RESIDENTIAL MASONRY CONTRACTORS ASSOCIATION
EXTERIOR WALL DESIGN – MANUFACTURED STONE VENEER
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This document outlines basic design principles of exterior walls constructed with manufactured stone veneer over wood stud-framed assemblies. It is intended as a general guide for appropriate design and construction practice for typical single family wood framed residential construction in the Pacific Northwest climate.

This document is limited to building envelope performance aspects related to control of rainwater penetration, air leakage, water vapor diffusion, and thermal transfer. The focus of this document is related to items typically within the masons scope of work, but is also intended to provide the mason with a general understanding of the overall performance requirements of exterior wall assemblies.

Structural aspects of the cladding attachment are beyond the scope of this document. Installation of the metal lath, mortar, manufactured stone veneer, all related accessories, and expansion joints must comply with manufacturers instructions and all applicable code requirements. In general, adhered masonry veneer should be limited to the first floor wall areas. Where installed at higher elevations, additional anchoring may be required, depending on the wind and seismic loads of the project site.

The details contained within this document represent appropriate design practice for typical low-rise wood framed residential buildings in the Pacific Northwest climate. The drawings are not intended to replace project specific design and detailing, which must be based on the climate and exposure conditions of the individual project. Note that this document illustrates a common method of construction suitable for most typical exposure conditions of low-rise wood framed buildings. There are several alternative options with respect to the systems and materials which may be appropriate for the exterior wall construction. It is critical that all components be selected and installed based on a systems approach to the exterior wall by analyzing the various performance requirements and determining the function(s) that each material within the exterior wall must perform.

The details contained herein are based on the following assumptions with respect to building envelope performance requirements. Specific aspects of each of these performance criteria are discussed in the following sections.

- Rainwater management is achieved by a drained cavity wall system, comprised of a prefabricated drainage mat installed over two layers of building paper behind the manufactured stone veneer.

- Air leakage is controlled by utilizing the exterior wood sheathing as the primary air barrier of the wall assembly. All joints and terminations of the sheathing are sealed to maintain air tightness. The sealing of the sheathing joints is typically not within the masons scope of work.

- Water vapor diffusion is controlled by use of an interior vapor retarder. The vapor retarder may be the facing on the batt insulation, a polyethylene sheet, or a suitably vapor resistant interior primer or paint. The installation of the vapor retarder is typically not within the masons scope of work.

- Thermal resistance is provided by batt insulation within the stud cavities. The installation of the batt insulation is typically not within the masons scope of work.

Rainwater Management

Appropriate rainwater management systems and details are vital to the performance of the building envelope. Rainwater is managed by deflection, drainage and drying. The first defense against rainwater intrusion is to deflect water away from the envelope by use of flashings, eave overhangs and the like. Rainwater that is not initially deflected away from the building can be managed by providing drainage. Finally, water that is not either deflected or drained from the system must be allowed to dry. Proper approach to the design of exterior wall systems is to assess the ability of a system to deflect, drain and dry and ensure that an appropriate balance of these management systems is provided to ensure adequate protection against water intrusion.

In exposed areas in coastal and high rainfall climates, it must be assumed that some water will penetrate the exterior wall cladding, regardless of the cladding type. Therefore, the use of a drained cavity or rainscreen approach to rainwater management is recommended for these climates. A rainscreen assembly is comprised of exterior cladding that provides a rain deflecting surface, a drainage cavity, and a weather resistive barrier to act as a second line of defense against wind driven rain that may find its way past the exterior cladding. This system allows incidental moisture to drain from the wall system and back to the exterior of the building. Ventilation at the top and bottom of the drainage cavity provides drying capacity for the cladding and for moisture within the drainage cavity.

The details contained herein are based on a manufactured stone veneer on a mortar bed as the exterior cladding, a prefabricated drainage mat to provide the drainage cavity, and two layers of building paper as the weather resistive barrier. There are several additional options for weather resistive barrier and drainage cavity materials. Pressure treated vertical

wood furring strips or strapping are often used behind cladding to create the drainage cavity in lieu of the prefabricated drainage mats. There are also many housewrap materials that may be utilized as the weather resistive barrier in lieu of the building paper.

The window details depict an exterior backer rod and sealant joint between the window frame and manufactured stone veneer. These sealant joints are critical to minimize water penetration past the cladding, while also accommodating the differential movements that will occur between the windows and surrounding cladding.

Air Barrier

The Washington State Energy Code requires measures be taken to limit air leakage. This is achieved by providing a continuous air barrier to minimize air exfiltration and infiltration through the wall assemblies. Minimizing air exfiltration reduces the risk of condensation in the wall assemblies. Should warm, moist interior air be allowed to pass through the wall during heating seasons, it may condense on colder exterior surfaces, causing moisture accumulation and potentially resulting in mold growth and structural deterioration of wall components. Minimizing air infiltration also reduces the risk of wind driven rain entering into the wall assembly. Minimizing airflow also reduces “drafts” and maintains comfort levels. Controlling drafts also decreases heating and cooling costs.

In order to be effective, the air barrier material(s) must be continuous, must have a low permeance to air flow, and must be structurally capable of withstanding the windloads on the building for the expected service life of the exterior wall system.

The details contained herein are based on the exterior plywood sheathing as the air barrier. All penetrations and terminations of the sheathing must be sealed to effectively limit air leakage through cracks and joints in the air barrier system. Because materials installed exterior of the insulation should be permeable to water vapor, it is important to minimize the use of impermeable membranes applied to the exterior sheathing. It is, therefore, recommended that a vapor permeable membrane be used to seal joints in the wood sheathing to control air leakage. This could be a vapor permeable self adhesive membrane or a liquid-applied permeable membrane with a reinforcing fabric. Where there are small gaps between sheathing joints and the joints align with framing, a sealant joint could instead be utilized for air leakage control. Impermeable self-adhesive membrane should only be used where the sheathing joints are well spaced and there are limited number of penetrations requiring membrane flashings at any given wall area, or at locations where the durability and

self-sealing characteristics of the impermeable membranes are necessary for adequate control of rainwater penetration.

Other options for primary air barrier material of the exterior wall include an airtight interior gypsum board (often referred to as Airtight Drywall Approach), a sealed polyethylene sheet, or a sealed exterior housewrap.

Vapor Retarder

A vapor retarder is required to control the diffusion of water vapor through the wall and roof assemblies. This is important to minimize the risk of condensation in these assemblies. Water vapor that is allowed to diffuse unimpeded through the wall or roof assemblies from the warm interior to the cooler exterior may condense within these assemblies if the air contacts a surface at or below the dew point of the interior air. The Washington State Energy Code requires a vapor retarder be provided on the warm side (in winter) of the insulation in exterior wall assemblies.

For proper control of vapor diffusion, the interior vapor retarder must be significantly less permeable to vapor diffusion than materials installed on the exterior side of the insulation. This is to ensure that water vapor that does diffuse from the building interior into the wall assembly does not become trapped by a vapor retarder on the cold side of the insulation. This trapped moisture can result in mold growth and structural deterioration of wall components, which may not be apparent on surface conditions until substantial deterioration has occurred.

The vapor retarder must be generally continuous across the exterior wall assembly. Unlike air barriers, however, penetrations through and termination of the vapor retarder do not need to be sealed for adequate control of vapor diffusion. If the interior vapor retarder is not sealed, however, and there are significant voids in the insulation that may allow air flow within the stud cavities, there is a risk of convective air movement that could result in interior air and moisture bypassing the vapor retarder. It is, therefore, important to ensure that the insulation sufficiently fills the stud cavities to minimize voids that can result in the convective air flow.

Installation of the vapor retarder is typically not within the masons scope of work. The details contained herein depict a dashed line installed at the interior of the insulation to represent the location of the vapor retarder. Vapor retarders at this location could be a polyethylene sheet or the facing on batt insulation. Alternatively a vapor resistant interior primer or paint could be installed to provide sufficient resistance to vapor diffusion.

Insulation

The purpose of insulation is to reduce heat transfer through the exterior wall assembly. Placement of the insulation within the wall assembly may also play an important role in controlling moisture problems. It is important to place insulation in such a way as to keep surfaces in contact with interior air above the dew point temperature thus reducing the risk of condensation.

Installation of the thermal insulation is typically not within the masons scope of work. The details contained herein depict batt insulation installed within the wood stud framing.