EQUIPMENT PLANNING PROCESS FOR HOSPITAL / HEALTH CLINIC CONSTRUCTION PROJECTS

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Planning Division MOH

Health Facility Planning Seminar For Hospital & Health Mangers
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Equipment Planning Process

1. **Equipping health facilities need detail planning and coordination, clinical needs and the equipment requirements are met with the design and function**
2. Medical equipment is a vital component in healthcare delivery
3. Integration of clinical experience, design knowledge and experience with medical equipment
4. Equipment is a major part of project planning process
5. Usually **40% of total project cost**
    i. 20% - M&E related equipment
    ii. 20% - medical equipment

Responsibility

1. **Hospital / Clinic managers / End-users**
   - To determine all the items of equipment necessary
2. **Architects**
   - built-in equipment
3. **Engineers**
   - M&E, ICT related equipment (fixed building equipment)
4. **Equipment Planners**
   - determine medical and non-medical equipment
5. **Medical Planner**
   - determine space required in clinical areas

Equipment Classification

Equipment shall include both loose medical and non-medical equipment, medical furniture, consumables, as well as vehicle

Shall be supplied complete with accessories, software necessary for the operation and use of supplied equipment

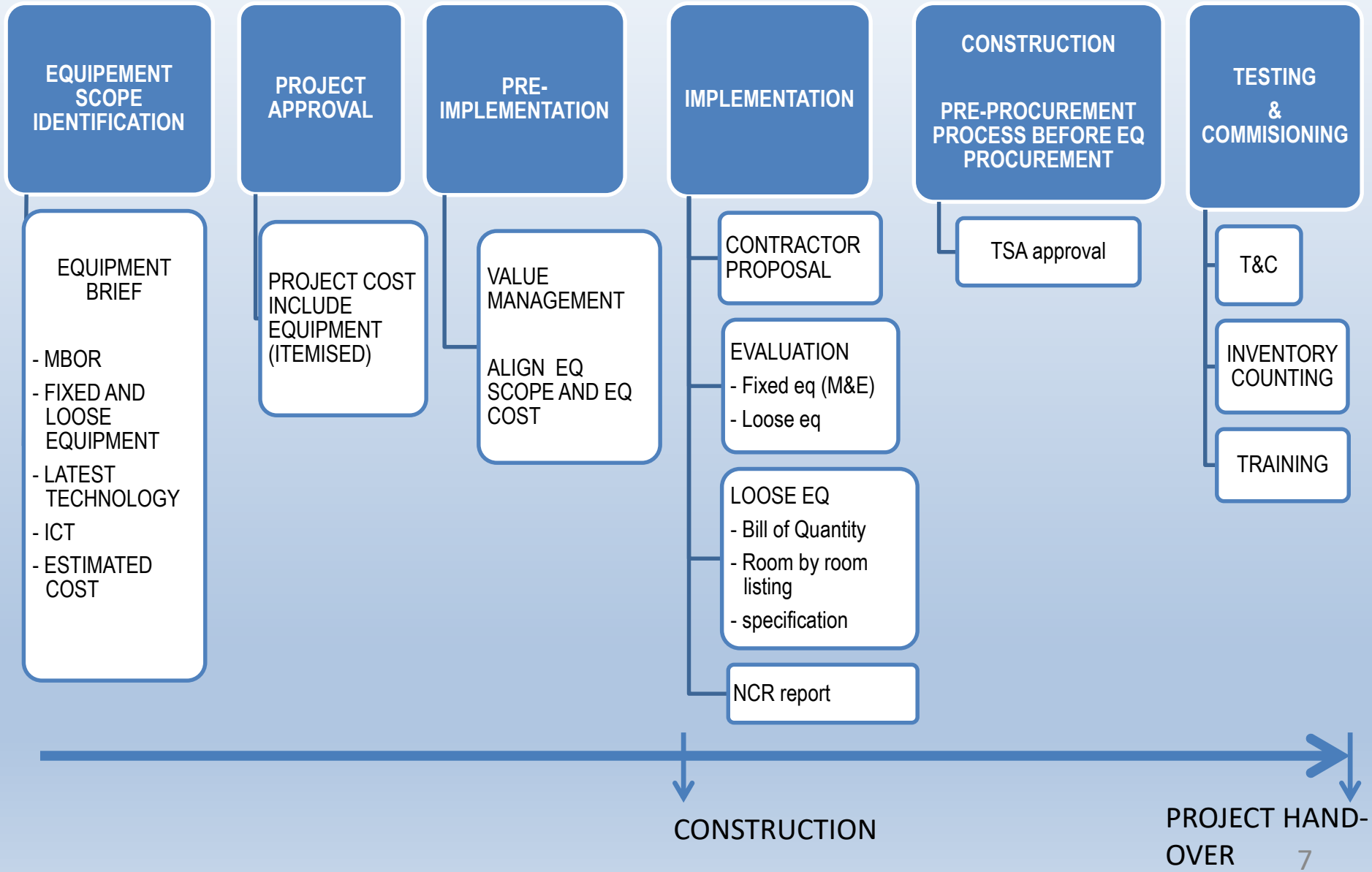
Medical Equipment Classification – Terminology 1

Equipment Group	Definition
Group I	Requires **major mechanical & electrical work related major medical equipment, coordination within building contract** Supplied by contractor Eg : sterilizers, mortuary equipment, dental unit, diagnostic imaging, operating light, operating table
Group II	Requires major mechanical & electrical work related major medical equipment, coordination within building contract Supplied by client Eg : salvageable items from existing facility
Group III	**'Plug and play"** equipment with normal M&E requirements easily connected to standard electrical outlets and/or water source Planned and/or supplied by contractor / procure by client Eg : ultrasound machine, ventilator, ECG machine, dialysis machine, endoscopy system, etc Shall also include loose medical and non-medical equipment, medical furniture, surgical instruments
Group IV	Other loose items, consumables, storage implication No M&E requirements within the building contract - vehicles

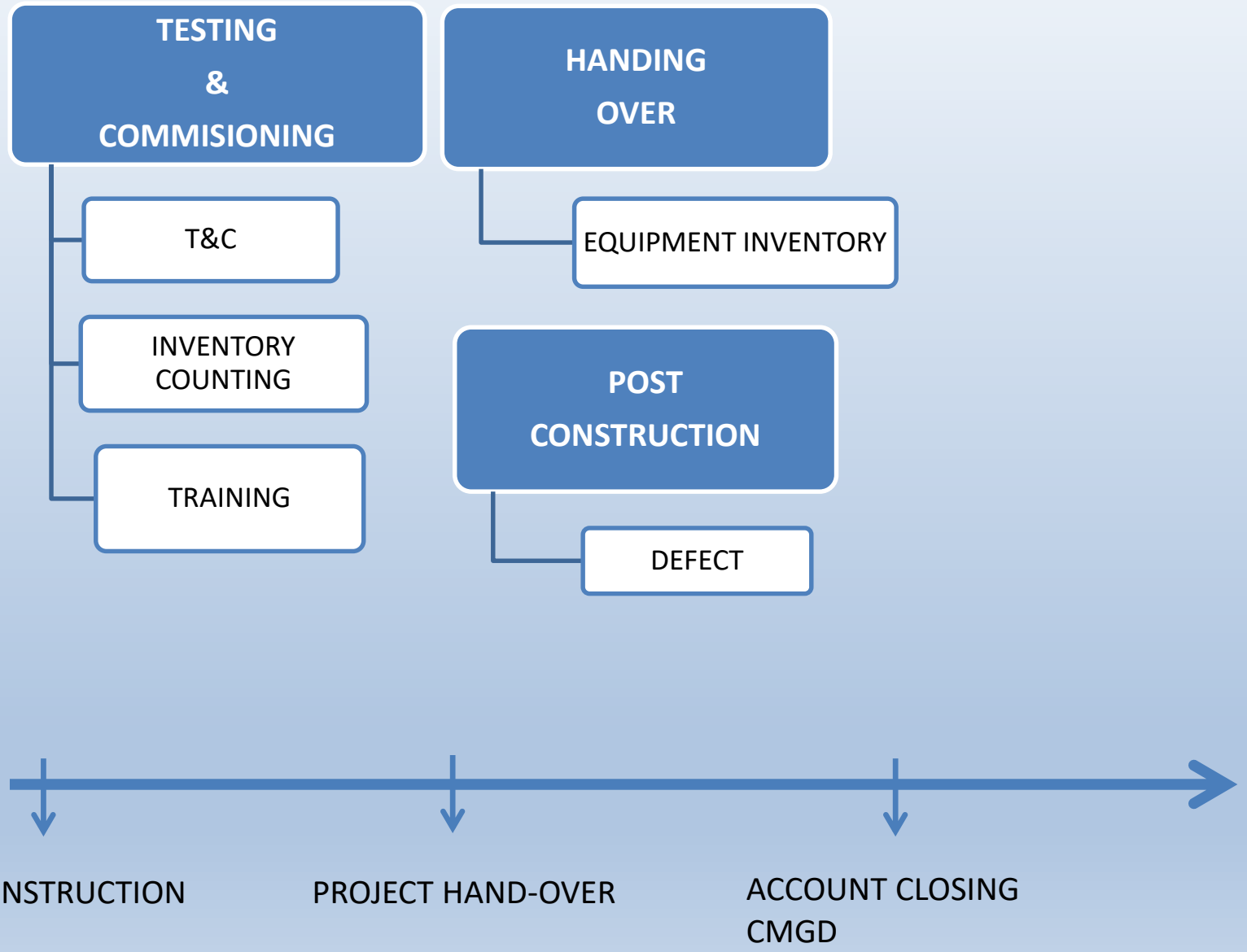
Medical Equipment Classification – Terminology 2 (Simplified)

Equipment Group	Definition
Fixed Medical Equipment	Requires major mechanical & electrical work related major medical equipment, coordination within building contract Eg : hydrotherapy pools, audiometry testing chambers, imaging equipment, dental chairs, OT light & table, etc
Loose Medical Equipment	'Plug and play" equipment with normal M&E requirements easily connected to standard electrical outlets and/or water source, portable Eg : ultrasound machine, ventilator, ECG machine, dialysis machine, endoscopy system, etc Shall also include medical furniture, surgical instruments Medical furniture – pt beds, transfer trolley, dressing trolleys,

Equipment Planning Process



Equipment Planning Process (cont..)



Equipment Planning Process

1. EQUIPMENT SCOPE IDENTIFICATION

EQUIPMENT BRIEF

- MBOR
- FIXED AND LOOSE EQUIPMENT
- LATEST TECHNOLOGY
- ICT
- ESTIMATED COST

a) Preparation of equipment brief of requirement

b) Both fixed and loose equipment requirement

c) Equipment shall be latest technology

d) Equipment specification

e) Incorporation of ICT requirement

f) Determination of estimated cost

Equipment Planning Process

2. PROJECT APPROVAL

PROJECT COST INCLUDE EQUIPMENT (ITEMISED)

Approved project cost inclusive of loose equipment cost

Project cost = Building Cost + Loose Equipment Cost

3. PRE-IMPLEMENTATION

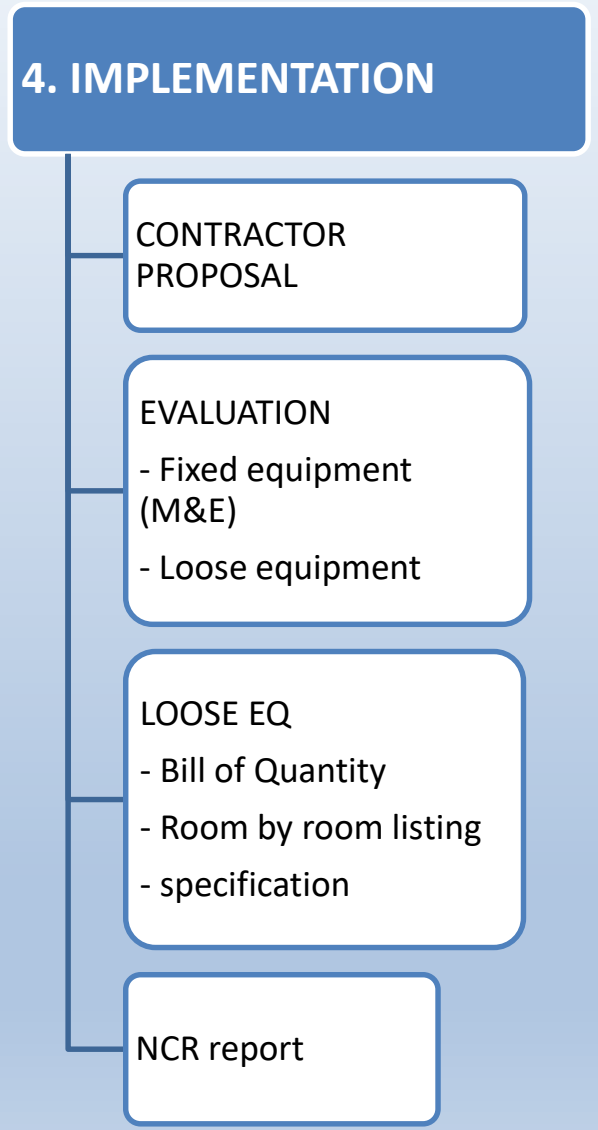
VALUE MANAGEMENT

ALIGN EQ SCOPE AND EQ COST

a) Value management conducted to match equipment scope and equipment costing

b) Adequate for function

Equipment Planning Process



a) Evaluation of contractor proposal

- ✓ Fixed (M&E Documents)
- ✓ Loose (Equipment Documents)

b) Analyzing both fixed and loose equipment proposal

- Quantity
- Distribution
- Specification – latest technology
- Brand (3 brands)

Shall comply with scope - MBoR / equipment brief

c) Preparation of non-conformance report

Equipment Planning Process

5. IMPLEMENTATION / CONSTRUCTION

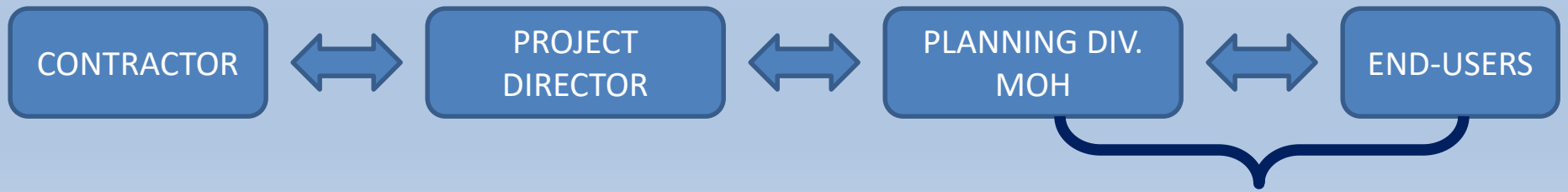
PRE-PROCUREMENT PROCESS BEFORE EQ PROCUREMENT

TSA approval

a) Room data interaction – equipment requirement inputs (fixed & loose equipment)

b) Receive of technical specification adherence (TSA) from PWD for procurement

c) Selecting the equipment
   i. TSA approval
   ii. Consultation (HOD, clinicians, medical staffs, technical staffs, etc)
   iii. Interaction between project team /contractor/supplier
   iv. Product presentation / factory visit



Key Performance Indicators = 30 WORKING DAYS

Equipment Planning Process

6. IMPLEMENTATION / CONSTRUCTION

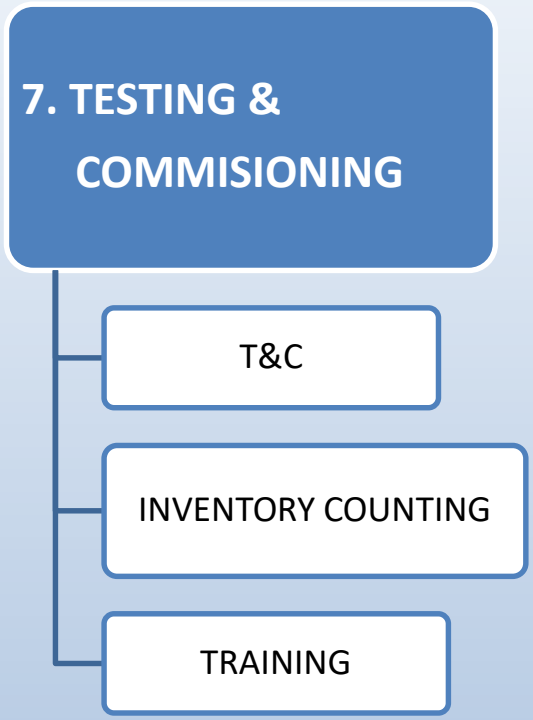
PROCUREMENT PROCESS

a) Procurement is carried out at 50 – 60% project progress

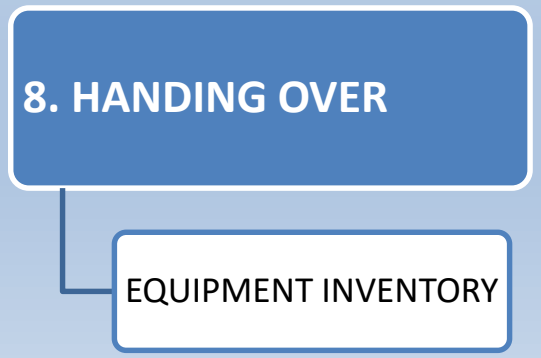
b) Building is ready to accommodate placement / storage of equipment

Project method	Design & Built		Conventional
	Turnkey	Non-turnkey	
TSA	√	√	×
Procurement			
Fixed Eq	PWD	PWD	PWD
Loose Eq	PWD	MOH	MOH

Equipment Planning Process

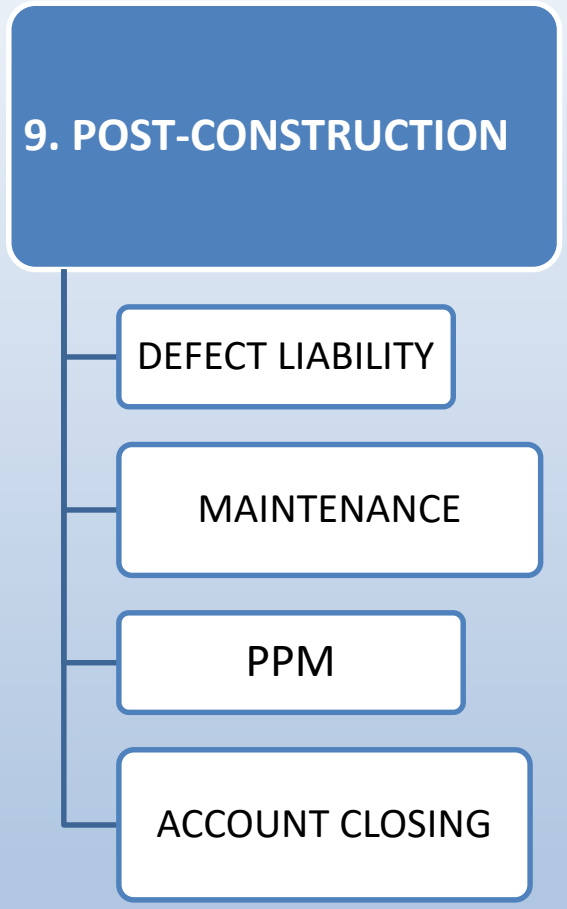


a) Testing & commissioning of medical equipment (fixed & loose items)
b) Inventory counting
c) User training



a) Assets registration - equipment inventory (KEW-PA)
b) Equipment listing – Bill of quantity (room by room, departmental)
c) Associated documents - warranty, manual, license

Equipment Planning Process

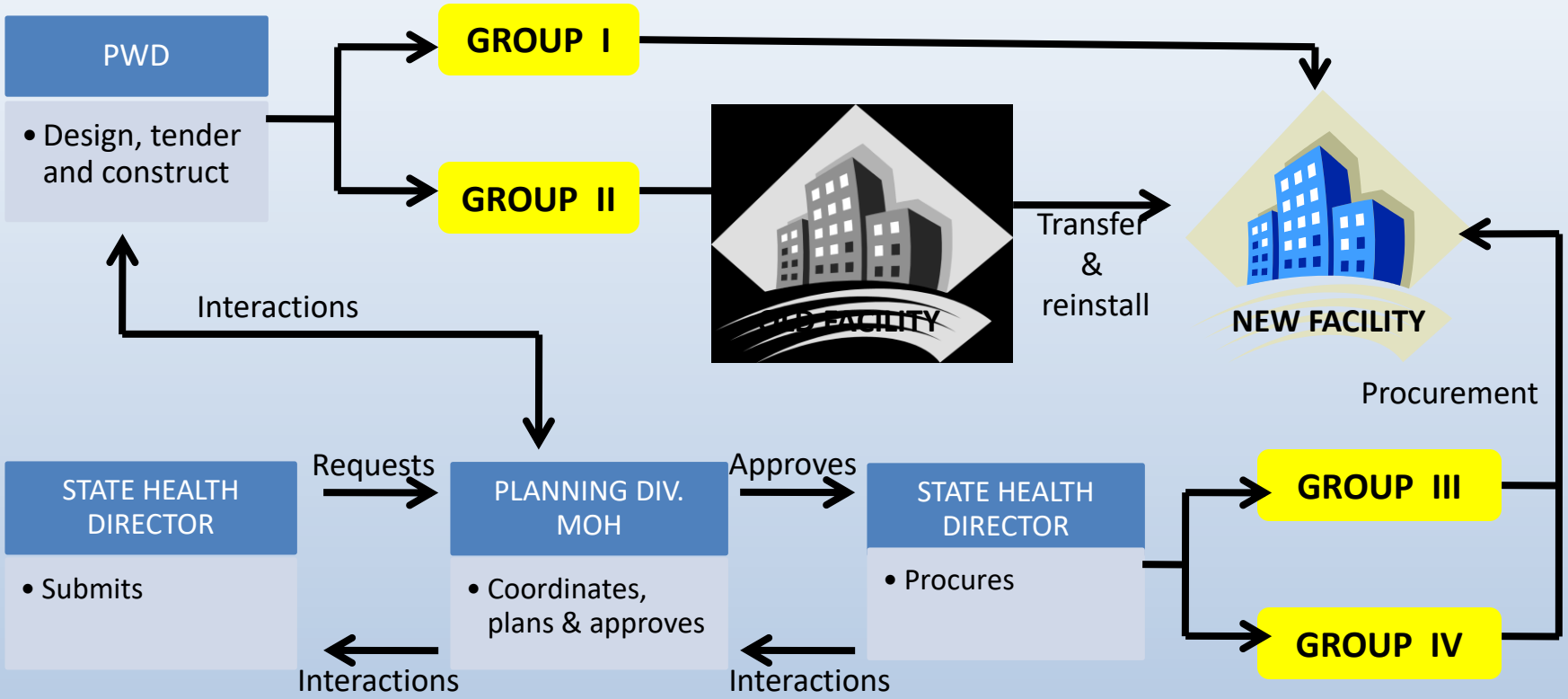


a) Defect liability period is either 12 / 24 months (from the date of practical completion)

b) Defect identification and rectification

c) Schedule maintenance shall be performed

Flow Chart For Equipment Acquisitions



ENGINEERING DIV. MOH	MEDICAL DEV. DIV. MOH	DEVELOPMENT DIV. MOH	OTHER DIVISIONS
• Sets technical policies • Technical inputs • evaluation	• Sets policies • Technical inputs • evaluation	• Issues warrants	

TECHNICAL SPECIFICATION ADHERENCE (TSA) FORM

Item Code : MLM-B002 Quantity 2
Item Description : Light OT Ceiling Main 110k + Sate 80k Lux 4300K Clr Temp C/W Cam Attachment Facility

This Proposal General Information :
Brand : Trumpf Kruezer
Model : Trulight 5300 / 5300 with camera preparation
Country of Origin : Germany
Local Supplier : Malaysian Healthcare Sdn Bhd

Contract Ref : JKR/IP/CKUB/42/2009
Sub No. : 2
Date :

Brands proposal in Contract :

Brand No. 1 : Trumpf Kruezer	Brand No. 2 :	Brand No. 3 :
Model : Trulight 5300 / 5300 with camera preparation	Model : Dr Mach	Model : Maquet
Country of Origin : Germany	Country of Origin : Germany	Country of Origin : Sweden
Local Supplier : Malaysian Healthcare Sdn Bhd	Local Supplier :Schmidt Biomed Tech	Local Supplier : IDS

a) General Specification :

TruLight LED Surgical Light complete with camera preparation

b) Technical Specification :

Lighting data	TruLight 5300 (Main Light) / TruLight 5300 (Satellite Light)
Central illuminance at 1m distance	130,000 lux
Dimmable from / to	100 - 30 %; 5 % endo
Focusable size of light field at 1m (d10)	200 mm (7.9")
D50 / D10 Ratio	~ 0.53
D50	~ 110 mm (4.3")
Colour temperature	4.500 K
Colour rendering index (CRI)	Ra 94
Total irradiance at 100.000 lux (max.allowable 600 W/m2)	356 W/m2
Irradiance intensity	3.48 mW/m2/lx
Remaining illumination with 1 masks	71,500 lux / 55 %
Remaining illumination with 2 masks	57,200 lux / 44 %
Remaining illumination with tube	128,700 lux / 99 %
Remaining illumination with tube and 1 masks	71,500 lux / 55 %
Remaining illumination with tube and 2 masks	57,200 lux / 44 %
Depth of illumination L1 + L2	1,150 mm (45")

Electrical data	TruLight 5300
Power pack supply voltage	100 – 240 V 50 Hz
Power pack supply voltage DC -DC box	19 - 36V DC 21.6 - 26.4 V AC
Rated power per light head	65 VA /72 VA
Power consumption (total system)	110 VA / 125 VA
Maximum power consumption (total system)	140 VA / 155 VA
Max. power input at 24 V AC/DC	< 6.0 A / < 6.5 A
Max. power input at 115 V AC	< 1.5 A
Max. power input at 230 V AC	< 1.0 A
Voltage at ceiling mounting point	48 V
Effective life time of the light source	> 30,000 h

Registration data	TruLight 5300
Classification (MDD)	1
Classification (FDA)	2
Mark of conformity	CE UL

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Mechanical data	TruLight 5300
Light emitting surface	1,332 cm^2 (206 in^2)
Laminar flow surface	2,100 cm^2 (326 in^2)
Diameter of ceiling plate (square)	340 mm (13.4")
Light head size (with handles)	640 mm (25")
Light head size (without handles)	580 mm (23")
Weight of the light head (incl. horizontal bow and vertical bow)	12.75 kg (28 lbs)

Weight and torque for single light system	
Maximum weight for single light system	1.500 N (337 lbf)
Maximum torque for single light system	1.500 Nm (1.106 ft - lbf)
Maximum weight for double light system	2.000 N (450 lbf)
Maximum torque for double light system	2.400 Nm (1.770 ft - lbf)
Maximum weight for tripple light system	2.500 N (562 lbf)
Maximum torque for tripple light system	2.500 Nm (1.844 ft - lbf)

c) Design Features :

Intelligent
Constant illumination: Adaptive Light Control Plus technology, TruLight 5000 automatically ensures constants illumination at different working distances.

User Comfort
Intuitive operation: Sensors allow the user to adjust the lighting intensity with the sterile handle.

Efficiency
High level of efficiency: The used and unique positioning of innovative LEDs within the light head ensure minimal heat build-up and high light output.

Environmental Friendly
Making a contribution: Powerful LEDs and a highly efficient lighting system minimize energy consumption. In addition, the use of toxic elements during the manufacturing process is eliminated.

Flexibility
Can be used anywhere: The flat, compact light head enables the efficient use of space (critical in low ceiling height applications and hybrid rooms) and, thanks to an LAF-optimized design, ensures the highest level of hygiene during operation.

Communication
More than just light: The integration of video sytems for high-definition digital transmission provides an optimum communication platform.

Cutting-Edge Technology in the Sportlight
Optical TruLight 5000 lighting system is based on extremely intensive research and many years of experience in LED technology, lens geometry, and LED elements positioning within the light head. The result is a highly sophisticated, multi-lens matrix that guarantees

Extemely High Energy Efficiency:
With an illumination level of 160,000 lux, a power consumption of 65 watts, and a lighting system with an unrivalled light output, TruLight 5000 is one of the most efficient surgical lighting systems in the marketplace.

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Light Where it's Needed:
There is no need to make adjustments to the TruLight 5000 system during a surgical procedure. The Adaptive Light Control Plus technology measures the distance to the operative field and adjusts the illumination level in line with the current working distance.

A Flexible Combination:
Depending on the working distance, Adaptive Light Control activates certain groups of lenses in the multi-lens matrix. The activated lenses provide optimim illumination, thanks to their angle and position in the light head.

Focused Illuminating Power:
The positioning of the LEDs within the light head enables the precise direction of rays of light with minimal shadowing effects in the operative field area. This ensures the homogenous distribution of light throughout the different planes of illumination.

Optimum Light Output:
The intelligent, multi-lens matrix is based on individually embedded LEDs in TRUMPF-designed convergence lenses. Because the LEDs are completely surrounded by the lens, all the light from each individual LED is directed to the surgical site.

d) Standard set consist of :-

No	Description	Part no	Qty
1	Cental axis duo - consisting of central axis and extension arm (arm length = 850mm; 1,000mm)	1532379	1
2	TruLight 5300 - consisting of spring arm, cardanic and light head	1532468	2
3	TruLight 5000 comfort Package	1613893	1
4	Ceiling anchor plate LED, complete	0337603	1
5	Ceiling tube, including flange plate, 250 - 1000mm	0337578	1
6	Ceiling cover LED, height 100 / 200 / 300mm, including holding plate if needed	0337600	1

No	Description	Part no	Qty
7	Interface plate, 230V, TruLight 2x (for mounting of the electrical accessories at the ceiling tube of the light)	1533017	1
8	TruVidia preparation, TruLight 5 x 10 for TruVidia SD/HD, including upgrade of carrying system, light head adaption, weight dummy and wall plug/cable- for 1 light system only	1533358	1
9	Sterilizeable central handle, for camera. 3 pcs/set	0337643	1set
10	Sterilizeable central handle ALC Plus, 3 pcs/set	1612088	1set

e) Accessories

Description	Qty

Description	Qty

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Services Requirement

1.	240 V/50Hz/AC	■	4. Cold Water		7. Exhaust		
2.	415 V/50Hz/AC		5. Hot Water		8. Drain		
3.	Medical Gas		6. Steam		9. Battery Powered		
10.	Other						

Testing & Commissioning (T&P) Requirement

1.	T&C Required	■	2. T&C not Required		

Training Requirement

1.	Training Required	■	2. Training not Required		
	Local	■	Overseas		

Local Authorities Approval

1.	JKKP		2. Jabatan Tenaga Atom		
3.	Jabatan Alam Sekitar		4. Others:		

Enclosed Documents

1.	Item Distribution List	■	4. Shop Drawing		
2.	Product Catalogs	■	5. Installation Reference	■	
3.	Technical Catalogs				

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CONTRACTOR

FAJARBARU BUILDER SDN BHD

I here by undertake to comply as set by the Consultant and to ensure the proposed material/equipment comply with required specification/functionality as per contract

Yes [redacted] No

Name : Leong T. C.

Designation : Sr. Bio Medical Co-Ordinator

Signature :

Date :

FAJARBARU BUILDER SDN BHD, Co. No. 27198-T

CONSULTANT

MEDI-CONCEPT SDN BHD

I here by certify that the proposed material/equipment comply with required specification/functionality as per contract

Yes ✓ No

Name : Mohan Narayanan

Designation : Equipment Director

Signature :

Date :

Medi-Concept Sdn Bhd, Worldwide Business Park, Jalan Tinju 13/50, 40675 Shah Alam, Selangor, Malaysia

CONSULTANT

VECTORONE ENGINEERING SDN BHD

I here by certify that the proposed material/equipment comply with required specification/functionality as per contract

Yes ✓ No

Name : Lim Chan Jing

Designation : Principal

Signature :

Date :

JURUTERA PROFESIONAL, LETRIK, IR. LIM CHAN JING, 10615, MALAYSIA

JABATAN KERJA RAYA (JKR) - WAKIL PEGAWAI PAKAR (ELEKTRIKAL/~~MEKANIKAL~~)

Not withstanding the Consurrence of the above material/equipment it is the responsibility of the Contractor to ensure that such material/equipment comply with the specification and functionality as in cotract.

Approved

Approved with Condition ✓

Rejected & To Resubmit

Remarks : Penukaran jenama yang dicadangkan tidak akan melibatkan penambahan kos dan memenuhi kehendak electrical needs statement (volume 5A) dalam kontrak

Name : Ir. NOLIAH BINTI ABU YAMIN Signature :

Designation : Ketua Penolong Pengarah Kanan, Unit Komunikasi Khidmat Teknikal (Elektrik), Caw Kerja Kesihatan Ibu Pejabat JKR Malaysia, Kuala Lumpur. Date : 11-11-2011

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APPROVAL KEMENTERIAN KESIHATAN MALAYSIA	APPROVAL KEMENTERIAN KESIHATAN MALAYSIA
Approved ✓ Approved with Condition Rejected & To Resubmit	Approved ✓ Approved with Condition Rejected & To Resubmit
Comments :	Comments :
Name : Designation : Signature : Date : 16/2/2012	Name : DR HATIJAH BTE HJ MOHD TAN (NO PENDAFTARAN PENUH MPM. 26867) Designation : PENGARAH HOSPITAL TAMPIN 73009 TAMPIN, N.S.D.K. Signature : Date : 21/2/12

JABATAN KERJA RAYA (JKR) - WAKIL PENGARAH PROJEK

Not withstanding the Consurrence of the above material/equipment it is the responsibility of the Contractor to ensure that such material/equipment comply with the specification and functionality as in cotract.

Approved ✓

Approved with Condition

Rejected & To Resubmit

Name : IR. ISMAIL B. CHE ROS Signature :

Designation : Ketua Penolong Pengarah Kanan, Unit Pengurusan Pembinaan 4, Cawangan Kerja Kesihatan, Ibu Pejabat JKR Malaysia Date :

Issues & Challenges

1. Approvals – licenses (imaging, radiotherapy)
2. Policy – local brands / imported brands / preferred brands
3. Managing a comprehensive strategy to procure equipment within given budget
   - Evolving technology
   - Escalating cost medical equipment
4. Organization commitment, coordination, control and accountability
5. Identification, relocation and installation Group II equipment
   – timing, warranty, realistic
   – obsolete

Delay, Extension of time
Variation order

TERIMA KASIH