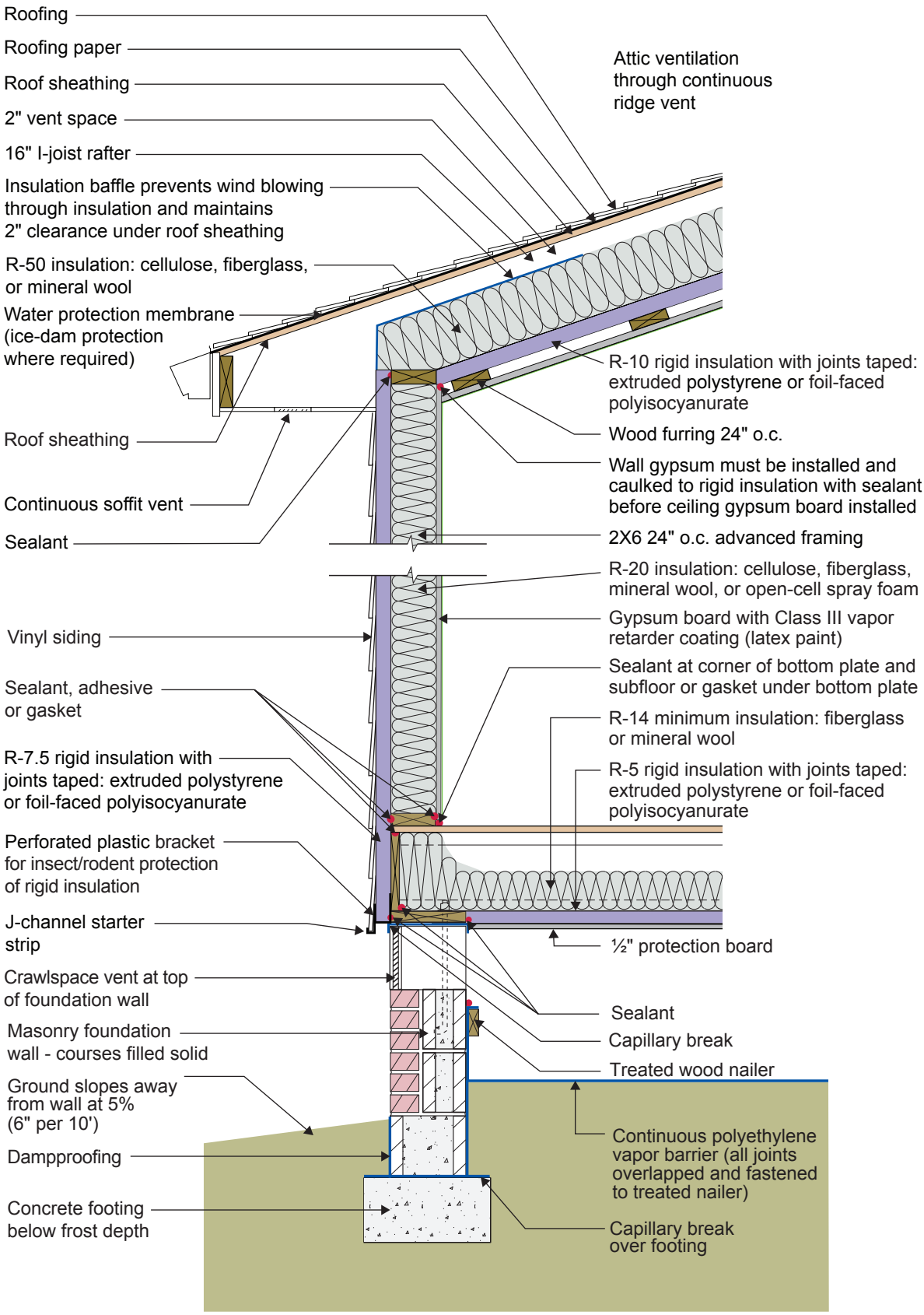
2021 IECC Climate Zone 4B: Vented Cathedral Ceiling, 2x6 Wall, Vented Crawl Space



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- The R-10 rigid foam at the ceiling is not required for vapor control in Climate Zone 4, though it does aid this purpose by reducing vapor transport into the attic. It is used in this assembly to bring the total roof R-value up to the 2021 IECC requirement of R-60. Because the I-joist rafter is 16 inches and a 2-inch ventilation space is needed above the insulation, only about 14 inches are available for the fibrous cavity insulation. This will typically give an R-value of about R-50, leaving the need for the R-10 rigid foam. Note that only 1 inch of ventilation space above the cavity insulation is required by code, but 2 inches is recommended in areas where ice damming could be an issue or where rafter spans are long. The rigid foam at the ceiling is also used to allow the creation of a service raceway between the rigid foam and the gypsum board below it. The rigid foam acts as the air control layer instead of the gypsum board. The service raceway allows the air control layer to be undisturbed by the electrical penetrations in the ceiling. A third purpose of the rigid foam in this application is that it also reduces drywall cracking. From a vapor control standpoint, however, the rigid foam and the raceway are not required by 2021 IRC, and R-60 fibrous cavity insulation could be installed directly on top of the gypsum board if cavity height allows and if the attic is properly ventilated. In this case the gypsum board would become the air control layer and would need to be carefully sealed.
- R-7.5 rigid insulation is shown on the exterior of the wall framing, though only R-5 is required per 2021 IECC and IRC requirements. Hygrothermal modeling shows that there is still some risk of moisture issues if using R-5 in this assembly in Climate Zone 4B. Hence, R-7.5 rigid insulation is recommended to control condensation within the framing cavities. There is no interior vapor barrier in this assembly – there is a Class III vapor “retarder” (semi-permeable latex paint). The reason that there is no interior vapor barrier is to permit drying to the interior.
- The rigid foam on the exterior of the wall allows construction without using structural sheathing: alternative methods of wall bracing are used instead, and the rigid foam provides a backstop for the cavity insulation as well as some structural support to the siding. Many contractors have found this to be a more economical approach.
- The plastic L-bracket at the bottom of the wall’s exterior rigid insulation should be perforated to facilitate drainage.
- The R-5 rigid insulation on the underside of the floor framing prevents moisture from the vented crawlspace from damaging the floor framing and floor finishes. The protection board is necessary to prevent rodents and other animals from damaging the assembly.
- The combined R-value of the floor cavity insulation and the floor rigid foam insulation should be at least R-19 to meet IECC 2021. A minimum thickness of 1 inch is recommended for the rigid foam for constructability.