WALL AND COPING TREATMENTS

Justin Henshell, FAIA

When a roofing system fails at the perimeter, the parapet construction is often the cause. The roofer is usually asked to repair the parapets even though this work is not a part of the roofing trade. Therefore, it is important for the roofer to understand the construction of parapets and the reasons for failure, so that repairs can be made intelligently.

Parapets are a necessary evil. In many cases they are mandated by Code. Sometimes the Architect selects them for aesthetics, to retain water or snow, or to reduce wind uplift at eaves. Regardless of the reason, they are a common building element and a common building headache.

It has been said that the best way to eliminate parapet problems is to eliminate the parapet and live with other problems. But, until Codes and building designers abandon the parapet, we will be obliged to work with them.

Because parapets are exposed to the weather on both faces, they are subjected to substantially greater stresses from temperature and moisture changes than the walls enclosing the structure. Temperature changes not only produce axial forces, but bending forces as well when one face is heated by the sun while the other face is in the shade. The designer must accommodate these stresses by strengthening the parapet and by providing joints to absorb some of the movement. Since all masonry parapets are subject to cracking, provisions must be made to prevent water from entering the building and roofing system when this occurs. This is particularly critical at the top of the wall so most masonry parapets, are capped with a coping.

Werner Gumpertz, (Roofing Consultant with Simpson, Gumpertz and Heger, Inc.) has said that any exterior surface that is not vertical is a roof. If we would consider the coping as a small roof over the parapet, and select materials and design details on that basis, we would have fewer problems. The materials generally used for copings are masonry and metal.

Many precast and cast-in-place concrete parapets are not capped and frequently experience problems at the joints. On the other hand, the majority of masonry parapets are capped -usually with brick, tile, stone, cast stone (hi density concrete) or metal. Cement washes, stucco and wood caps are sometimes used in warm climates.

Non-metallic copings such as cast stone and tile are discrete units, relatively short in length, installed on the wall, (sometimes over through-wall metal) in a bed of mortar. When copings differ either in joint spacing or material from the parapet wall faces, they will react differently to changes in temperature and moisture. For example, over a period of time, a brick parapet will grow in length, whereas one of concrete masonry units will shrink. This will produce stress differentials at the coping bed joint with a consequent loss of bond. Cross joints then crack and deteriorate. In extreme cases, the coping may be displaced laterally if the ends are restrained.

Prior to the advent of elastomeric sealants, masonry coping cross or head joints were slushed full with mortar. Sometimes the mortar joints were protected with a lead cap but, more often, they were simply tooled or stuck flush. When the mortar bond failed, water entered the parapet wall through the joints then found its way around the counter flashing and into the roofing assembly.

To remedy this condition, a smear of roofing cement or putty was usually applied to the top - and sometimes to the sides - of the joint. When sealants became popular, silicones or acrylics were substituted, but still as a thin surface coat. This “band-aid treatment” was rarely effective. The coping bed joint was almost always left unsealed and continued to admit water into the parapet, particularly where copings did not overhang the wall or were not designed with drips.

Proper repair of stone, cast stone and tile copings requires some understanding of proper parapet construction. As stated above, the parapet reacts more rapidly and to a greater degree to temperature and moisture changes than the rest of the wall. Consequently, they require more joints to absorb the movement. Joints should also be located within 4 feet of corners to prevent distortion and the familiar step cracking at these locations. All joints should extend through the parapet, be offset on each face to maintain lateral strength and properly sealed with elastomeric sealants over backer rods.

Through-wall flashing must be provided near the roof level and stepped through the wall. If differential movement occurs, it will be above this location and the flashing will protect the wall below and the base flashing. If the parapet is vertically reinforced, the penetrations must be carefully sealed. Sealing flashing cross joints is equally important and in cavity walls particular attention must be paid to sealing off the cavity at the roof line to avoid condensation within the parapet. End joints in through-wall flashing must coincide with movement joints in the parapet wall and the same provision made in the flashing to absorb movement. Weeps above the flashing are best formed by omitting the lower half of the head joint. Plastic tubes may clog with mortar or salts and are not recommended. Brick, stone, cast stone, tile and metal copings should be sloped to shed water, the sides extended beyond the face of the parapet and designed with drips.

Through-wall flashing located directly under masonry, stone and terra cotta copings frequently produces more problems than it cures. It is not always extended beyond the parapet faces and thus fails to provide bed joint protection. It creates a plane of weakness where bond strength is critical. When copings are secured with cramps or dowels which pierce the flashings, stresses from differential movements between the wall and coping often break the seal at the point of penetration.

With this background, we can now discuss remedial work. To correct faulty stone, masonry and terra cotta copings, the bed joints should be raked out 1/2"-1" and caulked with an elastomeric sealant applied over a bond breaker. Mortar in cross joints should be completely removed and tops and sides caulked with the same sealant applied over backer rods such as closed cell polyethylene rope. The joint may be filled with a compressible filler or vented with a small tube. Parapet movement joints should be continuous through the coping.

A more effective corrective measure is to cover or replace the masonry coping with metal. If the coping joints are badly contaminated with bituminous materials, elastomeric sealants cannot be used and a metal cover is the best answer. Metal copings may be shop fabricated from a number of different metals or purchased as prefabricated items. Lead-coated copper, stainless steel and aluminum are the most popular. Galvanized steel and copper are also used, although they may create straining problems. If white metal is undesirable, aluminum is available in both color anodized finishes and the newer long-life synthetic coatings.

Whether brake formed or extruded, metal copings should be well anchored, designed to shed water and absorb movement without distortion. When installed over existing masonry copings, the bottom should lap the bed joint at least 3/4" and be bent to form a drip. Both sides should be secured in the same fashion as the flange of a gravel stop, i.e., cleats, no face nailing, etc.

Prefabricated interior and exterior corners are essential for aluminum and preferred for most metals. Mechanical joints which allow some movement should be within 2-4 feet of corners.

Lightning rods, security lighting fixtures, conduit, and railings installed on copings should not violate its watertight or structural integrity or restrict movement.

Curbs 12" or more above the roof should be considered as parapets and provided with appropriate copings. Sometimes designers choose to omit copings on brick or concrete curbs for aesthetic reasons. An attempt is made to seal them by cutting or forming reglets in the top surfaces or on the roof side into which the base flashing is terminated. Whether the base flashing is of the built-up type, metal or an elastomeric sheet, the results are equally disastrous. Sealants and caulking are not capable of absorbing differential movement between the curb and flashing and water often enters the roofing system at this point. Concrete control joints, stone and masonry cross joints and prefabricated reglet discontinuity are other points of entry. To make matters worse, curb tops are often sloped toward the roof, and the flashing thickness creates a dam, ponding water and creating a reservoir to feed the cracks. Recalling Gumpertz' definition, it is no more proper to leave part of the curb unprotected, than to leave part of the roof deck exposed.

In summary, treat the parapet above the roof flashing as a wall and the parapet top as a roof. Slope the top to shed water back onto the roof and provide for movement. Align the flashing and coping joints with parapet control and expansion joints and arrange to absorb movement at these locations. Do not attempt to correct defective masonry coping joints by smearing with mastic or caulks. Rebuild and seal the joints with elastomeric materials, but don't tuck point. For long lasting weather tightness, cover or replace the masonry coping material with metal.

When you think that your base flashing problem is caused by water entering the brick parapet wall, do you try to stop it by waterproofing the wall with roofing cement and felt?

Roofing philosophy applied to masonry construction can often cause premature failure of the wall and perhaps the base flashing too. Roofing is intended to render a surface watertight but the application of a continuous impervious waterproof and vapor proof membrane by the technology of keeping water from passing through masonry walls is far different.