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Subject: **Learning from Forensics – Tips**
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Showers

Successful showers include:

1. Waterproof membrane assigned by contract from the builder or general contractor with the waterproof membrane installed over a pre-slope of ¼ inch per foot toward drain or outfall in order to protect all horizontal assemblies within the splash area of the shower head. This includes shampoo ledges, even if the shampoo ledge is above the 6-foot height requirement in the shower. The waterproof membrane is required to be 3 layers of hot mopping or equal as approved by the International Association of Plumbing & Mechanical Officials.

Shower receptors, curbs, pony walls, seats, shelves, soap dishes, shampoo ledges, and windowsills are horizontal assemblies. There should be no standing or ponding water in the shower, when the shower is finished being used. All finished tile and stone surfaces should have the same minimum ¼ inch per foot slope toward drain;

2. **Open weep holes at shower drains.**
3. Lapping of paper-to-paper and wire-to-wire on vertical walls for the scratch and brown coat of the mortar bed. Proper wire was: 3.4 pounds per square yard expanded metal lath attached directly to studs; 2.5 pounds per square yard expanded metal lath installed over solid backing and mechanically fastened to the studs; and 2 by 2 16/16 gage reinforcing wire for horizontal installations. Indent fracturing of the tile or stone or loss of bond of the tile or stone will occur when the paper and wire are not correctly installed.

Note there is not a requirement for the wire horizontally to be mechanically fastened. ANSI A108-99 accepts 2.5 pounds per square yard expanded metal lath attached directly to studs.

Note for multiple occupant usage, use a waterproof membrane underneath the mortar or backer board or use an ANSI A118.10 membrane where tile is to be bonded to the membrane.

4. Bathtub assemblies with positive slope from all bathtub ledges, including the bathtub rim, to drain water to the drain of the bathtub. The bathtubs have drainage channels or at least weep holes to drain moisture in the wall assembly that traps in front of the bathtub flange, to drain to the bathtub drain.
5. Bathtubs are properly supported.

6. Bathtubs with an integral 1-inch flange are required to make a watertight wall intersection. For bathtubs without integral flanges, a tile bead kit is installed. The tile bead kit must supply the equivalent of an integral 1-inch flange surrounding the bathtub. The purpose of the 1-inch flange is to be able to make a watertight intersection from the bathtub or shower pan with the wall assembly. The Uniform Plumbing Code was changed in 1992 requiring all shower receptors shall have a minimum 1-inch flange. Note the Tile Council of America Handbook has an outdated bathtub configuration in the shower details in the handbook.
7. Installation of a splashguard with curtain/drapery and rod installation.
8. Shower door assembly is properly installed including using a mildew resistant silicone sealant at frame intersections of the wall to the bathtub. Shower door enclosure, which does not allow moisture to flow through the frame or splash underneath the shower door. Shower door opening must be at least 22 inches.
9. Shower pans properly supported and sloped ¼ inch per foot to drain with an integral 1-inch flange. The shower pans have drainage channels or at least weep holes to drain moisture in the wall assembly that traps in front of the shower pan flange, to drain to the shower pan drain.
10. Plumbing fixtures adequately sealed to the wall assembly with mildew resistant silicone sealants.
11. Working mixer valves and bathtub spouts.
12. Adjacent floor covering that is not moisture sensitive.
13. Adequate air ventilation to supply the minimum 5 air changes per hour as required for ventilation.
14. When a shower is changed to a steam room, then all wall, ceiling and floor components of the shower are required to be equivalent to the steam room details in the Handbook for Ceramic Tile Installation.
15. Requirements for cement backer boards are covered in the manufacturer's installation instructions.
16. Showers in public swimming pools are required to be accessible.

Point to remember-The cheaper the installation assembly the more perfect the installation has to be installed in order to perform without failures. This theme leads me into water resistant gypsum board installations in showers. The tile industry has deleted water resistant gypsum board for direct bond of tile or stone in showers as a suitable assembly. The Gypsum Association was asked but would not change the Gypsum Association 216 publication to eliminate the requirement for the covering contractor to waterproof the water resistant gypsum board. The primary problem with water resistant gypsum board becomes an indoor air quality problem when the water resistant gypsum board has been exposed to long-term moisture. BOG is the term we use to identify bioorganic growth. We used to say mold, mildew and fungus, but the mycologist and toxicologist say we can't say mold mildew or fungus unless we have a test run to determine if the bioorganic growth is Stachybotrys Charterum, Penicillium or Aspergilli's or some other microbial growth.

We have since become certified in mold remediation and can now say the word "mold".

16. Water resistant gypsum board is not suitable for any horizontal assembly in a shower unless covered and protected 100% by a waterproof membrane. The exception to this may be ceiling assembly where the maximum spacing of stud support is 12 inches apart.

Water resistant gypsum board cannot be installed over any non-breathable backing surface. Water resistant gypsum board will retain moisture and support bioorganic growth and loose structural integrity at all locations where the water resistant gypsum board is installed over a non-breathable backing surface. A bathtub flange is a non-breathable backing surface. A waterproof membrane is a non-breathable backing surface.

All details for water resistant gypsum board require a minimum ¼ inch gap at the base of the water resistant gypsum board above the flange of the bathtub, shower pan, or tile lined shower receptor. Failure to supply the gap is a defect and will contribute to failure of the water resistant gypsum board with daily shower usage.

Portland cement thin set or mortar is superior for bonding tiles in shower as compared with using mastic. Tile setters are better trained in working with thin set and mortars than working with mastics.

Therefore all mastic installations in showers must achieve at minimum, 95% bond coverage and contact with the tile and stone in the shower.

Remember our California VOC requirements. Solvent-based mastic cannot be used to install tile or stone in a shower in the State of California. This only leaves multipurpose mastic and type II water-soluble mastic for installation of tile and stone when mastic is specified by the builder to the tile and stone contractor for usage in the shower. Gaps in the mastic with multipurpose mastic and type II mastic will support bioorganic growth. Failure to achieve the 95% coverage and contact between the tile or stone and the mastic will further allow condensation due to temperature changes, to collect in the void spaces between mastic and the tile or stone.

In the early 1980's, when type I mastic was used in California, we had mastic bleeding through stone installations in showers.

The International Residential Building Code 2006 has eliminated water resistant gypsum board as a suitable substrate for direct bond of tile in a shower assembly.

5.Setting materials used to installation stone in showers should be either white thin-set or latex modified white thin-set, or epoxy.

A survey performed by the Tile Contractors Association of San Diego was taken on the average lifetime expectancy of tile installed over water resistant gypsum board in showers. The result is the expected lifetime usage of the shower is 3 to 7 years. Professional tile and stone contractors in San Diego are asking for a waiver of liability or issuing a disclaimer to the contractor when the contract calls for installation of tile or stone directly bonded over water resistant gypsum board.

Tests performed by Cecil Hunt include a regular shower used 12 minutes a day will use water equivalent to 8,760 inches of rain per year.

Don Halvorson has performed analysis stating no matter where you live in the world, ***the range of moisture in the shower environment varies from 2.2 to 414 times the annual rainfall experienced on the structure's roof.***

Using studs on a 24-inch center in lieu of 16 inch maximum spacing in the walls is not a recognized backing for tile and stone installations.