

Virginia: Between December 1 and April 1, Virginia permits rock excavation and bridge construction work. The state estimated that 30% of the year's program is completed during this period. In portions of the state work of all types continues year-round, while in other portions temperature limitations prove to restrict most surfacing work. Winter grading is only permitted on new roadway sites, so traffic flow is not affected. Comparative cost figures are not available. Temperature restrictions and maintenance of traffic when existing pavements are disturbed seem to be the major problems encountered.

Washington: From December to March, 13% of the yearly highway construction program is performed. Surfacing work of all types, including bridge decking, is restricted during winter throughout the state. All work above 3,000 feet elevation is discontinued. Grading of fine grain soils subject to moisture difficulties is not permitted. Concrete work above ground is estimated to cost 20% more due to heating and curing requirements. An estimated 10% for all costs was made due to intermittent shutdowns, weather, inefficiency of labor and special heating equipment needed.

West Virginia: During the winter of 1965-1966, considered by most to be mild, West Virginia completed less than 12% of its yearly highway work.

Wisconsin: Under 10% of the yearly production in the highway construction field is accomplished during the winter months from December 1 through March 31. Substructural concrete work, erection of steel and prestressed girders on bridges, rock crushing, and placing of aggregate bases are the major items performed in winter. Operating equipment and providing for protection of materials and concrete through the curing period are the principal problems in Wisconsin.

Wyoming: From October to April, 30% of Wyoming's funds are expended. Temperature and frost limitations on items in specifications are the controlling factors on winter work. Concrete work does not require heating. Cost figures are not available for winter work, and heating of material and maintenance of temperature following completed work is the major difficulty. Frosting-up of material usually means time to shutdown for most operations.

Mr. O'HARA. I would like one other piece of information if your research department could furnish it. I would like to get from you any information you have on the relative impact of seasonality by types of construction, if you could furnish it, or whatever information of that sort that you can furnish.

(The information to be supplied follows:)

TECHNICAL NOTES ON BRICK AND TILE CONSTRUCTION—COLD WEATHER MASONRY CONSTRUCTION

INTRODUCTION

The matter of cold weather construction has been of much concern to industry, labor, the design profession and the government. Construction materials and labor are often in short supply during peak summer construction months. In the winter months there is an abundant supply of building materials and labor. The seasonal influence of construction results in idle production facilities, large material inventories and high rates of unemployment during the winter months.

This issue of *Technical Notes* discusses current requirements, research and observations relating to cold weather masonry construction. The following issue will discuss protection and construction recommendations.

BUILDING CODES AND STANDARDS

In the United States, all major building codes have requirements relating to the construction of masonry during cold weather. The Structural Clay Products Institute, as well as other construction industry organizations, has made recommendations relative to cold weather masonry construction. Frequently, architects' specifications include such provisions. Some of these requirements and recommendations are more conservative than others. Requirements relating to cold weather masonry construction from seven widely used codes and standards are quoted below:

BOCA Basic Building Code, 1965, page 183;

"835.3. Precautions Against Freezing. All masonry shall be protected against freezing for not less than forty-eight (48) hours after installation; and shall not