5.3.

The Finishing Processing for picked GTP Order Cartons is as follows:

1. If the Order Carton is the last Store Order carton that does not require Pick Consolidation (see Section 3.3.3), then

    a. a Packing List document is printed and inserted (see Section 2.2.7), and

    b. an Information Label is affixed stating "Packing List Enclosed" (see Section 2.2.12.2).

2. If the Order Carton is the last C2CB carton that had a VASing document consumed during the Packing process, then the VASing document is re-printed and inserted.

3. As required, the Order Carton will be delivered to the Finishing QA station.

4. The Order Carton is delivered to a height reducing lid applicator machine (see Section 2.2.3) that is appropriate to the size of carton where

    a. a standard lid is applied for a Store Order Carton, or

    b. a coloured lid is applied for an Online Order Carton.

5. A Despatch Label compliant with the Barcode Label Specification (see reference document 5) is applied to the top of the Order Carton.

6. If the Order Carton is the last C2C carton where Red Prairie has indicated that the recipient needs to confirm delivery by the Carrier, then an Information Label is affixed stating "Signature Required" (see Section 2.2.12.2)

NOTE: Order Cartons that require Pick Consolidation (see Section 3.3.3) bypass the above mentioned Finishing Process and be delivered to the Consolidation Sort Lane.

3.3.10 GTP Processing

The equipment provided to facilitate GTP Processing is identified in Section 2.2.5.6.

A simplified GTP Processing for picking GTP Order Cartons is as follows:

NOTE: The Pick Order mentioned below can be a Consolidated Order (see Section 3.3.2) or an Individual Order.

1. Based on the known Pick Orders, the Warehouse Control System will

   a. prioritise the Pick Orders based on the assembly date and time,

   b. perform logical Order Carton cubing per Pick Order based on the picking sequence of each Pick Order, and

   c. make the logical Order Cartons available for fulfilment.

2. Large / medium Order Cartons are erected (see Sections 2.2.2 and 2.2.12.1) in order to meet the demand or physical Order Cartons.

3. Stock is allocated to a logical Order Carton based on minimal Product Tote movement for a GTP Station.

4. Where necessary Product Totes are moved between GTP Storage aisles in order to satisfy the picking at a GTP station for the logical Order Carton.

5. A physical Order Carton is assigned to a logical Order Carton.

6. The physical Order Carton is presented to a GTP station for picking.

7. Concurrently the Product Tote delivery is sequenced to meet the requirements of the Order Carton which is based on order line product properties that include, but are not restricted to, the following;

   a. Division

   b. Brand

   c. Department

   d. Product Group

   e. Class

        f.   Style

        g.   Colour

        h.   Size (i.e. UPC product barcode)

8. The Warehouse Control System directs the operator for each pick quantity from each Product Tote into the Order Carton.

9. Each Product Tote is returned to GTP Storage, and the Order Carton exits the GTP Station. If there are outstanding GTP Station picks for the Order Carton, then steps 3, 4, 6, 7 and 8 are repeated for each GTP appropriate station.

10. If the Pick Order is an Online Order then:

    a. If Garment line items are required, then the Order Carton is delivered to the Online Order Garment Pick zone (see Section 3.3.5) for fulfilment.

    b. The Order Carton is presented to the Document Inserters (see Section 2.2.7) for the conditional inclusion of a Returns Form and/or VAS form.

3.3.11   Packing Processing

The equipment provided to facilitate Packing Processing is identified in Section 2.2.5.5.

The Packing Processing transfers picked items for Online Orders from the Order Carton into Satchels. If the items to be placed in a Satchel will not fit, then:

1. The operator notifies the Warehouse Control System.

2. The operator returns the item(s) to the Order Carton

3. The operator placed the Order Carton on the Carton Take-away Conveyor

4. Warehouse Control System directs the Order Carton to Finishing (see Section 3.3.9)

5. Warehouse Control System delivers the Order Carton to Sort Lane 5 .. 9 or the Reject Lane

Otherwise the Packing Process for picked Online Order Cartons is dependent on the Order Type.

Selection of whether the Packing Process is performed at a manual or automated Packing Station (see Section 2.2.14) is dependent on the Order Type and/or 'other' criteria required by the Client (e.g. custom satchel). The selection of the Packing Station necessary to service an Order Carton is managed within Warehouse Control System.

3.3.11.1   Batch Direct Order Packing

Batch Direct Packing Processing is relevant to Online Orders that have undergone Batch Consolidation (see Section 3.3.1). Since each item in the

Order Carton fulfils a single Online Order, the following procedure is actioned for each item in the Order Carton.

1. The item product barcode (e.g. UPC) is scanned by the operator.

2. The item is placed into a Satchel

3. A Despatch Label is applied to the Satchel

    a. For Automated Packing Stations, the Despatch Label is printed directly on the Satchel.

    b. For Manual Packing Stations, the Despatch Label is printed on the juxtaposed Label Printer and manually affixed by the operator.

4. The Satchel is placed on the Satchel take-away conveyor

    a. For Automated Packing Stations this transfer occurs automatically.

    b. For Manual Packing Stations, the operator actions this transfer.

5. The Satchel is transported to the Manual Satchel Sorting, where another operator associates the Satchel with the cage / container relevant to the specific Carrier, and then places the Satchel into that cage / container.

Once the Order Carton is empty, the operator places it on the Carton Take-away Conveyor. The Warehouse Control System makes the empty Order Carton available for assignment to a new Pick Order (see Section 3.3.10).

NOTE: All the above mentioned operator actions are directed by the Warehouse Control System.

3.3.11.2 Individual Direct Order Packing

Individual Direct Packing Processing is relevant to situations where the contents of the Order Carton represents a single fulfilled Online Order, and the following procedure is actioned for the Order Carton.

1. The Order Carton LP is scanned by the operator

2. All items are transferred from the Order Carton into a Satchel

3. A Despatch Label is applied to the Satchel

    a. For Automated Packing Stations, the Despatch Label is printed directly on the Satchel.

    b. For Manual Packing Stations, the Despatch Label is printed on the juxtaposed Label Printer and manually affixed by the operator.

4. The Satchel is placed on the Satchel take-away conveyor

    a. For Automated Packing Stations this transfer occurs automatically.

    b. For Manual Packing Stations, the operator actions this transfer.

5. The Satchel is transported to the Manual Satchel Sorting, where another operator associates the Satchel with the cage / container relevant to the specific Carrier, and then places the Satchel into that cage / container.

Once the Order Carton is empty, the operator places it on the Carton Take-away Conveyor. The Warehouse Control System makes the empty Order Carton available for assignment to a new Pick Order (see Section 3.3.10).

NOTE: All the above mentioned operator actions are directed by the Warehouse Control System.

3.3.11.3 C2CB Order Packing

C2CB Order Packing can only be performed at manual Packing Stations.

For Online Orders that have undergone Batch Consolidation (see Section 3.3.1), the following procedure is actioned for each item in the Order Carton.

1. The item product barcode (e.g. UPC) is scanned by the operator

2. The item is placed into a Satchel

3. A Despatch Label is printed on the juxtaposed Label Printer and manually affixed by the operator to the Satchel

4. The Satchel is retained locally and NOT placed on the Satchel Take-away Conveyor

Otherwise the following procedure is actioned the Order Carton.

1. The Order Carton LP is scanned by the operator

2. All items are transferred from the Order Carton into a Satchel

3. A Despatch Label is printed on the juxtaposed Label Printer and manually affixed by the operator to the Satchel

Once the Order Carton is empty, the operator returns all Satchels to the Order Carton, and places it on the Carton Take-away Conveyor. The Warehouse Control System directs the Order Carton to Finishing (see Section 3.3.9), and then it is then subject to Sorting (see Section 3.3.14).

NOTE: All the above mentioned operator actions are directed by the Warehouse Control System.

3.3.12 Pick Face Processing

Pick Face Processing is relevant to Pick Orders that require the picking of product that does not exist in sufficient quantities within GTP Storage. The fulfilment of such picks requires the operator to have machine access necessary to action the retrieval of product (see Table 28 in Section 3.2).

For pallet picks, the pallet is retrieved from the storage location and delivered to the location nominated by the Warehouse Control System.

For carton picks, the specific quantity of cartons is picked onto a pallet, and the pallet is delivered to the location nominated by the Warehouse Control System.

For item picks, the specific quantity of items is picked into an Order Carton, and the Order Carton is delivered to the location nominated by the Warehouse Control System. Such Order Cartons may be subject to Pick Consolidation (see Section 3.3.3).

Each Order Carton picked to fulfil an Online / Store Order will require a Despatch Label [and Information Label] to be affixed prior to being despatched.

3.3.13   Receiving Processing

Receiving Processing is to facilitate the induction of product quantities from suppliers into the facility. The Receiving Processing is driven by Purchase Orders (a.k.a. Expected Receipt) issued by Red Prairie, and initiated by the arrival of product at the Receiving Area. The Warehouse Control System checks the contents of the Purchase Order against the actual product volumes received.

Embedded within the above mentioned checking process is the production of an Expected Receipt Report by the Warehouse Control System. This hardcopy report summarises the Purchase Order Lines and includes a scannable outer barcode for each line item. The inclusion of the scannable outer barcode is necessary because not all suppliers include a barcode on the Product Cartons.

NOTE: Red Prairie is expected to process product Returns by mimicking Purchase Orders.

Except for Indent Cartons, each Product Carton received into the facility requires unique LP affixed. This is to ensure that all Product Cartons can be identified and tracked, since not all suppliers include correct carton (i.e. outer) labelling.

Multiple Product Cartons are associated with a single pallet by use of an applied LP. The pallet is used as a container for the transport and storage of the Product Cartons within the facility. The initial destination of the pallet contributes to the selection of Product Cartons container thereon. The initial pallet destinations include, but are not restricted to, the following:

- CubiScan

    NOTE: CubiScan is used by Toll to facilitate the gathering of product volumetrics into Red Prairie. Red Prairie tags those products that require volumetrics to be gathered. The volumetrics are relayed to Warehouse Control System in order to cube Order Cartons.

- GTP Decant Stations
- Shelving / Reserve Store
- Bulk Store

      ■   Indent Cartons for Wide Aisle storage

      ■   Consolidated Client-specific products for Narrow Aisle storage

● Flat-packed garments for steaming by an off-site 3rd party VAS

> **NOTE:** Hanging Garment stock is loaded onto a bin within a Garment On Hangar (GOH) Trolley. The Trolley bins are unknown to Warehouse Control System at the time, but are identified during the receiving process.

Once the Purchase Order is complete, the Warehouse Control System directs the Tramming of pallets from the Receiving Area toward their initial destinations. The intermediate destinations of P&D positions at the North end of the Bulk Store facilitates the handover of the put-away operation to specific machines.

3.3.14 Sorting Processing

The equipment provided to facilitate Sorting Processing is identified in Section 2.2.5.4.

The Sorting Process for picked Order Cartons is as follows:

1. Unfinished Order Carton (i.e. for pick consolidation) are delivered to the Consolidation Sort Lane (aka. Reject Lane) for subsequent processing.

2. Unidentifiable / unexpected Order Cartons are delivered to the Reject Lane for analysis and/or corrective action.

3. Order Cartons destined for Sort Lanes 1 .. 4 will nominally be delivered to the Despatch Buffer (see Section 3.3.4).

   > **NOTE:** Induction of Full-Case Cartons and the release of Order Cartons for a specific Consignment Number needs to be manually coordinated by Toll.

4. Order Carton destined for Sort Lanes 5 .. 9 will nominally be delivered to those lanes without visiting the Despatch Buffer. An Order Carton delivered to these Sort Lanes will be manually associated with the cage / container marshalling pallet relevant to a specific Carrier, and then the Order Carton will be placed into that cage / container / marshalling pallet.

3.3.15 Despatch Processing

Carrier-specific cage / container / marshalling pallets are created during

● Bulk Direct Order Packing (see Sections 3.3.11.1),

● Individual Direct Order Packing (see Section 3.3.11.2), and

● Sorting Processing at Sort Lanes 5 .. 9 (see Section 3.3.14)

The contents of each cage / container marshalling pallet contributes to the Manifest for each Carrier. The Warehouse Control System will tracking the

creation and disposition of each cage / container marshalling pallet into trucks for Despatch. Tracking and disposition events will be relayed to Red Prairie which will be responsible for informing the appropriate authorities. Concurrently the Warehouse Control System will produce appropriate Driver Manifest documentation.

3.4 System Design Rates

Where defined, the design rate for movements between entities within the Materials Handling System for the Sydney Fashion Distribution Centre is included in Figure 13.

Notwithstanding, acceptance criteria for the Dematic deliverables are as follows:

1. **Product Tote delivery Rate**

   The demonstration of a 1:1 RapidPick Station to meet-or-exceed delivery of 550 Product Totes / Order Cartons per hour at a single GTP Station.

   NOTE: Apparel pick rates are calculated at sustained pick rates of 550 lines per hour and Footwear sustained pick rates 325 lines per hour. This assumes product suitable for each grab picking, that has been appropriately prepared at decant for high picking, with trained pickers. (Approx. 5 seconds is provision for pick time for apparel).

2. **System Load**

   The demonstration of a combined Product Tote / Order Carton rate at a module of four (4) GTP stations meeting-or-exceeding 2,200 Product Totes per hour, equating to a throughput of 13,200 Product Totes per hour when considering the 24 workstations.

   NOTE: Dematic will demonstrate a System Load test while other functional areas of the order picking system operate at average rates as outlined in the materials flows

3.5 WCS Reporting

The Warehouse Control System includes a report server and configuration for a number of reports. The report server allows Toll personnel to configure their own reports and includes a number of tools to automate this process on an ongoing basis, such as auto-publishing the reports via email. Training is included to ensure that the appropriate Toll personnel are conversant in how to use the Report Writer tool.

The initial set of reports which will be configured by Dematic are:

- Inventory location contents (including last accessed date)

- Wave/Order status

- Orders, lines, units, shippers completed with details by total, order, line, shipper

- Orders, lines, units, shippers outstanding with details by total, order, line, shipper

- Orders, lines complete per brand and product group, etc. per module

- Sort lane configuration/allocation

- Sort lane status (e.g. lane full indication)

- Zone, station, machine, line status

- Operator/station productivities

- Event records including time-stamped data where those events are fed to the WCS

- Document and label reprinting functionality (at workstations)

- System faults

In addition the Warehouse Control System provides wave workload planning and management tools, based on known order line demand and average work rates per area.

The Warehouse Control System is required to generate sufficient data and statistics within the Management Information System in order to satisfy the above mentioned reports.

NOTE: Online reports may be realised as stored queries within the Warehouse Control System.

3.6   Key Performance Indicators (KPIs)

The Warehouse Control System is required to generate sufficient data and statistics within the Management Information System in order to satisfy the following Key Performance Indicators.

Table 30   Key Performance Indicators

KPI	Description	Qualifier ①
Receiving	Measures the inbound performance of the operation, ensuring that the maximum stock availability is achieved. Inbound Purchase Orders at SKU level received will be put-away and available for picking within the next working day (panning business days only) of the receipt time per date for that Purchase Order.	$\%Orders = 100\,x$ $\left(1 - \dfrac{\sum SKU\_not\_putaway}{\sum SKU\_putaway}\right)$ … within 24 hours
Inventory Accuracy	Measures the level of Stock on Hand (and stock accuracy) or Nett adjustments at SKU level relative to the units processed outbound.	$\%Accuacy = 100\,x$ $\left(1 - \dfrac{\sum units\_adjusted}{\sum units\_processed}\right)$ … wrt. SKU level

Table 30   Key Performance Indicators

KPI	Description	Qualifier ①
Picking Indent Orders	Measures the % of indent orders that are processed in accordance with the "indent" requirements for all brands. An order is defined as available for despatch when the order has been picked in full (excluding short picks and items not available) and systemically staged in the despatch staging area.	$\%Orders = 100\,x\left(1 - \dfrac{\sum orders\_not\_available}{\sum indent\_orders}\right)$
Picking Replen Orders	Measures the % of Replan Orders that are processed in accordance with the "Replen" requirement for all brands. An order is defined as available for despatch when the order has been picked in full (excluding short picks and items not available) and systemically staged in the despatch staging area.	$\%Orders = 100\,x\left(1 - \dfrac{\sum orders\_not\_available}{\sum replen\_orders}\right)$
Picking Online Orders	Measures the level of Stock on Hand (and stock accuracy) or Nett adjustments at SKU level relative to the units processed outbound. An order is defined as available for despatch when the order has been picked in full (excluding short picks and items not available) and systemically staged in the despatch staging area.	$\%Orders = 100\,x\left(1 - \dfrac{\sum orders\_not\_available}{\sum online\_orders}\right)$
Cross Lines	Measures the level of Stock on Hand (and stock accuracy) or Nett adjustments as SKU level relative to the units processed outbound.	$\%CrossLines = 100\,x\left(\dfrac{\sum units\_short\_picked}{\sum units\_shipped}\right)$
Utilisation	Measure the site utilisation as a percentage of the expected yearly unit throughput. The expected yearly unit throughput are statically defined values.	$\%Utilisation = 100\,x\left(\dfrac{\sum units\_shipped}{\sum units\_expected}\right)$

① Each KPI is to be provided as a total split by Brand.

> **NOTE:** The KPIs listed in Table 30 originate from the Toll issued "2.01 Project Enterprise_Business Requirements Document", dated 3-Jun-2016. This document post-dates the contract between Toll and Dematic.

Appendix A. Project Variations

Table 31 lists the project variations that have been approved by Toll at the time of this document being released.

Table 31   Project Variations

Variation	*Title* / Description	Status
VAR.06418-5	*Carton Lidder 2nd lid magazine* Dematic has been instructed to provide a 2nd magazine to two of the three carton lidding machines. The second magazine will enable coloured lids to be applied to signify "Click and Collect" and be visible from the side when cartons are stacked above. The second magazine will be applied to the two Fixed machines that are not set up for change over.	Client Approved
VAR.06418-6	*Deletion of 1,000 online order picking totes* Dematic has been instructed to provide Variation pricing to delete 1,000 Online Order Picking Totes	Client Approved
VAR.06418-7	*GTP: Deletion of weighing scales at 16 Decant stations* Dematic has been instructed during WCS FDS workshops to provide Variation pricing to delete weighing scales from the 16 Decant stations.	Client Approved
VAR.06418-8	*Credit for reduction in Label Applicators post-Lidding in the Finishing area* During detail design, layout changes around the Lidder area, re-positioned the Lidders from being "in series" to be "in parallel". This resulted in:- a. Change to number of label Applicators : ■ Originally with 3 Lidding machines "in series", there were 3 Print & Apply Label applicators (Despatch labels) and 3 Apply only label applicators (Click & collect - Signature required sticker). ■ Following changes to the mechanical lay-out, such that the Lidders were positioned "in parallel", and the replacement of Click and Collect stickers by coloured lids (ref. VAR.06418-5), the system now requires 4 Print and Apply LPA's. b. The nett change, while ostensibly a reduction of 2 machines, is in fact a loss of 3 Apply Only label applicators and a gain of 1 Print & Apply LPA machine.	Client Approved

Table 31   Project Variations

Variation	*Title* / Description	Status
VAR.06418-9	*Relocation of document insertion to become upstream of Finishing* Dematic has been instructed to provide Variation pricing to a. add 1 extra Document insertion machine (PSI) b. add extra conveyor and functionality to operate a pair of Document insertion machines on the Mezzanine, upstream of the Finishing Area To provide the capability of inserting Returns and/or VASing documentation for online order cartons upstream of the Finishing Area. The operation is to include Returns documentation into each online order carton irrespective of whether the carton is destined for a Packing Station or Finishing. The only exception would be batch picked orders that have multiple Single Line Single Unit (SLSU) orders within the order carton. This exception requires VASing documentation inserted where the Returns documentation is produced at the Packing Station for each order contained within the order carton. Click-to-Collect order cartons receive neither Returns nor VASing documentation. The two divert lines needed for document insertion after the Pack Stations shall remain (with appropriate network and power connections supplied by Toll), however only 1 Document inserter will be supplied for this location. This arrangement will provide a future upgrade path to add in an extra Document inserter at this location.	Client Approved
VAR.06418-10	*WCS change: C2CB Click to Collect Type B* Dematic has been requested to provide a Variation to WCS functionality to supply new Click to Collect (B) functionality. For clarity, this change is described within this Variation. The original Click-to-Collect order type has been expanded to include C2C and C2CB order types. All Click-to-Collect orders will be consolidated against the Consignment Number assigned by Red Prarie into separable order cartons. The order lines for each of the C2C and C2CB order types will be appended by Red Prarie to include a GTP pick of satchels which are picked as standard stock SKU. These satchels are to be the last items picked for the consolidated orders, as defined by Red Prairie. The C2C order cartons will bypass the Packing Stations and are directed to 'finishing'. The C2CB order cartons will be directed to a Packing station where an operator will repack the order items into the picked satchels which are NOT fed onto the Satchel Take-away conveyor. If the Packing Station has an Autobagger, then the Autobagger is to be prevented from feeding satchels onto the Satchel Take-away conveyor. The C2CB order cartons will rely on VASing documentation which is either inserted by the document inserter upstream of the Finishing Area, or produced at the Packing station. Once complete, the VASing documentation is discarded, the satchels are returned to the order carton, and the order carton is returned to the take-away conveyor for 'finishing'. Both C2C and C2CB last order cartons receive VASing documentation from a document inserter within the Finishing Area. All Click and Collect cartons are lidded with a coloured lid, labelled, buffered and sorted. There is a small amount of additional effort for DAI in printing the Vassing order list, and then handling the Vassing order list at a pack station, as implied and described above, the cost of which will be absorbed.	Client Approved

Table 31   Project Variations

Variation	*Title* / Description	Status
VAR.06418-11	*Store Ready Sequencing changes: Store Delivery configurable by Brand, Dept…Product Group, Style, …* Dematic has been requested to provide WCS changes to accommodate Store Ready Sequencing changes such that Store Delivery is configurable by Brand, Dept…Product Group, Style, Colour, UPC barcode. Sequence of GTP picking, using a configurable header (supplied by Toll), which identifies up to ten (10) sequencing fields for DAI WCS to follow when sequencing Style/Colour/UPC and more. Footwear is permitted in a carton with garments provided it is on bottom of the carton. The sequence of products to be picked will be defined in the Product Group field which has a numeric prefix defined by Red Prairie. Dematic can confirm that with respect to the "Store Ready Sequencing, subject to rules to be determined", the discussions to date between Toll and DAI have resulted in; a. Red Prairie sending WCS for each order the hierarchy in which the sequencing criteria can be applied for that order; b. A max number of hierarchies is yet to be agreed, but no more than 10. This approach simplifies Despatch Unit DU build logic.	Client Approved
VAR.06418-12	*Consolidation of GTP+GOH picks with manual picks for ecom orders* Proposed functionality is a change of WCS functionality and in summary involves the following steps: ● Manual picks are not planned onto pick trolley (Note Trolleys supplied by Toll) ● GTP+GOH pick carton bypasses optimisation, lidding, labelling. Carton is routed by default to despatch sorter reject ● RF unit operator loads GTP+GOH pick carton onto discrete trolley, performs manual picks logically into same carton ● Web OM operator splits logical carton into physical DUs, generates SSCC with despatch label for each	Client Approved
VAR.06418-13	*Credit to remove tilt and platforms on 4x outbound extendable conveyors* Credit to remove tilt and platforms on 4x outbound extendable conveyors. Dematic's offer did not specify a provision of tilt and end platforms on Extendable conveyors. Nonetheless, budget cost allowance was made, and given Toll's preference for a requirement for tilt and end platform on the 2 x Receiving/Inbound extendable conveyors, a credit is provided for tilt and end platforms on 4 outbound Extendables. Note that as Dematic's cost allowance for in-slab rails to allow traversing of Extendable conveyors (Receiving/Inbound) was sufficient only for 4 x Dock Doors, Toll have advised the preferred 4 to be serviced by traversing Extendable conveyors are those closest to the Outbound Despatch docks.	Client Approved

Table 31   Project Variations

Variation	*Title* / Description	Status
VAR.06418-14	*WCS Change : add Receiving Functionality* The Contract excluded Receiving functionality from WCS scope (refer 2.6 "WCS Software" - "Receiving" ; for all Receiving functions listed, the responsible system for Receiving was Toll WMS). Toll have requested that Dematic/DAI includes Receiving functionality with the WCS scope. Toll will undertake Returns functionality. The Receiving Functionality is bounded by the arrival of stock on the dock at Enterprise (WH 5) for both manual and automated elements of the WCS, up to the point of Putaway (to manual rack or Decant). It includes: ● The validation of physical stock to expected stock as defined by Red Prairie. Receiving User Interfaces (MOI) will be provided. ● Receiving, including PO management / reconciliation ● Flat items: single-SKU pallet build / carton LPN labelling where required / pallet unique ID / pallet height checking ● Hanging items: rail build / item unique ID where required / rail unique ID ● Put pallets / rails to inbound marshalling ● Cross dock put to inbound marshalling ● Flat packed garments to 3rd party steamers, returned as GOH The functions of returns, delivery scheduling, dock management, gatehouse and yard management and unloading are excluded from the WCS scope of work for Receiving.	Client Approved
VAR.06418-15	*WCS Change : add Despatch Functionality* The Contract excluded Despatch - Loading functionality from WCS scope, stating in Section 2.6 WCS Software "Despatch- Loading" that the responsible system for Loading was Toll WMS. Toll have requested that Dematic/DAI includes Despatch functionality with the WCS scope. Functionality includes association of Shippers (satchels, order cartons) with Despatch Units (Cages, marshalling pallets, full cases, GOH bags) at Despatch for both manual and automatic elements of the DC. Tracking and disposition of Despatch Units into trucks for Despatch. Despatch MOI will be provided.	Client Approved

VAR.06418-16	*Dimensioning and weighing of Full Case cartons to Despatch sortation from Full Case Induct & Lidders*	Client Approved
	Current scope covers the scanning of top mounted Despatch bar code labels en route to the Sortation. During the FDS workshops in August, Toll has requested the ability to dimension Indent Cartons that are manually inducted as Full-Case Cartons (as they are not cubi-scanned), L x W x H. Weighing was also requested for freight rate purposes at Despatch. In order to do so, Dematic proposes an alternate layout and equipment that:	
	● combines dimensioning with the current overhead scanning capability ;	
	● includes the supply and integration of a weighing conveyor upstream of the sorter (not in original scope), to be co-located with the dimensioner/scanner unit	
	● includes floor cutaway to permit the headroom for the overhead scanner, providing adequate depth of field for scanning to maximum height cartons,	
	● includes fall/bump protection (handrails/kickplate), where needed,	
	● includes AS 1657 compliant maintenance access platform with 2 x step type access ladders	
	● upgrade of original conveyor to include extra accumulation conveyor needed to buffer cartons due to relocated scan position. (The location has been selected to accommodate the combined weigher/scanner/dimensioner at a location that reads both Full Case cartons (Indent) and Lidded cartons (from GTP)	
	● credit for loss of roller conveyor replaced by the belt weighing unit.	
	Notes	
	1. The dimensioning and weighing will not be of an accuracy certified for Trade Use,	
	2. For the avoidance of doubt, this Variation includes WCS uploads of such dimensions and weights of those items that are transported on the sorter,	
	3. WCS records the most recent dimensions and weight reported by the PLC for a carton / case,	
	4. WCS does not validate the dimensions or weight and does not use them to route or reject the carton / case,	
	5. WCS passes the measured dimensions and weight through to Red Prairie in the VEH message for the carton / case,	
	6. WCS does not attempt to prevent any carton / case whose dimensions or weight are unknown from being loaded onto a trailer,	
	7. WCS passes zero values for the dimensions and weight through to Red Prairie in the VEH message if unknown for the carton / case,	
	8. The measurement, weighing and reporting of other items such as satchels, non conveyables, palletised cartons that are not conveyed on the despatch sorter, is excluded from the scope of this Variation. The manual recording of volumetrics of such items, not conveyed on the Despatch sorter, is outside the scope of this variation, and would be best handled by Red Prairie, if needed.	
	WCS WMS interface will need further review and amendment for interface with Red Prairie, to enable reporting back by carton SSCC to Red Prairie, in accordance with the Notes above.	

Table 31 Project Variations

Variation	*Title* / Description	Status
VAR.06418-17	*Impact of DA req'ts: Change of Site Overtime from 2 shift to 5 x 10 hr days* During the bid stage for Project Enterprise, Dematic agreed to accelerate the site schedule by working a 2nd shift for GTP rack installation, mezzanine floor installation, & conveyor mech/elec installation, to achieve PC by 19/10/17. In return Toll accepted shift uplift costs which were included in the Contract Sum. Planned work hours 5 days per week - 6:00am to 10:30pm. At a recent site meeting, the Builder advised that due to DA noise restrictions, work is only possible between 7am and 6pm, and 8am -1pm on Saturdays. Action Dematic has been asked to identify the time impact of working within the DA permitted hours, and provide options to mitigate. Please refer to Dematic letter dated 5th October for Options, in which Option "New 2" was later accepted by email from Toll (Leon Land email dated 11th October 2016), resulting in ● 5 x 10 hr days ● Saturdays for a small crew for preparation activities	Client Approved