



## WORKSHOP ON ARCHITECTURAL DESIGN OF EYE HOSPITAL LIONS ARAVIND INSTITUTE OF COMMUNITY OPHTHALMOLOGY (LAICO)

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# COST BENCHMARK FOR VARIOUS CONSTRUCTION ELEMENTS

# OVERVIEW

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PROJECT PHASES

SPATIAL BUDGET

PRE CONSTRUCTION

CONSTRUCTION PHASE – DISCIPLINES INVOLVED

PHASE WISE BUDGET OVERVIEW

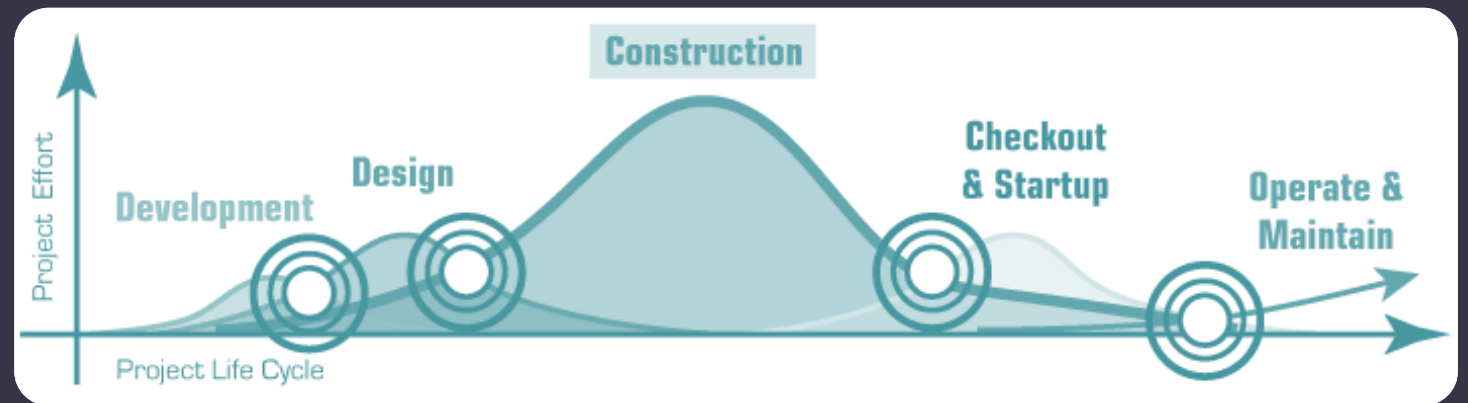
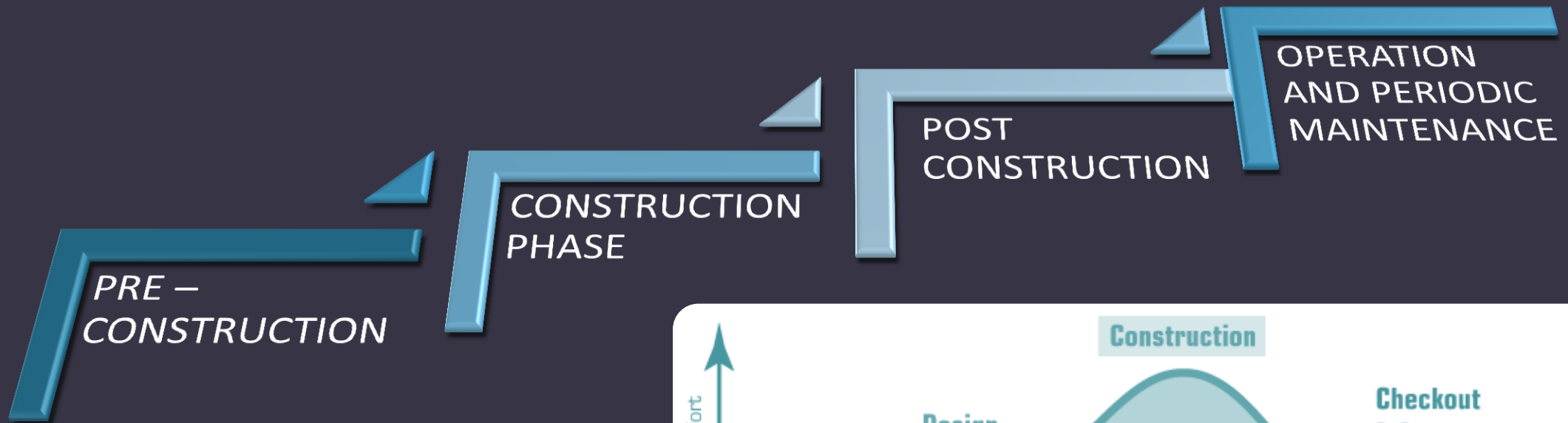
POST CONSTRUCTION ACTIVITIES

OPERATIONS AND PERIODIC MAINTENANCE

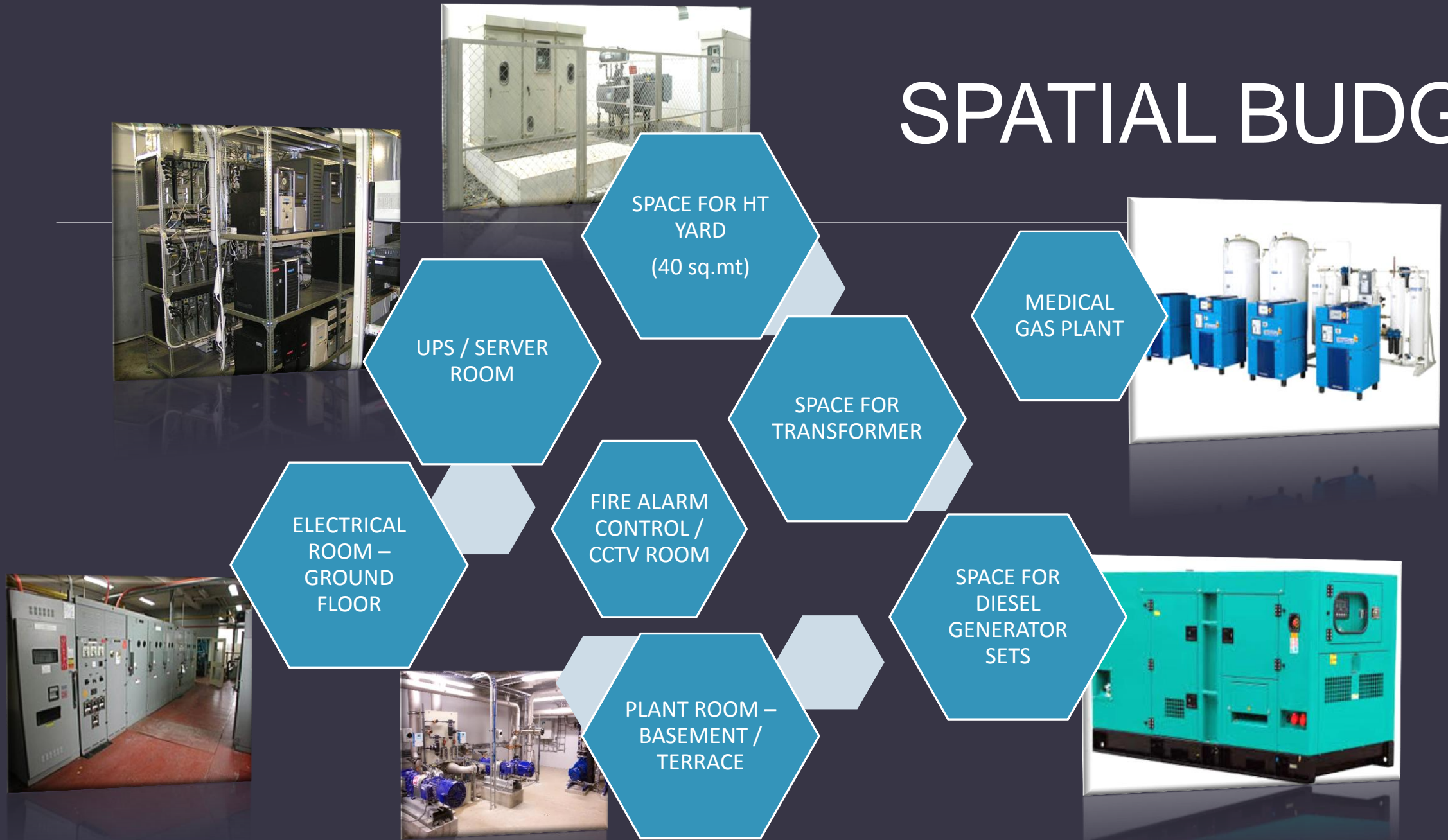
SUGGESTIONS FOR COST OPTIMISATION



# PHASES OF A PROJECT



# SPATIAL BUDGET



# PRE - CONSTRUCTION



- ❑ LAND USE CLASSIFICATION
- ❑ BUILDING PLAN APPROVAL – NOC
- ❑ FIRE
- ❑ PCB - CTE
- ❑ OTHER STATUTORY CLEARANCES
- ❑ WATER TESTS / YIELD TESTS / SOURCE



# TOTAL PROJECT COST

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- CIVIL CONSTRUCTION
- ARCHITECTURAL FINISHES
- INTERIOR FINISHES
- MEP INFRASTRUCTURE
- MEP EQUIPMENT
- VERTICAL TRANSPORTATION
- MEDICAL EQUIPMENT





# CONSTRUCTION - CIVIL

STRUCTURE

ARCHITECTURAL FINISHES – FLOORS / WALLS

JOINERY – WINDOWS / DOOR

CONSTRUCTION OF SUMPS, OVER HEAD TANKS

CIVIL WORKS ASSOCIATED WITH MEP SYSTEMS



# INTERIOR WORKS

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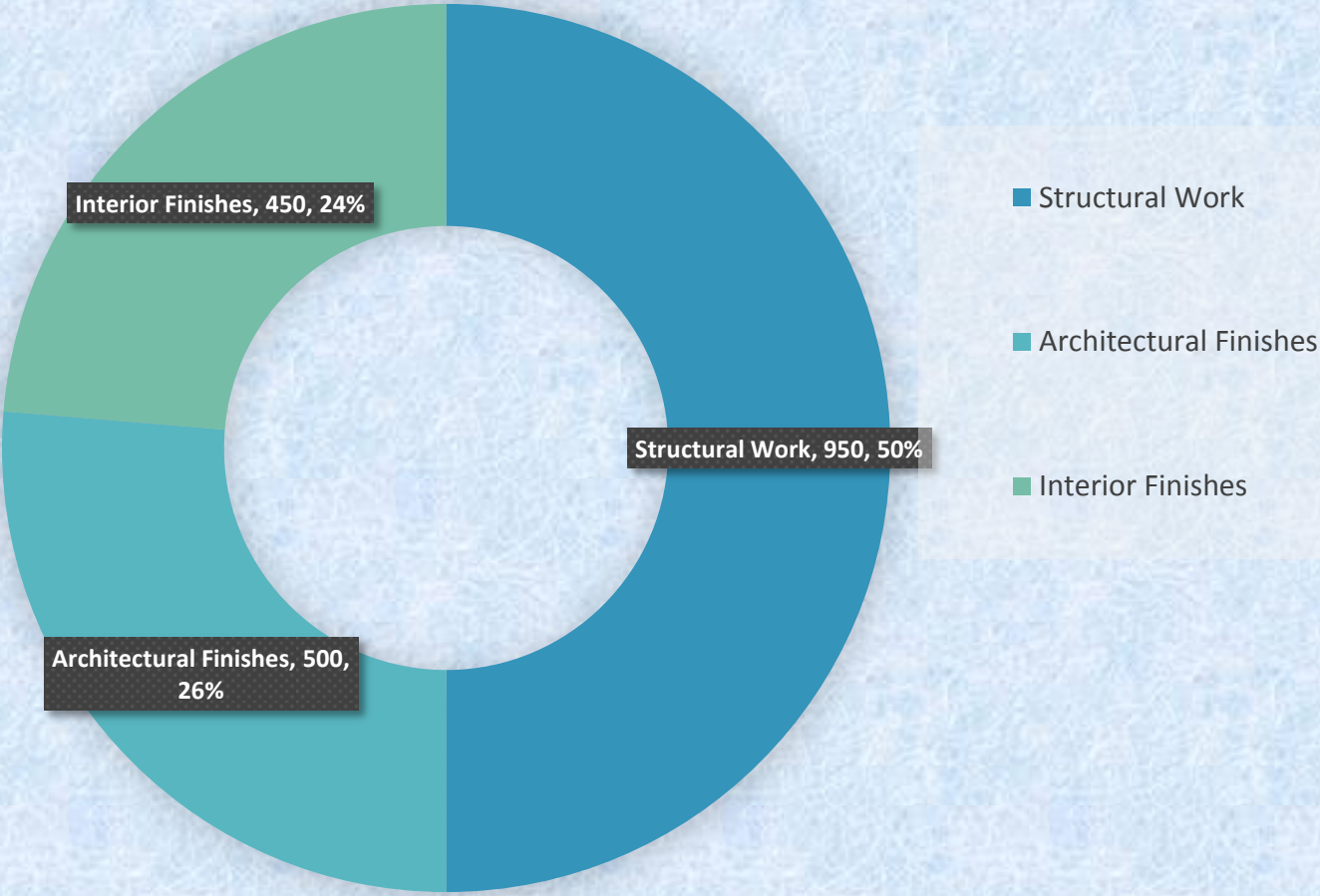
UTILITY FURNITURE – FIXED / LOOSE FURNITURE

FALSE CEILING – PREFERRED IN CONDITIONED SPACES / CORRIDORS – GRID CEILING





CIVIL AND INTERIOR WORKS



CIVIL WORKS	RATE / SFT
STRUCTURAL	950 - 1150
ARCHITECTURAL FINISHES	500 - 600
INTERIOR WORKS	500 - !

# MEP WORKS

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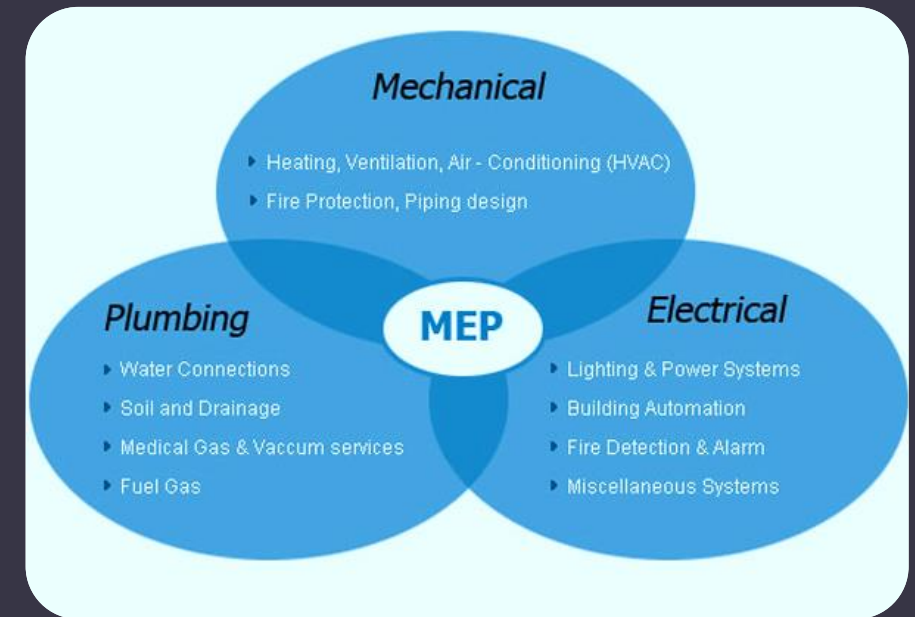
PLUMBING, SANITATION & DRAINAGE

ELECTRICAL SYSTEMS

AIR CONDITIONING AND MECHANICAL VENTILATION SYSTEMS

FIRE PROTECTION SYSTEM

EXTRA LOW VOLTAGE SYSTEMS



# ELECTRICAL

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HT / LT INFRASTRUCTURE – HT PANEL / LT PANEL, TRANSFORMERS

BACK UP POWER SYSTEMS – DG, UPS

DISTRIBUTION SYSTEM – DISTRIBUTION PANELS, DISTRIBUTION BOARDS, CABLES, SWITCHES & SOCKETS

EARTHING SYSTEM

LIGHTENING ARRESTER SYSTEM

LIGHT FIXTURES – CAN BE A CLIENT SUPPLY ITEM



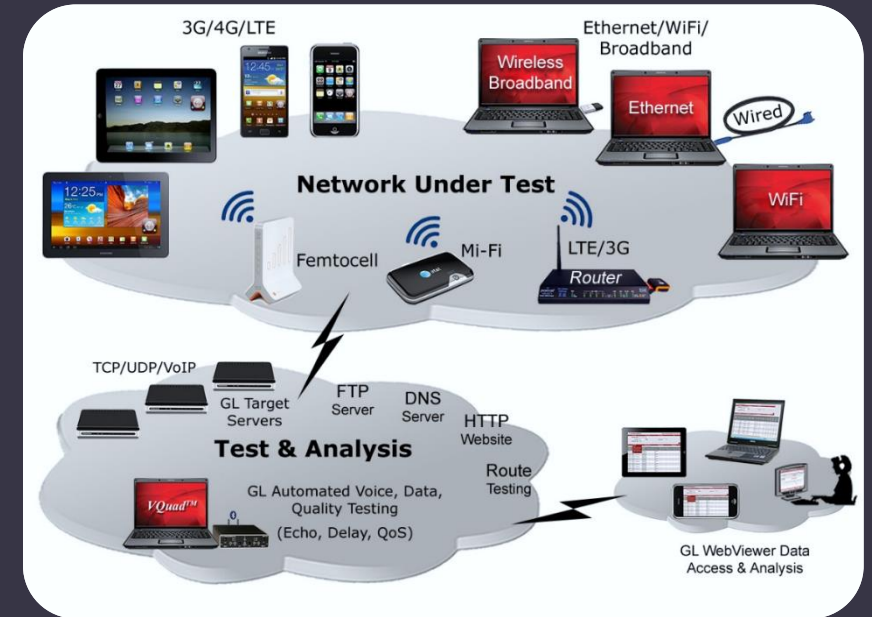
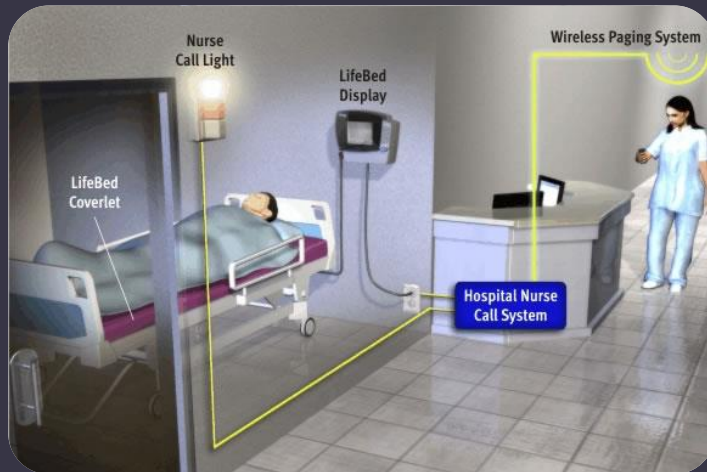
# EXTRA LOW VOLTAGE SYSTEM

NETWORK – INTERNAL / INTERNET

TELEPHONE NETWORK

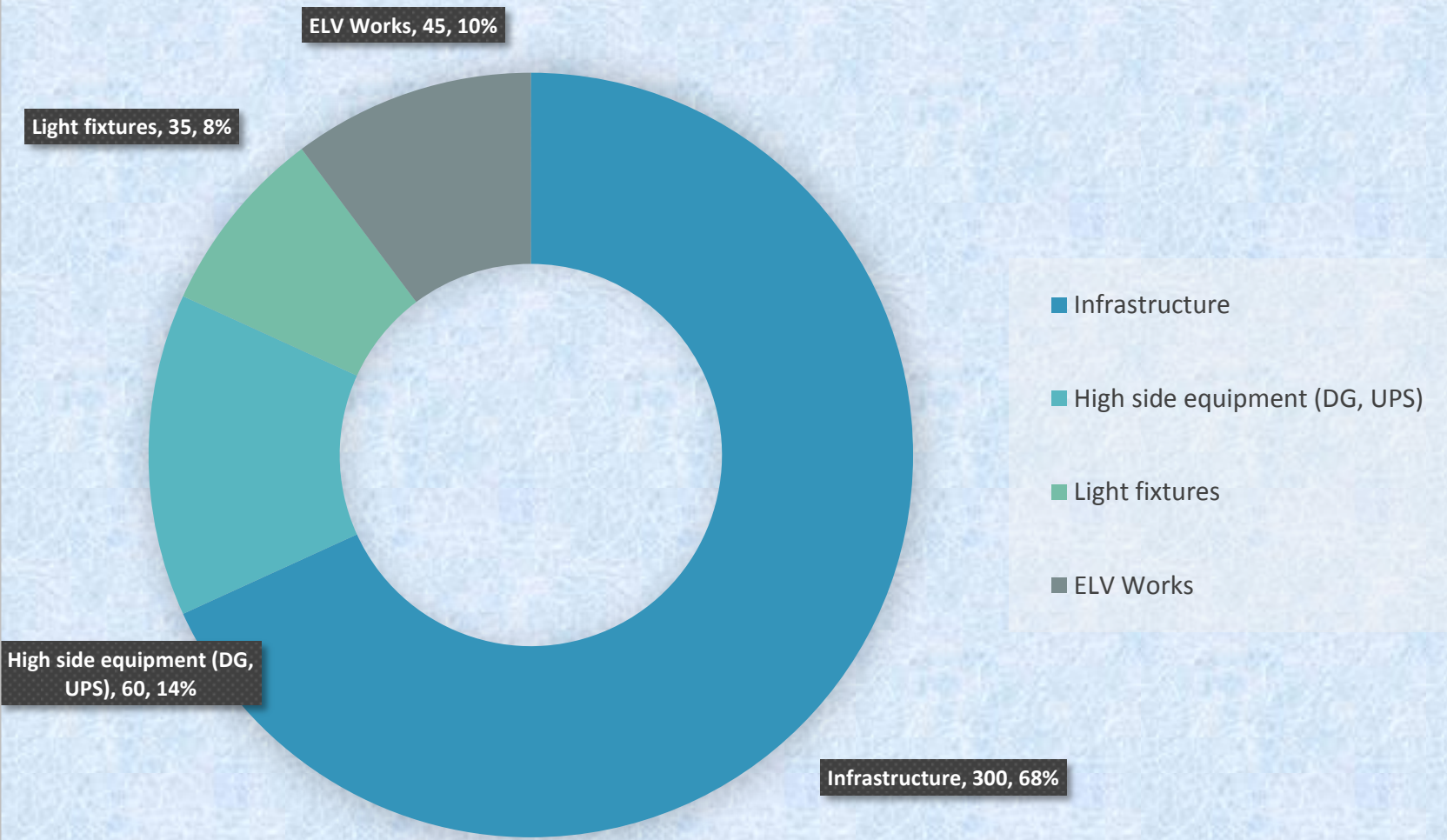
CCTV SYSTEM

NURSE CALL SYSTEM





Electrical Works



ELECTRICAL WORKS	RATE / SFT
INFRASTRUCTURE	300
HIGH SIDE EQUIPMENT (DG, UPS)	60
LIGHT FIXTURES (LED)	35
ELV WORKS	45

# PLUMBING

PLUMBING INFRASTRUCTURE – WATER SUPPLY PIPES / DRAINAGE PIPES

RESTROOM NUMBERS AS PER NBC REGULATIONS

PLUMBING FIXTURES – CLIENT SUPPLY ITEM

HOT WATER GENERATION SYSTEM – ALTERNATE TO BOILER / ELECTRICAL HEATERS

WATER TREATMENT PLANT

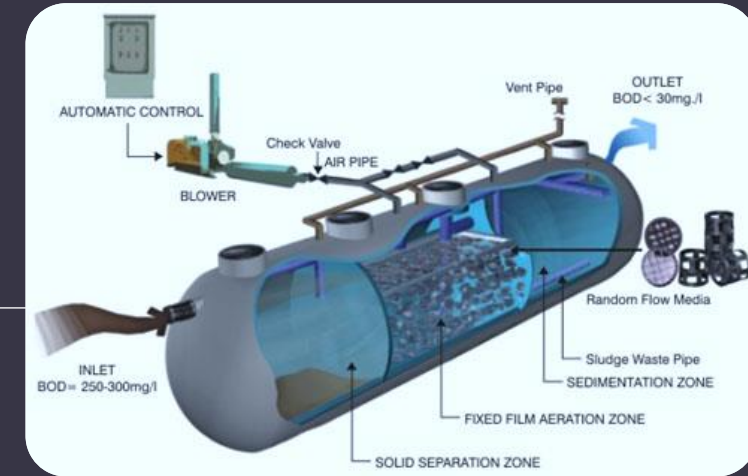
REVERSE OSMOSIS PLANT – DIALYSIS / DRINKING

SEWAGE TREATMENT PLANT

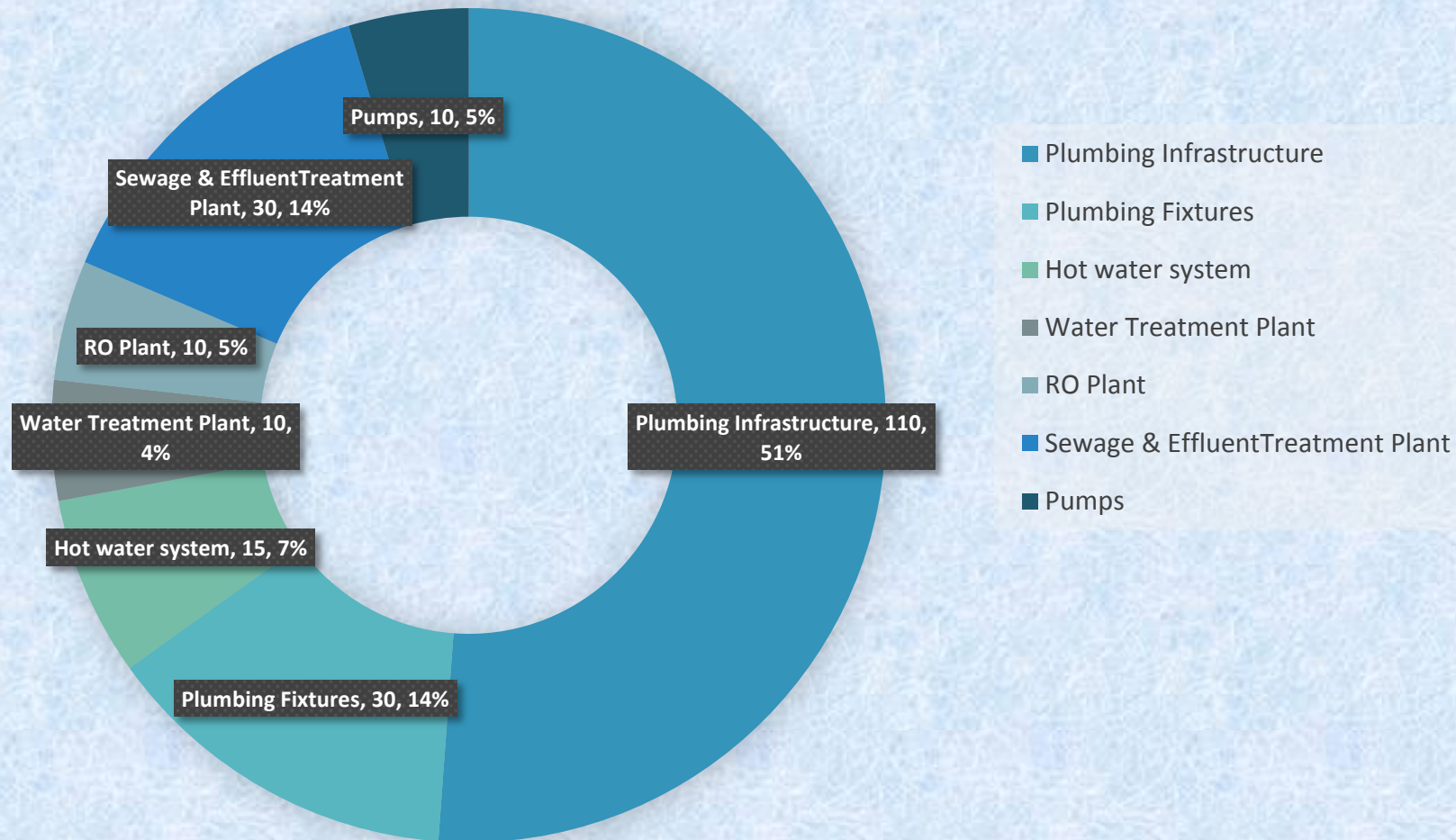
EFFLUENT TREATMENT PLANT – LABS, CSSD, LAUNDRY

PUMPING SYSTEMS

RAIN WATER HARVESTING / STORM WATER MANAGEMENT



## PLUMBING SYSTEM WORKS



PLUMBING WORKS	RATE / SFT
INFRASTRUCTURE	110
PLUMBING FIXTURES	30
HOT WATER SYSTEM	15
WATER TREATMENT PLANT	10
RO PLANT	10
SEWAGE & EFFLUENT TREATMENT PLANT	30
PUMPS	10

# HVAC WORKS

AIR CONDITIONING FOR GENERAL CIRCULATION / PATIENT SPACES

AIR CONDITIONING FOR SPECIAL WARDS

AIR CONDITIONING FOR OPERATION THEATRES / PROCEDURE ROOMS

MECHANICAL VENTILATION FOR BASEMENTS, SERVICE AREAS





# HVAC SYSTEMS

CENTRALIZED CHILLED WATER PLANTS – CHILLERS / AHUs / FCUs

CENTRALIZED – VRV / VRF SYSTEMS

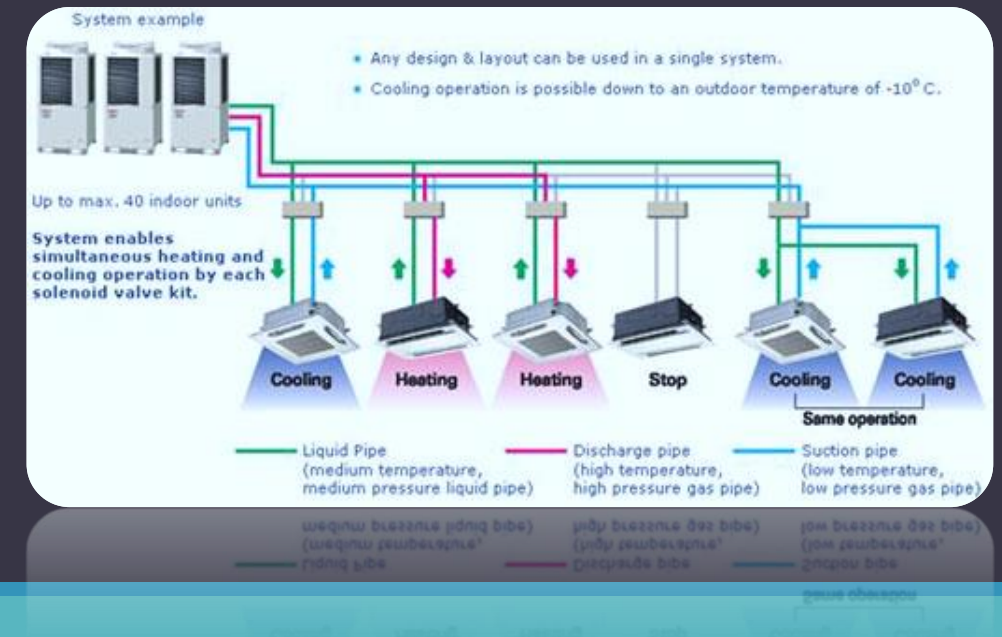
UNITARY SPLIT / DUCTABLE – DX SYSTEMS

5 MICRON FILTRATION SYSTEM

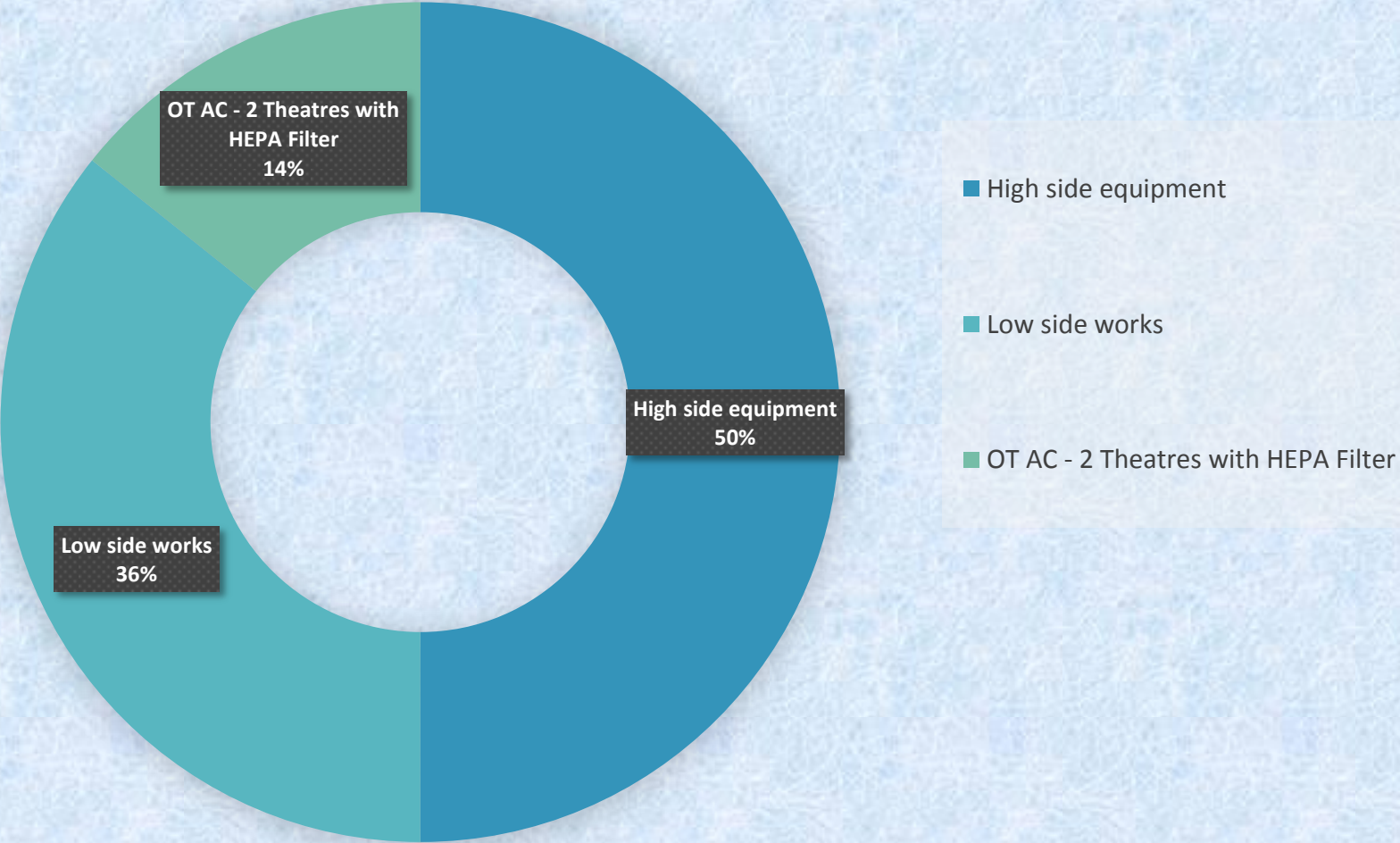
HEPA FILTRATION SYSTEMS

MAINTAINING PRESSURE DIFFERENCES

INDOOR AIR QUALITY



HVAC Works



HVAC WORKS	RATE / SFT
HIGH SIDE EQUIPMENT	175
LOW SIDE WORKS	125
OT AC – 2 THEATRES WITH HEPA FILTER	50

# FIRE PROTECTION SYSTEM

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FIRE HYDRANT SYSTEM – INTERNAL / EXTERNAL

AUTOMATIC SPRINKLER SYSTEM

AUTOMATIC ADDRESSABLE FIRE DETECTION AND ALARM SYSTEMS

SPECIALISED SUPPRESSION SYSTEM – CRITICAL SPACES

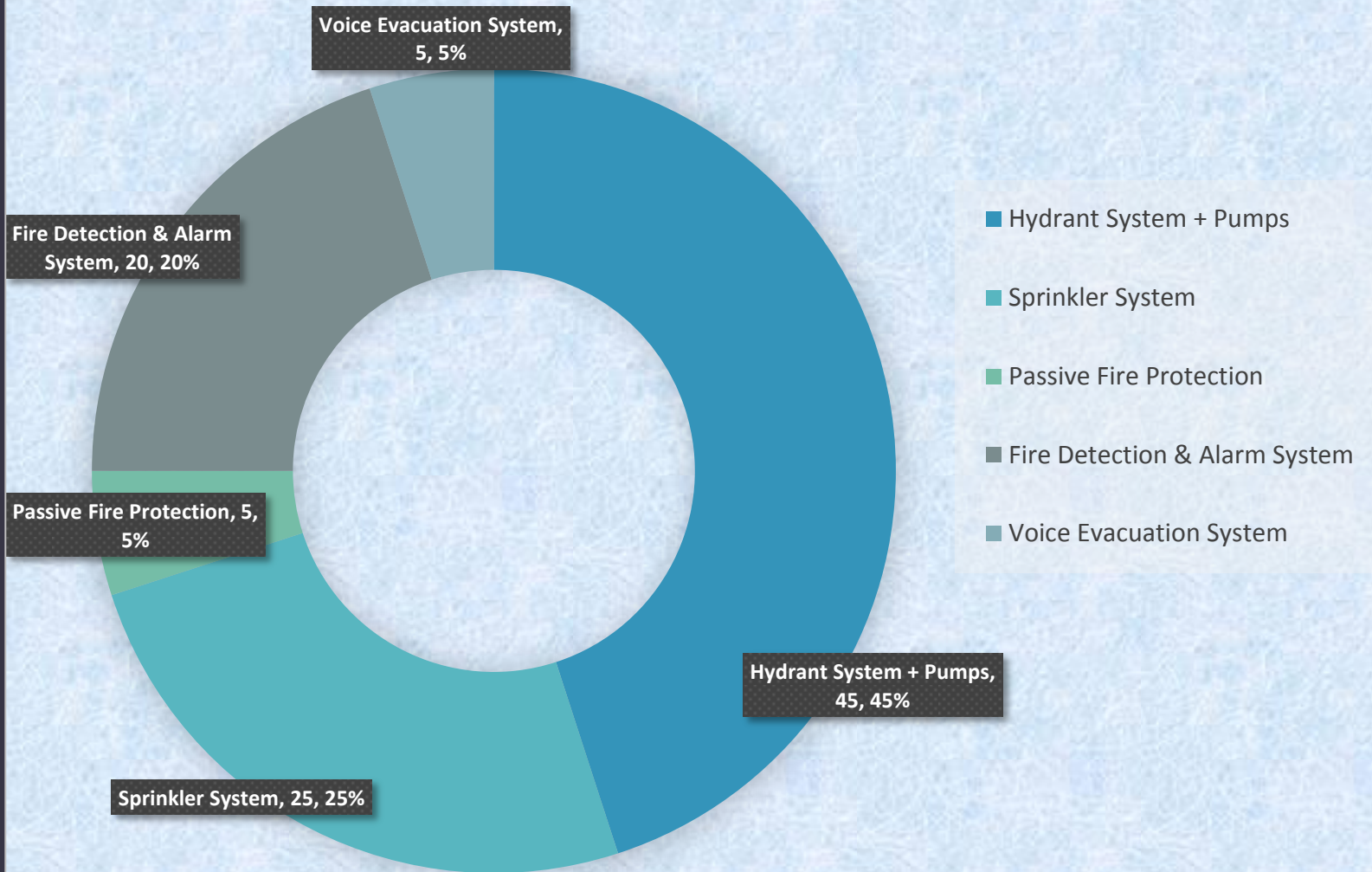
PA SYSTEM FOR VOICE EVACUATION

HAND HELD FIRE EXTINGUISHERS

SIGNAGE



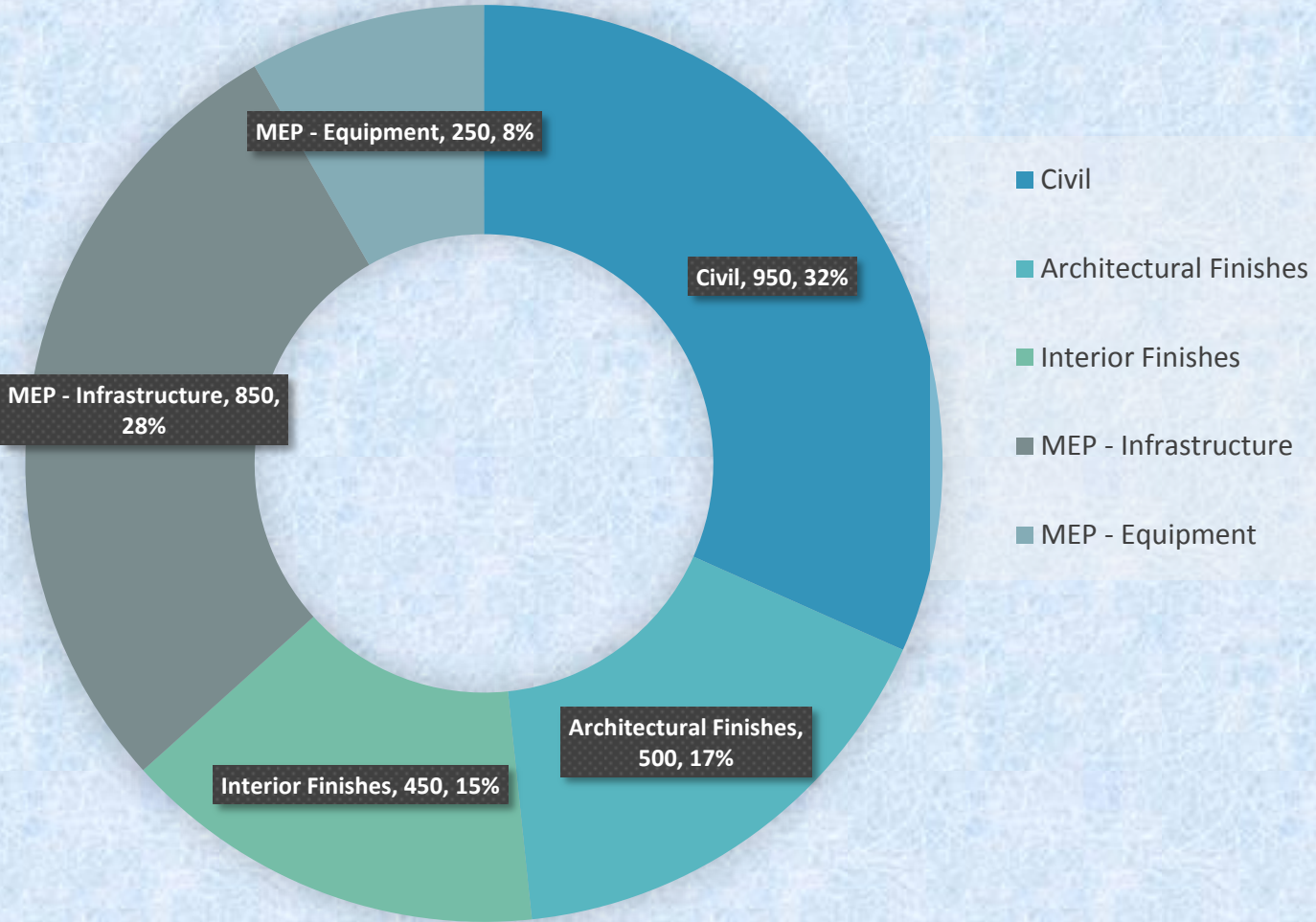
## FIRE PROTECTION SYSTEM WORKS



FIRE PROTECTION SYSTEM WORKS	RATE / SFT
HYDRANT SYSTEMS + PUMPS	45
SPRINKLER SYSTEM (IF WARRANTED)	25
PASSIVE FIRE PROTECTION	5
FIRE DETECTION & ALARM	20
VOICE EVACUATION SYSTEM	5



HOSPITAL CONSTRUCTION – BASE BUILDING & FIT OUT



TOTAL CONSTRUCTION	RATE / SFT
CIVIL WORKS	950
ARCHITECTURAL FINISHES	500
INTERIOR FINISHES	450
MEP INFRASTRUCTURE	850
MEP EQUIPMENT	250

# MEDICAL EQUIPMENT

OPERATION THEATRES

ICU EQUIPMENT

DIAGNOSTIC EQUIPMENT

MEDICAL FURNITURE

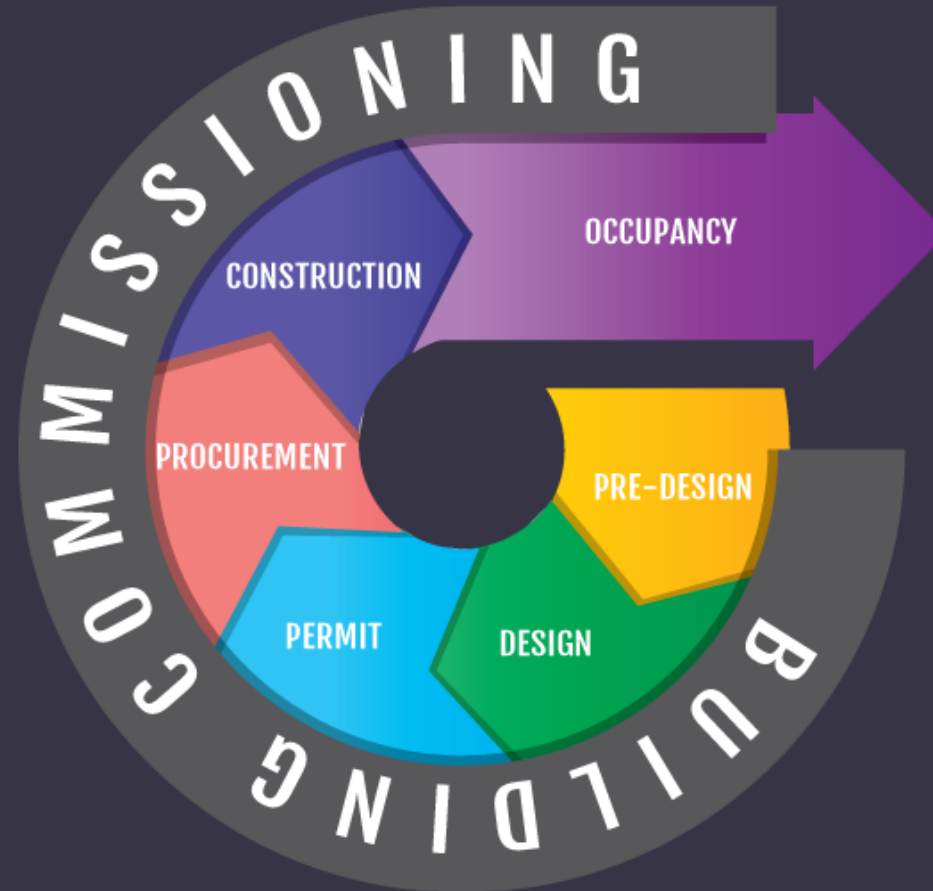
MEDICAL GAS SYSTEM



# POST CONSTRUCTION - COMMISSIONING

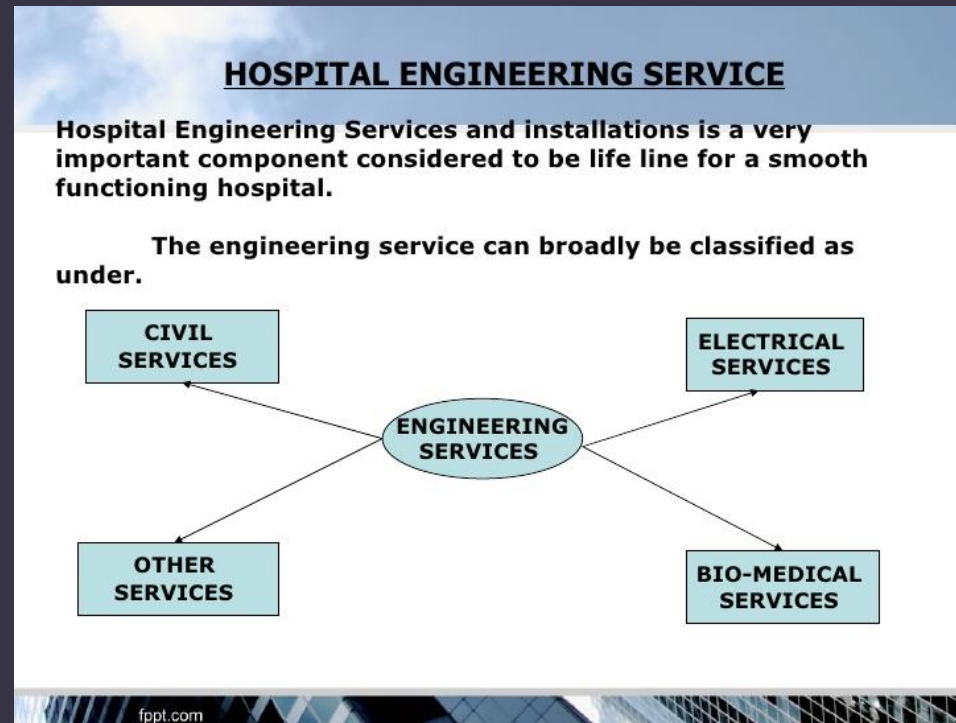
## APPROVALS

- CEIG
- TNPCB
- FIRE SAFETY
- BUILDING OCCUPANCY CERTIFICATE



# OPERATIONS & MAINTENANCE

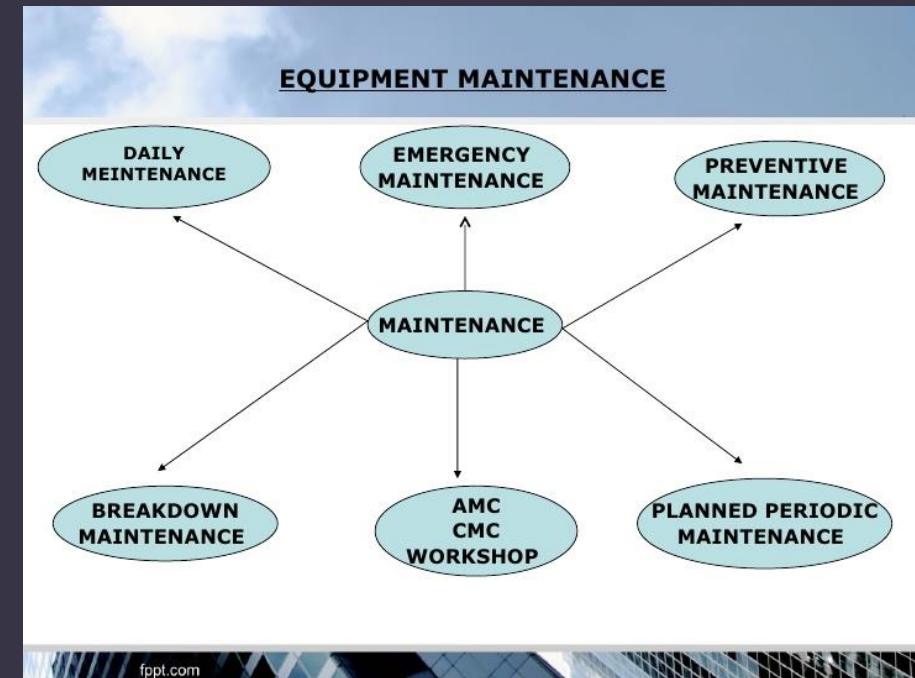
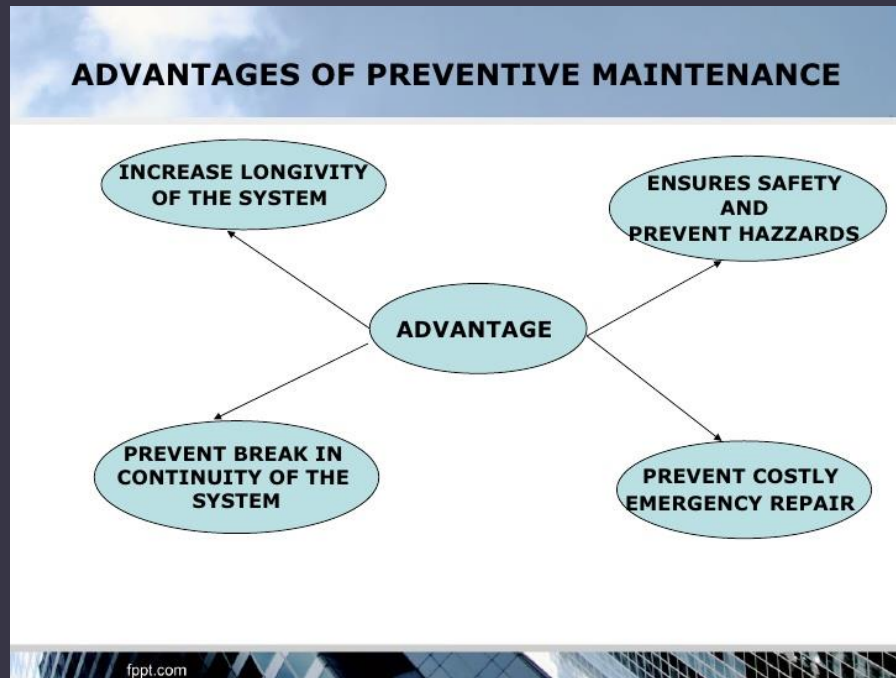
NEED FOR A TEAM OF ENGINEERS / TECHNICIANS – FACILITIES DEPARTMENT





# OPERATIONS & MAINTENANCE

## MAINTENANCE SCHEDULE



# OPERATIONS & MAINTENANCE

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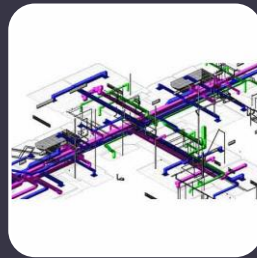
UTILITY CHARGES – ELECTRICITY / WATER

FACTOR OF DESIGN / EFFICIENCY / JUDICIOUS USAGE

ANNUAL MAINTENANCE CONTRACTS – PREVENTIVE MAINTENANCE

FIRE SAFETY TRAINING / DRILLS

# PROFESSIONAL RESOURCES



FEASIBILITY  
STUDY

ARCHITECT

STRUCTURAL  
CONSULTANT

MEP  
CONSULTANT

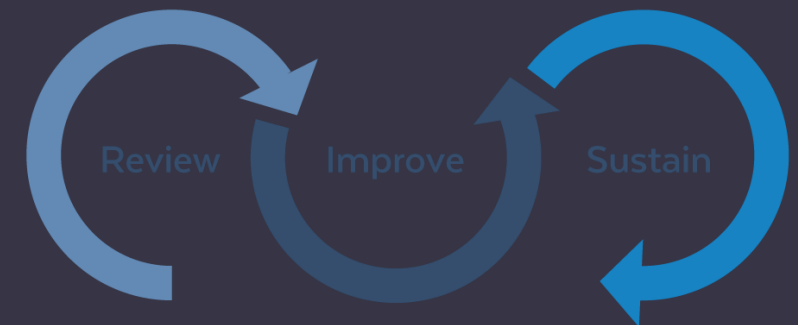
MEDICAL  
FACILITY  
PLANNER

PROJECT  
MANAGER /  
MANAGEMENT  
COMPANY

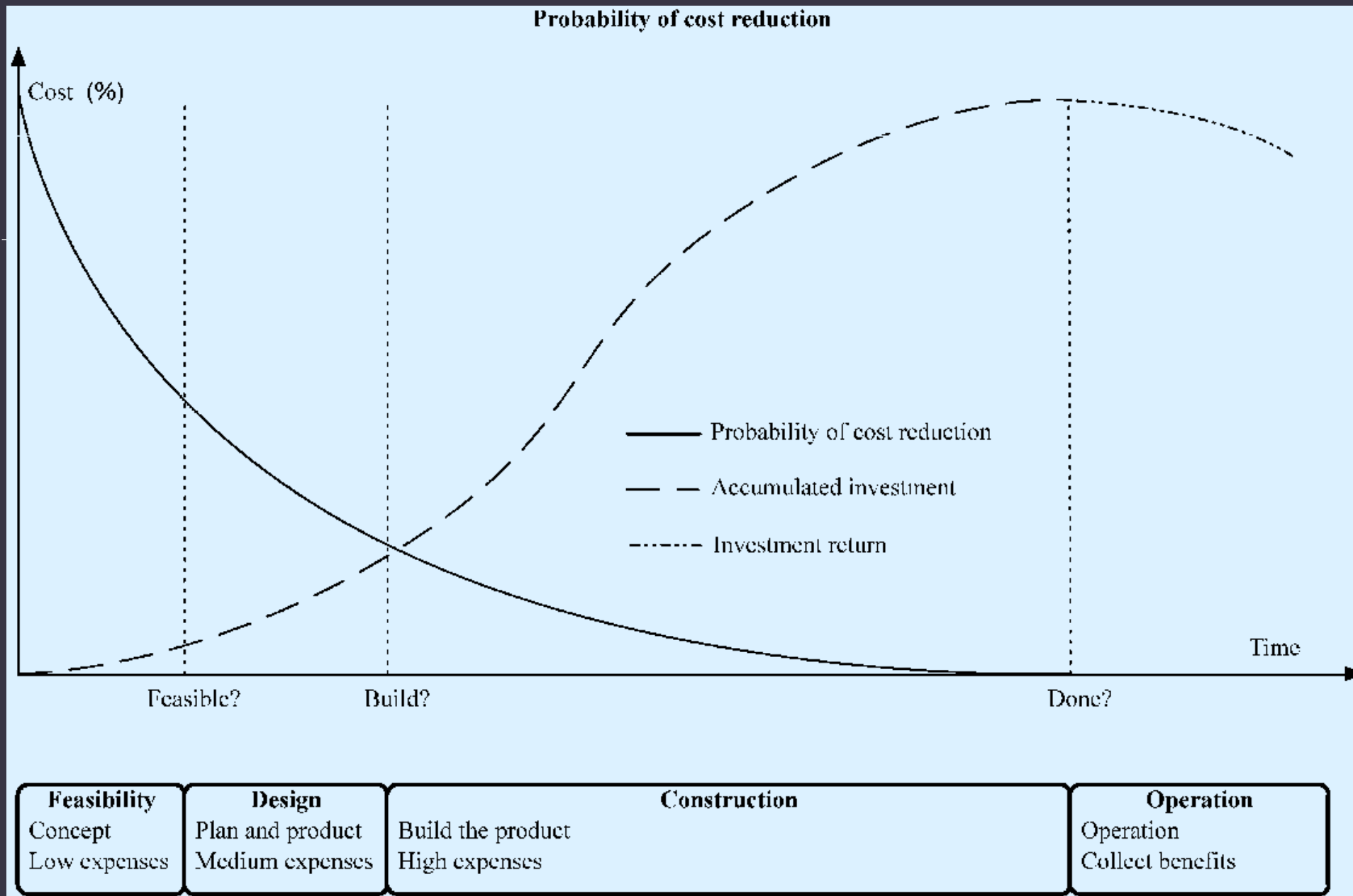
# COST OPTIMISATION BY DESIGN



- REQUIREMENTS TO BE FRAMED – SPECIALITIES / DIAGNOSTIC
- REQUIREMENTS SHOULD NOT BE FLUID – NEED TO BE FIRMED UP DURING DESIGN PHASE – REVIEW EXISTING USAGE AND CONSTRAINTS
- DISCUSS THE LAYOUTS WITH SPECIALISTS TO ENSURE REQUIREMENTS ARE MET
- AVOID CHANGES ONCE CONSTRUCTION COMMENCES – COST / TIME OF CHANGE IS HIGH
- PROVISIONING - LOAD ESTIMATES / EQUIPMENT CAPEX INCREASE – SOCKETS / SPARE EQUIPMENT
- OVER DESIGN / UNDER UTILISATION – CAPEX HIGH / OPERATIONAL INEFFICIENCY IS THERE
- COST OF EFFICIENCY
- STANDARDISATION OF FITTINGS / FIXTURES



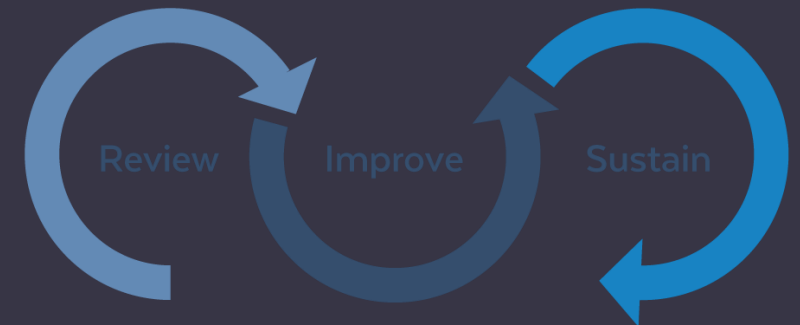




# COST OPTIMISATION - CONTRACTS



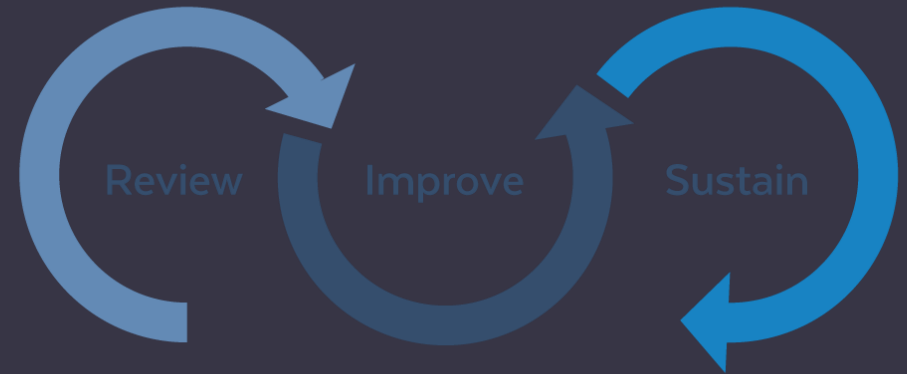
- ✓ HIGH LEVEL BUDGET
- ✓ CLARITY ON REQUIREMENTS
- ✓ CONTRACTS – DESIGN & BUILD / TOTAL CONTRACT / LABOUR CONTRACT – NOT A RESIDENCE !
- ✓ TENDERING – CONTRACTOR PRE-QUALIFICATION / LIST OF APPROVED MAKES (GRADE A)
- ✓ COST OF QUALITY – NOT FIT AND FORGET
- ✓ WATER TIGHT CONTRACTS
- ✓ WHERE TO USE SPECIALISED CONTRACTORS
- ✓ RANGE OF SYSTEMS AVAILABLE



# COST OPTIMISATION - OPERATIONS



- ✓ AMC COSTS – LOCK DURING TENDERING – 2 YEARS DLP / 5 YEARS AMC
- ✓ GROUP METERING – ELECTRICAL / WATER / AC – USED FOR ANALYSIS AND OPTIMISATION
- ✓ INTELLIGENT - BUILDING MANAGEMENT SYSTEMS
- ✓ MAINTENANCE LOGS AND SCHEDULE – ANALYSIS OF USAGE PATTERN



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*You can contact me for your queries*

***PRINCELY SAMUEL***

***PRINCIPAL MEP CONSULTANT***

***CAPSTONE BUILDING SERVICES***

[prince@capstonebsc.com](mailto:prince@capstonebsc.com)

**+919884067750**

