



Motorised trolleys for transport of Haemodialysis and Reverse Osmosis Machines

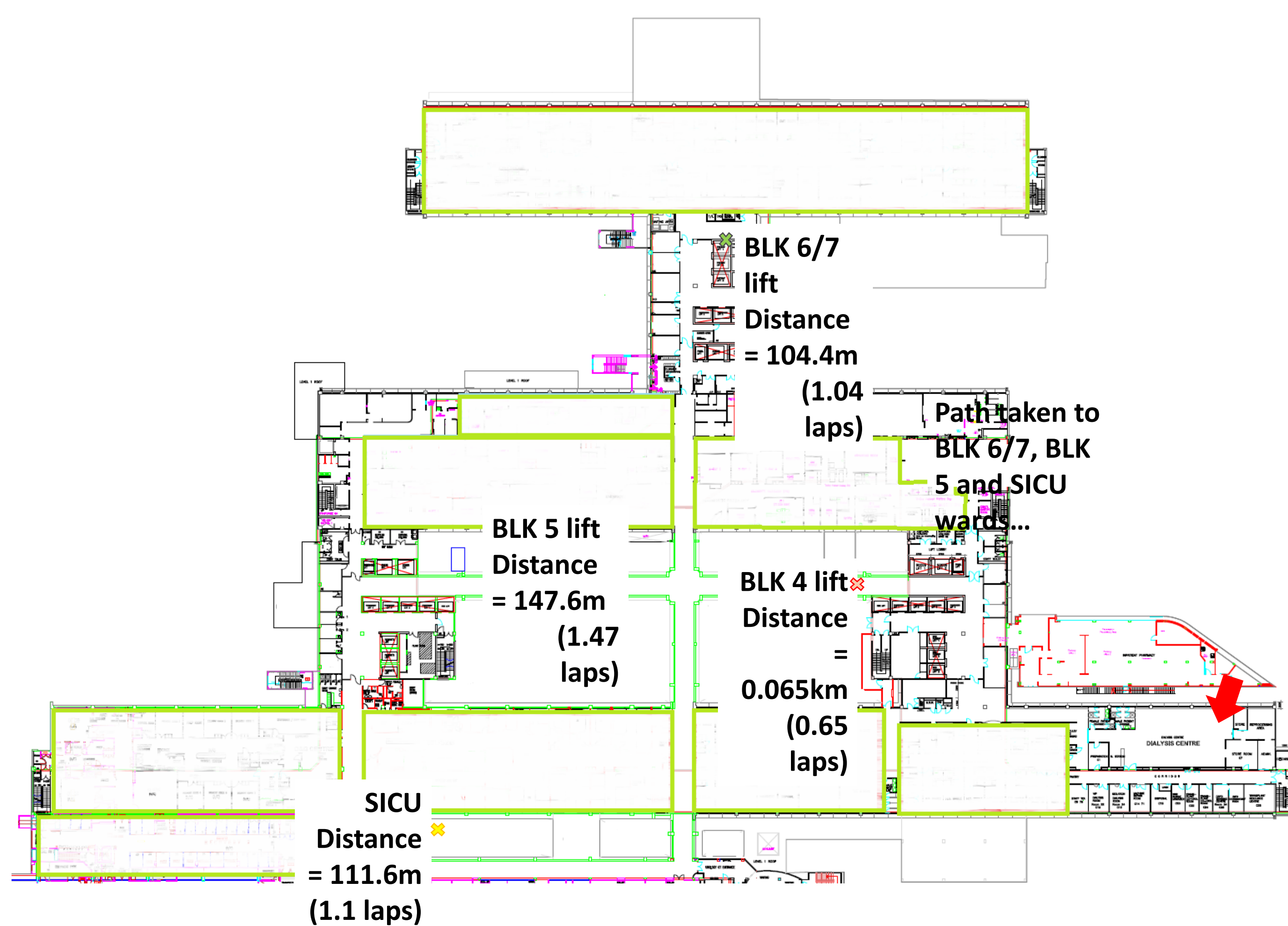
Background

Annually RDC provides about 6,428 off-site haemodialysis treatments to Renal inpatients who are unable to receive haemodialysis services at the Renal Dialysis Centre (RDC) situated at Singapore General Hospital.

To provide off-site dialysis services, nurses are required to manoeuvre a dialysis machine which weighs about 73-86 kg, as well as a reverse osmosis (RO) machine which weighs about 33 kg. Moreover, these machines are not designed for long distance manoeuvres.



To provide a single dialysis session, nurses will need to make four trips to and fro Renal Dialysis Centre. The distance for each trip travelled varies from 64 metres to 295 metres. Hence, the aim of this project was to design and build a motorised trolley that can transport the two machines at the same time.



Method and Results

A multi-disciplinary team, consisting of members from Nursing Division, Facilities and Management Engineering, Biomechanical Engineering and Workplace Safety was formed to work on the process improvement to increase productivity.

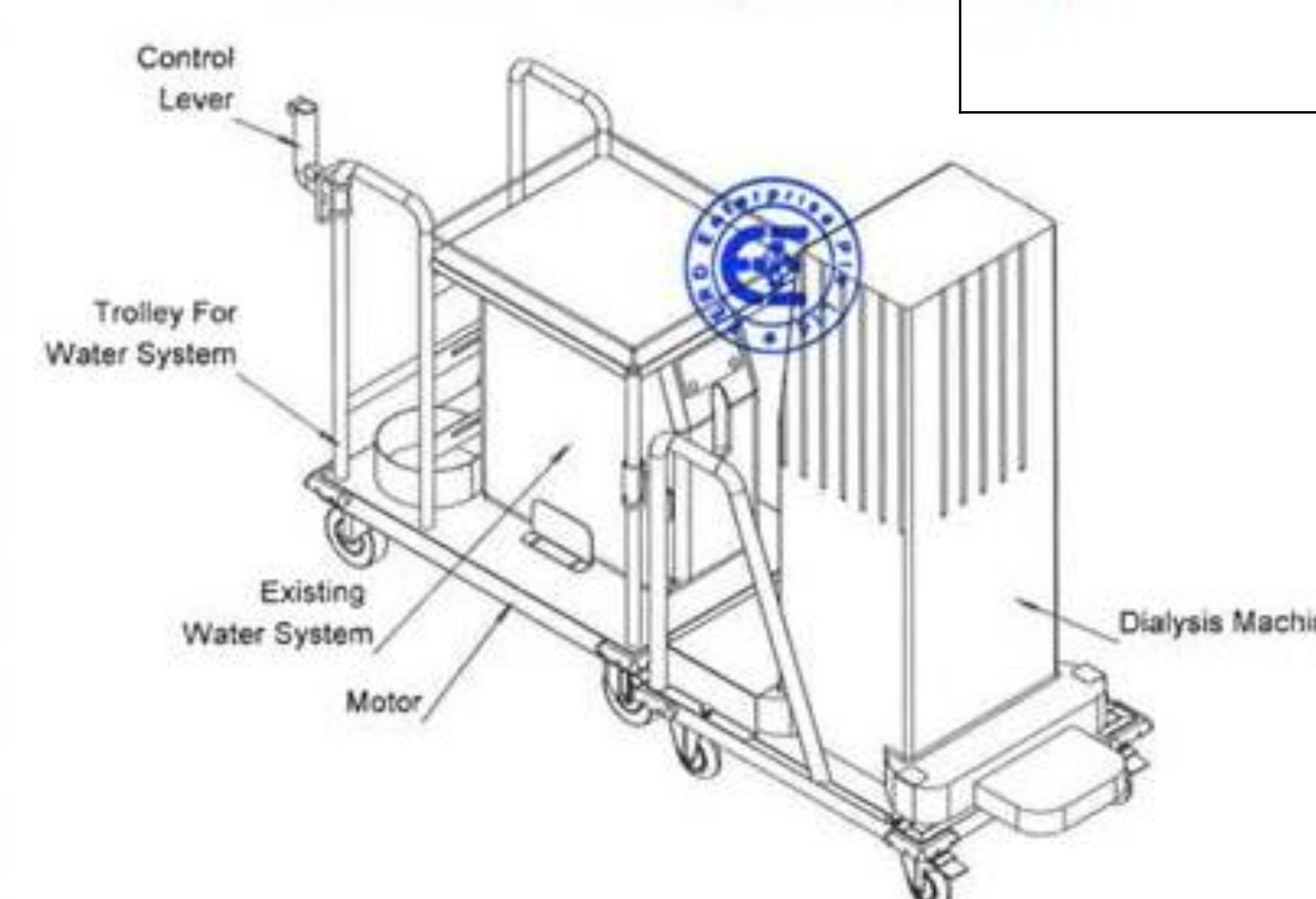
Prototype 1



Key Features	Areas that need Improvement
Dialysis machine mounted on motorized trolley	• Risk of electric shock as motor not sealed off from dialysis machine
RO machine attached to dialysis machine	• Hard to maneuver in both ways (forward and backward)
Steering via a hand lever	• Frames limited access to machines during maintenance and repair
	• Lack of braking mechanism

Prototype 2

The operator guides the motorized trolley with the control lever from the front with a clear line of sight.



Key Features	Rationale
RO machine mounted on motorized trolley	• Less exposure of trolley motor to spills and splashes
Trolley frames changed to removable types.	• For ease of access during maintenance
RO water trolley to provide side access for maintenance	
Front base cover (between machine and trolley base)	• For ease of cleaning
Compact and lighter design	• As there is no braking system in the motor, a lighter trolley would be easier for the operator to control and stop

The use of the motorised trolleys helped to:

- Reduce turnaround time between hemodialysis sessions
- Enable more dialysis sessions to be provided
- Improve Ergonomics at the workplace, thereby reducing risk of occupational injury and illness related to prolonged push/pull manoeuvres of heavy machineries

Conclusion

[WITHOUT TROLLEY]

Total time required to provide 1 dialysis session = dialysis cycle (4 hours) + transport time for machines (80 mins ie 1.3 hours) = 5.3 hours
FTE required (number of available hours per nurse per shift:7) = 0.75 FTE



A motorised solution helped to ensure workplace safety and staff's health during transport of equipment, and lead to enhanced service provision for patients.

[WITH TROLLEY]

Total time required to provide 1 dialysis session = dialysis cycle (4 hours) + transport time for machines (40 mins ie 0.6 hours) = 4.6 hours
FTE required (number of available hours per nurse per shift:7) = 0.65 FTE

Hence savings = 0.1 FTE per trolley