CONSERVATION GUIDELINES
TECHNICAL SUPPLEMENT

UNDERSTANDING
THE PARTYWALLS

July 1997

SINGAPORE

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THE PARTYWALLS

July 1997

URBAN REDEVELOPMENT AUTHORITY
TOWARDS A TROPICAL CITY OF EXCELLENCE

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INTRODUCTION

Partywalls are the principal load carrying walls which separate one shophouse from another. They are either constructed of brickwork or of column-and-beam construction with non-structural infill walls. The load bearing walls are supported on continuous strip foundation whilst columns rest on brick footings.

Being full height walls, often protruding above the shophouses, the partywalls break the continuous rows of shophouses into individual units and contribute to the crosswall effect of the shophouses. Also commonly referred to as "firewalls", these partywalls serve as fire breaks preventing the lateral spread of fire to neighbouring units. Any substantial removal of partywalls would destroy the spatial quality intrinsic to shophouse design and would compromise the structural integrity of the conservation building.

Assessment

Before restoration works begin on site, careful visual inspection of the existing partywall structure should be carried out to determine the structural stability of the element. Cracks on the walls would indicate the extent of decay and structural damage. There are basically two types of cracks - stabilised cracks which require stitching of the walls and live cracks which require strengthening of ground, underpinning if necessary, and stitching thereafter.

In addition to the visual inspection, a test for plumbness of the walls is also required to determine whether there is a need to rebuild the partywalls. Severe tilting would suggest structural instability of the walls. Brick samples should also be taken to assess the inherent strength of the brick as this also affects the structural stability of the walls.

(See Fig 1 - 3)

Fig 1: Cracks on the walls, due to weathering or structural settlement, require proper treatment and repair.

Fig 2: Organic growth on the partywall, caused by water penetration and the humid environment, requires proper treatment and cleaning.

Fig 3: Deteriorated partywall, due to algae, moss and lichen growths, requires proper treatment and repair.

TEMPORARY PROTECTION AND STABILISATION

Collapse of partywalls during restoration works have occurred from time to time. This is often due to the removal of lateral restraint to walls, the lack of provision of temporary support or shoring, improper types of structural intervention, undermining of existing foundation or structural overloading. *(See Fig 4 - 5)*

Hence, it is important that adequate protection is carried out before the commencement of restoration works on site. Proper temporary shoring or propping is required upon the removal of timber floor joists or beams and roof purlins. These elements should be removed on an elemental basis (alternate members at any one time). Underpinning of the foundation and structural repair works should be carried out in the early stages of construction before any of the lateral restraint is removed. *(See Fig 6 - 7)*

Fig 4: Collapse of partywalls during restoration works is often due to the removal of lateral restraint to walls, lack of provision of temporary support or shoring, improper structural intervention, undermining of existing foundation or structural overloading.

Fig 5: Partywall collapses could also be due to the structural instability of the existing partywalls which could be detected through comprehensive assessment of the existing structure.

Fig 6: Propping up of the decayed timber beams during restoration is a means of providing structural stability.

Fig 7: Adequate protection and lateral stabilisation during restoration works would prevent the collapse of the partywalls.

RETENTION AND RESTORATION

Brickwall

During restoration, the extent of cleaning and repair of the partywalls would be determined by the extent of decay. The strength of the mortar jointing is tested with the use of sharp instruments to probe the joints. Old bricks which are damaged due to weathering require stitching with new bricks and mortar jointing. *(See Fig 8 - 9)*

Water penetration through capillary action from the ground is prevented through the injection of silicon into the wall. This is done about 500 mm above the ground. This process will prevent the seepage of water through the walls, which will cause damage to the finishes on the internal walls. *(See Fig 10 - 11)*

Fig 8: Cracks in existing brickwall indicate damage to the old bricks, thereby requiring areas of localised repair.

Fig 9: The process of stitching of new bricks and mortar jointing as a means of localised repair to the old brickwall.

Fig 10: The process of injection of silicon into the brickwall to prevent water penetration through capillary action from the ground.

Fig 11: The holes made at about 500mm above the ground for the injection process.

Plaster Rendering

Checks, through knocking for hollowness of the plaster renderings on walls, would determine the areas of localised damaged of the existing plaster. Such damage may arise from a loss of adhesion due to water penetration or crumbling, and powdering on surface as a result of contamination from backing, aggregate or rising damp. *(See Fig 12 - 14)*

Fig 12: Cracks and areas of localised damage of the existing plaster, require proper cleaning, repair and treatment.

Fig 13: Damage to the plaster rendering due to vegetation growth and water penetration.

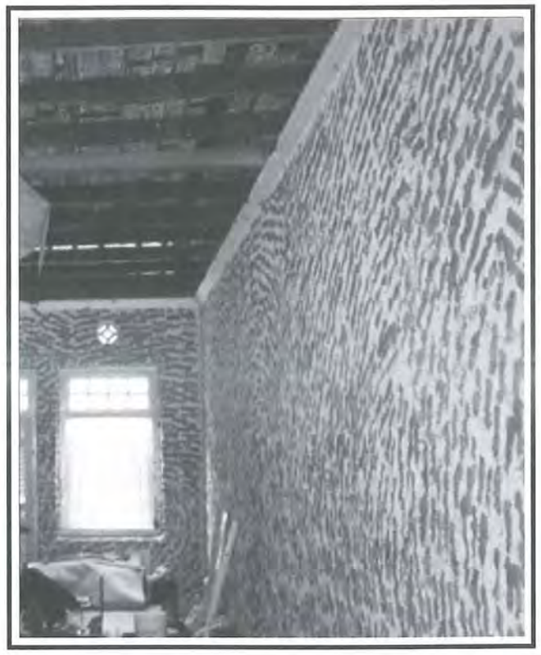
Fig 14: Damage to the plaster rendering arising from the loss of adhesion due to water penetration or crumbling, and powdering on the surface as a result of salt contamination from backing, aggregate or rising damp.

Areas of plaster, which are extensively cracked or which sound hollow, should be cut out in square edges or slightly undercut edges with sharp chisels to the backing. All dust, loosely adherent material, efflorescence and any organic growth should be thoroughly removed by bristle brushing and treatment with biocide. Surfaces to be replastered should be clean, firm and sterile. Important factors to consider when carrying out such patchwork are compatibility of materials, matching of colour and texture and adhesion of repair. *(See Fig 15 - 17)*

Fig 15: Parts of the brickwall, upon removal of the existing plaster rendering, require localised repair.

Fig 16: The surface of the brickwall, thoroughly cleaned by bristle brushing and treated with biocide, is ready for a new coat of plaster rendering.

Fig 17: The brickwall is sufficiently keyed to ensure the proper adhesion of the new coat of plaster rendering.



Lime-plaster is recommended for its porosity, especially useful to walls in the local hot and humid climate. This will prevent excessive moisture from being trapped within the walls, letting the walls "breathe". Trapped moisture could cause damage to the interior finishes and promote the growth of algae or moss on the walls, and the loss of adhesion of the plaster to the backing. The recommended mix for the lime plaster is 1 : 2 : 9 (cement : lime : sand). *(See Fig 18)*

Fig 18: The new coats of plaster rendering applied to the wall

ADAPTATION

Amalgamated Units

Some shophouse units are amalgamated for a single use, and this often requires the partial demolition of the internal partywalls for circulation within the units. In order to facilitate this function, openings in the partywall are allowed subject to the total width of openings being not more than 50% of the total length of partywall within the building envelope. Where large openings are created, concrete box frames are recommended. *(See Fig 19)* However, it is important that the crosswall effect must be retained, with the first 3 m length of the partywall at first storey retained.

Fig 19: The use of concrete lintels for the creation of openings in the partywalls for amalgamated units.

Additional reinforced concrete structures

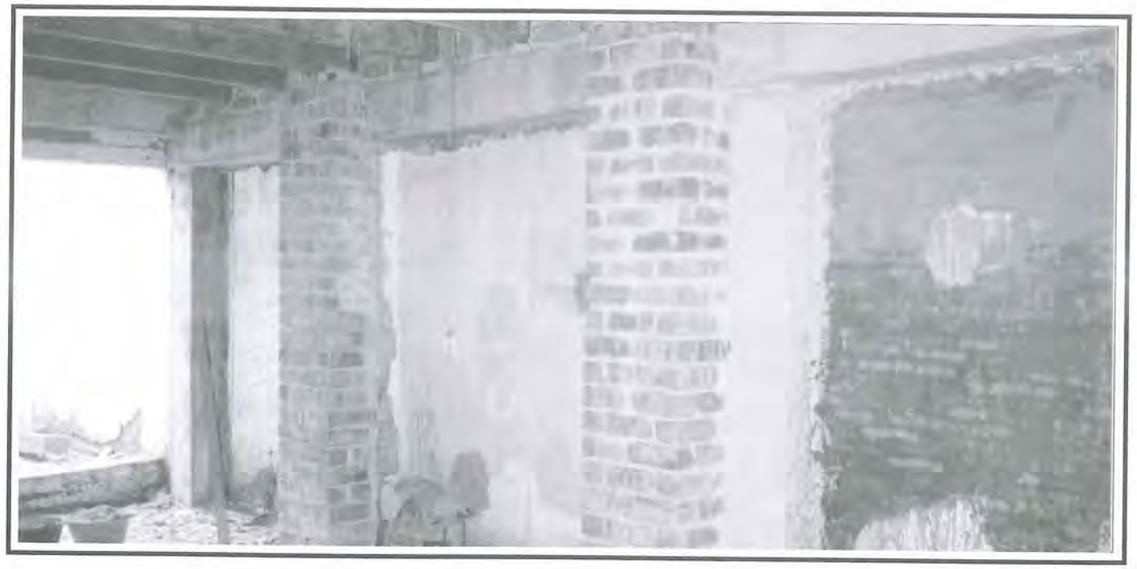
The use of additional reinforced concrete structures would be allowed if there is increased structural loading. These additional structures should be placed adjacent to the partywalls and not be enchased into the partywalls. The reinforced concrete columns and beams must be carefully constructed with the use of small displacement piles such as micro-piling at the foundations to prevent the collapse of the adjacent partywalls.
(See Fig 20 - 23)

Fig 20: The strengthening of the existing foundation with reinforcement to prevent the collapse of the partywalls.

Fig 21: The addition of reinforcement to the existing reinforced concrete columns and ground structure to increase the loading capacity of the structure.

Fig 22: The addition of new reinforced concrete beam in an existing partywall as a means of structural intervention.

Fig 23: The addition of new reinforced concrete structures to take increased structural loading.



FIRE SAFETY REQUIREMENTS

To prevent the spread of fire to adjacent units, the partywalls are usually extended about 300 mm above the roof. *(See Fig 24 and Fig 26, opposite page)* In cases where the firewall does not extend beyond the roof, fire protection is provided through the use of vermiculite cement grouting between roof tiles and timber purlins along the partywalls. *(See Fig 25 and Fig 27, opposite page)*

Fig 24: Partywalls extending above the roof acts as a fire-breaking device.

Fig 25: Shophouse units where firewalls do not protrude above the roof.

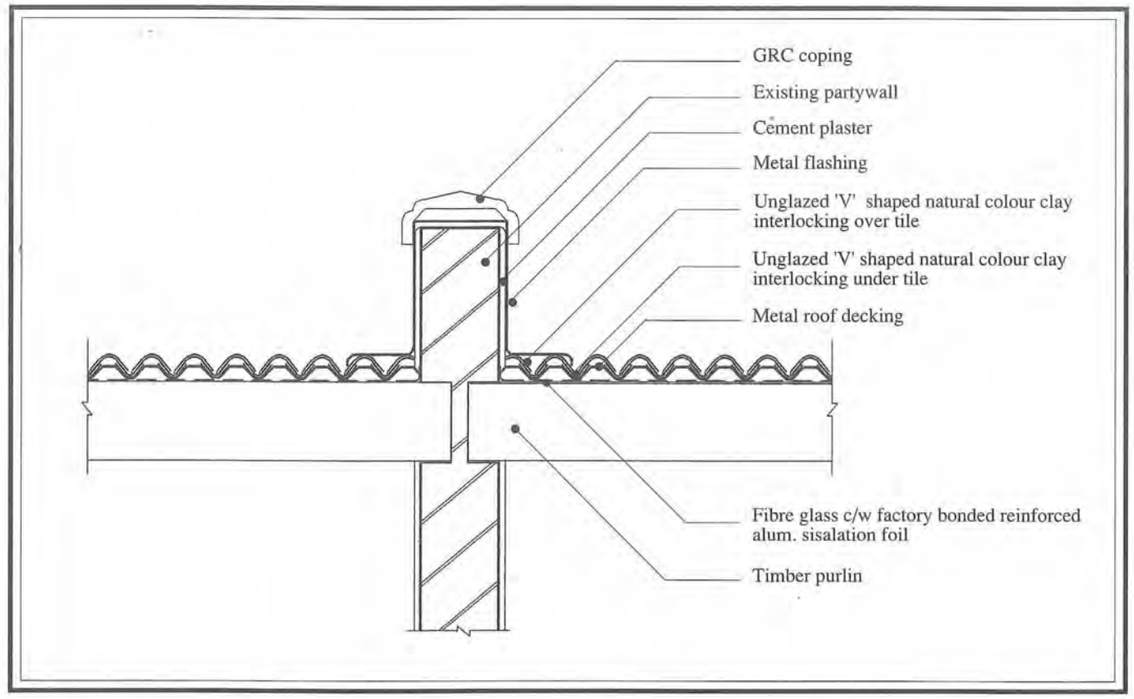
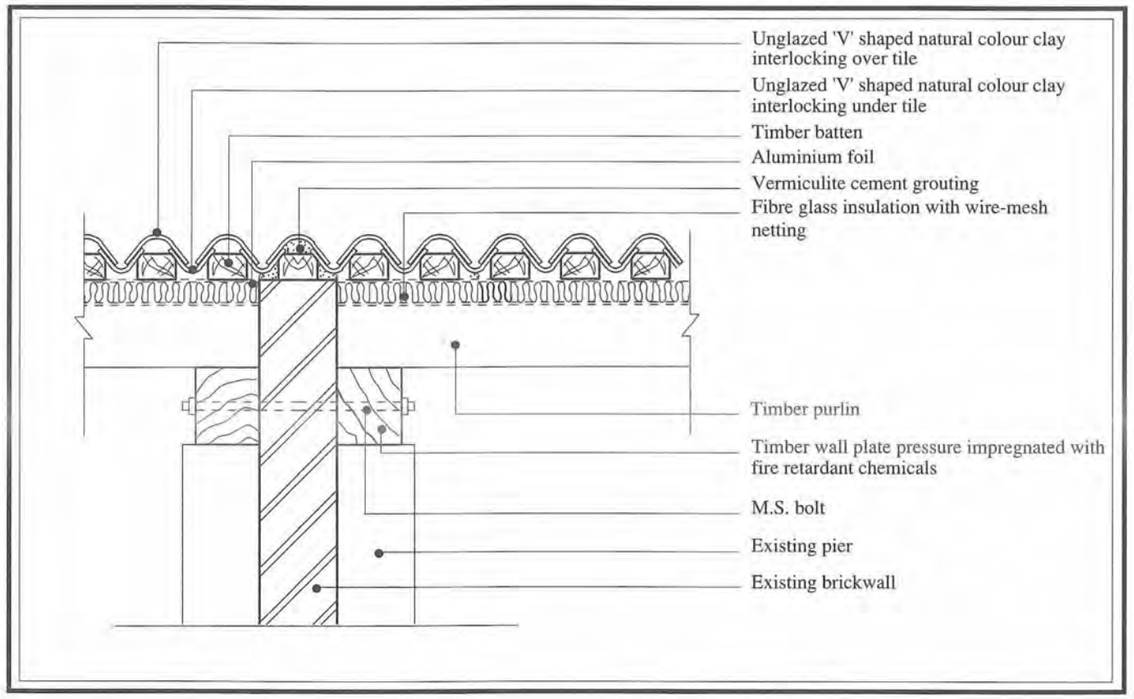


Fig 26: The partywalls are usually extended above the roof to prevent the spread of fire to adjacent units.

Fig 27: The use of vermiculite cement grouting between the roof tiles and the timber purlins along the partywall in cases where the firewall does not extend beyond the roof.



MAINTENANCE

Regular Checks

Regular checks will help ensure that the partywalls do not deteriorate. The surfaces should be cleaned and proper repainting carried out. The growth of moss on the external surfaces should be treated with biocide and properly cleaned to prevent damage to the walls. Water penetration can also be detected and treated early using proper repair and appropriate measures. Early treatment would also reduce costs.

Coping

The use of coping, either glass reinforced concrete (GRC) coping, metal flashing painted to match colour of roof tiles, reinforced concrete coping, would protect the exposed surface of the partywall from deteriorating due to weather elements. Regular checks should be carried out at these critical areas so that any damage or points of leakage can be eliminated. *(See Fig 28 - 30)*

Fig 28: The use of coping on the partywalls protects them from deterioration due to weather elements.

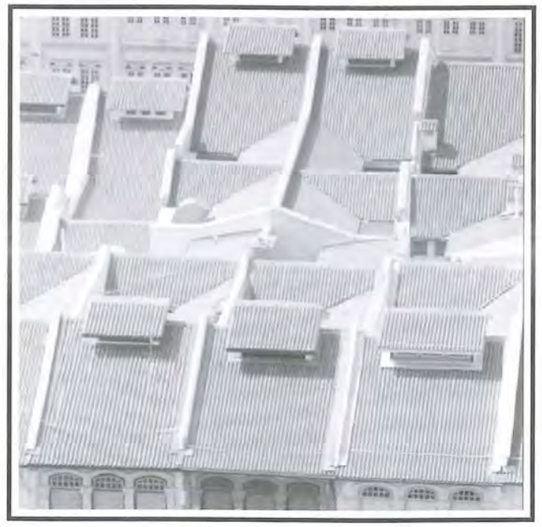


Fig 29: The use of glass reinforced concrete (GRC) coping at the partywall above the roof.

Fig 30: The use of metal flashing between the roof and the partywall.

CONCLUSION

Effective protection and maintenance are the keys to preserving the historic elements of a conservation building. Deterioration can be remedied through proper restoration techniques and sensitive repair. It is important to ensure that any material used in the repairs or replacement is compatible to and integrates well with the existing structure/ material. Although adaptive reuse of the old building may involve the introduction of new construction methods or repair, it is important that the structural integrity and historic character of the building should not be compromised. *(See Fig 31 - 36)*

Fig 31: The partywalls during restoration.

Fig 32: The partywalls after restoration.

Fig 33: The crosswall effect of a shophouse as experienced along the five footway is retained when the first 3m of the partywall is retained at 1st storey.

Fig 34: The structural integrity of the old building reinforced with the use of reinforced concrete structures.

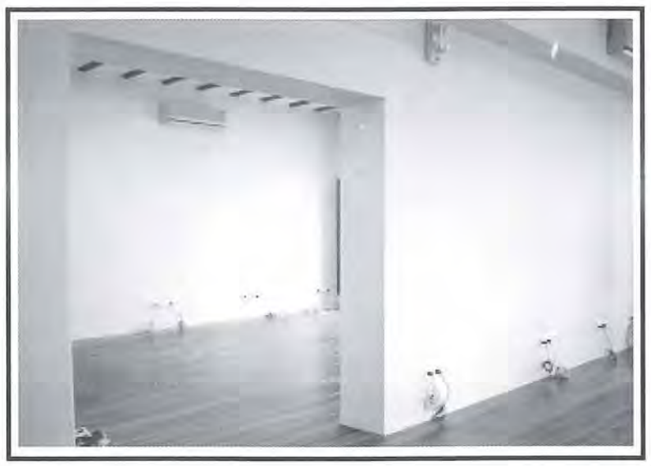


Fig 35: The creation of openings in the partywalls in amalgamated units.

Fig 33: Partywalls which extend beyond the roof give added scale and texture to the roofscape within a conservation area.