MECHANICAL REQUIREMENTS & DESIGN ISSUES

DESIGN OF STORMWATER DETENTION SYSTEMS

Background

Clause 7.1.5 of the Code of Practice (COP) on Surface Water Drainage:

*Industrial, commercial, institutional and residential developments greater than or equal to **0.2 hectares** (ha) in size are required to control the peak runoff discharged from their sites.*

Peak runoff flow rate = 0.55 x Area x Rain Intensity

For design storms with a return period of 10 years and for various storm durations of up to 4 hours (inclusive).

Effective for NEA DC applications made from 1 Jan 2014.

PUB's On-site Stormwater Detention Tank Systems Tech Guide

The guide can be downloaded from PUB's web site. It outlines the design approach for on-line & off line systems.

HDB's principles for design of underground detention systems

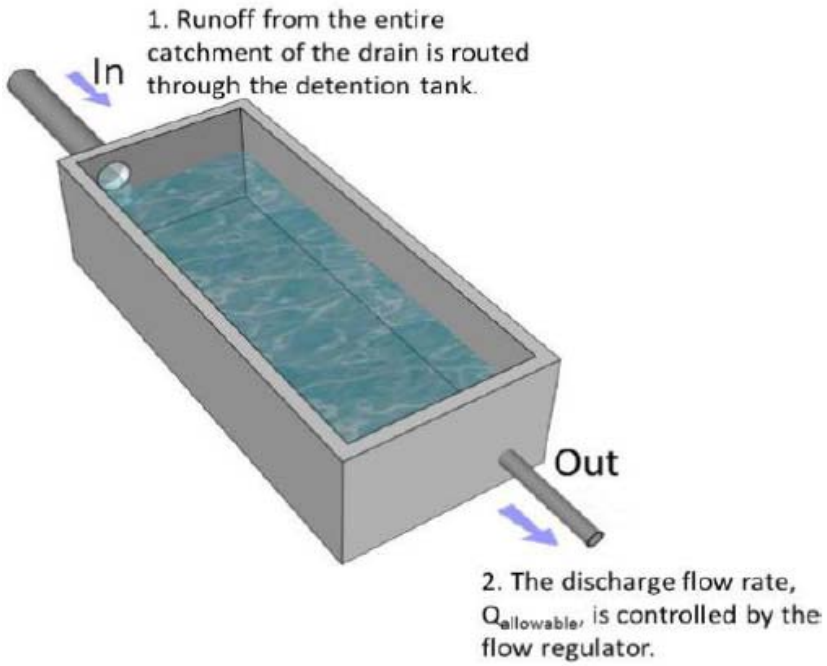
- Design an optimal & cost efficient system with minimal land-take & site works (eg. minimal tank sizes, piling & excavation works etc)
- Minimize maintenance with stormwater run-off discharge by gravity wherever possible
- If needed, to optimise M&E design with minimal M&E elements (eg. nos & size of pumps)

Preferred Systems

1. On-line detention system (by gravity)

Discharge rate from detention system regulated by flow control device, usually an orifice.

Sufficient elevation difference of more than 1m is needed between the proposed system inlet and outlet point.

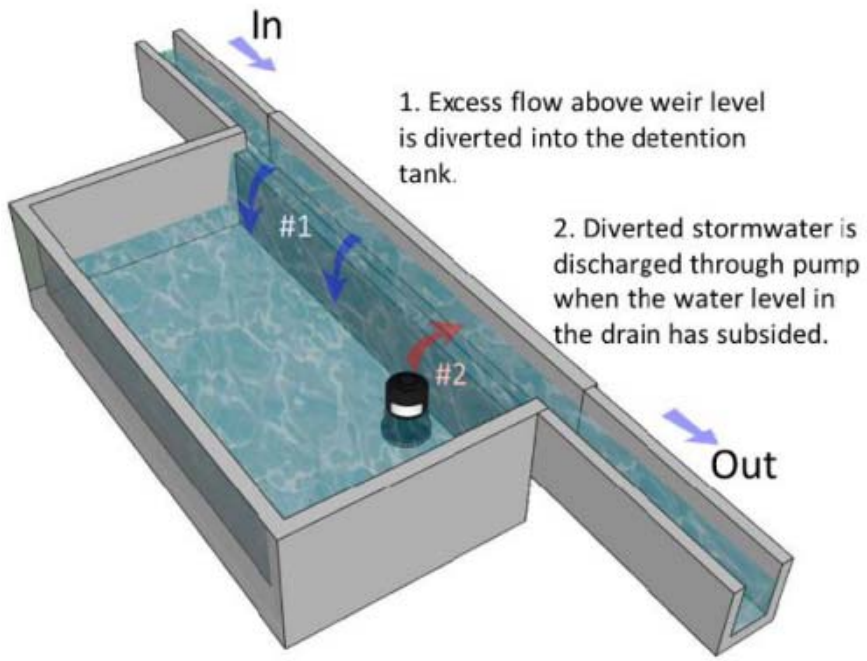


2. Off-line detention system (by pumps)

Usually requires smaller detention volume.

Discharge system operates only after significant storm events (smaller pumps).

Need hydraulic calculations to design & rain or water level sensor to start pumping after storm.



Challenges faced by M&E consultants

- Coordination with C&S Engineer & Arch
- Some C&S consultants may not be familiar with the design of an off-line system
- Pumping system for off-line system should operate after storm
- Pumping system for on-line system should be avoided
- If the above cannot be met, pls inform HDB.

Design of pumping system

- Submersible pumps to be adopted
- Provision to facilitate the hoisting of pumps
- No need of gen-set support
- Consultants encouraged to be familiar with hydraulic calculation method for non-standard design

Comparison of hydraulic calculations using MIKE11, SWMM & Spreadsheet

Issue	MIKE11	SWMM	Spreadsheet
Cost	High	Free	Free
Ease of use	Need training	Need time to read tutorial & manual	Easiest to learn & use; consultant has full knowledge of all equations used
Modelling Method	Fully dynamic simulation	Fully dynamic simulation	Steady state approximation
Size of tank	Smaller	Smaller	Small

Case Study 1

	Online Pumped	Offline Pumped	% Reduction
Detention Tank Size	240 sq m x 1.6m	220 sq m x 1m	43
Pump Capacity	665 L/s	16 L/s	98
No of pumps	11	3	63

Case Study 2

	Online Pumped	Offline Pumped	% Reduction
Detention Tank Size	171 sq m x 1.5m	119 sq m x 1.5m	30
Pump Capacity	480 L/s	10 L/s	98
No of pumps	9	3	63

CP48 – AMENDMENT 4

Item 8 – 3.1.19

- The water tanks & their ancillary equipment shall be housed in an adequately secured and locked dedicated tank/pump room or located within an adequately secured and locked enclosure. The room/enclosure housing the water tanks and their ancillary equipment shall be segregated from other services ...

Impact on HDB projects

- No other services can enter 1st storey transfer pump room.
- The roof water tanks & booster pumping system have to be fenced up so that they are segregated from other services.
- M&E consultants to inform & work with Arch.
- Approval from PUB is required for non-compliance.

Item 20 – 7.2 (i)

- Common area taps shall be of threaded types to allow for proper hose connection to prevent water leakage/wastage and shall be secured and locked to prevent pilferage and unauthorized use of water.

LARVAE INFESTATION IN HIGH LEVEL WATER TANKS

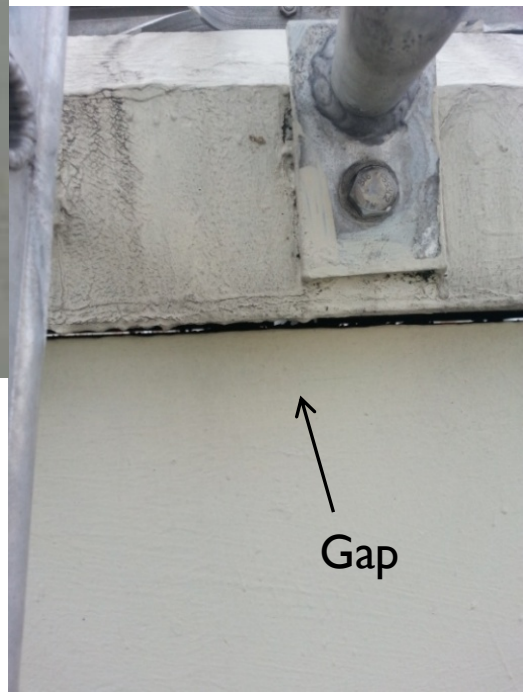

Tank cover

Trap door

- There is trap door on the roof cover for access. Rubber gaskets are provided to prevent entry of rainwater, dirts or insects.







Occasional gaps underneath tank cover due to poor workmanship

Yishun projects

- In Dec 14, BQG spotted gaps underneath tank covers during audit.
- Contractor & consultant were informed.
- Apparently, the rectification was incomplete.
- In Apr 15, PUB received a feedback on ‘worm in water’ from a resident.
- PUB had a joint inspection with TC & spotted larvae in roof tanks & spotted gaps under our roof tank covers.

Role of M&E consultant

- Pls check & confirm the rectification work by contractor.

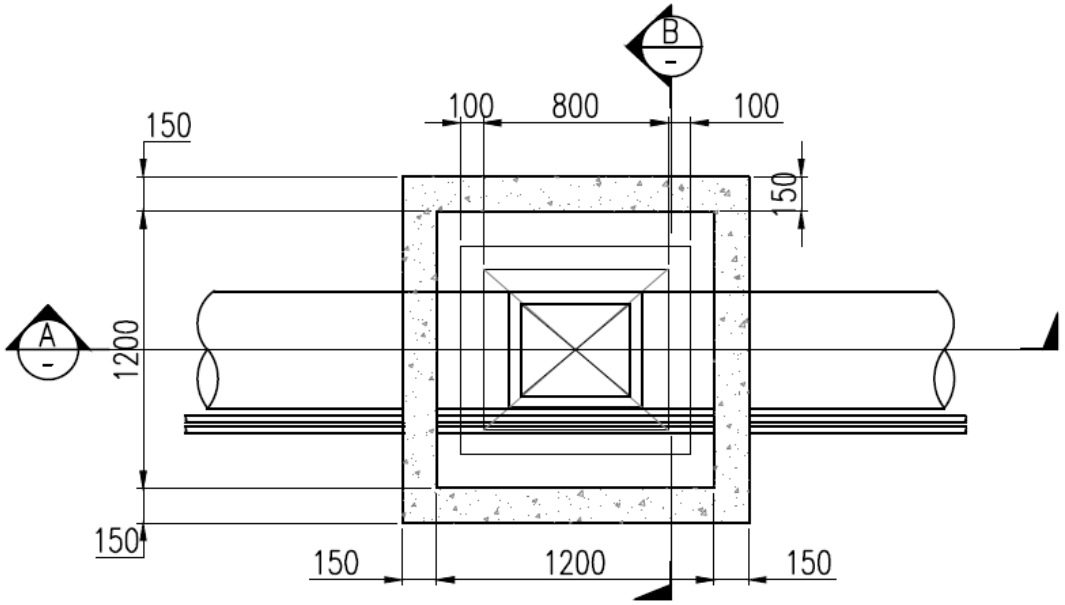
DISTRICT LEVEL PNEUMATIC WASTE CONVEYANCE SYSTEM (PWCS)

Background

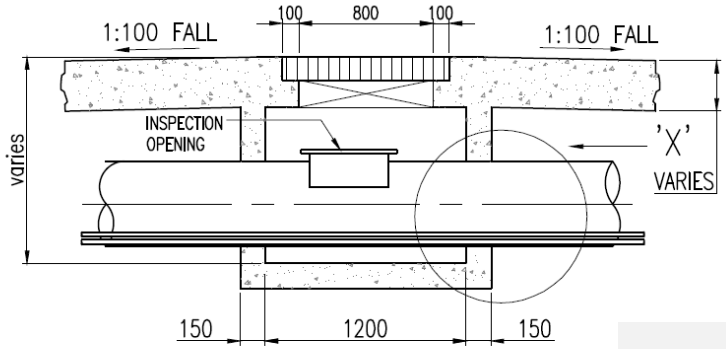
- To-date, there are two running BTO projects with PWCS – Tampines & Jurong.
- Other projects – Punggol North, Bidadari etc.
- HDB is calling specialist contracts.



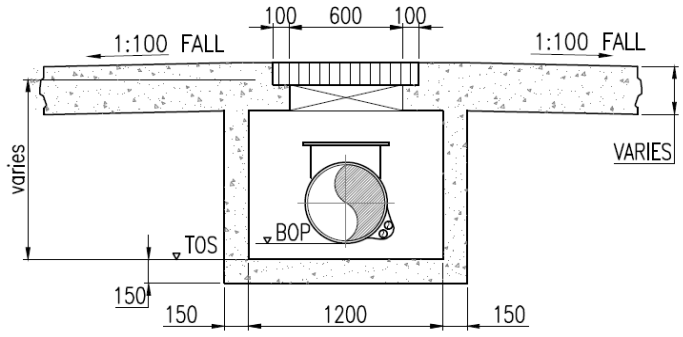
TYPICAL MANHOLE DETAIL



PLAN

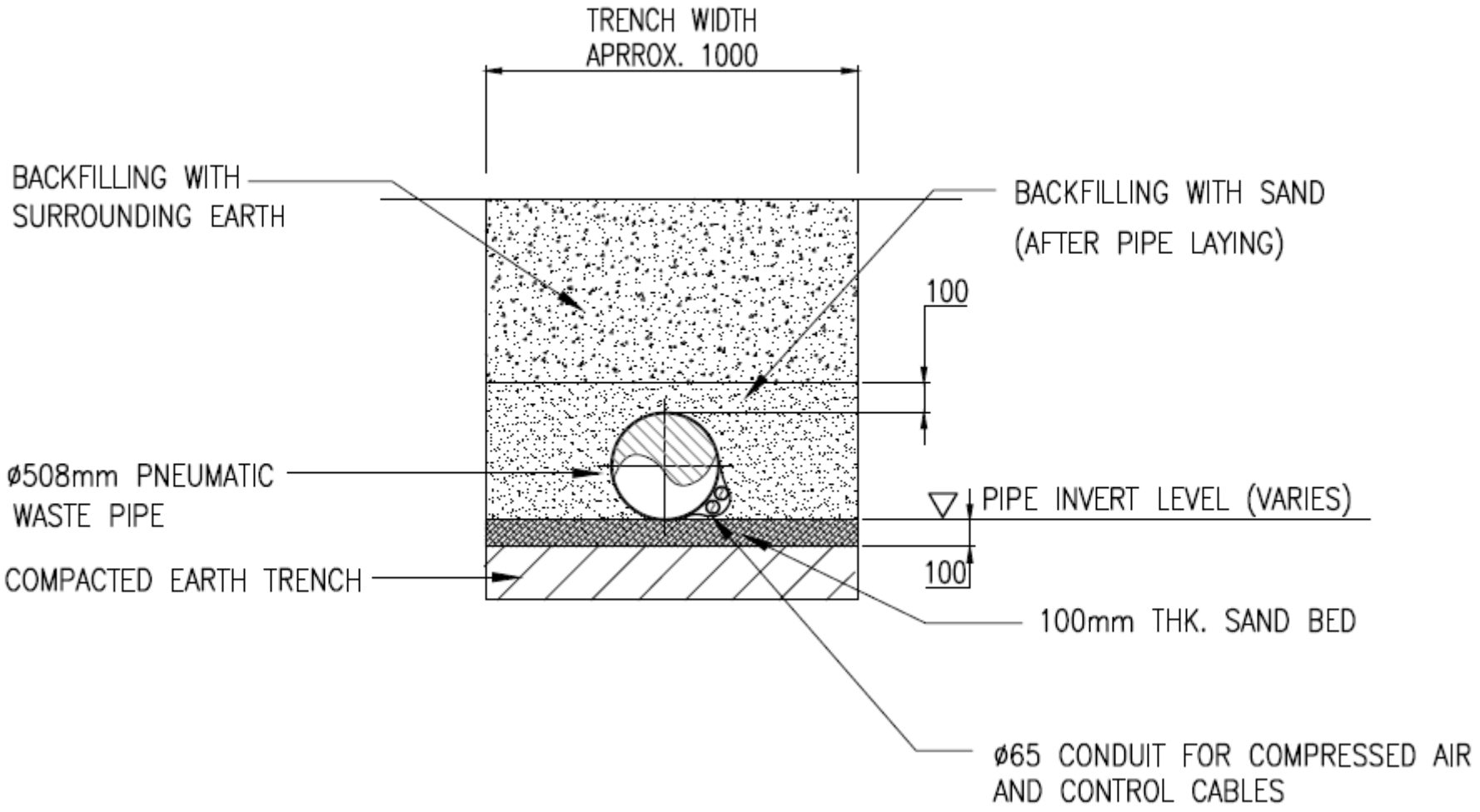


SECTION A



SECTION B

TYPICAL PIPE TRENCH DETAIL (GOOD SOIL CONDITION)



Impact on M&E consultants

- Work with the specialist on the underground pipe routing.
- Coordinate the services drawings.
- Submission through Ecorenet

NEW REQUIREMENTS FROM CITYGAS

Recent requirements from CityGas

- Corridor pipes without joints
- Copper material & aesthetic box-up without opening

Recent requirements from CityGas (2)

- Pipes with joints along well-ventilated corridor
- No box-up or box-up with openings along the corridor
- Otherwise, API pipes have to be used
- Consultant to inform HDB if running contract is affected with abortive works

API pipe entry to dwelling unit

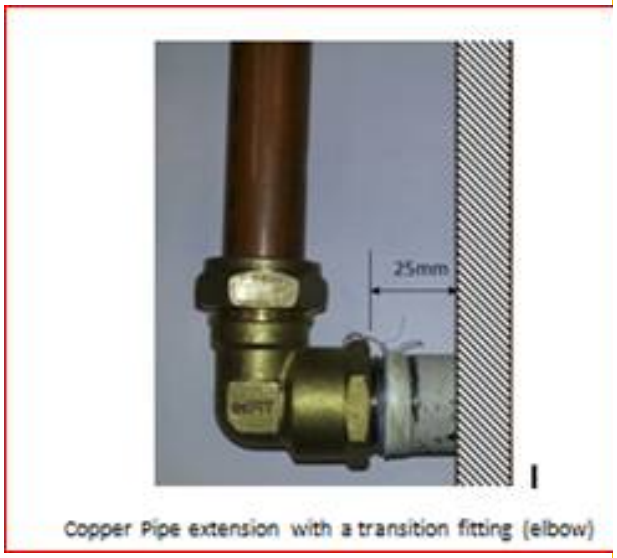
- 25mm protrusion
- Threaded termination with cap



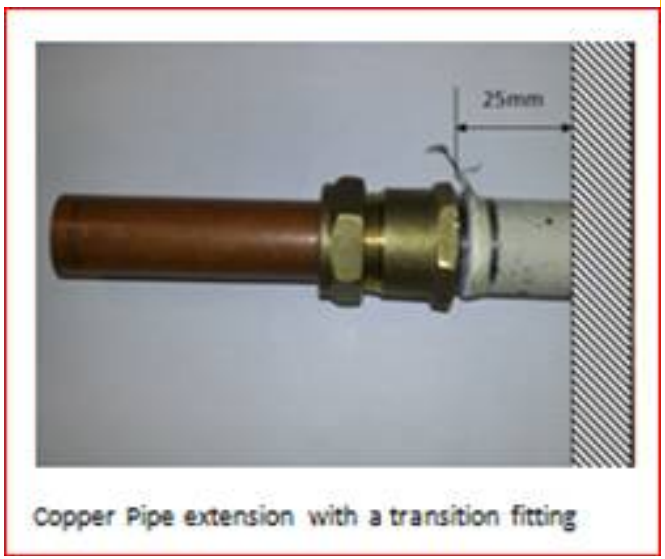
API pipe ends with a cap inside kitchen.

Running of copper pipe inside dwelling unit

- Transition from API to copper pipe using a straight or elbow joint



Copper Pipe extension with a transition fitting (elbow)



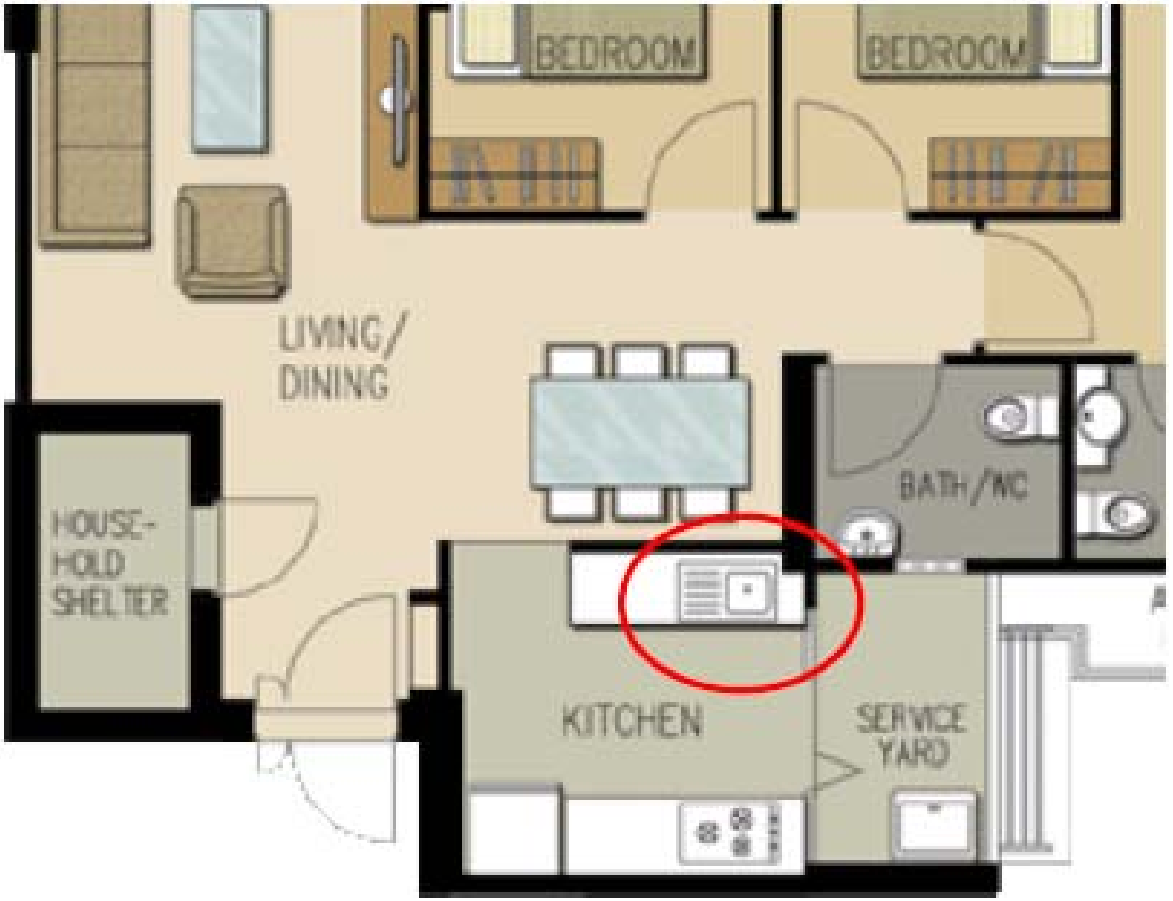
Copper Pipe extension with a transition fitting

DESIGN OF MECH SERVICES FOR OPEN KITCHEN AND OCS KITCHEN PARTITION WALL

Location of kitchen sink

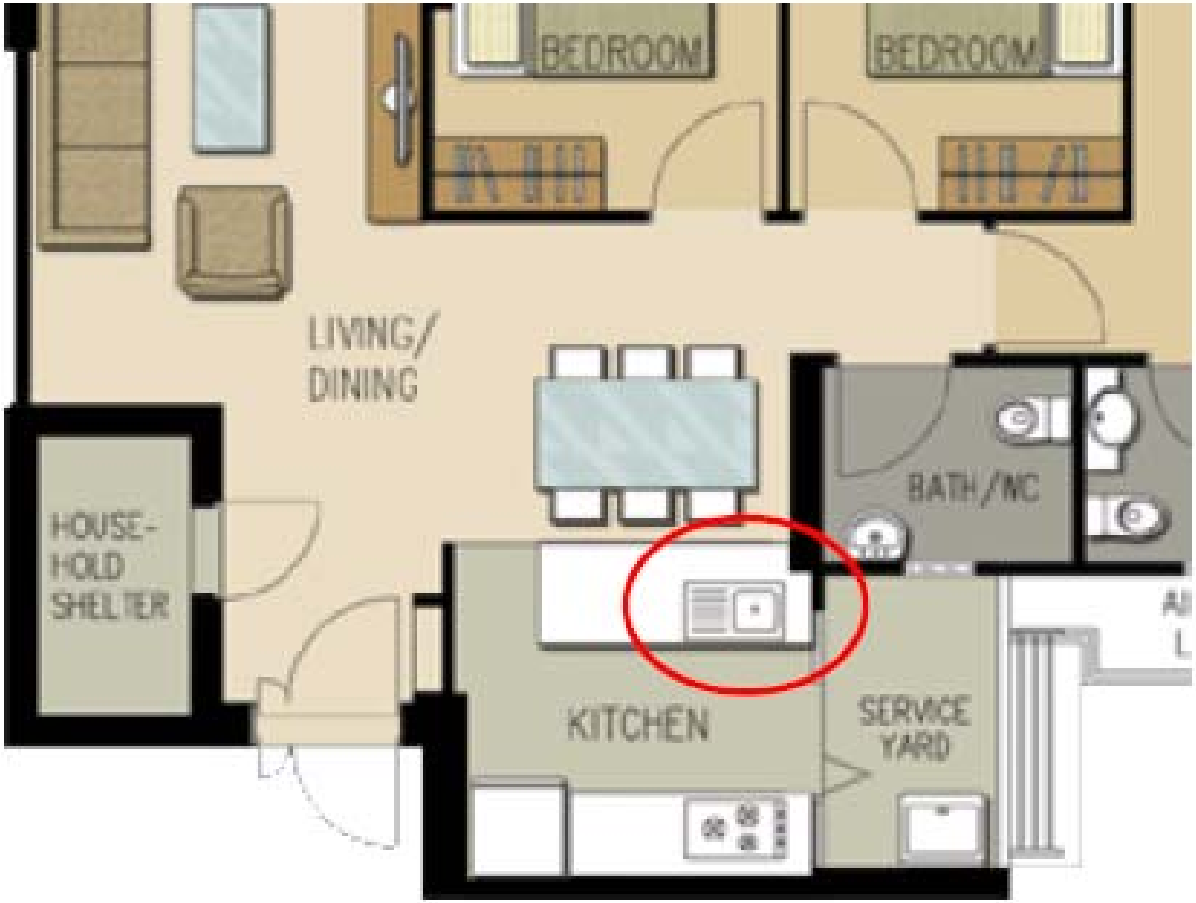
- Consider water point, floor trap/waste, piping connection to main stack.
- Avoid placing sink along optional wall.
- Avoid long length of high level pipe running within the kitchen (connecting floor trap to main stack) as it will affect the future installation of high level kitchen cabinet.
- No running of concealed water pipes in the optional wall.

Avoid placing sink at optional wall side



With Kitchen Partition Wall

Avoid placing sink at optional wall side



Open Kitchen Concept (Default)

Pipe fittings on the floor

- Not able to achieve true open concept as residents have to install counter-top at the sink area.



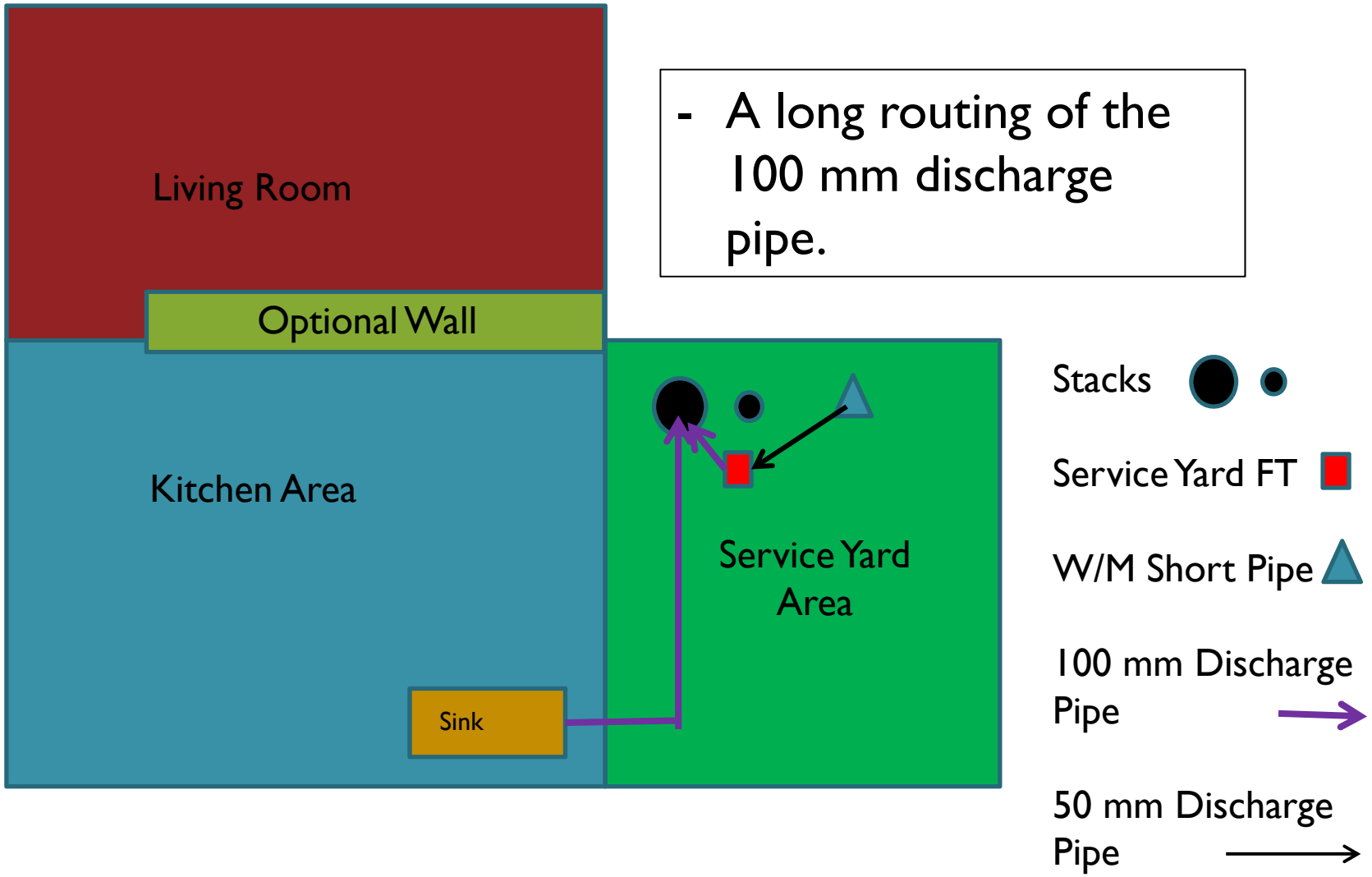
Floor trap can be seen from living room



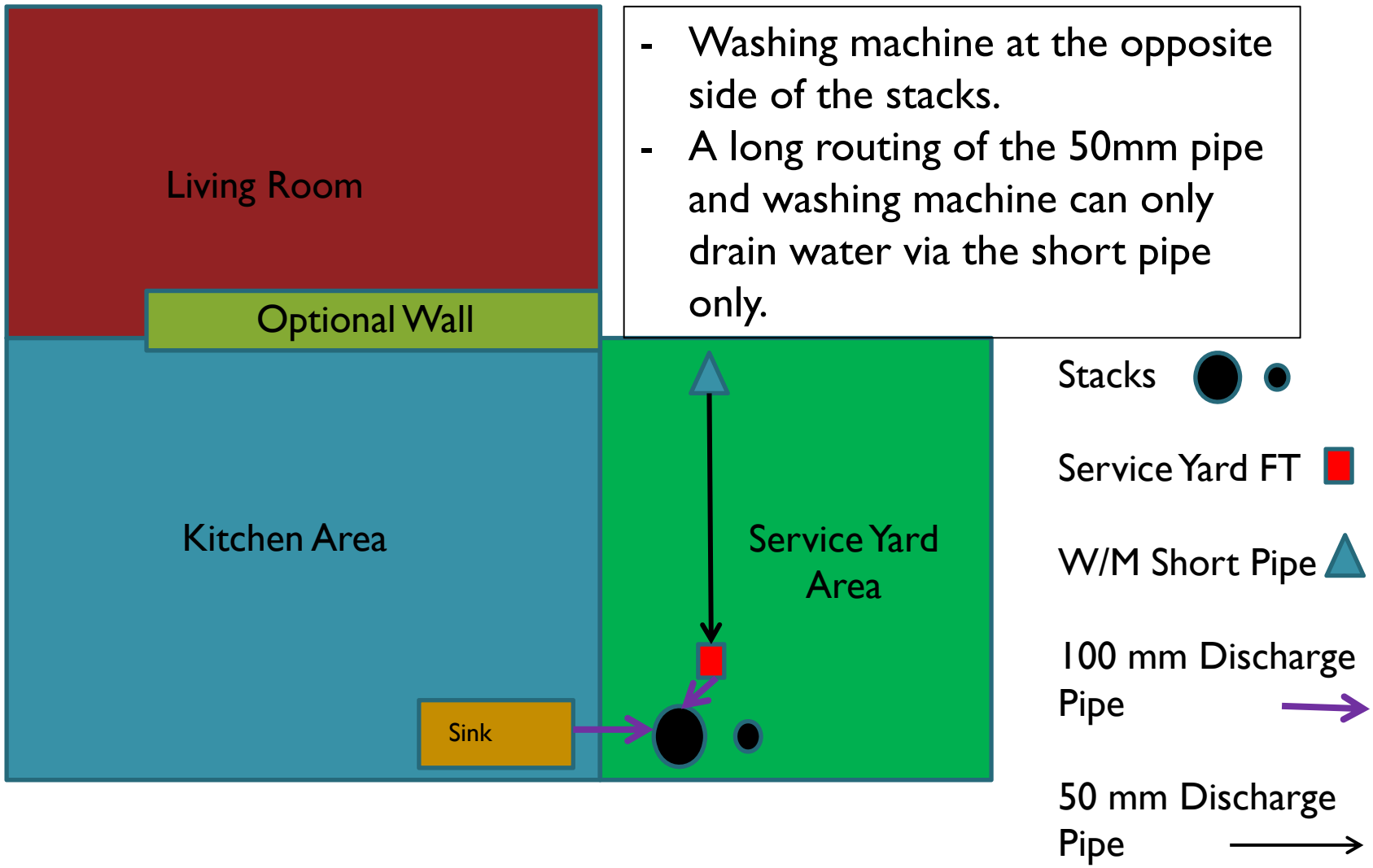
Vertical height of floor trap limited by its connection to stack



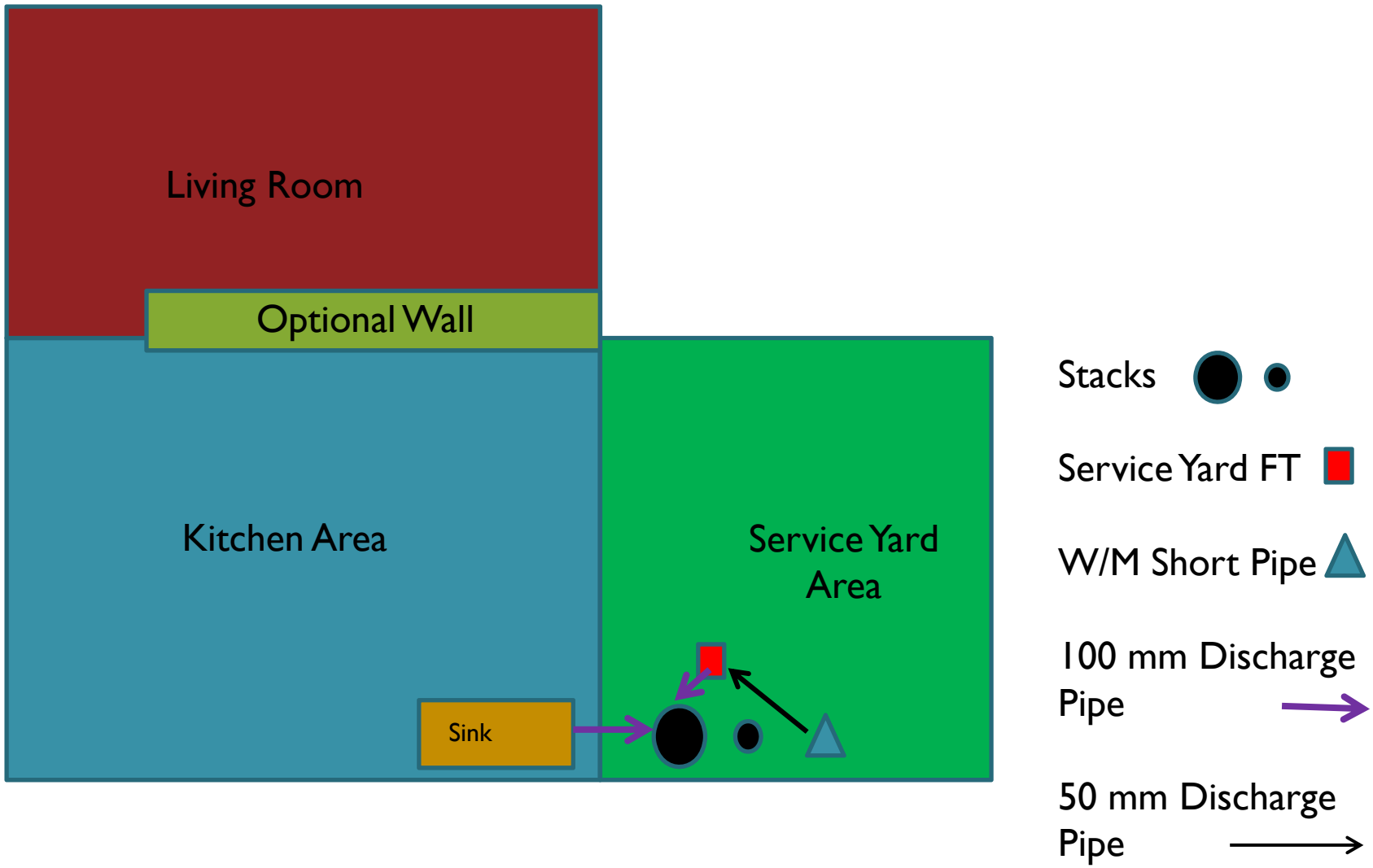
Avoid having Kitchen Sink and Stacks located far apart



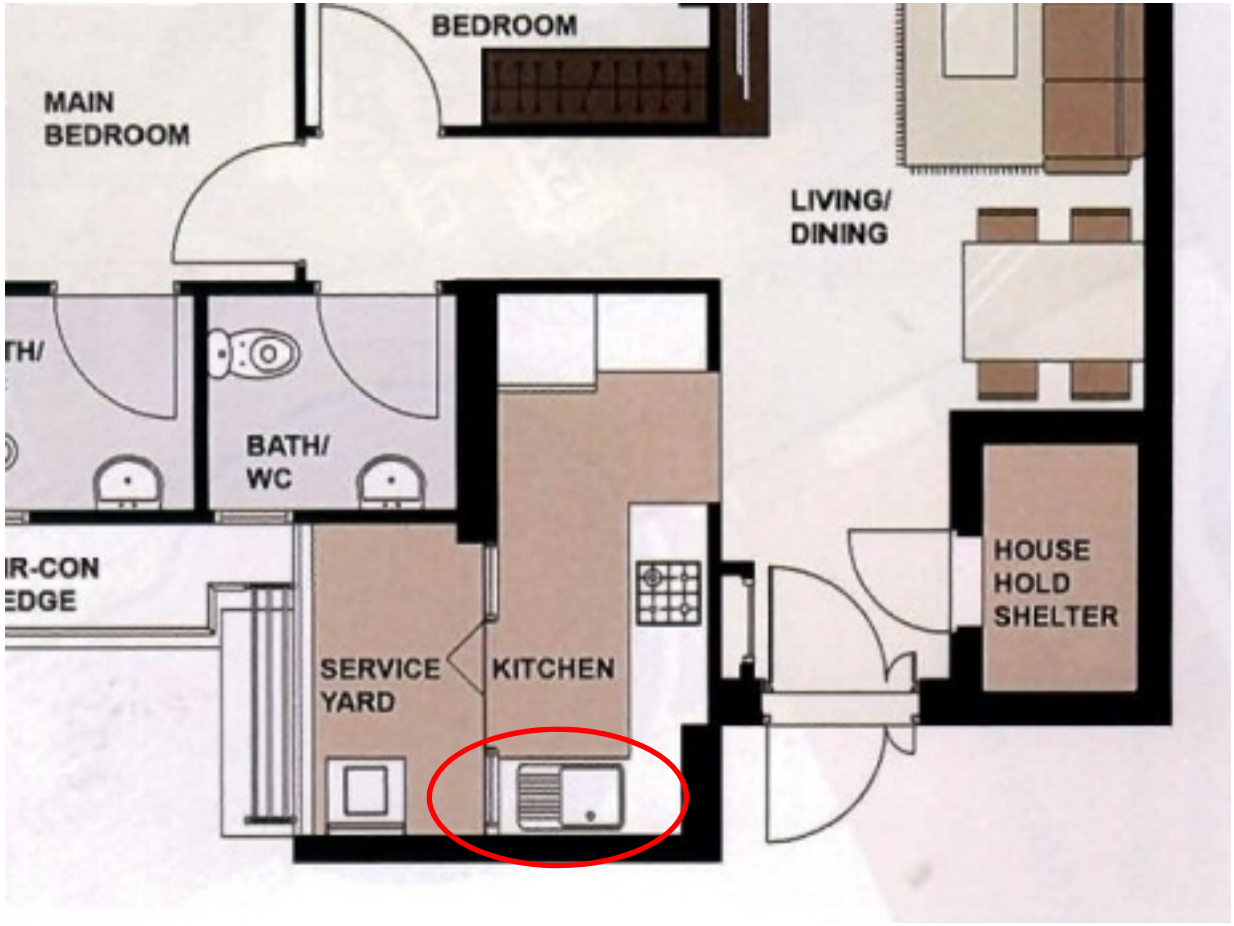
Layout due to space constraint in service yard



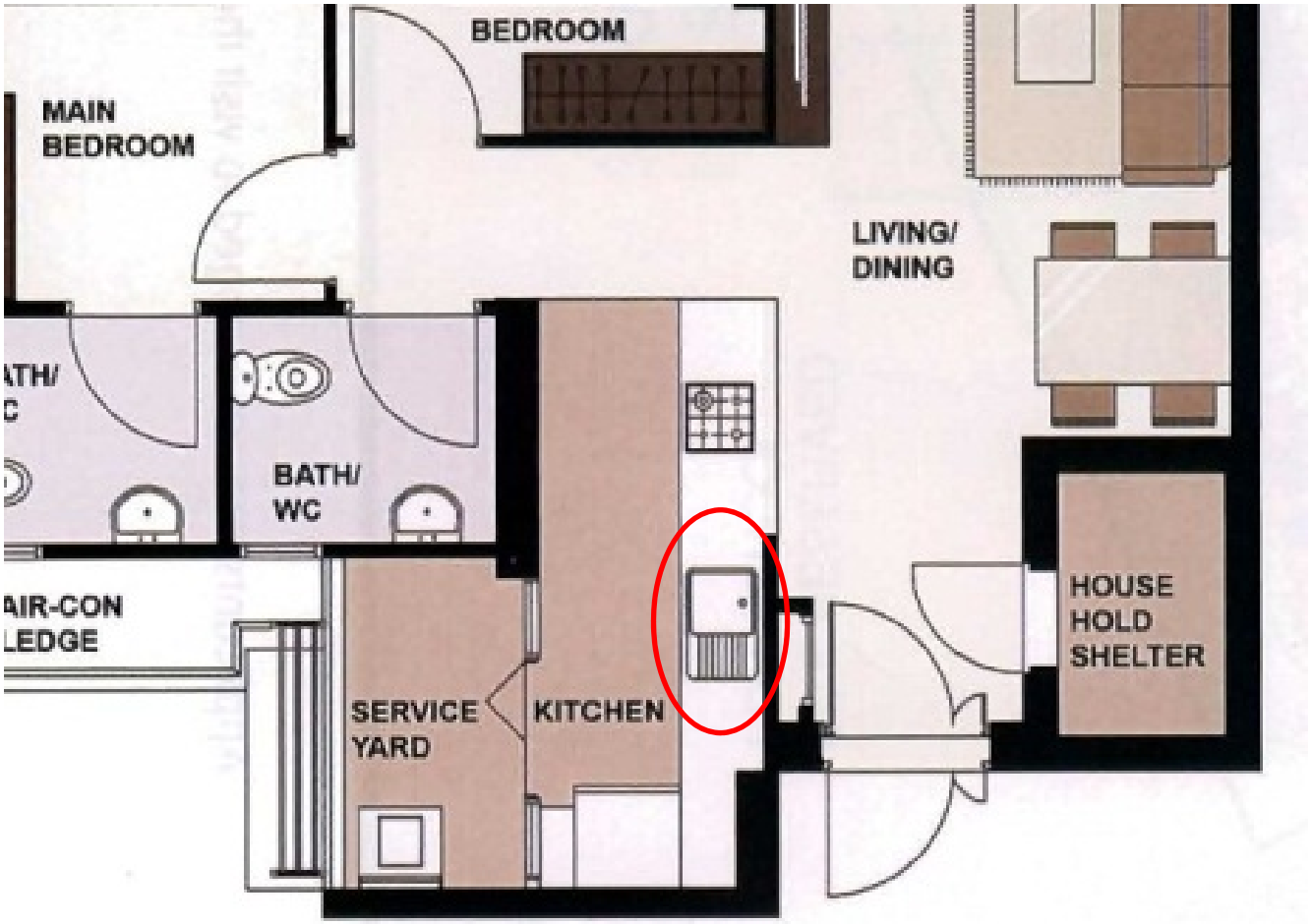
Ideal Layout



Avoid placing sink differently for OCS



Avoid placing sink differently for OCS



Timber mock-up with partition wall



Timber mock-up with partition wall

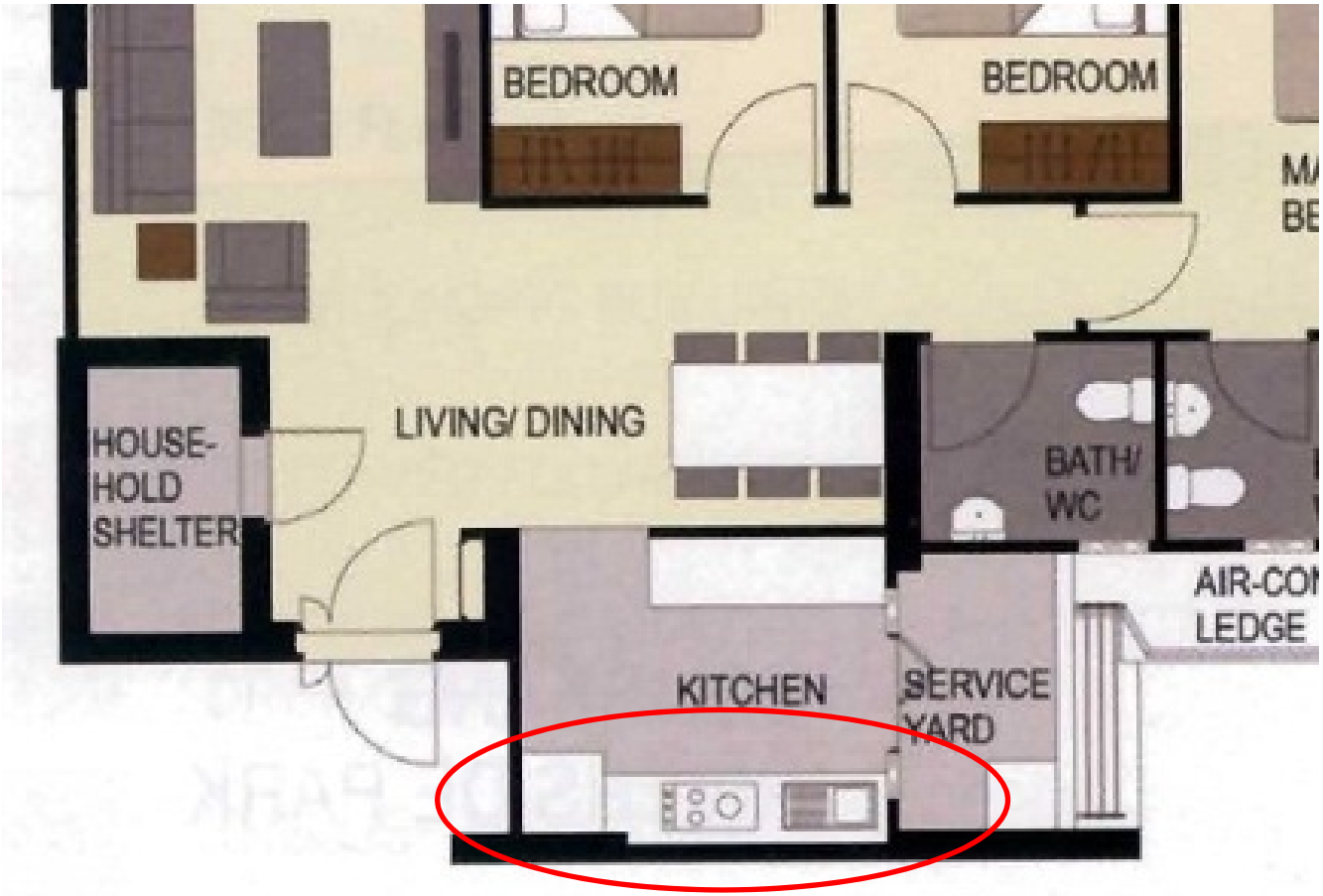


Timber mock-up with open kitchen

Floor waste is located away from sink



Preferred configuration



Air-con Sleeve

- For bathroom surrounded by beams & column(s), provision of extra opening to bedroom is required.



Sanitary stacks for 2 room units

- Consultant may consider combining stacks for bathroom & kitchen to increase available space at A/C ledge



Roof top piping

- Worker’ access to catladder is affected by pipes & other services



FIRE PROTECTION & FIRE SAFETY ISSUES

FIRE SAFETY REQUIREMENTS FOR BUILDING UNDER CONSTRUCTION

Background

- There was a surprise internal audit at six contracts under construction in Dec 2013.
- The main objective was to ascertain that all dry rising mains were installed progressively according to Fire Code.
- A follow-up inspection was carried out this Jan for six contracts.
- Three projects failed.



Accountability

- According to Fire Code & HDB Specs, Contractor's PMs should take the necessary measures for the site enforcement based on the construction progress.
- Consultant's QPs should also monitor and advise the PMs accordingly.



Follow-up Actions

- Demerit points imposed to the three contractors under Clause 44.1 of Building Specs.
- Consultants are reminded to work with contractors to prevent recurrence.

COMPLIANCE WITH SS575 CONTROL PANELS FOR WR PUMPING SYSTEMS

SS575

- Pumpsets shall be listed for fire fighting service (Clause 5.1.1)
- Definition of Fire pumpset (Clause 1.4.15): An assembly comprising a pump, a driver, a coupling and ancillary components on a common base together with an integral or separate fire pump controller, and listed by a recognized institution….
- Jockey pumps do not need listed panels.

Impact to HDB projects

- At present, only controllers listed by UL/FM are available
- UL/FM controllers comply with NFPA20
- Long lead time (5 – 6 months) and significant cost increase
- Consultant to check the pumproom & gen-set sizes
- Consultant to consider the most cost-effective design

Thank You