

# TILE ON EXISTING EXTERIOR REINFORCED CONCRETE BALCONIES

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Fig. 1: Defects in existing concrete balcony

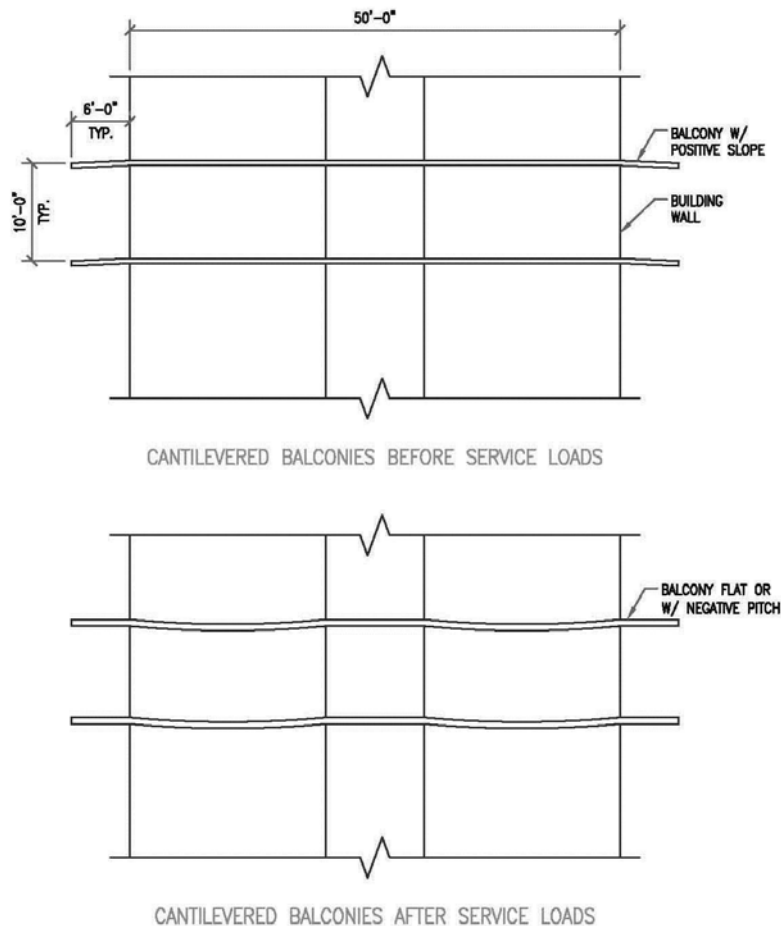


Fig. 2 (Note: 1 in. = 25.4 mm; 1 ft = 0.3 m)

**E**xterior reinforced concrete balconies are often covered by tile set in mortar beds with grouted joints. These installations are not only aesthetically pleasing but are also durable, easily cleaned, and protective. This article provides details for the proper installation of tiled surfaces over structural concrete slabs.

## OVERVIEW AND EXISTING CONDITIONS

Tile-covered balconies require positive pitch of about 0.25 in./ft (21 mm/m) and consist of a waterproofing membrane, a portland cement mortar setting bed, exterior-grade tile, and latex-modified grout joints. The purpose of these requirements and components is to protect the structural concrete by removing precipitation quickly from the balcony surface and away from the main building structure.

Balcony surfaces should be sound and any cracks, delaminations, spalls, scaling, and other defects should be identified and repaired (Fig. 1). Existing balconies must be inspected prior to consideration of a tile installation to see if the aforementioned criteria can be met. Many existing balconies will not be able to receive tile installation without certain modifications. If tile is going to be considered, the aforementioned conditions should be incorporated into the proposed balcony design.

## WATERPROOFING

Waterproofing beneath the tile system is necessary to protect the structural slab so that water that infiltrates the tile cannot enter cracks in the slab. This infiltration can cause spalling of the concrete and tile surface, requiring removal of the tile to allow needed access for repairs.

The selected waterproofing system for an existing elevated balcony surface should be readily available and easily installed without the need for specialty equipment or highly skilled labor. When cured, the tile mortar setting bed can be applied to the finished surface of the waterproofing. Effective waterproofing measures include urethane base coats and cold-applied liquid membranes with cast-in select aggregate.

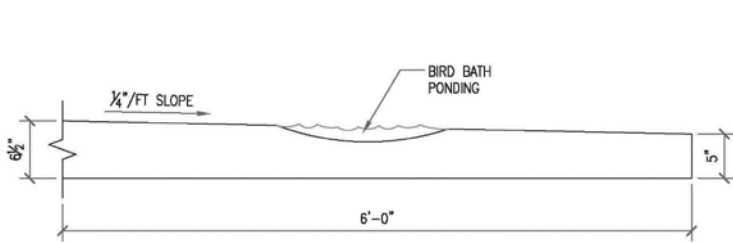


Fig. 3 (Note: 1 in. = 25.4 mm; 1 ft = 0.3 m)

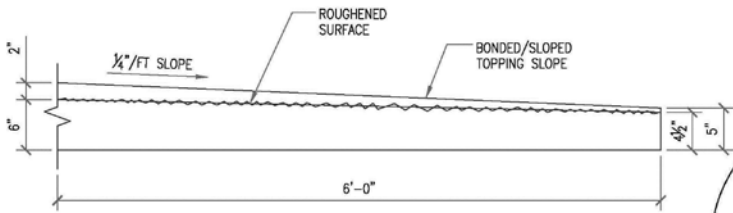


Fig. 4 (Note: 1 in. = 25.4 mm; 1 ft = 0.3 m)



Fig. 5: Accommodating existing features

## TOLERANCES

Existing balconies are not always pitched positively away from the main building and although a pitch of 0.25 in./ft (21 mm/m) may be specified, it is frequently not achieved. In some balconies, positive pitch can be altered when the interior portion of the building is loaded and placed into service. This loading condition can cause the balcony surface to become flat or even create a negative pitch back toward the building (Fig. 2).

Finishing techniques and available access to balcony surfaces during original construction can create birdbaths—low spots where water accumulates or “ponds” (Fig. 3). A topping or slurry coat can be used to fill in and address these low spots and minor slab deficiencies (Fig. 4). The mortar setting bed for the tile can address some inconsistencies in slab surfaces but should not be relied on for surface leveling or to improve slope and drainage.

There can be no voids or hollow sections between the topping and the structural slab. The integrity of the topping slab and the overall tile system can be compromised by the accumulation of moisture seeping into the voids through cracks or other deficiencies. The additional weight of the topping slab in conjunction with the tile

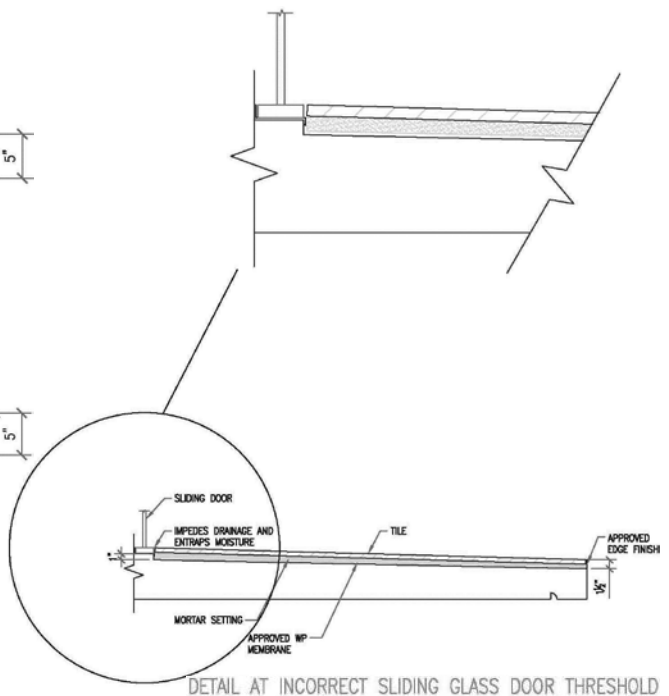


Fig. 6 (Note: 1 in. = 25.4 mm)

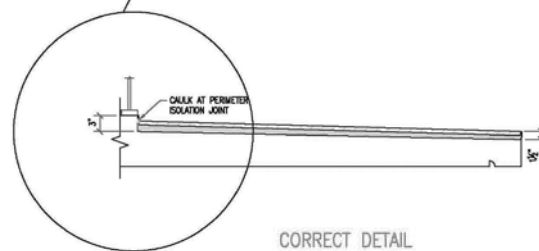
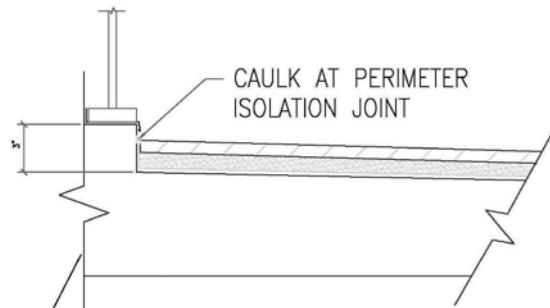
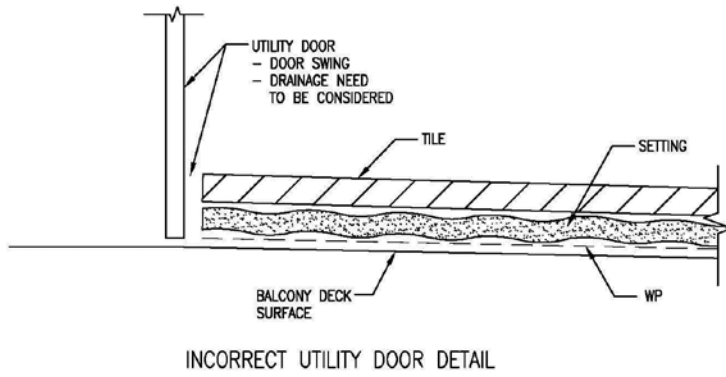


Fig. 7 (Note: 1 in. = 25.4 mm)

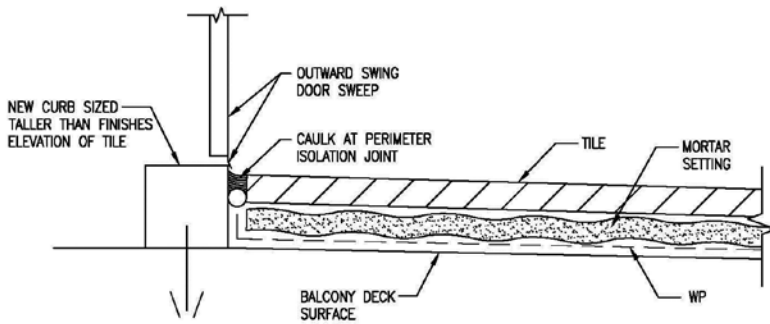
system should be evaluated by a structural engineer before installing.

## CONSTRAINTS

The feasibility of the project may be jeopardized by existing features such as door threshold height, location of storage closet doors and privacy panels, the type of railing system (Fig. 5), and the height of through-wall flashings adjacent to the tile installation. Conflicts can be resolved prior to construction by making sure the finished elevation of the selected tile system does not have an impact on the existing hard features. Figure 6 shows an incorrect installation, while Fig. 7 shows the proper accommodations for existing features.

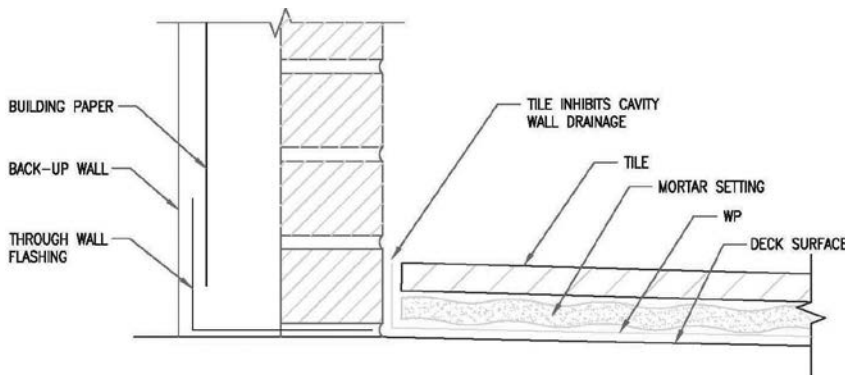


INCORRECT UTILITY DOOR DETAIL

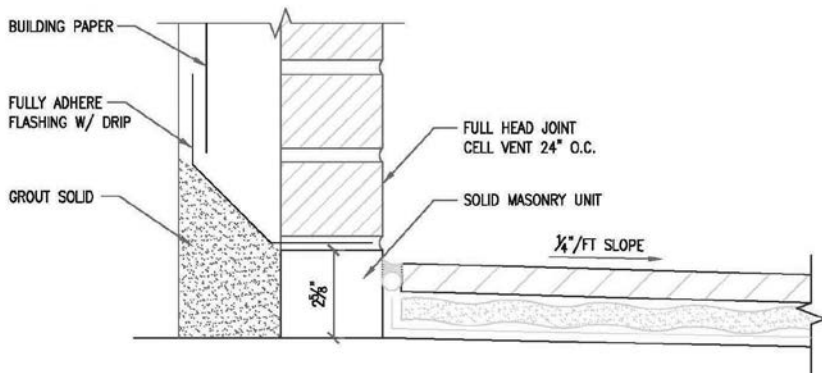


CORRECT UTILITY DOOR DETAIL

Fig. 8



INCORRECT DETAIL AT MASONRY CAVITY WALL



CORRECT DETAIL AT MASONRY CAVITY WALL

Fig. 10 (Note: 1 in. = 25.4 mm)



Fig. 9: Drainage outlet for existing balcony wall

Closet doors and privacy panels may need to be cut or modified to provide adequate clearance for the proposed tile system. Cut components should be treated to prevent rusting and future maintenance of these altered components must be considered because of limited access between the door/panel and the tiled balcony deck (Fig. 8).

### ACCOMMODATING EXISTING DRAINAGE

Some guardrail systems such as masonry walls (Fig. 9) can promote ponding because they inhibit drainage or because the balcony slab is not properly sloped toward scuppers, drains, or weep holes. Tile installation in such scenarios can obstruct outlets and alter drainage patterns. To prevent this from occurring, scuppers, drains, and weeps may need to be raised and resized.

Masonry walls equipped with through-wall flashings can drain directly onto bare balcony surfaces. Coatings and tile installed on existing balcony decks often block these drainage points and existing flashing must be modified to allow for proper drainage (Fig. 10). One alternative that still provides drainage without the need for flashing modifications is an elevated paver installation.

Provisions for drainage from hollow posts must also be considered if the point of drainage is covered by the new tile installation. Posts that cannot drain may hold water for extended periods of time and cyclic freezing and thawing of entrapped water can cause the post to bulge and crack (Fig. 11). In addition, trapped moisture can cause posts made of ferrous metal to rust from the inside out. Tile heave and delamination can also occur when embedded posts drain water into the setting bed instead of onto the tile surface.

### EDGE DETAILING

A proper edge restraint supports the leading edge of the tile, prevents chipping and damage, and provides a transition point between the waterproofing membrane and the coating systems used





Fig. 11: Existing post with freeze damage

to protect the exposed face of the balcony slab. An angle support at the outside face of the tile system is one method that leaves a clean support to the edge of the tile while providing resistance to water infiltration. Another acceptable approach is a clean caulk joint (Fig. 12). This approach is less expensive than a prefabricated edge support, but will require regular maintenance to replace the sealant joint about every 7 to 10 years, or as needed.

Edge detailing and integral expansion/soft joints at the periphery of the tile and in intervals about every 12 ft (3.7 m) are necessary to allow for differential expansion and contraction of the tile system and adjacent hard features (that is, building walls and guardrails). Wherever the tile system is interrupted by or adjoins a differing material type, internal expansion joints and soft joints should be provided.

The detailing of the tile edge can be affected by the railing/guard configuration, the method of railing/guard attachment to the deck, and the type of railing/guard system. Some of the most popular railings for decks are painted steel or aluminum with embedded or surface-mounted posts. Tile can be cut to fit around posts for railings with embedded support posts (Fig. 13) and the joint between the posts and the tile at the periphery of the post should be caulked.

Surface-mounted railings require proper detailing to provide the correct transition between the tile and base of the railing (Fig. 14). Drainage from the post at the base of the mounting shoe must be considered unless the post is solid or the drainage point is located above the shoe. When installing a tile system, the shoe of the mounted post must be isolated from the tile system. Enclosing the mount in a pitch pocket or isolating three sides with a finished edge and leaving the outside face open for drainage are acceptable methods for this type of installation.

## DURABLE INSTALLATIONS

Tile installation on existing balconies is possible as long as appropriate details and existing constraints are considered. The most important concept is to

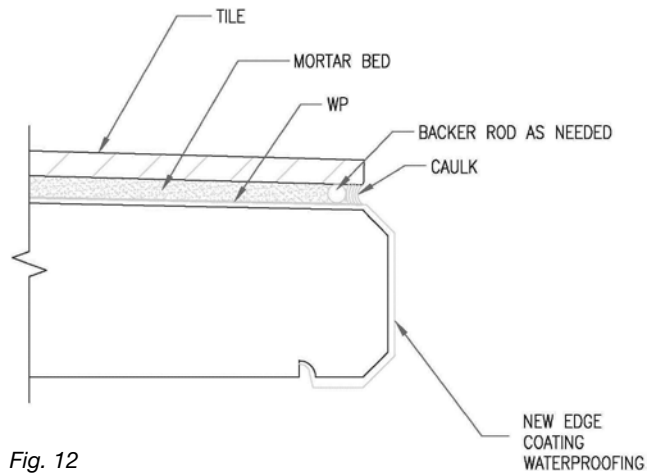


Fig. 12

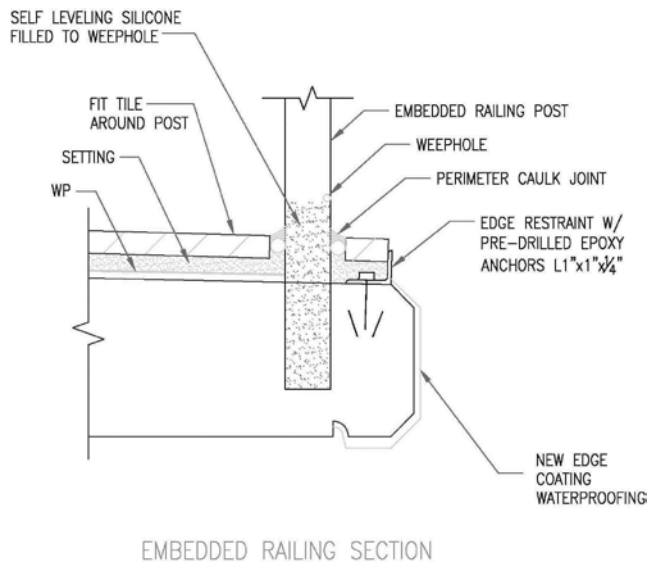


Fig. 13

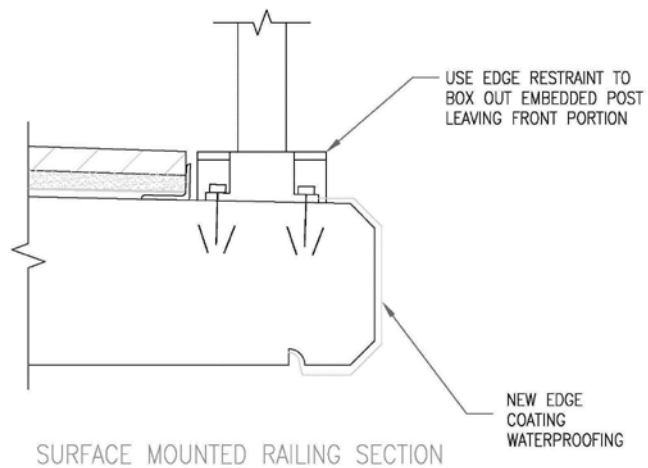


Fig. 14

protect the existing structure by installing waterproofing and implementing drainage systems that will quickly shed the balcony surface precipitation.

Regular maintenance is required to ensure the longevity of any exterior tile system. Failure to

diligently maintain sealant and grout joints and replace tile that becomes cracked or broken will allow moisture to infiltrate the setting bed, resulting in possible freezing-and-thawing damage, heaving, and local deterioration of tile. A properly installed waterproofing membrane beneath the tile will protect the slab, but the tile and membrane system may need to be partially or completely removed should inspection of the structural slab become necessary. It should be noted that matching pre-existing conditions and the costs associated with restoration of the membrane and tile following the inspection can be costly.

When a single owner is involved, the distribution of costs for this work is known. In situations where condominium associations or multiple owners maintain the structural balcony component as a common element, maintenance, inspection, and repair costs of a tiled surface installed by a resident can become an intricate section in the association bylaws. Uniformity, architectural compliance, access, quality assurance during installation, maintenance, recordkeeping, and temporary inspections are some of the factors that should be considered by a condominium association when a tile system installed by an individual resident will impact a common structural element.

This Viewpoint article has been selected by the editors as an offering to the interest of our readers. However, the opinions given are not necessarily those of the International Concrete Repair Institute or of the editors of this magazine. Reader comment is invited.



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