

Below-Grade Construction: Issues and Needs

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Preface and acknowledgments

This report (PHRC Report 50) is the product of one of four projects on basements recently conducted by the Pennsylvania Housing Research Center (PHRC). The four reports together represent a comprehensive effort to address basement-related issues with reference to Pennsylvania in particular, and the north-east in general. This report and the report entitled *Foundation Wall Systems for Houses* (PHRC Report 51) are complementary.

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Below-grade Construction: Issues and Needs will be of interest not only to builders, developers, and homeowners, but also to the real estate, banking and mortgage community. When this project was started, we were largely concerned with identifying technical needs in order to provide a basis for planning future research, development or technology transfer activities. It soon became apparent that there were economic, process, and political considerations that had to be taken into account. We have also tried to address these contextual aspects of the topic.

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- Dr. Jim Work and Mr. N. Scott Qualls of Armstrong World Industries Inc.
- Mr. John Morgan, Mr. Robert Lewis, and Mr. Bill VonLeer, all of whom responded on behalf of the Pennsylvania Concrete Masonry Association.

We had worthwhile discussions and useful feedback. Thanks are due to each of these individuals for their time, interest and patience. The assistance of Michelle McMullen and Angela Burnett in producing the final version of the report is also appreciated.

The PHRC is responsible for producing this report. We welcome questions or other feedback.

E. F. P. Burnett

Director

Executive summary

This study to establish the issues and needs relating to the below-grade portion of a house was initiated for two main reasons:

- the opinion that the below-grade portion of new housing in Pennsylvania could do a better job of serving the needs of the initial and later occupants and, in the longer term, also serve the best interests of many, if not most, builders; and
- the need to provide a basis for planning future research, development, demonstration, and technology transfer projects for the Pennsylvania Housing Research Center.

Early on it became evident that the situation with regard to basement construction needed to be examined in a broader context than simply that of technical R and D. Review of the economic data made it clear that Pennsylvania badly lags the national average and most other states in new housing activity. If the rate of growth in gross state product (GSP) is to remain at current levels, then both Pennsylvania and its housing industry would benefit from a change in the way basements are built, especially if such a change would stimulate additional construction activity each year.

Most new housing is currently built with a basement that is not finished and not particularly well suited to future habitation (the “initial house”). It has been estimated that, if the builder can be persuaded to build and get paid for providing a potentially habitable and finishable basement, then the subsequent returns due to finishing the habitable basement area could amount to \$400 million a year. This is equivalent to building 3,500 new houses, or a 12 1/2% increase in housing activity and about 8,000 new jobs.

At present, there is little or no incentive for the builder to change the delivery process. Unless the buyer insists on a finishable and habitable basement and can afford it, current economic and market conditions do not favor change on the part of the builder. Without a reason to change, the builder remains the gatekeeper or main decision-maker with regard to short-term (and therefore long-term) basement utilization and performance. By continuing to build basements that are difficult to finish and expensive to make habitable, the builder inadvertently not only affects the lives and lifestyles of all successive occupants but also either blocks or restricts expenditures on making the basement space habitable and useable.

Two strategic questions arise:

- First, can the rest of the “downstream” industries (those who could finish or service or furnish the basement space) afford to let the builder continue to be their economic gatekeeper?

· Second, how is the builder, who is blameless in this situation, to be persuaded to change? There are economic and technical components to the answer.

This report attempts to provide an answer by addressing the overall economic design and planning aspects of house production. It is demonstrated that, **by thinking of the basement as an integral part of the whole house**, the following can be achieved:

- Without any increases in overall cost, an alternative house can be built that is different and, in marketing terms, bigger and a better value than the initial house.
- Through inclusion of habitable, finishable basement space, the “dollar per square foot of useable area” cost of a house can be significantly reduced. The marketing and real estate consequences have a significance far beyond the need simply to build better basements.

It is argued that instead of being an option that involves a relatively small but nonetheless very important increment in cost, building a better basement can be turned into a pro-active, builder-initiated, imaginative response that involves the whole house. The obvious question is how to encourage builders to make that change and how to reward those builders who do so.

Governmental involvement is likely to be counter-productive and should not be contemplated. That leaves the private sector to take the initiative.

Apart from the occupants, the economic stakeholders who lose the business opportunities offered by habitable, finishable basements are the remodeling and finishing sectors, as well as the businesses further “downstream” such as the furniture, appliance, hobby, and recreational industries, i.e., the after-market. For Pennsylvania and for the north-east, the amount of foregone business is very significant.

There are in fact a number of actions that could be taken. Initially, some serious thought should be given to the notion of building an alternative house for the same amount of money, as outlined in the report. It is likely to be some time before the implications of this approach take hold, but it is one way for niche builders, especially those doing custom houses, to expand their business.

Later sections of the report (as well as the complementary PHRC report 51, *Foundation Wall Systems For Houses*) discuss the component parts of the basement enclosure and the basement space, as well as a number of technical issues, especially moisture control. The following conclusions were drawn:

- Whether it is the exterior finish, waterproofing products, or the wall system, there is an extraordinary amount of innovation going on, and the rate at which change is occurring is phenomenal. Because of the scale of the market and the need for improvements in quality, there are many incentives and opportunities that arise from the below-grade part of the house.
- As far as the basement enclosure is concerned, it would seem that attractive opportunities exist for the development of foundation walls that do a better job of meeting all the relevant control functions (particularly moisture and termites) as well as finish functions. Furthermore, opportunities exist for the development of multiple-function exterior treatments to facilitate drainage, provide better damp-proofing or limited waterproofing capability (moisture proof), and also contribute to thermally insulating the basement wall.
- To address the issue of moisture control, which is one of the obstacles to builders wanting to build better basements, it would seem that a short, builder-friendly good practice guide would serve a valuable purpose and would be well received.

The work on this project received support from members of the insulation industry, the flooring/ceiling tile industry, and the concrete masonry industry. The individuals involved provided feedback that was both critical and constructive. At one meeting it was recommended that “under third-party leadership an industry-wide effort should be made to address the situation with regard to basements in new housing, not only in Pennsylvania but for the north-east.” There is certainly a need to further develop and consolidate some of the work in this report and to extend it to other states in the north-east.

In our view, the stakes—for both consumers and industry—are too high to leave to very short-term market forces. Current practice is not favorable to the consumer or, in the longer term, to the builder. Further, the market forces that prevail can be altered, but to do so will take time, a variety of approaches, and the expenditure of some money. In any event, it is strongly recommended that a multi-party effort be mounted to vigorously pursue the issue of building better basements. The PHRC is ready to lead or support an effort of this nature. Constructive reactions to this report and to these recommendations are sought and will be welcomed.

