

The concrete in the bottom of the pier holes was covered and protected with a small amount of straw. The straw was removed after the concrete had set, and the pier holes were filled with earth. This system would probably be in widespread use except for the fact that a satisfactory economic coating has not yet been developed for the galvanized steel. All of the exterior surfaces were prefinished so that no exterior on-site painting was required. This eliminated any dependence on weather for exterior finishing. A number of exterior prefinished products are on the market today, but the use of some of these is not widespread for several reasons including what is thought by builders to be their relatively high cost.

In our sixth research home, prefinished exterior surfaces of a different type were used along with components to speed construction. In our last and just completed research house project, the Research Foundation developed a prestressed, lightweight aggregate concrete panel system that accomplishes our other objectives and minimizes the effect of weather. The panels were actually cast in an outdoor yard in Richmond, Virginia, in late January and were erected in the District of Columbia in February. During most of this time, the temperature was below freezing. Conventional construction in concrete, brick, or block masonry could not have proceeded during such weather except at greatly added expense.

One of the research objectives of the National Association of Home Builders and the Research Foundation continues to be minimization of the effect of weather on construction.

The primary weather-caused residential construction problems relate to grading, materials handling, installation of underground utilities, construction of streets, curbs, gutters, sidewalks and driveways, installation of footings and foundations, exterior finishing and landscaping.

There have been other research developments that contribute to reducing the effect of weather on construction. Such developments include: Long-length plastic pipe which reduces the number of joints and simplifies bad weather joinery, synthetic rubber pipe connections, additives for concrete, prefinished exterior siding, improved materials handling equipment, improved materials delivery methods, materials protective coverings such as paper-wrapped palletized lumber and others. Home builders have developed a number of methods to offset the effect of bad weather. Even though much research has been done by manufacturers and builders to try to reduce the extra cost effects of bad weather, the two house examples set forth in the table above illustrate that much remains to be accomplished.

WHAT CAN BE DONE

There have been some efforts to control weather. This, however, is out of my field of knowledge, and I will not try to comment on this. If it is assumed that little can be done to change overall weather patterns, then additional new materials, equipment, and methods need to be developed if building is to proceed economically in spite of the weather. A few examples of these have been set forth above.

In addition, an improved weather forecasting and notification system could be developed so that builders and contractors could plan ahead better, thus minimizing the effect of whatever weather was going to occur. In residential construction, builders need to know at 6:00 a.m. whether it is going to rain and whether the temperatures will be freezing or below during the next 12 hours. It would also be helpful for builders to be able to learn at 3:00 p.m. whether it will rain or be below freezing during the next 24 hours. Since micro climates around major suburban areas, where most of the building is done, vary, the information mentioned above would be most helpful if it could be related more precisely to geographic areas smaller than an entire metropolitan community.

In summary, weather and seasonality in construction contribute to increases in costs for both direct and indirect construction items and probably increases the hourly price of wages and the unit price of materials. During inclement winter weather, this can add as much as or more than \$1,000 to the cost of construction of a typical dwelling. Research has been undertaken to minimize the effect of weather, and improved materials, methods, and equipment have been devised by the industry. More research will be necessary if the added cost of inclement weather is to be further reduced. Better weather forecasting and information systems would be helpful in minimizing the effect of whatever weather is going to occur.