# Electrical Design Requirements & Issues

9 Apr 2014
Senior Engineer Choong Po Siong
Development & Construction Productivity Department
Building Quality Group
Housing & Development Board

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# Consultant's Duties

- To provide adequate, cost effective and optimal design
- Familiarize with design brief and owner's requirements
- Work closely with Lead Architect and ensure that regulatory and owner's requirements are incorporated in M&E design
- M&E System shall be designed for minimal and ease of maintenance, and the design shall not result in high cost of upgrading / replacement in future, either carried out by residents or managing agents

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# Consultant's Duties

- Timely submission for Engineering Review, and Technical Review, and to e-CORENET
- Mindful of the comments given and measures to ensure no recurrences
- System in place to effectively retain and disseminate information/feedback gathered and experiences gained
- Diligently check drawings to ensure complete, consistent, practical and workable design with adequate details incorporated before submission

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# M&E Design Submission

- After award of consultancy contract, M&E Consultant to work with Architect Consultant on requirements of M&E facilities of the project

- Submit conceptual design of M&E facilities to DCPS3(M&E) of BQG for clearance before going into detailed design

- Submit detailed design to DCPS3(M&E) for clearance at least 6 weeks before tender

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# Update of Design Brief

- Arrange Working Sessions to review design progressively before submission via ecorenet
- Lead in pipes (UPS) for PowerGrid cables to cross underneath road side drain
- 1 Set of service cables for MSCP with commercial premises and social communal facilities or standalone commercial block
- 15A power points outside staircase
- Provision of spare MCB for future CCTV (SPF) system.

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# Update of Design Brief

- Separate riser mains for Storey Shelter (SS)
- All Storey Shelters metered under one PG meter
- Space provided to cater for future fixing of individual meter near each storey shelter.
- Luminaires with discharge lamp used in high void areas shall be wall mounted at least 3.5m and with suitable IP rating if subject to rain.

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# Update of Design Brief

## Residential Unit

- Positioning of SSO(s) shall be functional, easily accessible, user friendly and complement the furniture layout plan (Sales Brochures)
- Adequate SSOs to support the activities at various areas in the kitchen.
- Co-ordinate to enable SSOs to be mounted on the external of the Household shelter wall.
- Provision of fibre cabling, fibre interface point (FIP) at telecommunication riser in accordance to latest COPIF requirements.
- To add Enclosure for TV splitter in service closet
- Provision of Patch panel except for 1 room rental flat.

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# Update of Design Brief

ELECTRICAL PROVISION FOR FUTURE ELECTRONIC PARKING SYSTEM (EPS)

- A 60A Double Pole MCCB, sealed in "OFF" position, at the unmetered busbar of the main switchboard of Multi-Storey Car Park.
- A metering panel in lockable metal enclosure located outside the EPS room for PG meter in future.
- Provision of 2 number of 65mm diameter underground UPVC pipes across each traffic lane at the EPS gantries locations along Driveway and Service Road to facilitate the future cabling works for the EPS.
- The UPVC pipes to be terminated with sealed cappings above the slabs at every central island and at both side of the lane with draw-wires provided.
- To indicate possible cable routing from EPS room to gantry location.
- Underground UPVC pipes are not required if EPS provision is located within MSCP.

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# Electrical Design Issues (Services Room & Common Area)

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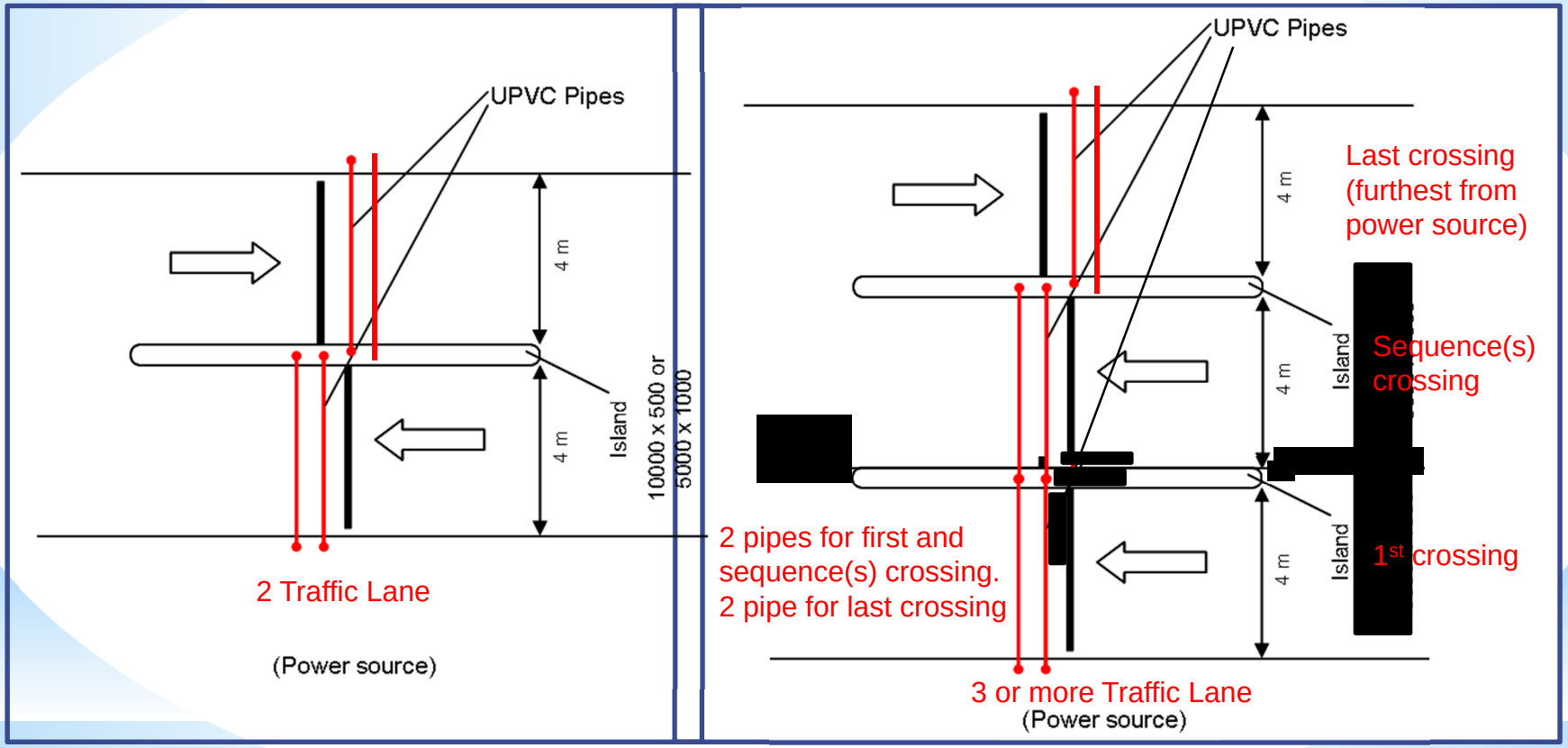
# Electronic Parking System

## Provision of Underground pipes crossing

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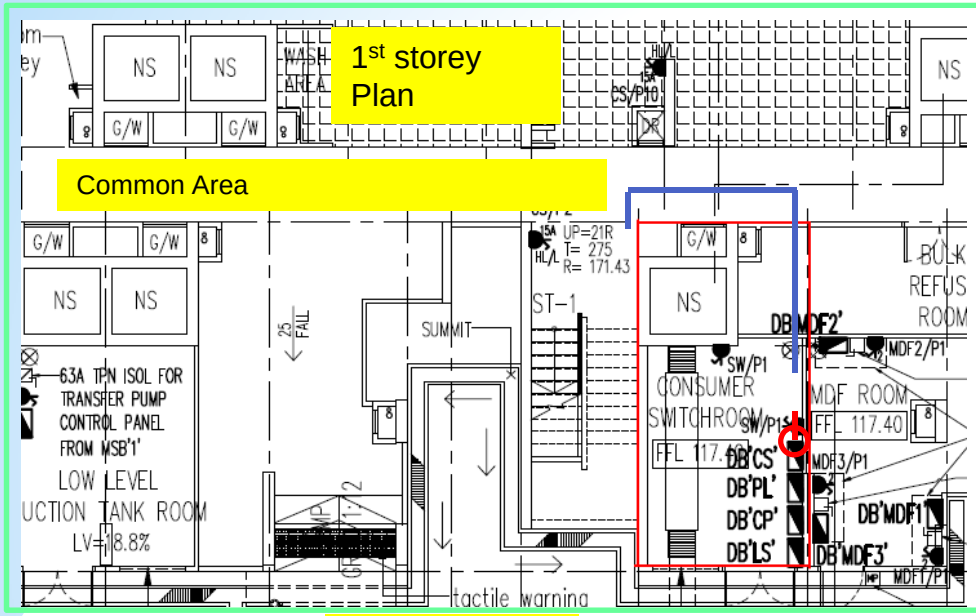
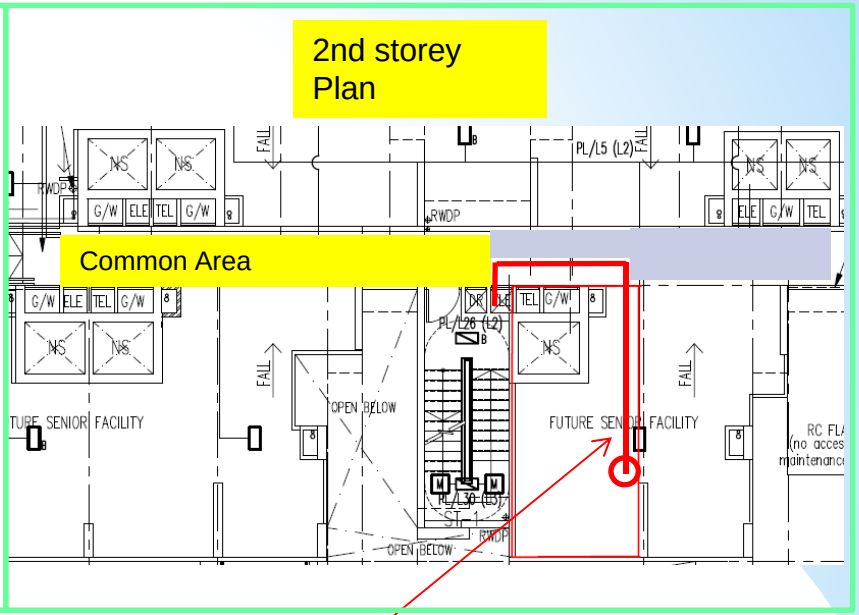
# Cable Installation

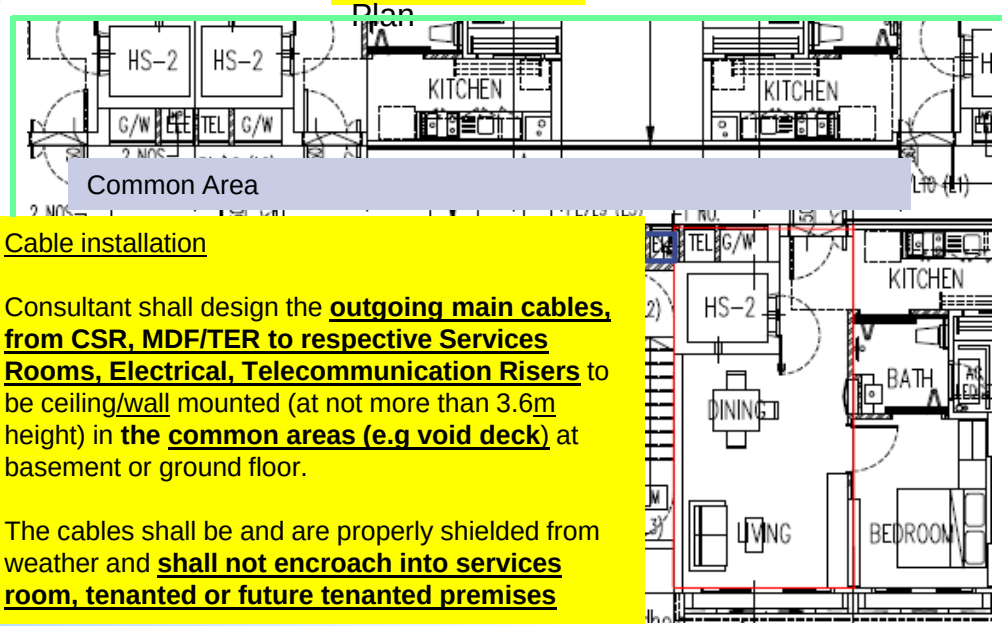
1st storey Plan



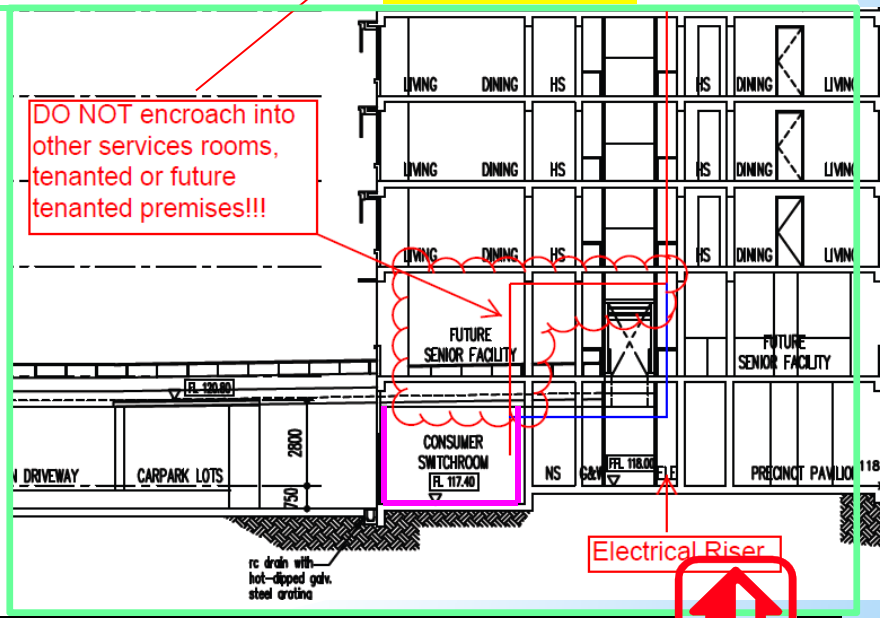

2nd storey Plan




3rd storey Plan




Section Plan




Cable installation

Consultant shall design the **outgoing main cables, from CSR, MDF/TER to respective Services Rooms, Electrical, Telecommunication Risers** to be ceiling/wall mounted (at not more than 3.6m height) in **the common areas (e.g void deck)** at basement or ground floor.

The cables shall be and are properly shielded from weather and **shall not encroach into services room, tenanted or future tenanted premises**

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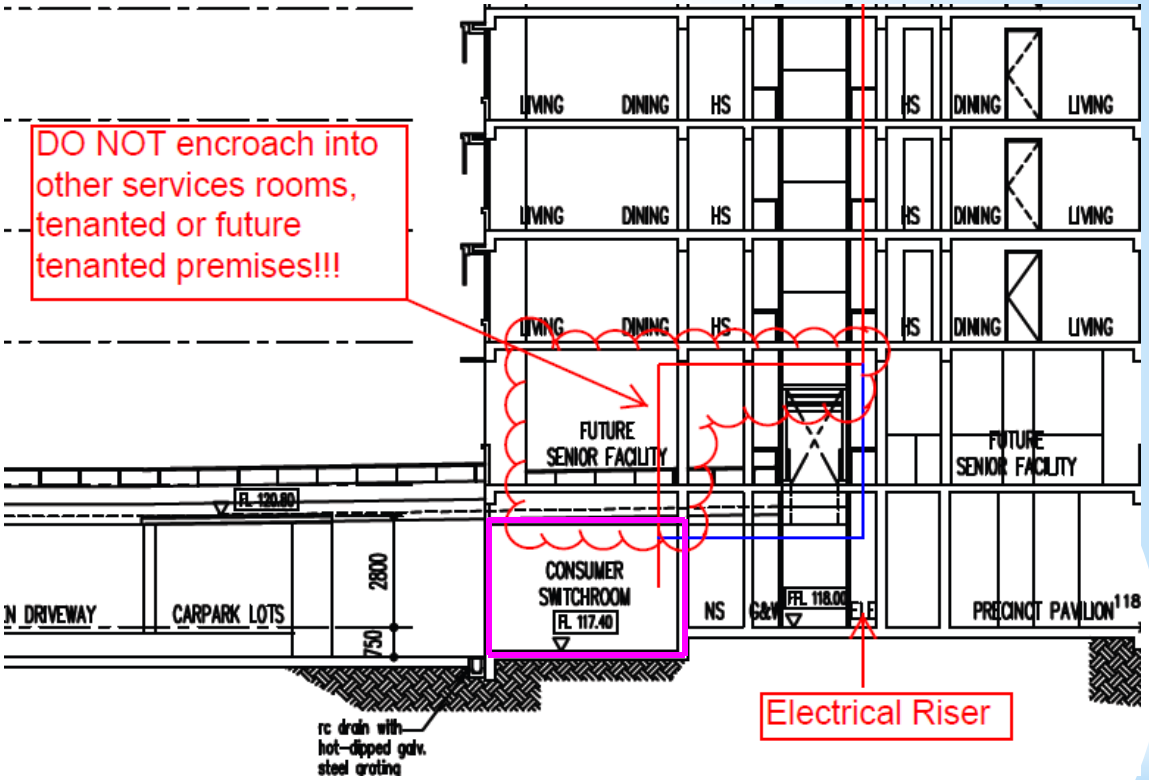
# Cable Installation

Outgoing Cable from CSR encroaching into future senior facility before going to Elect. Riser.



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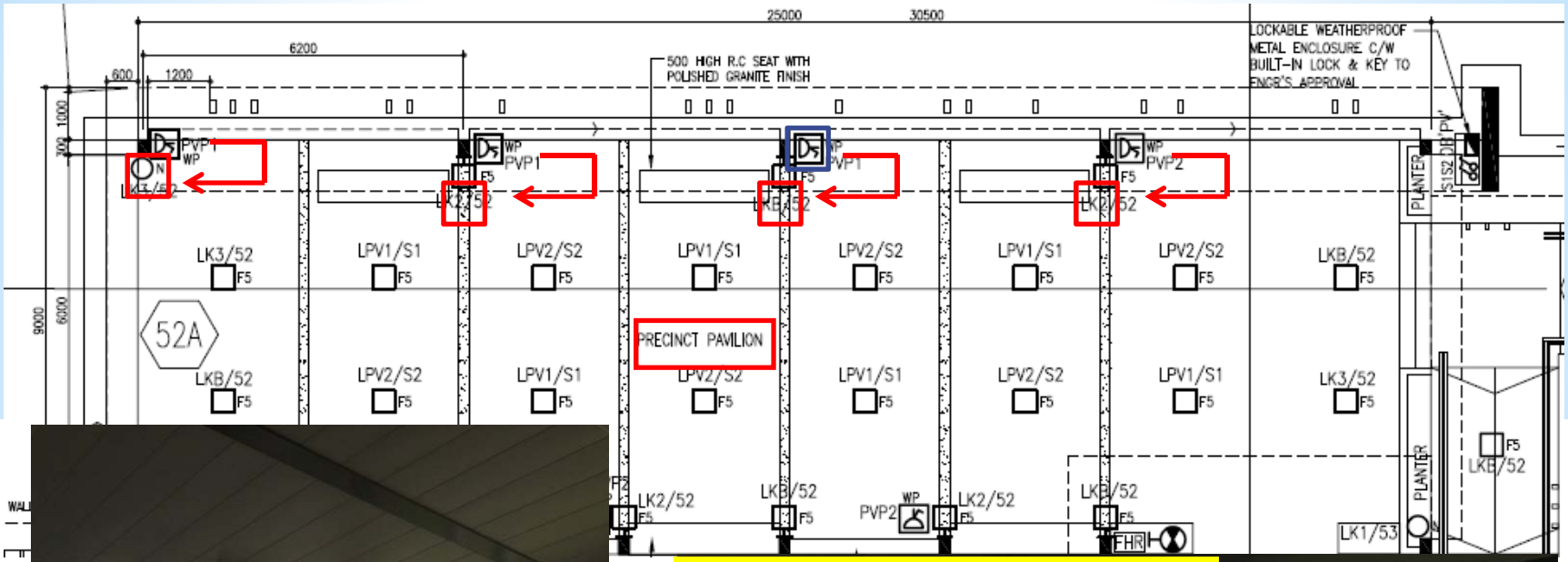
# Precinct Pavillion Installation






To resolve rain water splashed into the precinct pavilion ,Relocate socket outlet box facing inward to precinct pavilion

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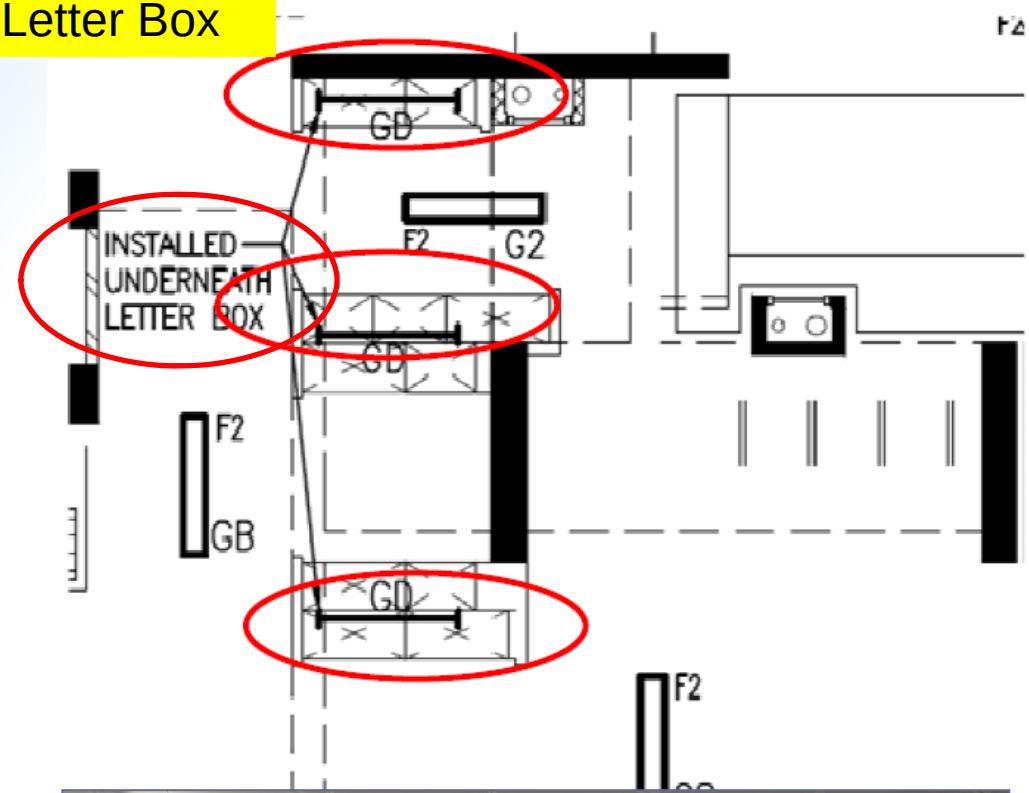
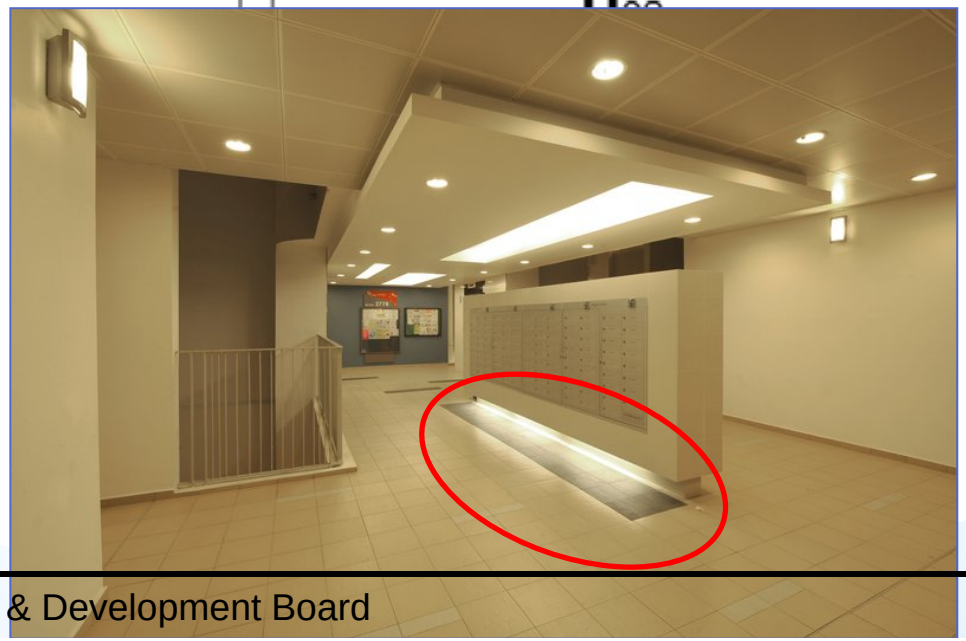
# Lighting Underneath Letter Box



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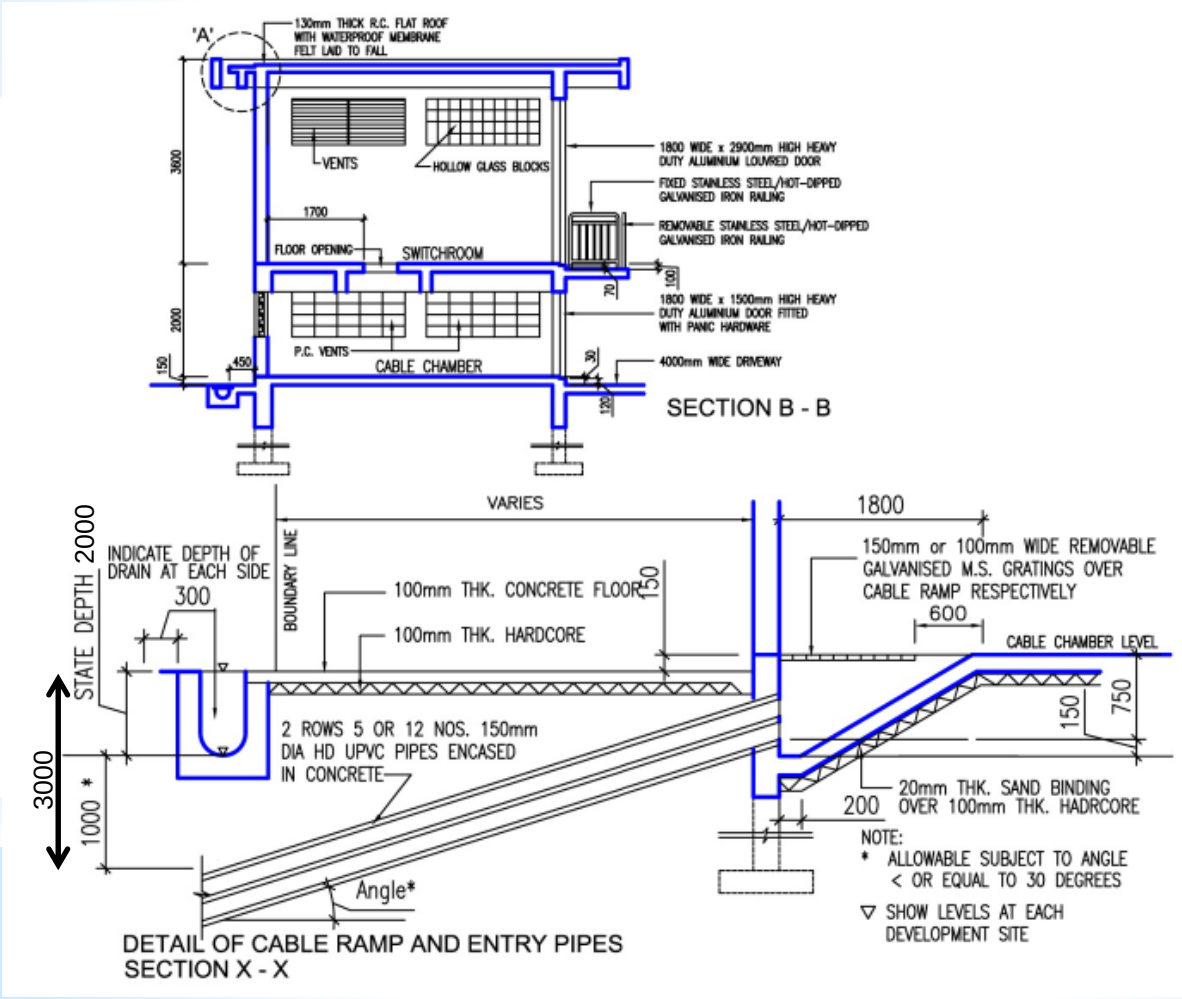
# Substation Lead-In Pipes To 22kV/LV Substation

## 28.1.3 Cable Room of 22kV Electrical Substation

The lead in pipes into the substation cable room shall laid underneath any LTA road side drain/PUB drain. The pipes should be at least 300mm after the drain and to a depth of not more than 3 metres below the road surface or ground in compliance with SP PowerGrid requirements.



# MDF Room Installation

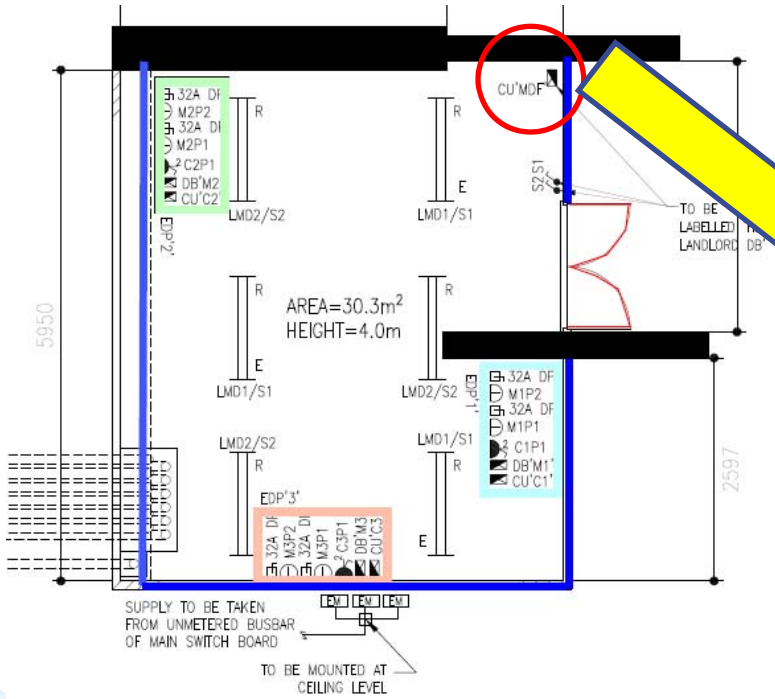
Mr Soh

We wish to inform you that we are not able to accede to your request as the wiring will encroach into the "territory wall" of other service provider.
The distribution board shall be installed by the Service Provider on each individual wall as per your conversation with Mr Tan.

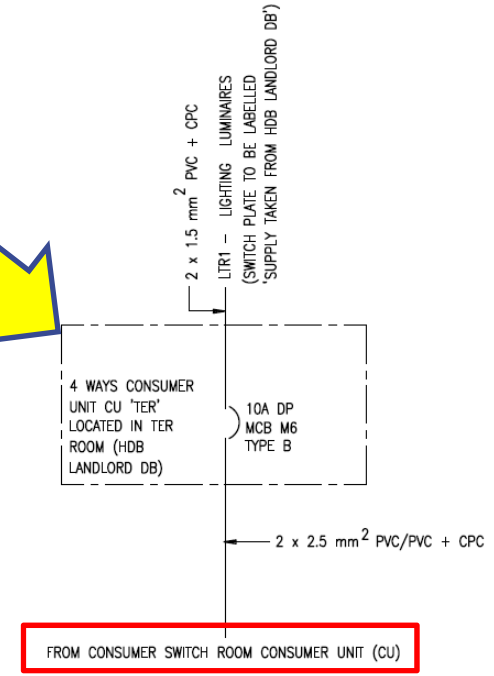
Thanks,

Best Regards,
Tan Lay Hua

Installation Branch Section
SP Services Ltd
Co Registration No: 199504470N




ELECTRICAL INSTALLATION TO MDF ROOM
(FOR EST. BLK. NO. 410) SCALE 1:50




TYPICAL SINGLE LINE DIAGRAM OF LIGHTING INSTALLATION IN MDF/TER Room

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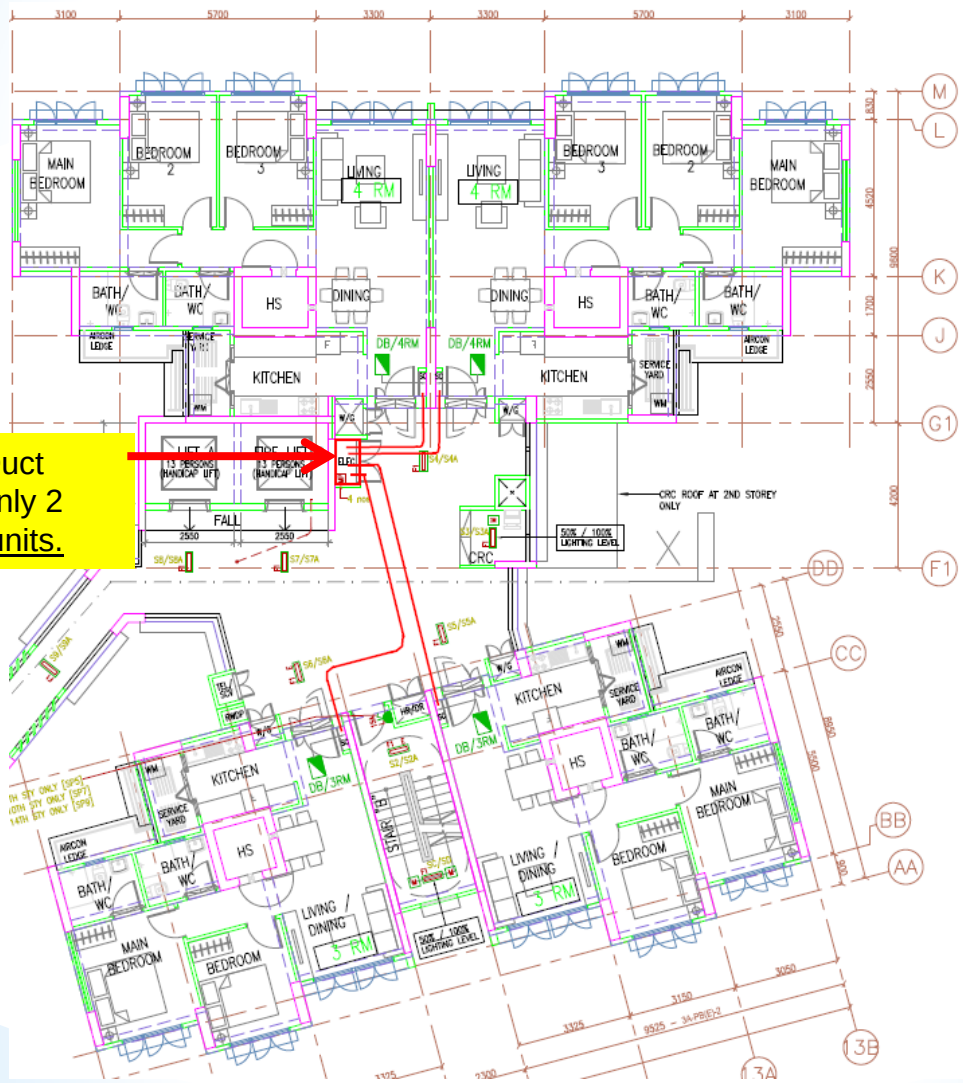
# No. Of Meter in Elect. Riser Duct

Sold flat and block

The electrical and telecommunication service ducts shall be centrally located to serve the correlated units. A draw box shall be provided for every 2 numbers of 90 degree angle bend in any concealed conduit run from these ducts to their correlated units. Each electrical duct shall accommodate two and not more than two electrical meters.

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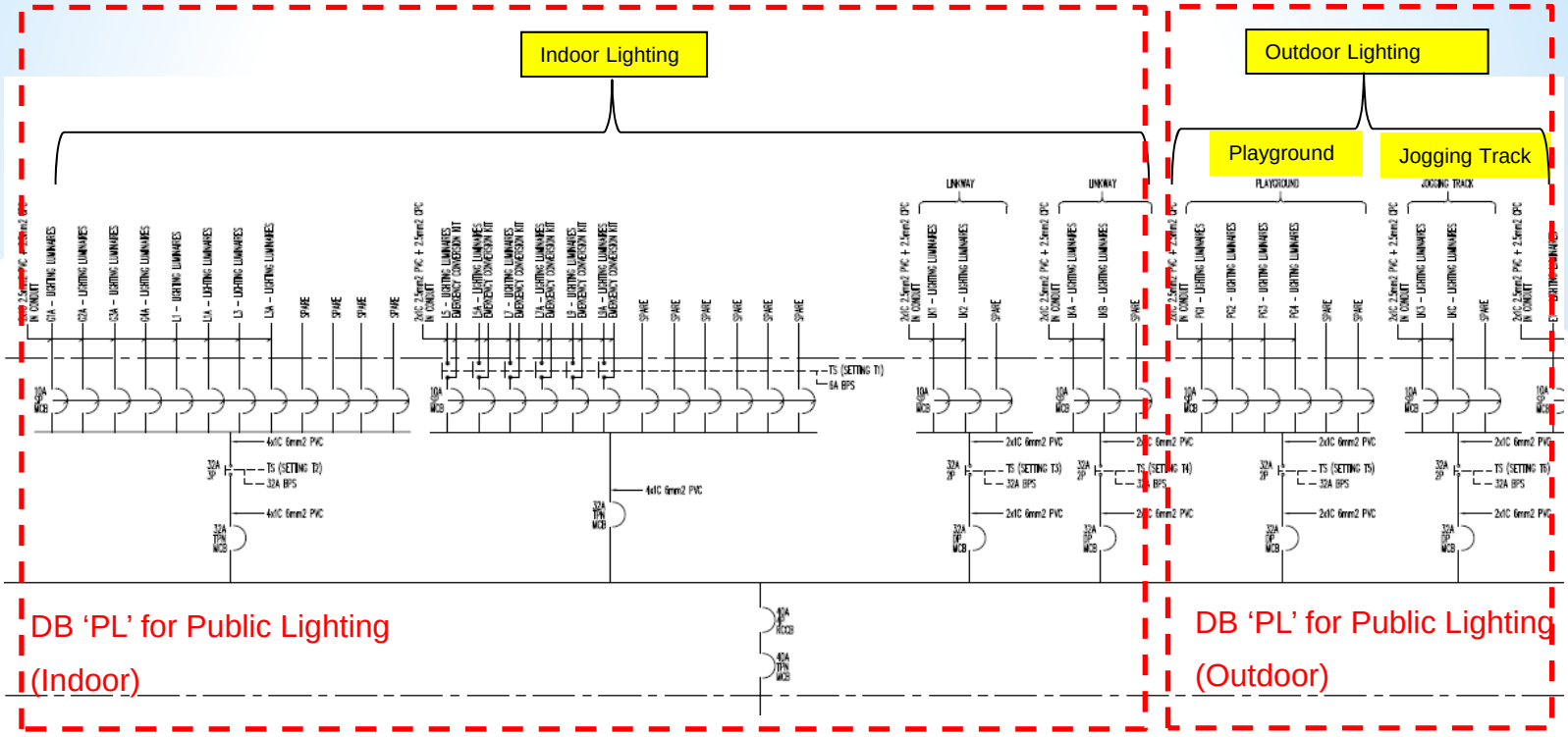
# Indoor Lighting Circuit & Outdoor Lighting Circuit

Separate DB for Indoor Lighting Circuit & Separate DB for Outdoor Lighting Circuit.

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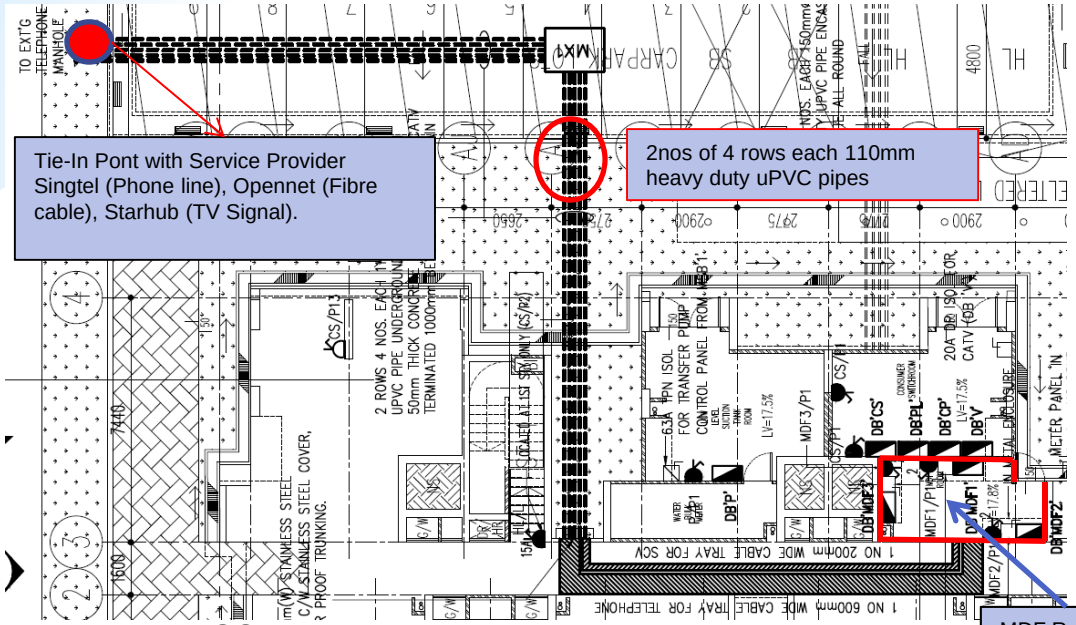
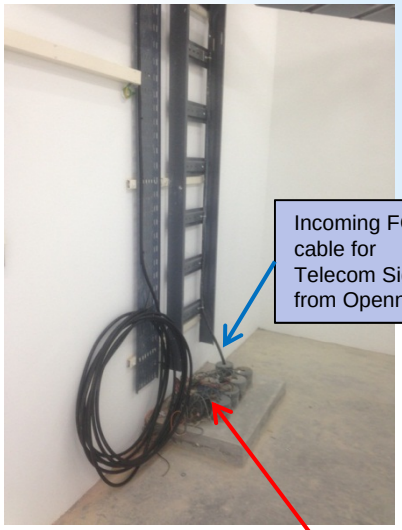
# Underground Telecom System

For U/G Telecom System to MDF Room, Consultant shall
a)Obtain approval from TFCC.
b)Coordinate with service providers for connection to telecom operator underground pipelines: Singtel (Phone line), Opennet (Fibre Optic cable), Starhub (TV Signal).




TFCC
(Telecommunication Facility Coordination Committee)

Consultant

MDF Room

Service Provider

Singtel – Telephone Line
Opennet – Fibre Optic Cable
Starhub – TV Signal

SAMPLE TFCC APPROVAL LETTER

TFCC
Telecommunication Facility Co-ordination Committee

For connection to the telecommunication operators' underground pipelines, kindly contact Mr Lee Chong Beng of SingTel (tel: 96497719, cblee@singtel.com , Ms Jane Peh of StarHub (tel: 6825 6366, jane@starhub.com), Ms Rena Fong of OpenNet (tel: 6595 9123, rena@opennet.com.sg) or Mr Lee Him Buan of CityNet (tel: 9653 1397, himbuan.lee@citynetlink.com.sg) respectively.

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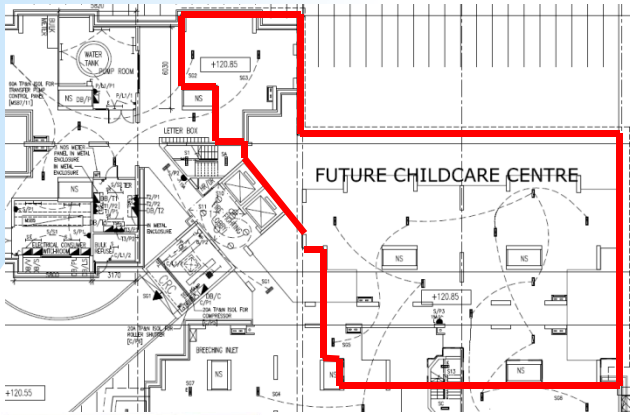
# Commercial Premises – Meter Panel location

Electrical Load <= 100A,
Meter panel could be house in DB and located in the electrical Riser.

Electrical Load > 100A,
Meter panel could be located in the premises (SAC/CCC).






To provide cover with locking device to EL DB at service duct, including house number to service duct




Meter Panel >100A to be located in Premises (SAC/CCC) instead of installing at the SAC entrance.

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# Electrical Design Issues (Residential Unit)

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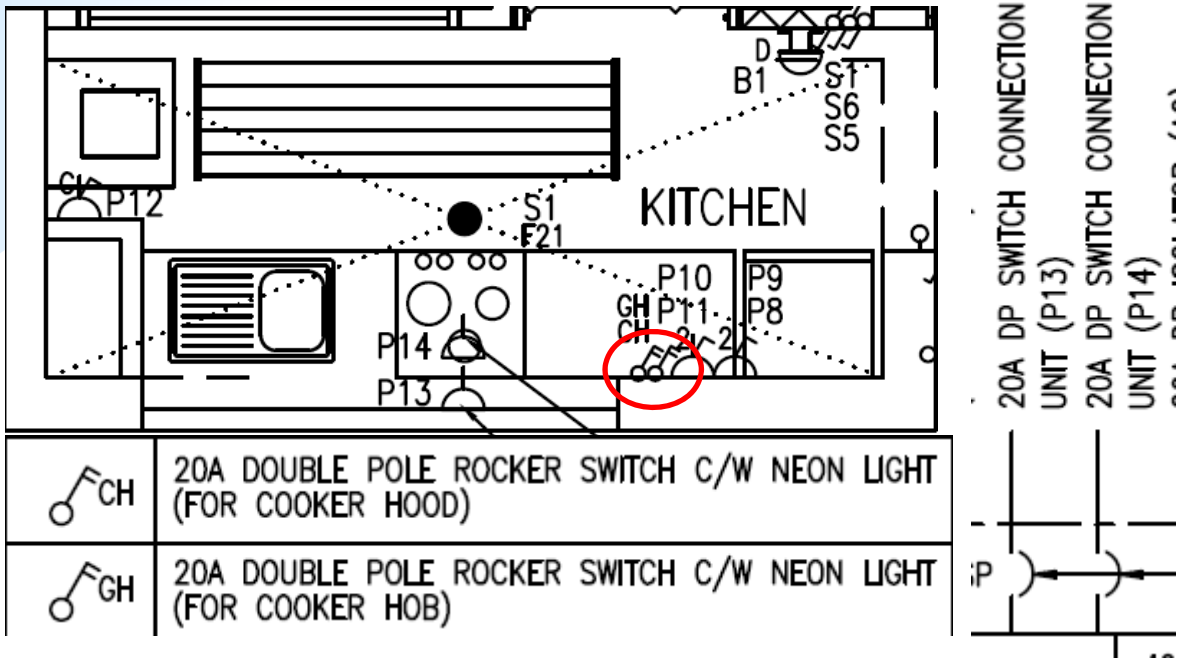
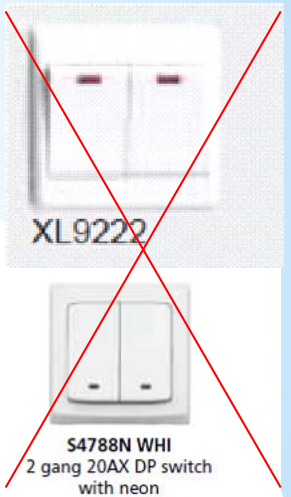
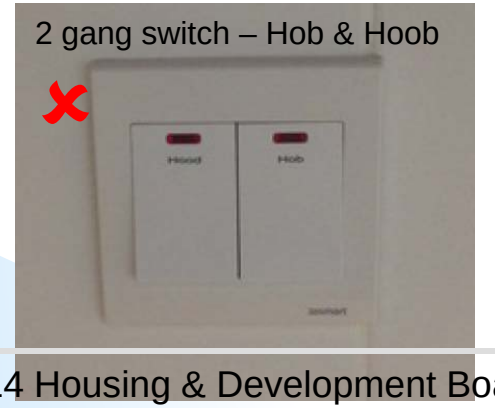
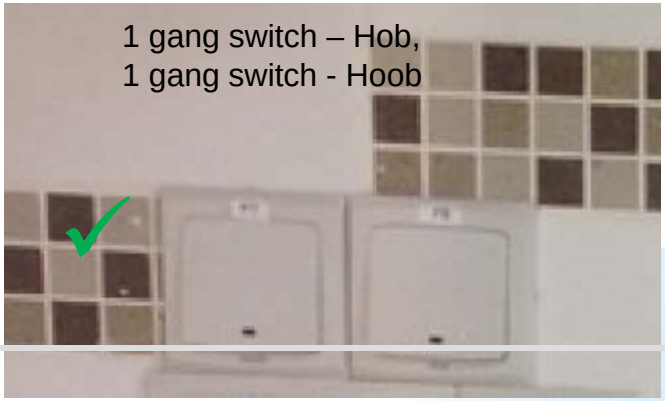
# 2 POLES 2 GANG SWITCH FOR KITCHEN COOKER HOOD AND HUB ARE NOT ALLOWED

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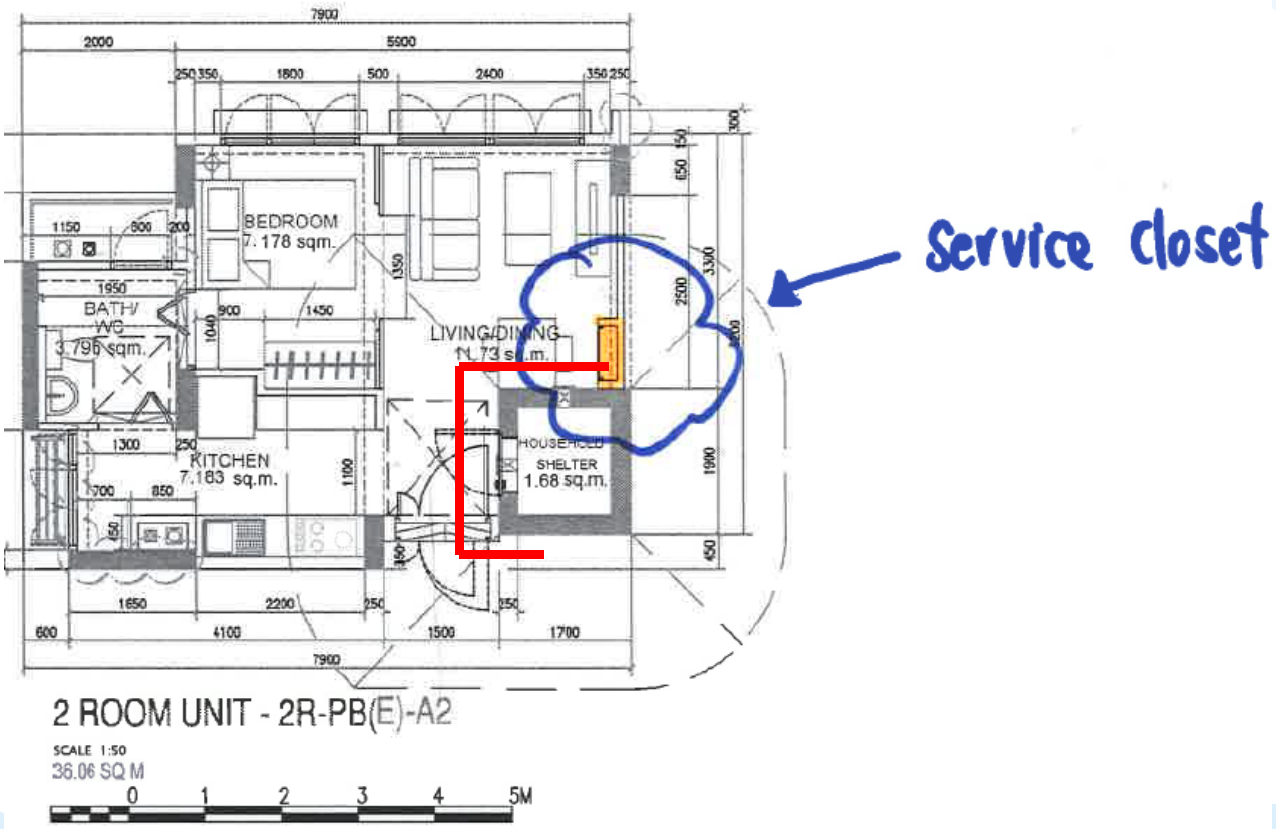
# DB Closet Location in living/dining (2 Room Unit)

There are some issues (accessibility & maintainability) on the laying of electrical cables (Electrical as well as Telecommunication) from the riser(s) to the Service Closet above layout for future wiring works. This layout has to be discontinued.

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## Optional Component Scheme – Kitchen Partition Wall

Kitchen partition wall is offered as a standard OCS (Optional Component Scheme) starting from Sept13 BTO launch exercise.





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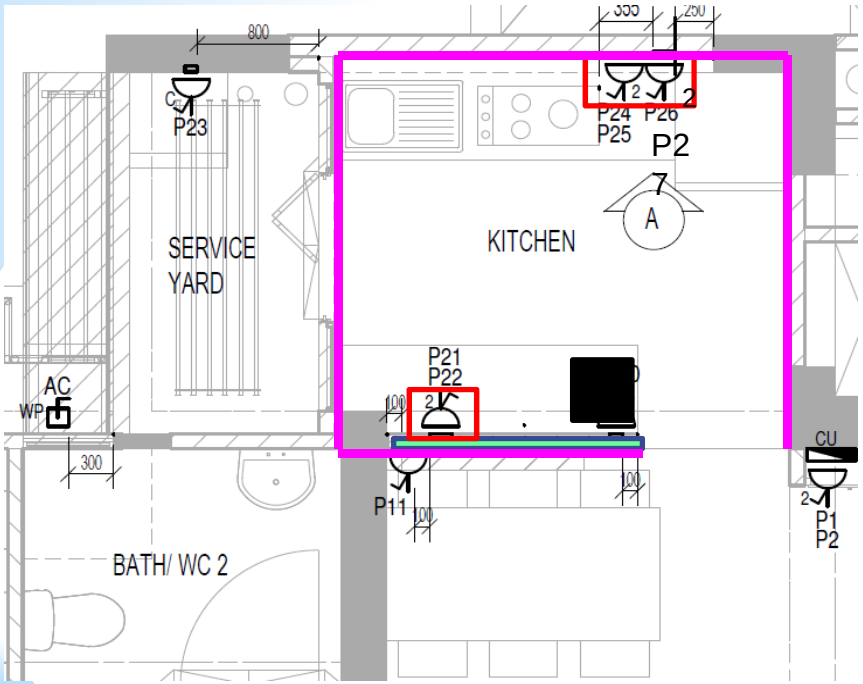
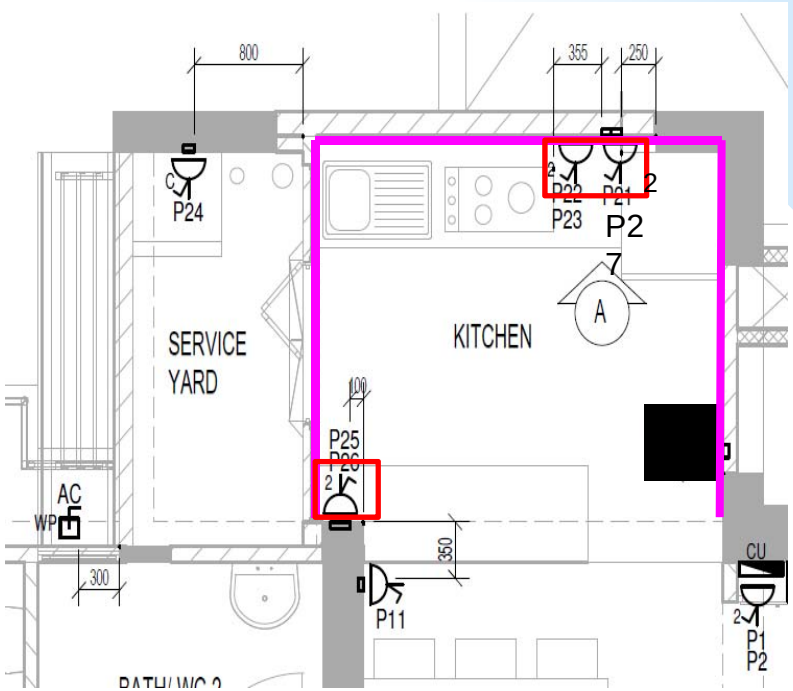
# Typical Layout for Socket Outlet in Kitchen

Kitchen
Partition Wall

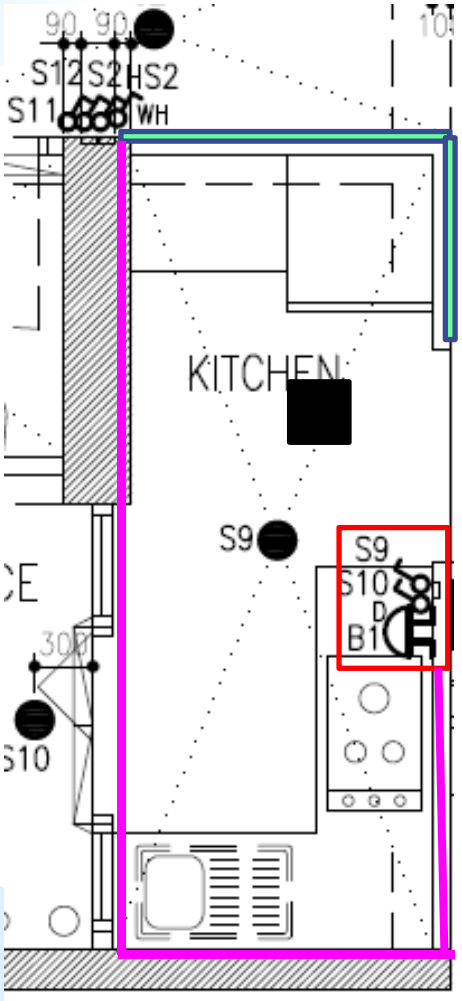



Open Kitchen
Concept

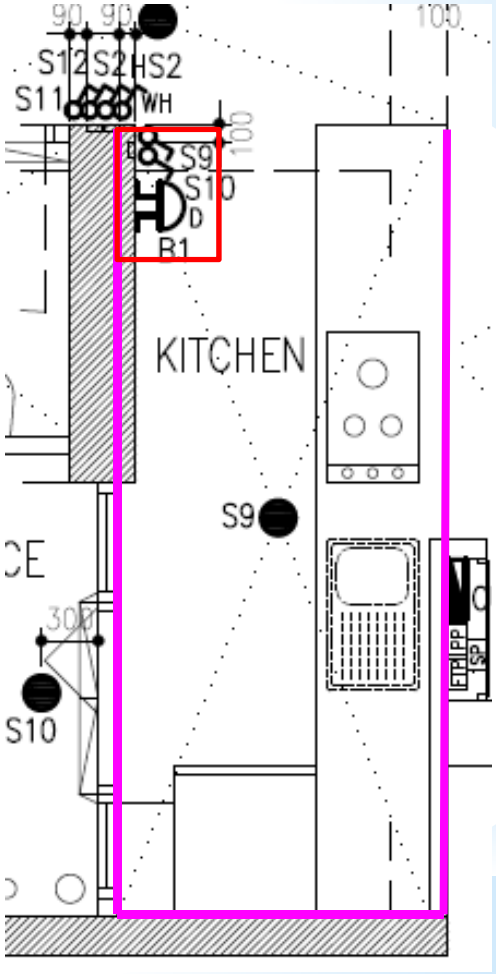


# Typical Layout for Lighting in Kitchen

Kitchen
Partition Wall

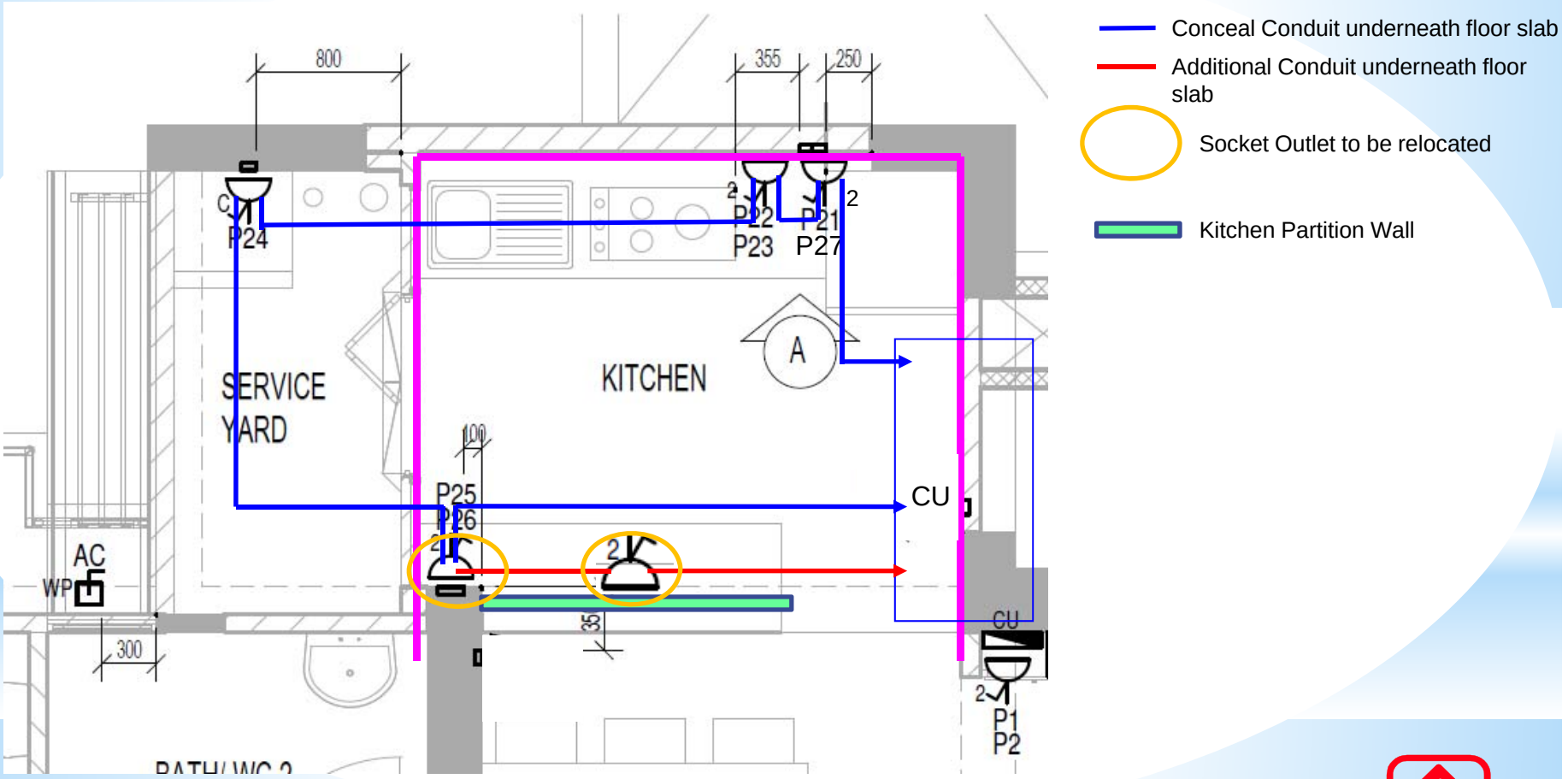



Open Kitchen
Concept



# Conduit Routing Provision in Kitchen

->Socket outlets are installed based on “open kitchen” layout.
->Extra provision of spare conduits are laid underneath the floor slab to the socket outlet positions based on kitchen partition wall.
->If buyer chooses to have “open kitchen”, conduits laid underneath will be abandoned. Installed socket outlets will remain.
->If buyer “opt-in” the kitchen partition wall, spare conduits will be utilised and socket outlets will be re-positioned to the kitchen partition wall

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Recommendations

1)Consultant shall **submit 2 design showing power points with open kitchen concept and power point with kitchen partition wall**.

2) For both layouts of “open kitchen” and kitchen partition wall.

M&E provisions can be made as follow:

a) Socket outlets are installed based on “open kitchen” layout.

b) Extra provision of spare conduits are laid underneath the floor slab to the socket outlet positions based on alternative layout of kitchen partition wall.

c) If buyer chooses to have “open kitchen”, conduits laid underneath will be abandoned. Installed socket outlets will remain.

d) If buyer “opt-in” the kitchen partition wall, spare conduits will be utilised and socket outlets will be re-positioned to the kitchen partition wall.

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# Changes to Code of Practice for Info-communication Facilities in Buildings (COPIF 2013)

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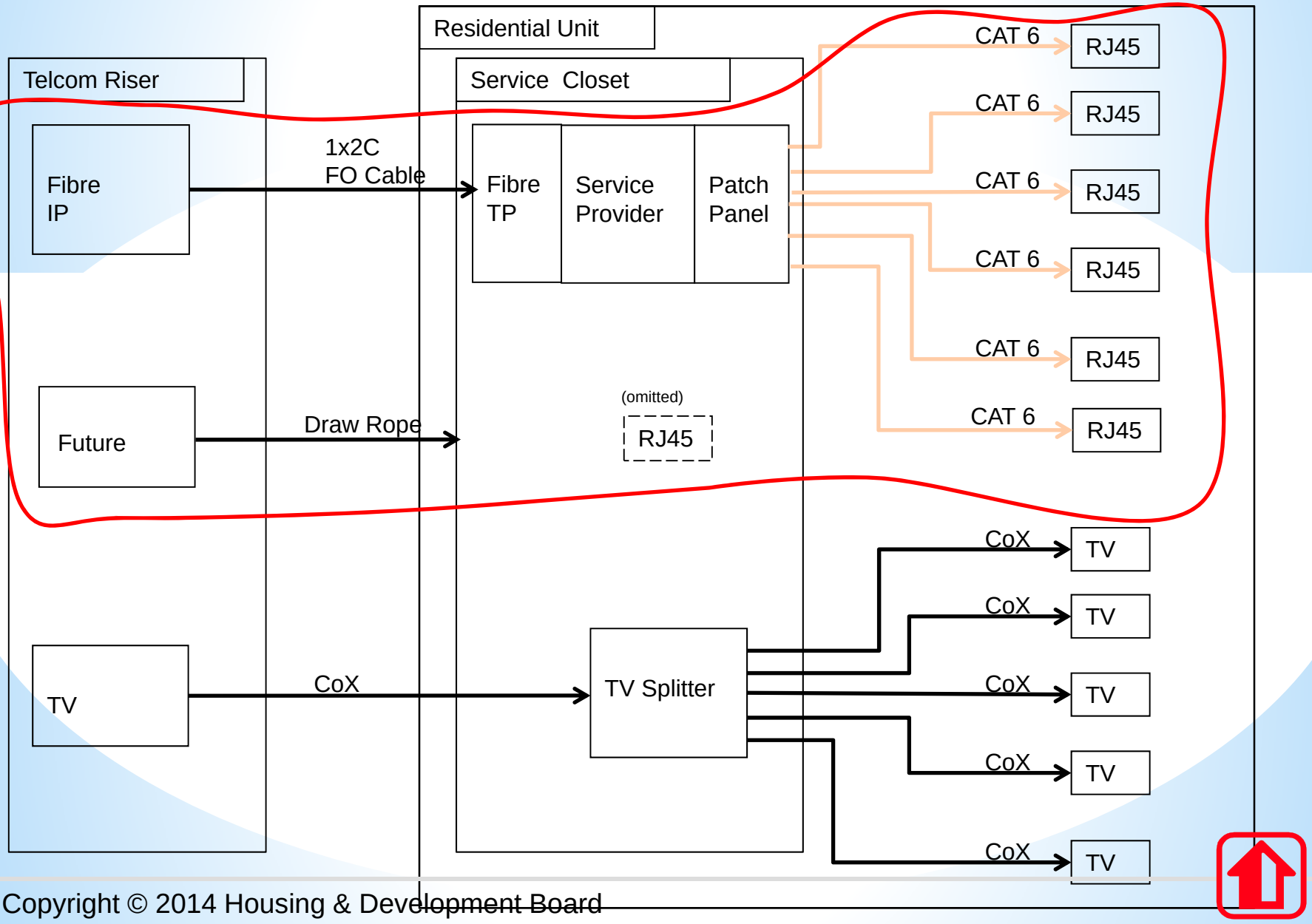
# COPIF 2013

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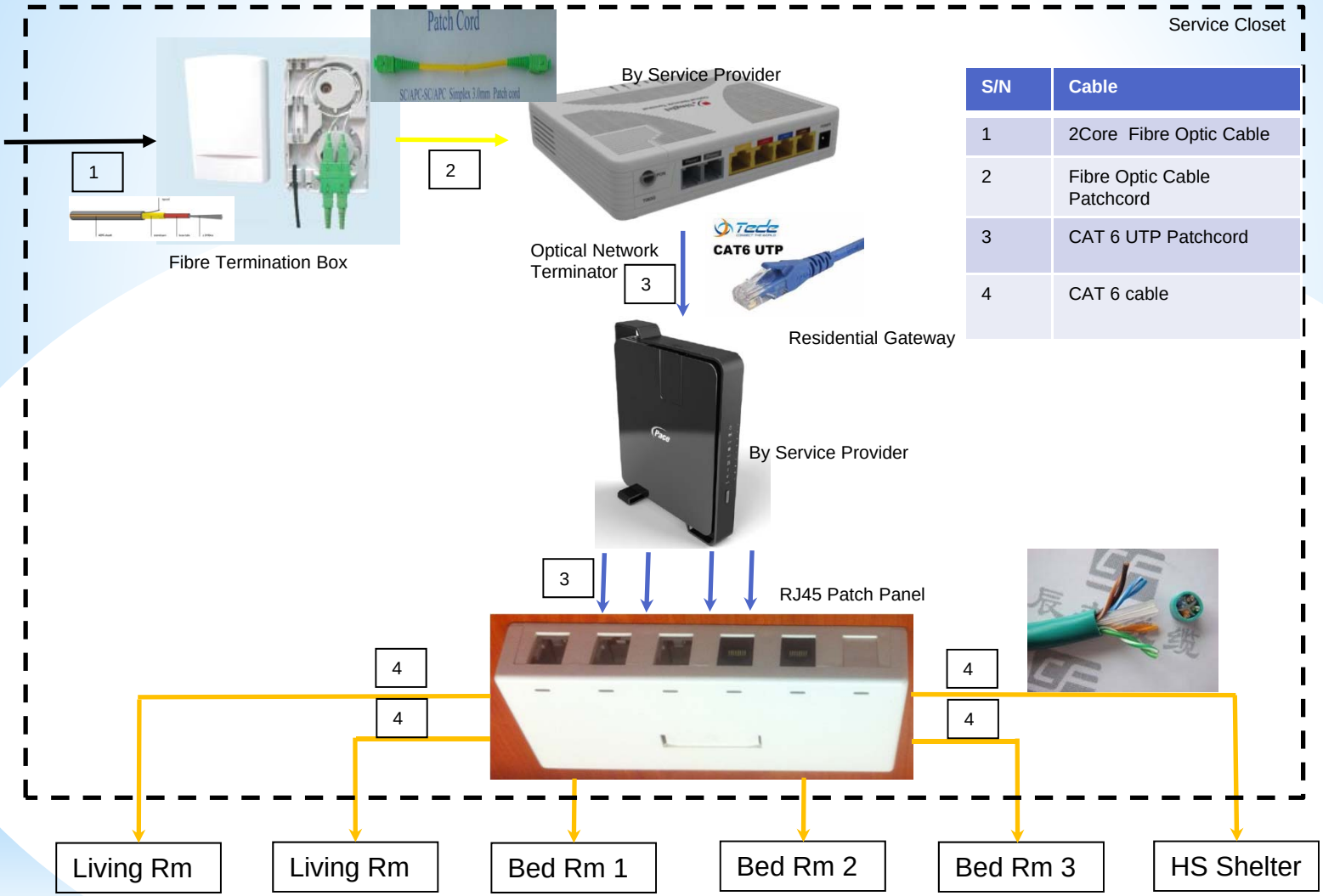
# Wiring of 5Rm Flat




| S/N | Cable |
|---|---|
| 1 | 2Core Fibre Optic Cable |
| 2 | Fibre Optic Cable Patchcord |
| 3 | CAT 6 UTP Patchcord |
| 4 | CAT 6 cable |

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| Existing | New |
| --- | --- |
| Riser<br>10Pair Block Terminal | Riser<br>Fibre Interface Panel |

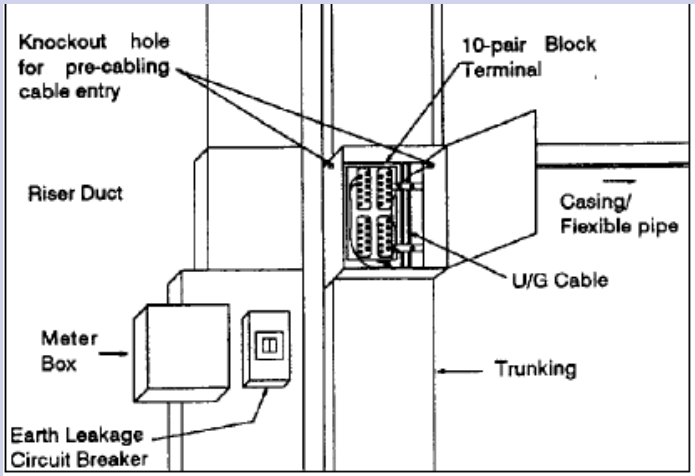


Fig.3-4 Location of DP in riser duct for HDB



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| Existing | New |
| --- | --- |
| Living Rmser To Residentia'<br>2x4pair Copper Cable<br>(Telcom Cable)<br> | Riser To Residential<br>1x2C FO Cable<br> |
| Service Closet<br>MMB Box-Telcom Block Terminal, Splitter Box<br>RJ45 outlet<br> | Service Closet<br>Fibre Termination point, TV Split Box, RJ45 Patch Panel<br><br><br><br><br> |
| Residential Unit<br>RJ11 Tel outlet<br><br> | Residential Unit<br>RJ45 Outlet<br><br> |

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## Existing COPIF 2008

1.Remove MMB box

2.Remove RJ45 outlet

3.Remove Block Terminal



By Service Provider




Service Closet

## New COPIF 2013

75x50mm Trunking

50x50mm Trunking

Splitter Box





TV Splitter





RJ45 Patch Panel

FTP

Service Closet

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# CAT 6 Cable Testing Requirement

The test report shall include the following information for each cabling element tested and be in a format approved by the relevant authority and SO Rep.

(a) (Wiremap results that indicate the cabling has no shorts, opens, miswires, split, reversed, or crossed pairs, and end to end connectivity is achieved.

(b) Attenuation, NEXT, PSNEXT, Return Loss, ELFEXT, and PSELFEXT data that indicate the worst case result, the frequency at which it occurs, the limit at that point, and the margin. These tests shall be performed in a swept frequency manner from 1 MHz to highest relevant frequency, using a swept frequency interval that is consistent with TIA and ISO requirements. Information shall be provided for all pairs or pair combinations and in both directions when required by the appropriate standards. Any individual test that fails the relevant performance specification shall be marked as FAIL.

(c) Length (in meters), propagation delay, and delay skew relative to the relevant limit. Any individual test that fails the relevant performance specification shall be marked as FAIL.

(d) Cable manufacturer, cable model number/type.

(e) Tester manufacturer, model, serial number, hardware version, and software version.

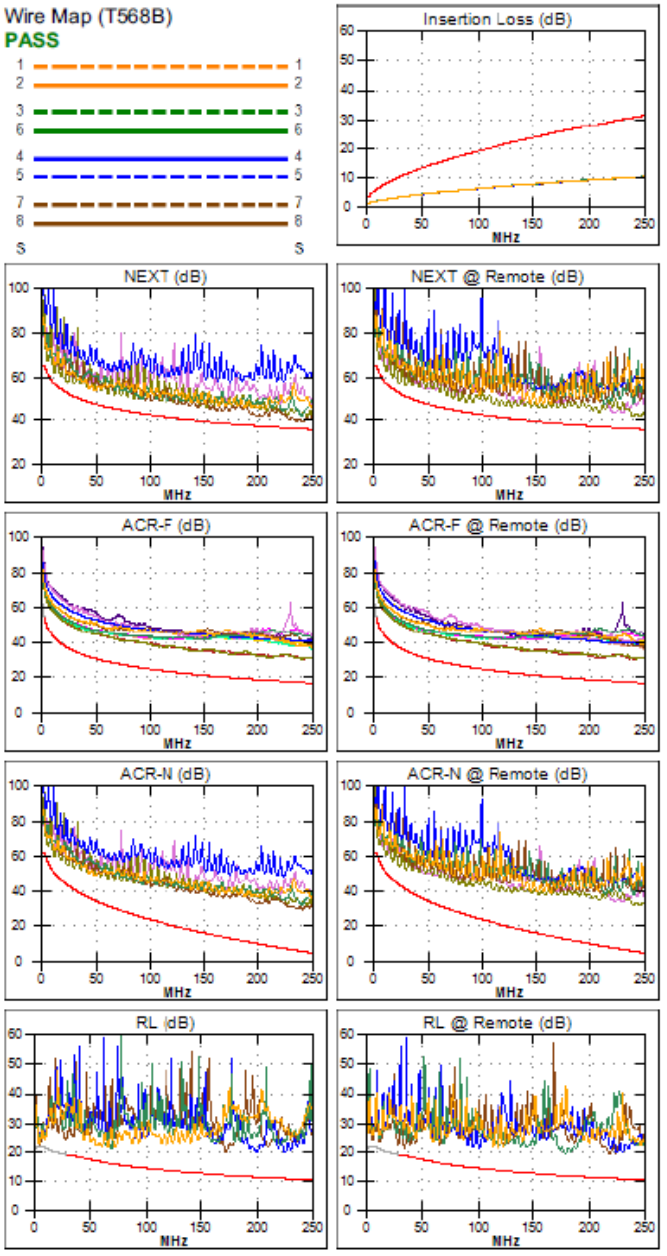
(f) Circuit ID number and project name.

(g) Auto-test specification used.

(h) Overall pass/fail indication.

(i) Date of test.

| | Worst Case Margin | | Worst Case Value | |
|---|---|---|---|---|
| **PASS** | MAIN | SR | MAIN | SR |
| Worst Pair | 36-45 | 36-78 | 36-45 | 36-78 |
| **NEXT (dB)** | 3.1 | 4.3 | 3.1 | 5.4 |
| Freq. (MHz) | 241.5 | 85.3 | 241.5 | 239.5 |
| Limit (dB) | 35.6 | 43.0 | 35.6 | 35.6 |
| Worst Pair | 36 | 36 | 36 | 78 |
| **PS NEXT (dB)** | 3.8 | 5.3 | 3.8 | 7.0 |
| Freq. (MHz) | 240.0 | 84.8 | 240.0 | 239.5 |
| Limit (dB) | 33.0 | 40.5 | 33.0 | 33.0 |
| **PASS** | MAIN | SR | MAIN | SR |
| Worst Pair | 36-45 | 45-36 | 36-45 | 45-36 |
| **ACR-F (dB)** | 13.0 | 12.9 | 13.3 | 13.2 |
| Freq. (MHz) | 138.5 | 205.0 | 240.5 | 240.5 |
| Limit (dB) | 21.4 | 18.0 | 16.6 | 16.6 |
| Worst Pair | 45 | 45 | 36 | 45 |
| **PS ACR-F (dB)** | 13.3 | 13.4 | 15.4 | 15.7 |
| Freq. (MHz) | 11.0 | 26.3 | 242.5 | 248.5 |
| Limit (dB) | 40.4 | 32.8 | 13.5 | 13.3 |
| **N/A** | MAIN | SR | MAIN | SR |
| Worst Pair | 36-78 | 36-78 | 36-45 | 36-78 |
| **ACR-N (dB)** | 9.2 | 9.3 | 23.9 | 26.6 |
| Freq. (MHz) | 5.5 | 5.3 | 241.5 | 245.5 |
| Limit (dB) | 57.8 | 58.2 | 5.1 | 4.7 |
| Worst Pair | 36 | 36 | 36 | 36 |
| **PS ACR-N (dB)** | 9.3 | 9.8 | 24.5 | 27.7 |
| Freq. (MHz) | 5.5 | 5.3 | 240.0 | 239.5 |
| Limit (dB) | 55.5 | 55.9 | 2.6 | 2.7 |
| **PASS** | MAIN | SR | MAIN | SR |
| Worst Pair | 12 | 78 | 45 | 36 |
| **RL (dB)** | 5.1 | 2.6 | 8.9 | 7.4 |
| Freq. (MHz) | 56.8 | 35.0 | 225.5 | 180.0 |
| Limit (dB) | 16.5 | 18.3 | 10.5 | 11.4 |

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# CAT 6 Witness of Testing

Witness of Testing CAT 6 shall be submitted together with test report verified by Consultant.

Your Ref :
Our Ref :
Date :
TEL (DID) :
EMAIL :

Building Quality Group
Development & Construction Productivity Section 3 (M&E)
Attn: _____

Dear Sir

**Witness of Testing Carried Out By Data Tester**

| | | |
|---|---|---|
| Contract Title: | | |
| Block: | Street Name: | |
| Main Contractor | | |
| Electrical Sub-Contractor | | |
| Witness Officers | Officer Name | Signature |
| Consultant Supervisor | | |
| Data Tester | | |
| Electrical Sub-Contractor Supervisor | | |

1 I declare the Data Sample Test have been witnessed and tested satisfactorily by the Electrical Sub-Contractor & the Data Tester.

| S/N | Data Sample Test | Unit No | Date of Witness | Remarks |
|---|---|---|---|---|
| 1 | Day 1 | | | |
| | Day 2 | | | |
| | Day 3 | | | |
| | Day 4 | | | |

Remarks: _____

Yours faithfully

Name & Designation
M&E Consultant

cc BQD PD _____

Note : This form shall be submitted together with the test report verified by the consultant.

* delete where not applicable
☐ tick if applicable

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# Storey Shelter

## Guide Drawings

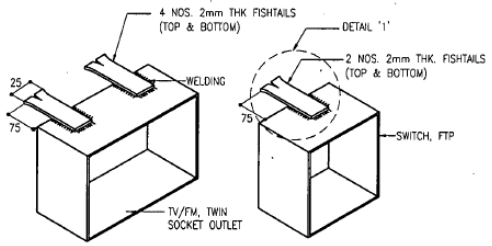



Fig. 1a ANCHORING OF GALVANISED STEEL MOUNTING BOXES WITHIN SHELTER WALLS
SCALE : N.T.S.

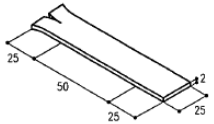
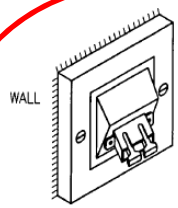
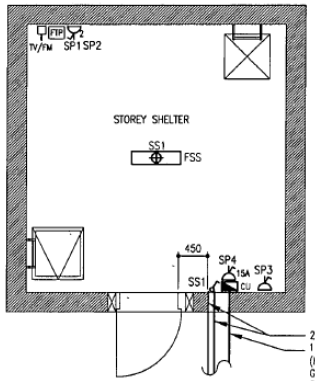



Fig. 1b DETAIL '1'
SCALE : N.T.S.

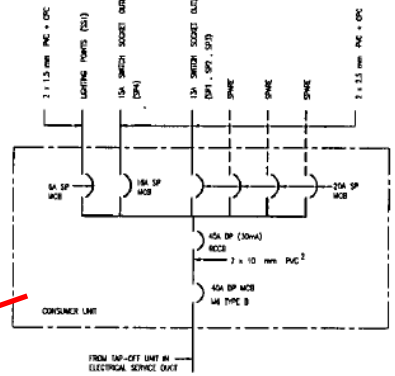
| ELECTRICAL LEGEND | |
|---|---|
| | LIGHTING POINT COMPLETE WITH BATTEN HOLDER |
| | CONDUIT BOX |
| | 6AMP ONE WAY BIG ROCKER SWITCH |
| CU | CONSUMER UNIT |
| 15A | 15AMP SWITCH SOCKET OUTLET |
| | 13AMP SWITCH SOCKET OUTLET |
| 2 | 2 GANG 13AMP SWITCH SOCKET OUTLET |
| TV/FM | TELEVISION/FM OUTLET |
| FSS | 28W FLUORESCENT LAMP |
| FTP | FIBRE TERMINATION POINT |
| LEGEND FOR CONCEALED CONDUIT | |
| | CONDUIT/ CONDUITS RUN VERTICALLY |
| | 60 x 20 PVC MULTI-COMPARTMENT TRUNKING |
| | 25 x 12.5 PVC TRUNKING |
| | 25 x 12.5 PVC TRUNKING FOR RJ 45 OUTLET |




FIBRE TERMINATION POINT/BOX
TO BE RECESSED MOUNTED
SCALE : N.T.S.




CONCEALED CONDUITS IN CEILING SLAB
(LIGHTING, SWITCH SOCKET OUTLETS, TV & FTP OUTLETS)
SCALE 1:50




SINGLE LINE DIAGRAM OF ELECTRICAL INSTALLATION

DRAWING TITLE :
CONCEALED CONDUITS AT STOREY SHELTER

DRAWING NO. : HB-001401-0E720-003
DATE : DECEMBER 2013
SCALE : AS SHOWN

HOUSING & DEVELOPMENT BOARD

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## Copper Cessation Plan

- SingTel announced Cessation of Copper Phone Services will begin with occupants of homes that obtain temporary occupation permit (TOP) status from Dec 1 2013.

- For these projects confirmed under SingTel's copper cessation plan, please arrange with your Project Consultant Manager to monitor and liaise with SingTel/OpenNet to provide and install the fibre cabling to the riser ducts and into the flat units in advance before the block completion and handing over.

**News @ AsiaOne**

### No copper phone lines for new homes

SingTel phasing out old lines to move customers to new fibre-optic tech. -ST
Irene Tham,Technology Correspondent

Mon, Apr 22, 2013
The Straits Times

SINGAPORE - SingTel will stop offering services delivered over its traditional phone lines to new homes, in a bid to move customers over to newer fibre-optic technologies.

Cessation of such services will begin with occupants of homes that obtain temporary occupation permit (TOP) status from Dec 1 this year, SingTel said in a statement last night.

A large portion of its telephony, broadband and pay-TV services are currently carried over the copper-based phone lines, already laid in the one million or so homes here.

These services are also piped to customers over the Government-backed Next Generation Nationwide Broadband Network, which is based on newer fibre-optic technologies capable of surfing speeds of up to

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# Thank You

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