SEASONAL UNEMPLOYMENT IN THE CONSTRUCTION INDUSTRY

HEARINGS

BEFORE THE

SELECT SUBCOMMITTEE ON LABOR

OF THE

COMMITTEE ON EDUCATION AND LABOR

HOUSE OF REPRESENTATIVES

NINETIETH CONGRESS

SECOND SESSION

ON

H.R. 15990

A BILL TO AMEND THE MANPOWER DEVELOPMENT AND TRAINING ACT OF 1962, AS AMENDED

HEARINGS HELD IN WASHINGTON, D.C., JULY 15, 16, AND 17, 1968

Printed for the use of the Committee on Education and Labor

CARL D. PERKINS, *Chairman*

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1968

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CONTENTS

	Page
Hearings held in Washington, D.C.:	
July 15, 1968	1
July 16, 1968	29
July 17, 1968	107
Text of H.R. 15990	1
Statement of—	
Bone, Allan Turner, B. Sc., MEIC, Montreal, Canada, Chairman, National Joint Committee on Wintertime Construction	115
Fancher, Maurice, vice president, Laborers' International Union of North America, accompanied by W. Vernie Reed, Robert Powell, Jack Curran, and James Sheets	39
Foster, Robert B., Jr., Deputy Commissioner, Public Buildings Service, General Services Administration	18
Haggerty, C. J., president, Building and Construction Trades Department, AFL–CIO (accompanied by Walter Mason, legislative director, AFL–CIO and James Sheets)	107
Johnson, Ralph J., staff vice president, NAHB Research Foundation, Inc., National Association of Home Builders	132
Murphy, Thomas F., president, Bricklayers, Masons & Plasterers Union of America	29
Naumann, William E., chairman, legislative committee, accompanied by Scott Shotwell, director, legislative information, and Art Hintze, director, governmental labor relations, the Associated General Contractors of America	56
Reynolds, Hon. James J., Under Secretary of Labor; Philip Arnow, Director, Office of Policy Planning and Research; and Philip Yahner, Deputy Associate Solicitor, Department of Labor	2
Velardo, Charles, chairman, MCAA, All-Weather Committee; accompanied by George A. Miller, executive vice president, Mason Contractors Association of America	143
Whitlock, Douglas, general counsel, Structural Clay Products Institute	97
Prepared statements, letters, supplemental material, etc.:	
Arnow, Philip, Director, Office of Policy Planning and Research, Department of Labor, letter from W. Willard Wirtz, Secretary of Labor to Peter W. Weber, president-business agent, International Union of Operating Engineers, Local 825, Newark, N.J., enclosing decision: In the matter of the contract between local 825, International Union of Operating Engineers and the Associated General Contractors of New Jersey	11
Benenson, Mark K., Community-Wide Panel, New York, N.Y.:	
Brennan, Peter J., president, Building and Construction Trades Council of Greater New York, letter to Richard A. Givens, enclosing a letter from H. Earl Fullilove, chairman, board of governors, Building Trades Employers' Association	190
"Job Security in the Building Industry—and High Quality Low-Rent Housing," article by Richard A. Givens, in the August 1967 issue of Labor Law Journal	179
Letter to Chairman Holland, dated July 18, 1968	177
Panel report entitled, "To Break the Housing Bottleneck"	177
Bone, Allan Turner, B. Sc., MEIC, Montreal, Canada, chairman, National Joint Committee on Wintertime Construction:	
Statement by	116
Better Building Bulletin—Winter Construction	191

Page

Statement by—
Foster, Robert B., Jr., Deputy Commissioner, Public Buildings Service, General Services Administration, two memorandums from William A. Schmidt 27
Freeman, Gordon M., international president, International Brotherhood of Electrical Workers, AFL–CIO, statement of 106
International Union of Operating Engineers, statement and exhibits prepared by 154
Johnson, Ralph J., staff vice president, NAHB Research Foundation, Inc., statement of 133
Laborers International Union of North America:
Statement of 40
Table I.—Covered employees by number of hours worked, selected health and welfare plans—1966 41
Table II.—Average hours worked, by region—1966 42
Table III.—Nonfarm laborers employed, by industry of employment 44
Murphy, Thomas F., president, Bricklayers, Masons & Plasterers International Union of America, statement of 30
Naumann, William E., chairman, legislative committee, Associated General Contractors of America:
"Highway Construction Under Winter Conditions," article entitled (AGC survey) 67
Letter to Hon. James G. O'Hara, dated August 1, 1968, enclosing State limitations on asphaltic concrete placement (table) 62
Technical notes on brick and tile construction, Structural Clay Products Institute:
Cold weather masonry construction 72
Construction and protection recommendations 76
Winter building techniques in Europe 80
Nelson, Otto L., Jr., vice president in charge of housing, New York Life Insurance Co., paper entitled "Economies of Year-Round All-Weather Construction as Viewed by the Building Owner" 99
Terzick, Peter E., general treasurer, United Brotherhood of Carpenters & Joiners of America, statement of 114
Whitlock, Douglas, general counsel, Structural Clay Products Institute, statement by 97

SEASONAL UNEMPLOYMENT IN THE CONSTRUCTION INDUSTRY

MONDAY, JULY 15, 1968

HOUSE OF REPRESENTATIVES,
SELECT SUBCOMMITTEE ON LABOR
OF THE COMMITTEE ON EDUCATION AND LABOR.
Washington, D.C.

The subcommittee met at 10:05 a.m., pursuant to call, in room 2261, Rayburn House Office Building, Hon. James G. O'Hara presiding.

Present: Representative O'Hara.

Staff members present: Jim Harrison, Director; Dr. James R. Wason, Legislative Reference Service, Library of Congress, consultant; and Austin Sullivan, legislative specialist, full committee.

Mr. O'HARA. The Select Subcommittee on Labor of the House Committee on Education and Labor will meet today to consider the bill H.R. 15990, an amendment to the Manpower Development and Training Act of 1962, as amended, having to do with seasonality in the construction industry and the implications of the seasonal nature of that industry on national manpower policy.

(Text of H.R. 15990 follows:)

[H.R. 15990, 90th Cong., second sess.]

A BILL To amend the Manpower Development and Training Act of 1962, as amended

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Manpower Development and Training Act of 1962, as amended, is amended by adding a new section 108 to title I of the Act:

"SEC. 108. The Secretary of Labor is directed to investigate, conduct research and prepare a report on seasonality in the construction industry with special attention to its implications for national manpower policy. This report, together with such proposals for remedial action as the Secretary may deem appropriate, shall be transmitted to the President no later than March 1, 1969, and to the Congress no more than sixty days thereafter."

Mr. O'HARA. Our first witness is a very distinguished member of the executive branch who has added great distinction to the Office of Under Secretary of Labor, the Under Secretary, Mr. James J. Reynolds.

Mr. Secretary, would you please proceed with your testimony in whatever manner you would feel would be most appropriate.

STATEMENTS OF HON. JAMES J. REYNOLDS, UNDER SECRETARY OF LABOR; PHILIP ARNOW, DIRECTOR, OFFICE OF POLICY PLANNING AND RESEARCH; AND PHILIP YAHNER, DEPUTY ASSOCIATE SOLICITOR, DEPARTMENT OF LABOR

Mr. REYNOLDS. Thank you, Mr. Chairman, for that very gracious greeting. I am accompanied here this morning by Mr. Philip Arnow, Director of the Office of Policy Planning and Research, seated on my right; and Mr. Philip Yahner, Deputy Associate Solicitor of the Department.

Mr. Chairman, perhaps the best way would be to run through this testimony of mine, if I may. It is fairly brief, and first I would like to express my appreciation for the opportunity to appear before your committee.

Your legislative inquiry parallels the investigations of the executive branch which are presently proceeding, and this opportunity to be with you affords us a chance to tell you something of our progress and to share with you or findings.

As early as back in 1924 a Government report recommended year-round construction and the scheduling of public works for the off-season. The man who submitted the report was a distinguished public servant and successful civil engineer who had firsthand knowledge of operations in the construction industry. His name was Herbert Hoover, and the following paragraph in his report is particularly pertinent to this inquiry:

> Bad weather is not the principal cause of seasonal idleness. Customs which became fixed when builders had not yet learned how to cope with adverse weather conditions have not been changed to meet improvements in building materials, the development of new equipment, and innovations in management methods.

Seasonality in construction continues to be one of our most vexing problems relating to the utilization of manpower and industry resources.

In 1967 the President directed us to concentrate our attention and efforts on the remaining sizable groups of the unemployed, and to give special attention to the problems of the seasonally unemployed such as agricultural and construction workers. In the Manpower Report of that year he said, and I quote:

> To help these workers, I have asked the Secretary of Labor in cooperation with the Secretary of Agriculture and the Acting Secretary of Commerce to make a detailed survey of seasonal unemployment and underemployment—and to find ways to deal with these problems.
>
> This study should seek methods by which Federal, State, and local governments, through their contracting procedures and other activities, can reduce seasonal lags in employment, especially in the construction industry (Manpower Report of the President, 1967, p. xvi).

Since that time we have been looking into this area, and in a sense my testimony is based on the findings of the study conducted pursuant to the President's directive.

The construction industry, which is primarily composed of contract construction, produces about 10 percent of our gross national product. Yet, it is not a single, simple industry.

It is interesting to note that it is really rather a fragmented indus-

try—about 3 percent of contract construction firms have 50 or more employees, and over half have three or less employees. Like agriculture, this is an expression of the small entrepreneur exercising his privileges under the free enterprise system.

The symptoms of seasonality we have found indicate a widespread, chronic situation:

August employment in contract construction for the Nation as a whole is typically about one-third higher than February employment.

Unemployment rates in 1967 ranged from 13 percent in February to 4.3 percent in August for this industry.

The pattern of seasonal employment has not improved significantly since World War II.

The unemployment rate is about double that of all other industries combined. For 1967 the nationwide rate for experienced private wage and salary workers was 3.9 percent while in construction it was 7.3 percent. From 1957 through 1967 the ratio of unemployment in the construction industry to all other industries averaged about 2.1 to 1.

The impact of unemployment on the individual employed in the construction industry is severe. In 1966, for instance, 27 percent of all construction workers out of work for at least 1 continuous week during the year compared with 14 percent of manufacturing workers and 13 percent of all nonagricultural workers. This pattern, of course, varies by geographical area.

In the course of a single year the contract construction segment of the industry adds as many workers between February and August as are employed in the motor vehicle manufacturing industry of this Nation.

We learned these facts rather quickly. But let's examine the details subsequently found:

Site preparation and road building operations are extremely susceptible to bad weather and the workers who perform these jobs are particularly subject to recurring periods of unemployment. What to do with frozen or muddy earth is the single largest technical problem to be solved in this area, although a start has been made.

Even in building construction, once off the ground and under cover, the problem is rapidly diminished, but by no means is it ended. Successive groups of workers on individual projects are employed with differing seasonal patterns.

The workers in such trades as plumbing, electrical work, and sheet metal work generally have longer average annual employment opportunities than do laborers, although seasonality has an adverse impact on all crafts.

Even in the peak season the unemployment rates hit all crafts, but affect the laborers to the greatest extent. While construction laborers as an annual average have about twice the unemployment rate of construction craftsmen, the unemployment rate for craftsmen declines by two-thirds or more between February and August, while for laborers it declines by about one-half.

The rates for construction craftsmen average consistently higher than for craftsmen in the economy as a whole: In 1967, for instance, 4.7 percent against 2.5 percent.

Limited research shows startling variance even within an individual trade in the number of hours worker per year. For instance, in one State 27 percent of the operating engineers worked more than 2,000 man-hours in 1964 while 22 percent worked less than 1,000 hours.

Seasonality forms an important background to collective bargaining negotiations and has a definite effect on wage rates. Yet, it is little noticed that there are three vastly differing groups in each one of the crafts: those with year-round employment; those who bear the brunt of seasonality and fluctuations; and those who are only in and out of the industry in summer. This fact has clear implications for wage-price discussions and the entire range of economic stabilization problems.

Scientists, architects, and engineers have developed scores of materials and techniques to permit cold-weather operation:

Rust-resistant steels that do not require painting; and additives and heating procedures that permit pouring concrete in subfreezing temperatures.

Polyethylene films that allow large work areas to be enclosed from cold and rain; improved low-temperature lubricants; space heaters to warm work areas; and power equipment that works in frozen soil.

Drywall construction techniques unaffected by cold; and offsite preparation of curtain walls, which can be quickly installed to protect workers.

Precast and prestressed concrete structural elements; a mud-hardening process using lime to alleviate boggy conditions; and systematic scheduling, including the use of computers, to avoid unsheltered work in the coldest, wettest weather.

Although these methods are widely known, they are not as widely used as they shoudl be. It would certainly appear that the Federal Government could do much more to promote these techniques and inventions.

Technical innovations alone could not be expected to end seasonality, but it is surprising that the seasonal patterns of construction employment existing at the end of World War II have not changed significantly. Indeed, had it not been for certain offsetting factors the situation would be even worse.

Fortunately, in addition to the new technology, there have been—

A shift in geographic distribution of employment in favor of areas with less severe weather and a trend toward a higher proportion of nonconstruction workers in the industry (e.g., office workers, white collar engineering types); and

A capacity for planning that has increased as firms have grown larger (in terms of work undertaken); and a diminishing importance of institutional practices that encourage seasonal fluctuations in employment.

But other factors have also been at work. For example, planning techniques and scheduling which could permit more winter work are actually utilized to complete more work in favorable weather, thus reinforcing seasonality.

The penalty pay provisions of union contracts, which require pay for certain minimum hours of work each week, have frequently caused contractors to suspend work for the entire week if there is a threat of bad weather.

Fear of bad weather has often been more important than the actual weather conditions. Many jobs are not scheduled, but those that are can progress rather rapidly even under poor weather conditions.

Winter construction is now clearly feasible in many more cases than is now the practice. Canada, with winter temperatures well below freezing, has made great strides in all types of construction work throughout the year. Experience throughout Europe—particularly in Scandinavia—confirms the technical feasibility of construction in extreme cold.

But technical ability is of no value if coupled with economic impossibility. The major impediments to winter construction in the United States is cost, although too often it is the fear and expectation of cost rather than careful analysis based on accurate information.

With proper planning many projects can be completed without any rise in costs. In others there certainly may be an apparent increase of 1 or 2 percent due to failure to take into account other factors, such as savings in unemployment insurance. In some instances, contractor's costs may be higher, although in terms of the entire economy there may be a large saving.

There may be higher fees for design; the architect must so choose his materials and plans as to bypass work which presents special problems in cold weather. More frequent inspections of the work may be needed since the consequences of errors may be more serious. However, hot weather and dehydration may be even more serious problems than the cold.

An investment in knowledge is needed. Research on special materials and methods must be undertaken and workers must be trained to use these improvements. Special protective shelter may have to be provided, and snow shoveled away. Heat for workmen and for cement and masonry may be necessary, and in some instances protective clothing for workmen. Other indirect expenses, such as damage from the weather, may arise.

But there are also many savings which can be realized by winter work:

The year-round use of owned equipment reduces cost; rentals are usually cheaper in the winter; and interest costs for short-term operating capital are generally less in the off-season.

Contract officers confidently expect more and sharper bids, especially for work not crowded into the heavy bidding periods in the spring and summer.

There are definite savings because of less overtime, a regular feature in the busy construction summer. (Overtime in construction now costs the Nation about $1 billion a year.)

There are savings in workmen's compensation costs because of higher summer accident rates directly attributable to excessive overtime, worksite congestion, and inexperienced crews.

Fewer delays occur in the off-season because of material shortages; and better use is made of year-round skilled skeleton crews maintained by some contractors during the off-season.

Possibilities for quality control in a less hurried work pace and lower off-season industrial prices, especially in lumber products, are enhanced.

When the direct costs of halting operations in winter are weighed against the difficulties and costs of operation, the balance is often in favor of operation. The cost-savings to the economy becomes particularly notable when the direct and indirect savings in reduced unemployment are added to the scales.

The current employment fluctuations result in a steady drain on unemployment insurance trust funds, far in excess of contributions by the construction industry. These costs, and other costs of lost production due to seasonality have been estimated at $3 to $4 billion a year. That means that the rest of the industry is carrying the UI burden to provide the protection for construction workers during the period when they are laid off.

The reduction of seasonality could yield significant savings for the unemployment trust fund—now included in the Federal budget. Not only can we better use the capacity of this industry, but we can anticipate some clear deficit-reducing possibilities. In a social accounting sense, even if winter work did cost more, we estimate that up to a 7-percent increase in costs will be offset by a decrease in unemployment insurance outlays.

This 7 percent compares with additional costs of winter work found in the most specific U.S. surveys and confirmed by Canadian experience of about 1 percent, and there, of course, many cases where that will rise to 4 or 5 percent but, compared to the 7-percent savings, it is still an attractive saving. Thus the expected savings from UI alone would substantially exceed additional cost of heat and winter protection.

EXPERIENCE IN OTHER COUNTRIES

Seasonality is expensive, and it is inconceivable that we will continue to do so little to improve conditions. Many ideas have been tried abroad and foreign nations have already accumulated considerable operating experience.

The Organization for Economic Cooperation and Development has published an analysis of these methods and results which can benefit the United States.

Various governments have mounted substantial attacks on seasonality in diverse ways: Canada, Austria, Belgium, Denmark, Finland, West Germany, the Netherlands, Norway, Sweden, and the United Kingdom. Administrative action has been taken to plan Government construction to yield year-round employment, to require that maximum possible winter work be done by all departments, and to influence private projects by withholding permits.

Subsidies have also been paid either to municipalities, or contractors, or private owners. In some cases these subsidies are paid out of unemployment insurance savings.

Canada has been especially active in public education programs, designed to create a demand for winter construction through radio and television announcements, pamphlets, stickers, and letter inserts.

A sample of additional methods which have been attempted abroad includes—

> Grants or loans to contractors, sometimes conditioned on measures to winterize the project; loans to purchase winter equipment; and grants to workers for winter clothing and to owners who build in winter;

Free travel for visits to his family for a workman who follows a job to another area; and

Revision of building codes to permit use of modern advances, such as pouring cement in far colder weather by the use of additives; education of the many small contractors on modern techniques; and subsidized training for workers.

EXPERIENCE OF FEDERAL GOVERNMENT

The first area of Government consideration has been its own involvement with the industry. We are a good-sized customer of the industry. The Federal Government buys about one-third of all public construction which, in turn, represents one-third of all construction.

One of the striking features of the Government's activity in the construction field is that there is now no clear directive with respect to seasonality or winter operation.

Many agencies contract for construction directly with construction firms, while others finance grants-in-aid through State, city, or county governments. Each agency contracts for a specific kind of work, in some cases with specialized contractors, although usually with substantial interchange of labor force among contractors.

The agencies try to schedule their own operations as best they can, and often use or require such systems as PERT (Program Evaluation Review Technique) and often a systematic work scheduling technique is employed. There is, however, minimal interchange among agencies, or coordination of their activities in the same local areas. There is also little knowledge on the part of one agency of what other agencies are doing, and none at all on problems of seasonality.

The problems that Federal Government contracting officials would face in any effort to diminish seasonality are compounded by the fact that they generally lack the ability to influence State and local patterns of construction activity undertaken with funds from other sources.

There are indications that present practices tend to put the Government into the construction market at the most crowded period of the year. This is the spring and summer when resources are strained and when contractors' estimating capacities are so overloaded that adequate attention cannot be paid to the possibilities that exist for sharper and more competitive bids. It is also at a time when the Nation's supply of funds for construction credit is at its worst point in seasonal terms. The opportunity to enter the market in earlier months could result in significantly lower bids because of opportunity to use the more plentiful resources then available and to elicit more competitive contractor estimating procedures.

There are, of course, many situations in which spring or summer starts can lead to the completion of outside construction on a schedule which permits inside finishing over the following winter. Different groups of workers are involved in these two types of activity, however, and the development of scheduling methods which will diminish seasonality for all is an intricate process which requires careful attention. The best methods of achieving optimum results will grow out of operating experience under a conscious effort to diminish seasonality of employment.

Already I can visualize a number of actions which can lead us to the savings inherent in off-season work:

We can request off-season bids along with regular bids as is done in Canada.

We can request off-season bids along with regular bids as is done in in summer. Discounts and lower prices are frequent in the off-season.

We can take special steps to eliminate seasonality in warmer parts of the country; and we can develop labor area reports to dovetail governmentwide scheduling.

We can develop scheduling methods by computer techniques to predict when the same kind of operation under several contracts will bunch in local areas. This can be done through cooperation with State and local government officials and other interested parties.

As a result of the study and deliberations which were initiated by the President's request in his 1967 Manpower Report, the executive branch is now actively considering steps to achieve more attention to seasonality in Government procurement. I hope that this consideration will lead to action which can be taken under existing authority.

Mr. O'HARA. Thank you very much, Mr. Secretary.

Mr. REYNOLDS. You are very welcome, Mr. Chairman.

I think that that statement, Mr. Chairman, reflects the fact that the executive branch is going forward with a careful evaluation of this problem. We in the Labor Department and the Commerce Department have been embarked upon this as directed by the President following his Manpower Report of 1967. There are very thoughtful deliberations being indulged in in the Government in the executive department right now.

I am not in position to tell this committee of any specific actions which may be forthcoming, but I can assure you, sir, that the deliberations of this subcommittee could not come at a more felicitous time.

Mr. O'HARA. Mr. Secretary, I am pleased to hear that. I would gather that you have essentially three points.

One is that it certainly would be desirable from a number of standpoints to minimize the seasonality of the construction industry; second, that you feel it would be worthwhile to seek and obtain further knowledge of how this could be done; but I think your third point would be that we already have the technology and the knowledge that would permit actions to be taken that would reduce seasonality in the industry if we were to sit down and figure out just how to go about this. The technology has probably reached a sufficiently advanced state so that, if fuller advantage were taken of it, we could further reduce seasonal fluctuations. The subcommittee staff has made some little study of the experience in other countries and the OECD study of the subject, and we do think that there are things that can be done.

One of the problems is that several of them are outside the jurisdiction of this committee. I think that one thing we have found is that the sort of attack on this problem that you ought to mount would cut across the jurisdictions of a number of committees and executive agencies.

When I was in Sweden a few years ago I was impressed by what they have done and, of course, they tie much of their operation in with their overall manpower policy.

As you know, I have been very desirous of creating in this country

a comprehensive and active manpower policy and I think that we are moving toward that goal.

But one of the things that they do in Sweden, for instance, and we could not do it in quite the same way certainly or to the same extent they do there, is that, through their influence over the issuance of building permits and construction funds, they are able to use construction by reducing it in times of excess demand for labor and by pushing it when demands slack off and when unemployment rises. They are able to make a very significant impact upon the unemployment rates and the little recessionary lags that an economy gets into. Maybe someday we can do that. I don't know.

Mr. REYNOLDS. I would hope we could someday. That whole imaginative approach of theirs, using capital tax and deferred credit so that there is a fund available to trip off when they are permitted to do it to indulge in capital improvements many of which take the form of construction of new facilities, is a very sensible thing to do it seems to me.

Mr. O'HARA. And they have gone a good deal further on the seasonality program in spite of the severe winters they have as compared to ours. It was in the months of January when I was there, as I recall, and it was about 10 degrees or 15 degrees below in Stockholm and there they were working away on their construction projects.

Mr. REYNOLDS. I think when one considers the drain on the unemployment funds that is occasioned by seasonality of this industry one recognizes that it is the rest of the American industry which is making up the difference between what the construction industry pays in and what is paid in benefits to construction workers and then one realizes the overall social gains to be accomplished, even forgetting the more important human terms of keeping the people gainfully employed.

Mr. O'HARA. One of the obvious possibilities, it seems to me, is that if your figures are correct, and I certainly have confidence in the information you have provided this committee, it would be a good deal cheaper to subdize year-round construction out of the unemployment insurance funds to a certain extent than it would be to pay the benefits that are paid because of the seasonal nature of the industry, and that you would probably end up with a net financial advantage that way simply to the UI fund alone; in other words, that it would be cheaper for the UI fund let alone the problems of the individuals who are unemployed for parts of the year and the social costs of different kinds. It would just be cheaper to the UI funds to pay a small subsidy for construction in the wintertime rather than pay out the benefits that must be paid because there isn't more.

Mr. REYNOLDS. It might very well be. I suppose that leads one to imaginative thoughts about other efforts against seasonality, consider the recreational season in the New England States, or in your own State of Michigan where there is a brisk summer season and then a complete winter close-down coinciding with the opening of the season in Florida. Mobility of these workers would help a lot too.

Mr. O'HARA. That is right.

Mr. REYNOLDS. It takes imagination to do this and with the problems of the hard core ghetto I suppose there are not sufficient hands and brains to go around at the moment.

Mr. O'HARA. Of course, there ought to be because we both understand one of the secrets to employing more workers who lack work experience and who lack educational and technical background is to keep as many entry level jobs as possible open and one of the ways you do that is by trying to keep others who have work experience, training and education, out of that entry level job; so I agree with you. One of my little quiet arguments, once in a while, with your Manpower Administrator is that sometimes I think the mix gets a little bit too heavily focused on the disadvantaged because, unless you are opening up entry level jobs at the same time, there is really no place to put the people.

Mr. REYNOLDS. We need an upgrading of the people in the entry level jobs so that you find the openings for people you have to place in less skilled areas.

Mr. O'HARA. That is right. We have certainly enjoyed having you, Mr. Secretary.

The staff has reminded me here about the labor market survey technique that is now employed within your department which, I think, is done by the public buildings service.

Mr. REYNOLDS. GSA.

Mr. O'HARA. Are you familiar with that?

Mr. REYNOLDS. We just know that it is done. That is about all I could say.

Mr. O'HARA. Then we ought to talk to the GSA representative, I think. The staff has reminded me that in 1966 the operating engineers union had a labor dispute going up in New Jersey and the Department got involved in trying to help settle the dispute between the operating engineers and the New Jersey contractors and that one of the suggested solutions involved the contractors taking certain steps to reduce seasonal unemployment in the industry.

I wondered if you were personally acquainted with that.

Mr. REYNOLDS. I am personally familiar with it, but the man who headed that whole project is Mr. Arnow who is sitting right to my right who is intimately familiar with it.

Mr. O'HARA. Perhaps Mr. Arnow could enlighten us as to his experience in that dispute.

Mr. ARNOW. Mr. Chairman, the work that was done there showed a pattern of seasonality essentially like that described in the Secretary's testimony. The suggestions that were made grew out of the particular facts of that situation with respect to the possibility of using some funds for the development of off-season work and the creation of minimum assurance of certain work, particularly for those who were subject to seasonal fluctuations. The suggestions were then a matter of bargaining by the parties and initially rejected, but my understanding is that in a subsequent period the parties did negotiate something to go in this direction although not fully in accord with the recommendations of Secretary Wirtz and Commissioner Male. We would be glad to supply a copy of the report, which was entitled a "Determination," for the committee's record.

Mr. O'HARA. Could you supply that?

(The information to be supplied follows:)

JULY 13, 1966.

PETER W. WEBER,
President-Business Agent,
International Union of Operating Engineers, Local 825,
Newark, N.J.

SPENCER MARSELLIS,
President, Associated General Contractors of New Jersey,
Trenton, N.J.

GENTLEMEN: The enclosed Determination is transmitted in response to the parties' agreement of March 25 and 28, 1966.

Sincerely,

W. WILLARD WIRTZ,
Secretary of Labor.
RAYMOND F. MALE,
New Jersey Commissioner of Labor and Industry.

DETERMINATION: IN THE MATTER OF THE CONTRACT BETWEEN LOCAL 825, INTERNATIONAL UNION OF OPERATING ENGINEERS, AND THE ASSOCIATED GENERAL CONTRACTORS OF NEW JERSEY

I. IN GENERAL

The previous contract between these parties expired on June 30, 1965. Negotiations for a new agreement started before the expiration date, and continued on past it. Substantial but not complete agreement on a new three-year contract was reached last October. Prior to final agreement the negotiations became the subject of extensive public comment.

On March 25 and 28, 1966, the parties agreed on an interim wage settlement and agreed further, on their own initiative, to submit this controversy to the Secretary of Labor of the United States and the Commissioner of Labor and Industry of the State of New Jersey for "determination, resolution and disposition." We accepted this submission.

A series of meetings, joint and separate, have been held with the parties. We have extended our inquiry to cover certain aspects of construction industry practice which appear relevant. A draft Determination was submitted to the parties for their comments and suggestions on June 24, following which the parties indicated that the lines set forth in the draft were an appropriate basis for future action and requested time for joint exploration. Such time was accorded, and views concerning specific points were thereafter received.

We have taken account of three sets of factors:

1. The extent of agreement reached by the parties in this case prior to its submission to us.

2. The interests of the parties and of the public in maintaining economic stability.

3. The desirability of developing some method of meeting or at least reducing the problem of seasonality in the construction industry, with its adverse effects on contractors, workers and the public.

Particular emphasis has been placed on the third of these factors—the meeting of the seasonality problem. We have felt that if an answer can be found to this, the stabilization factor can be more constructively handled, and a settlement made in this case which will be more to the advantage of both parties—as well as to the industry, its employees, and to the public generally.

This case has been considered in the context of collective bargaining practices in the construction industry as a whole. The independent local settlements common in the construction industry are heavily affected by the long-established and pessimistic habit of viewing the industry as highly seasonal and characterized by great uncertainties which hover over contracts, business fortunes, and job assignments. This has led to the view that gains must be taken wherever and whenever they can be obtained to balance periods in which gains are not feasible, and to the development of an historic process of justifying relatively high hourly rates as being necessary to provide reasonable annual earnings.

These considerations are reflected in the tentative (and incomplete) agreement reached earlier by the parties in the present case.

Yet seasonality and intermittent work mean high costs and wasted resources. If these root problems can be met, the result will be substantial savings in costs and at the same time the elimination of some of the human uncertainties that cast a cloud over bargaining. From the viewpoint of stabilization, the right answers in the construction industry depend on meeting these problems.

The costs associated with intermittent and seasonal work are not only reflected in negotiated wages; they develop in other ways:

Substantial amounts in overtime premiums are paid during peak periods of seasonal and rush work. Penalty premiums run at least two to three million dollars a year for the contractors involved in this proceeding, and about a billion dollars a year for the construction industry in the Nation as a whole.

The costs of seasonality and intermittent work impose a substantial burden on the unemployment insurance system. Only half the costs of unemployment benefits for construction workers are supported by the taxes paid by construction employers and construction employees, despite merit rating provisions. Other New Jersey employers and workers, through their unemployment insurance taxes, subsidize half the benefits paid to unemployed workers of New Jersey Associated General Contractors members; this subsidy is at least a million dollars a year. This figure for the entire construction industry in New Jersey is close to 10 million dollars. In the Nation, unemployment insurance benefits in this industry run close to two-thirds of a billion dollars a year, of which only half is covered by taxes on construction payrolls and wages.

The cost of seasonal unemployment in general is one of the important national problems. One-fifth of total unemployment in the United States is seasonal, and unemployment in the construction industry alone is half of this.

A significant proportion of all these costs are costs to the general taxpayer. The Federal Government alone provides $180 million a year for construction work in New Jersey—financing which covers at least a quarter of the work of the operating engineers and their employers.

The Causes of Seasonality and Irregularity

Operating engineers usually work outdoors, and their employment is therefore affected by weather. But it is also affected by habit and by operating practices which can be changed.

Technology has opened the way for stabilization of nonroad building operations which are carried on under cover and even some types of building excavation work. Tasks which involve the handling of soil (grading, compacting, etc.) at ground level cannot normally be done under muddy or wet conditions. The physical operations associated with earth moving (despite improvements in size of equipment, use of pumps, moisture barriers, etc.)—which constitute the single largest element in the operating engineer's work and a key element in the starting of work for a new season—are restricted in the New Jersey area, and in similar climatic areas of the United States and Europe, from about December 1 to March 31. In New Jersey, governmental specifications generally prohibit road work in this period, in some cases unnecessarily.

Seasonality also affects paving operations. Government (Federal and State) standards prevent pouring of concrete when the temperature is below 32–40 degrees; however, concrete under some circumstances is poured in New Jersey throughout the year.

The organization and scheduling of work, particularly the letting of contracts, is also an important factor leading to seasonal bunching of work. In 1965, for example, the largest volume of highway contracts awards made by the State Highway Department occurred in July and August. New Jersey has been far behind other States in using its allocation of Federal funds for highway work.

The Effects of Seasonality on Hours and Earnings Opportunity

The seasonal pattern of work affects the employment or earnings of different members of Local 825 in different ways:

Some operating engineers are employed the year round by the same employers. Others receive the equivalent of a full year's employment, or more, from several employers, during the months of peak activity. Forty percent of the membership of the Local at work in 1964 had at least 1,800 hours of work; almost 30 percent had 2,000 hours or more. Significant proportions of these hours were paid at overtime rates.

At the other extreme were engineers who worked no hours at all, or less than a few hundred hours during the year. Most of this group received substantial earnings from other activities.

The major impact of seasonality and intermittent employment is felt by about one-third to two-fifths of the members of the Local who are attached to the industry and rely on it as their major or sole source of work.

This is an important matter. Concern over seasonality and irregularity of work has invariably resulted in general increases in wage rates that have gone to all workers, whether employed the year round or not. There is litle justification for continuing a bargaining habit which provides double benefits for those who receive both the higher rates and full annual employment.

It will take a new approach to deal with the problems of the intermediate hours group—those who rely upon operating engineer employment for their livelihod, and who have total annual employment of 700 to 1600 hours.

The Practical Possibilities of Diminishing Seasonal and Intermittent Employment

There has not been a thorough review of seasonality and its costs since the 1920's. The facts that exist today show little improvemen over those which existed when Herbert Hoover, then Secretary of Commerce, summarized the 1924 report of a labor-management committee of the President's Conference on Unemployment in the following words: "* * * the committee has well demonstrated the most important fact that the seasonal character of the construction industries is to a considerable extent a matter of custom and habit, not a climatic necessity."

Weeks of additional work each year are feasible if there is a conscious effort to achieve it. A few weeks' inroad into the present four month "off-season" can greatly reduce the employment problem of the great bulk of those affected.

The role of government will be particularly important. The Federal and State governments and the public authorities finance a volume of work sufficient in size to create or eliminate seasonal patterns. Changes in Government contracting practices can also influence practices throughout industry.

A number of practical steps can be taken:

First, the bunching that exists in the awarding of contracts for different types of construction by the State of New Jersey (and in addition by public authorities and local groups) can be diminished by conscious planning at all levels of government by the public agencies responsible for construction. Stabilizing employment has not, in the past, been an assigned mission of these agencies; such an assignment would yield results.

Many large contractors use modern management systems, including computer-based methods, in their own administration. Such systems can be installed by the public agencies, with the additional specific objective of scheduling work for time that is now unused, in periods when construction is possible.

Second, the present technical standards used in government specifications can be updated to reflect modern advances in technology.

Third, there are a great many tasks in New Jersey which need to be done, which can be done in slack periods, and which call for the skill of operating engineers:

Stream channel improvement and bank protection; windbreaks; sewage and flood control projects; work on parks, ponds, beaches and other recreational facilities all over the State;

Major new developments respecting the meadowlands in Northern New Jersey, and work in the Delaware Water Gap area;

Work on Federal facilities; and

Work for which Federal matching funds are available (other than roads) and for which the availability of operating engineers' time might be calculated in developing a local matching contribution.

Many of these are tasks for which public financing is not now fully available, but which could be organized to provide off-season employment.

Fourth, changes are needed in the present weekly guarantee for workers called in any time during the week and in traditional equipment rental practices. These arrangements inhibit early starts on projects which might begin in late winter or early spring, when severe weather changes might be unusually unpredictable.

Fifth, there is a substantial need for the training and retraining of workers in the operation of new types of equipment and in the maintenance of equip-

ment, during off-seasons. Equipment has become increasingly complex in a trade in which there has been no formal training or apprenticeship, and where accident rates are high.

MDTA training programs in several States (Pennsylvania, Ohio, Idaho, Arizona, California) have demonstrated the usefulness of six-week training sessions involving large numbers of operating engineers.

Training should be supplemented by new types of adult education. Operating engineers in the United States whose education is greater have higher annual earnings at their own trade. In New Jersey, education undoubtedly helps a great many operating engineers who are young in terms of age and experience to enjoy greater hours and earning opportunities than their seniors.

The volume of construction activity in the United States has been growing, and heavy construction has been increasing at a faster pace in New Jersey than in the United States as a whole. Predictions concerning future volume and employment opportunity show a continuing increase, and vary only respecting the degree of upward climb. The national commitment to maintain an economy which grows without periodic setbacks, and the demonstration now that this is possible, should reduce the uncertainty which has dominated bargaining.

The operating engineers, who man some of the most spectacular machines of a new era, are growing in number. The parties are in a unique position to begin a long-overdue job.

An attack upon seasonality and intermittent work will require not only new attitudes but new institutional arrangements and financial investment. But it should have long-range effects which substantially diminish unit costs while providing security and year-round earnings for individuals. There is hardly a Western nation—other than the United States—which has not embarked upon a deliberate effort to reduce seasonality and the effects of intermittent work assignments.

Beyond the matters at issue in this case, it is clear that a sizable effort should be directed at the problems of seasonal unemployment in the industry as a whole.

II. CONCLUSIONS AND DETERMINATIONS

The parties to this case, by their unprecedented action in referring it for determination and disposition to offices of the State and the Federal governments, recognized the combination here of both their own and the public's interests—and also their own and the public's responsibilities. They indicated their willingness and their desire to make this a case which tests the possibility of finding a better answer, in a prosperous economy—which is properly concerned with maintaining both its growth and its stability—to the problem of seasonality and intermittent work in a key industry. They have recognized that there is both a case to be settled and an industry and an economy to be served.

These are the five steps which appear to us appropriate in response to the parties' decision to follow this course:

1. *Every effort should be made to ensure the establishment by public contracting authorities of practices and procedures in the awarding of construction contracts which will reduce seasonal unemployment to a minimum*

The offices of the undersigned are in a position to promote the establishment of such practices and procedures.

The Commissioner of Labor and Industry of the State of New Jersey undertakes, on the basis of consideration of this matter with the Governor of New Jersey:

(*a*) That there will be initiated promptly an independent and comprehensive administrative and technical study, under contract supervised by a key central official of the State, covering the letting and administration of contracts for public construction in the State. In view of the importance of highway construction to the total employment of operating engineers, emphasis will be placed in this study on the operations of the State Highway Department, but it will also include all construction activity financed in whole or in part or administered by the State, or by localities subject to State coordination. The study will be scheduled to yield preliminary results in time to affect operations during the winter of 1966–67.

2. Active attempts should be made to extend the efforts to reduce the seasonality and intermittent work factors in this particular situation to other parts of the construction industry in this area and, so far as is practicable, in the industry in general

The undersigned, as Federal and State officers, undertake to extend the study which has been made in this case to include a comprehensive review of seasonality and intermittent work throughout the construction industry, or at least so far as it affects, directly or indirectly, the interests of these parties. This review will include the effects of seasonality on hours of work, annual earnings, and the cost of construction, the technical problems which must be solved, and the practical steps that can be taken by government, labor, management, and technical groups to reduce seasonality and its high costs.

It is recognized that this broader approach will depend, for its effectiveness, on the participation of labor and management groups in the construction industry. Such participation will be actively sought.

3. The new contract should include effective provisions for the assurance of extended earnings opportunities to all covered operating engineers with a substantial attachment to the industry

(*a*) A reasonable schedule of such extended earnings opportunities should provide that journeymen operating engineers who were employed 700 hours or more as operating enginneers during the 12-month period from April 1 of one year to April 1 of the following year, and who are substantially attached to the industry as evidenced by eligibility for participation in the Pension Fund, will receive at least 1600 hours of total earnings opportunities during the succeeding 12-month period, with supplemental opportunties to begin December 15. In determining whether 1600 hours of earnings opportunties have been reached, the hourly equivalent of outside earnings shall be adjusted to reflect differences in rates of pay.

(*b*) These earnings opportunities will be supplied, in the main, through regular employment by the contractors who are parties to this agreement. It is recognized, however, that there will not in all cases be such employment opportunity. It is intended that the assured opportunities be *earnings* opportunities which arise from work or training.

4. The parties should establish a Development Authority for the purpose of assuring earnings opportunties where they are not available through regular employment

(*a*) The Development Authority shall be headed by an Executive Director, appointed by the Governor of New Jersey, who shall be responsible for the development and implementation of work or training projects to provide earnings opportunities for operating engineers, and who shall not be removable except by the Governor.

(*b*) The affairs of the Development Authority shall be under the sole direction of the Executive Director, who shall act in consultation with an Advisory Board, appointed by the undersigned, which shall include representatives of labor and management. This Authority shall operate in a manner consistent with the provisions of Section 302 of the Labor Management Relations Act.

(*c*) The initial "working capital" of this Development Authority shall be provided by—

(i) The funds presently accumulated, and accumulating in the future, under the parties' apprenticeship training fund agreement; and

(ii) Payments to the Development Authority by the contractors party to this agreement, starting July 1, 1966, of so many cents per employee per hour paid for (excluding fringes) from April 1 to November 30 of each year, as will be necessary to fund the extended earnings opportunities provided for in Paragraph 3(a) above. It is recognized that the financial obligation of the contractors will not exceed the total resources which arise from these contributions and those specified in (i) above, and that these payments in turn depend upon the making of the most reasonable possible estimated determination of the number of operating engineers who will be employed and for what periods of time during the next two years. The parties shall attempt to agree upon this hourly payment figure, and upon methods of applying it which will provide additional financial incentive to

stabilize employment. If they are unable to reach agreement by August 1, 1966, their respective positions shall be presented to the undersigned and this figure will be set on or before September 1, 1966, to be applied retroactively to July 1, 1966.

(*d*) It is an essential element in this Determination that the Development Authority will be authorized to conduct such operations and activities as will provide constructive use of the time of all operating engineers who participate in its activities. This can and should be a human resources development program—worthwhile to those engaged in it, and worthwhile to the community and to the Nation. The Authority should be authorized to engage in activities for profit where this is in the interests of the parties to this agreement; or in not-for-profit activities where this better serves the interests involved. The idea is that people are entitled to a chance to produce, to serve, to earn, and to learn; and that it doesn't make sense to waste either men or manpower.

The charter and program of the Development Authority should be worked out by the parties and should include the following:

Establishment of upgrading and retraining programs involving new methods and equipment;

Development of an apprenticeship program which will ensure that new entrants are trained for a variety of assignments, thus making them increasingly valuable for year-round work; it should establish and administer objective standards for recruiting and selecting apprentices;

Power to negotiate special arrangements, at special prices or on an unreimbursed basis, for doing nonbudgeted and noncompetitive public work while paying those employed established rates of pay;

Assisting management in developing new methods and season-extending techniques;

Enlisting the cooperation of activities such as The Neighborhood Youth Corps in its project work;

Undertaking, sponsoring, or encouraging new research to solve weather-related technical problems;

Undertaking the training of foreign trainees, here and abroad, and undertaking special projects overseas;

Developing programs of adult education and sabbaticals, particularly for members whose lack of education impedes earnings opportunity; and

Authority to investigate the factors which produce seasonality and intermittent work, including those which may arise from the provisions or administration of collective bargaining agreements between the parties.

(*e*) The present contract provisions for weekly guarantees should be suspended between December 1 and March 31 of each year.

(*f*) The point of this Determination is that "employment" in this industry should include some of the assurance of continued earnings opportunity which it includes in most other industries; and that the answer to the "stabilization" issues which have developed is to provide this assurance instead of paying for the uncertainty which now exists.

5. Wage rates and fringes

(*a*) The hourly rates established in the contract which expired on June 30, 1965, are to be increased as follows:

(i) Thirty-five cents an hour, the amount agreed upon by the parties, to be effective July 1, 1965.

(ii) An additional fifteen cents an hour, effective July 1, 1968.

(*b*) If, as of June 15, 1967, the cost of living (Consumer Price Index) has increased by more than one percent during the preceding 12 months over and above the average annual increase during the period between June 1961 and June 1966, the Union may reopen the contract on wage rates; and if agreement is not reached by August 1, 1967, the wage rates for the period from July 1, 1967 to June 30, 1968 shall be determined by a person designated by the Secretary of Labor and the Commissioner of Labor and Industry of the State of New Jersey.

(*c*) The parties shall jointly sponsor an actuarial study of the present welfare and pension funds to determine whether present benefit levels can be properly sustained in the future under present financing arrangements. Unless it is agreed, on the basis of this study, that they can be so sustained, there shall be submitted to arbitration the question of whether additional payments should in the future be made into these funds either from the funds of the Development Authority or by additional payments by the contractors on a per hour per employee basis.

(*d*) Other contract provisions relating to wages and fringes shall remain as set forth in the previous agreement.

Any questions of clarification of this Determination which may arise shall be submitted to the undersigned for resolution and disposition.

W. WILLARD WIRTZ,
Secretary of Labor.
RAYMOND F. MALE,
New Jersey Commissioner of Labor and Industry.

Mr. REYNOLDS. Mr. Chairman, it is interesting to note that that brief reference in my testimony to a State where 27 percent of the operating engineers worked more than 2,000 man-hours whereas 22 percent worked less than 1,000 hours was the State of New Jersey where we made this very careful study, hopefully to come out with an imaginative scheme to lighten the burden of seasonality. Unfortunately it did not get off the ground at that time. That plan contemplated off-season make-work of nonprofit nature, parks and communities, playgrounds. It called for the training of unemployed workers with allowances and the funds were to be provided by a per hour tax for every hour worked to placed into the fund. But it did not get off the ground because it was in conflict with other demands of the union at that time for very substantial economic benefits; so that it fell apart. That is one of the problems, of course, that we have in this industry.

Mr. O'HARA. Well, I think that it certainly is clear as you pointed out in your testimony that the seasonal nature of the industry is a factor in labor negotiations and in determining wage rates. I have often heard outraged comment about the hourly rates of people in the construction industry but I have also heard the defense to that which is that unless you make that much an hour your annual income is not going to be adequate because such long periods of unemployment are typical of the industry.

Mr. REYNOLDS. That is right, plus the vicissitudes of weather when the job is open so that there can be a very good case made on behalf of the building trades that they have to get these rates to provide their workers who are the most skilled workers in the country with an adequate annual wage.

Mr. O'HARA. I have heard the case made with some force.

Mr. REYNOLDS. I am sure you have.

Mr. O'HARA. I think once that pattern gets established as your experience in New Jersey suggests it is hard for them to then go back to their membership and say, "Look, we are not getting a wage increase this year. Instead we are going to get year-round employment." I think that after the workers become habituated to the idea of a high rate and periods of layoff then it is a little more difficult to rationalize the whole thing once the pattern is established. I know some of them develop patterns of family life that are built around this fact that they are unemployed for part of the year and they are then reluctant, or at least everyone is opposed to change and they are a little leery about changing the system.

Thank you very much, Mr. Secretary.

Mr. REYNOLDS. You are very welcome.

Thank you, Mr. Chairman.

Mr. O'HARA. Our next witness will be Mr. Robert B. Foster, Jr., who is Deputy Commissioner, Public Buildings Service, General Services Administration. Mr. Foster, as perhaps the largest builder

in the United States of America, we feel that you will have some very valuable insights into this problem that you may provide us and we are looking forward to your testimony.

STATEMENT OF ROBERT B. FOSTER, JR., DEPUTY COMMISSIONER, PUBLIC BUILDINGS SERVICE, GENERAL SERVICES ADMINISTRATION

Mr. FOSTER. Thank you, Mr. Chairman.

We actually are not the largest by any means. We are a large builder it is true but, as my testimony will reflect in a moment, in the aggregate the work that GSA does is actually only about 1 percent of the annual work placement in the United States. As Secretary Reynolds reported to you a moment ago public construction of all kinds is about a third of the construction input and Federal construction is a third of that. We in GSA do about 10 percent of the Federal part. We do have some strong views on this subject which I would, with your permission, like to present, and I have a brief statement.

Mr. O'HARA. Please do.

Mr. FOSTER. Mr. Chairman, I am Robert B. Foster, Jr., Deputy Commissioner of GSA's Public Buildings Service. It is a distinct privilege for me to represent the Administrator of General Services, Lawson B. Knott, Jr., and to present the views of GSA on the general problem of seasonality in the construction trades as well as on H.R. 15990, a bill which would result in an in-depth study of this problem. I would like to discuss first, our construction activities; second, our experience with seasonality and certain related matters; and third, some suggested areas we believe such a study might embrace.

II. MISSION AND PROGRAMS

The mission of the Public Buildings Service is to provide for the general purpose real property needs of the Federal Government through the acquisition and management of facilities. These facilities include Federal office buildings, courthouses, postal facilities, storage installations, and border stations. We also act as design and construction agents for many special purpose facilities funded by other Federal agencies, such as laboratories, medical facilities, and educational buildings. Our acquisition program includes the usual methods of providing space; that is, construction—including conversion and extension—leasing, and purchase. Through our management program we provide for the operation, protection, repair and improvement, and assignment of space in much the same way as a real property management firm.

We are concerned here this morning primarily with the type of work included under our construction and repair and improvement activities. Both of these activities are funded by direct appropriation to GSA usually in the case of general purpose space, and by transfer appropriation for special types of space. To give you some idea of the size of these programs, in fiscal year 1966 total obligations for construction amounted to $132.7 million while $88.4 million was obligated for repair and improvement. In fiscal year 1967 $84.9 million and $68.7 million were obligated for construction and R. & I. respec-

tively. This past year, fiscal year 1968, about $70 million was obligated for construction and approximately $85 million for R. & I. However, with recent and necessary budgetary constraints drastically limiting our fund availability, particularly in the new construction area, we expect annual obligations to decrease significantly for the next year or two.

As another index of the magnitude of our construction effort, in the 10-year period between fiscal years 1959 and 1968, GSA completed 21.5 million square feet of office building space throughout the United States. The cost of these buildings amounted to approximately $675 million.

I would like to insert at that point although it is not in my prepared statement, Mr. Chairman, that these statistics would probably surprise my boss if he reflected on them because this is a rather special extract. We completed this amount of office building space. We have many other types of buildings and have a lot more under construction. The figure would look a little small to my colleagues but I thought I would synthesize this net figure out for the committee this morning.

Although we believe we have a certain diversity in our work, all of it—with a few exceptions—has a common factor; all is concerned with buildings. We must defer to others for experience in what I will call "outdoor" work such as highways, airfields, and bridges, for example. Unlike these forms of construction, a relatively sizable portion of our work is done indoors, particularly with respect to our repair and improvement projects and consequently climatic conditions have a lesser effect on our programs than those of the "outdoor" projects.

III. GSA EXPERIENCE IN EFFECT OF SEASONALITY

Recognizing this limitation, it is believed of interest to report to the committee that we have been unable to identify any significant change in levels of activity between winter and summer. Using dollar expenditures as a measure of work placement, we find that in the months of July and August 1965, 1966, and 1967, our work placement for all types of projects totaled $35.6 million, $48.4 million, and $38.3 million, respectively. In January and February 1966, 1967, and 1968, comparable figures were $41.1 million, $39.4 million, and $32.1 million.

These simple statistics, however, do not necessarily tell the whole story. We recognize that the normal geographic distribution of public building projects places a fair share in Southern and Southwestern States, where seasonal variations of weather are not so severe. It is also conceded that such a statistical comparison is valid only to the extent that initiation of work is spread more or less uniformly throughout the year. Obviously, this is not always the case. Although most of the construction appropriations with which we deal are "no year" funds and thus not subject to expiration on June 30, there is a seeming tendency toward placement of more construction contracts in the spring and early summer than in the fall. This very fact alone indicates a conscious effort on the part of program managers, as well as construction contractors, to get a new building project underway and closed in before the snow flies.

Another factor which influences seasonality statistics in the building construction effort is the ability to effect sizable expenditures in the

indoor trades. More and more of the building construction dollar is going into mechanical, electrical, and plumbing components. This means that the work placement statistics may be weighted unfairly in favor of the indoor trades if the dollar increase is in the nature of sophisticated equipment rather than manpower for its installation.

IV. THE NEED FOR PUBLIC AGENCIES TO WATCH COSTS

The escalation in construction costs in recent years has become a major factor governing the award of buildings construction contracts. There is an increasing number of instances when our projects are subject to bids which exceed the amount of funds programed. Increasingly, low bids not only exceed funds programed for a project but also the amount by which those funds can be legally augmented. This remits GSA to a position of deferring such a project indefinitely or returning to the Congress for authority and funds sufficient to do the job. On certain occasions, delay in seeking such increased resources has resulted in a second series of bids proving to be too high. It is understood that similar problems are faced by other Federal agencies and by the private sector in both the indoor and outdoor type of project.

It is especially necessary, however, for public agencies to husband their resources most carefully to avoid worsening an already difficult fiscal situation. The present fiscal restraints under which Federal agencies are now operating are only a current manifestation of a need for extra economy which has been with us for several years.

This is cited simply to prove that we have been, for some time, seeking the best means of accommodating our projects to the labor and materials market. If we had found marked differences in the availability of building construction workers in winter as opposed to summer, we would have taken advantage of it through the means of our market survey technique.

V. THE MARKET SURVEY

In September 1966, GSA implemented a procedure for market surveying to determine the most advantageous time to commence construction. These surveys are required for projects estimated to cost in excess of $200,000 and include an evaluation of the labor market, projects under construction in the neighborhood, and work contemplated within the area which might affect market conditions. Although the principal reason for establishing this survey procedure was to minimize cost to the Government, it also serves as a means for smoothing peaks and valleys in the construction work force within a particular locality. This is because the survey will usually indicate that the best time for construction is during a slack period for the local construction work force, and, conversely, higher costs can be expected when the work force is being more fully utilized. Our market surveys have resulted in postponing some projects and, where market conditions are found to be favorable, a decision to proceed immediately with award of the construction contract.

Again, let me emphasize that the principal purpose for which our market survey was developed was to help GSA in securing construction of a facility at the lowest possible cost. It is possible that this or a

similar system with greater emphasis on national manpower policy if implemented by other Government agencies involved in construction would make considerable strides toward minimizing any deleterious effects of weather on the construction work force.

VI. OTHER SUGGESTIONS

GSA will welcome an opportunity to contribute to the proposed study by the Secretary of Labor in any way that we can. In this vein, we would like to offer certain suggested areas for consideration which might prove profitable in the study.

It might prove effective to develop a mechanism for coordination at the local level of construction project work starts among the various levels of government.

Let me depart from my prepared statement here, Mr. Chairman, to say that although I have not looked this up in recent times, a few years ago I had occasion to check the number of public entities that do construction in the United States and it was something in excess of 50,000, when you include all of the State and local agencies and special authorities that have bonding authority and construction authority.

It is envisaged that this coordination mechanism would be established in major cities or metropolitan areas and would consist of a cooperative effort between Federal agencies, State agencies, and the diverse local agencies performing public construction in the area. Through a continuing exchange of information, each agency could, within limits, voluntarily schedule its projects in a manner least conflicting with the then existing schedule of other projects. Such an intergovernmental cooperative effort might better measure at the local level the real impact of seasonality on employment in the construction trades and take more immediate action to alleviate any imbalance.

It is believed that there is a need for continuing an increased research and development in the materials, equipment, and construction methods adaptable to adverse weather. The primary emphasis might well be on cold weather construction, but due attention ought to be paid to construction in areas of heavy rainfall, high prevailing winds, and the like. It may well be that the added cost of embracing new methods or materials can be reduced to a point where they will be the economic choice. This research effort ought to be undertaken in consultation with organizations representing both construction labor and construction contractors.

Most construction appropriations of Federal agencies are now of the no year variety. Funds are available to the agencies concerned until expended, thus relieving them of any necessity to "use or lose" before the end of a given fiscal year. It is suggested that those few appropriations which remain on a fiscal year basis be made no year so far as they apply to capital construction.

Action is already underway at the instigation of the Advisory Commission on Intergovernmental Relations to study possible standardization of building codes in the United States. This undertaking could be effective in simultaneously removing any artificial barriers which may exist to the employment of adverse weather construction procedures or materials.

VII. CONCLUSION

In conclusion, Mr. Chairman, GSA believes that its work through the Public Buildings Service is not as susceptible to seasonality as other construction efforts may be. Nonetheless, we suspect there are elements of seasonality of which we may not be aware. We would welcome an opportunity to support the Secretary of Labor in a thorough study of the problem. However, we would defer to him as to the necessity for passage of H.R. 15990 as a means of initiating such a study.

This completes my prepared statement, Mr. Chairman. I will be happy to answer any questions the committee may have.

Mr. O'HARA. Thank you very much, Mr. Foster. I noticed with respect to your labor market surveys that you say at the top of page 6 that you have "been, for some time, seeking the best means of accommodating our projects to the labor and materials market. If we had found marked differences in the availability of building construction workers in winter as opposed to summer, we would have taken advantage of it through the means of our market survey technique."

Then you speak of the market survey. Am I to gather from what you said at the top of page 6 that your market surveys have not found marked differences in the availability of construction workers?

Mr. FOSTER. That is exactly what it means, sir. We have only made in the last year and a half somewhere between 75 and 100 of these market surveys. We do not now require our regional officials who do this work to submit their reports into Washington unless there is a recommendation not to proceed with the project.

If they find a favorable climate they proceed. This record is also influenced by the fact that for the last two years we have been on a slowly reducing level of effort through slowdowns and stretchouts. We have had fewer projects going on the market.

So I would not want to represent to you that this is a hard and fast and statistically sound sample that I report to you. It just happens that the amount of work that we have awarded, the amount of obligations we have made, the amount of expenditure or work in place, has not shown any seasonal pattern, nor have we had one case where I can remember where a region recommended that we not proceed with the job because the construction labor market was too tight and the skills and trades were not there.

More likely delay in marketing a project by the Public Buildings Service has been due to the fact that there is too much other construction pending and we are afraid our bids will be too high. Now, this has been the exception. The rule has been that we survey the market and proceed.

In preparing for this testimony this morning I went back and looked at work placement by months for a several year period and I couldn't detect any seasonal pattern. I suppose that there was a slightly less production effort in winter if averaged out but not enough to rely on.

Mr. O'HARA. Of course the time of the award, as you point out, doesn't necessarily say when the construction takes place.

Mr. FOSTER. This is true.

Mr. O'HARA. Because related to that you have your completion dates

and if you were to make an award in September and require completion by March, that would mean something.

Mr. FOSTER. Yes. I should point out to the committee, Mr. Chairman, that most of our buildings take in excess of a year to build. We have a few that are in the 6- to 10-month variety, but most of them are a year, 15 months, 18 months.

Mr. O'HARA. So that there is at least one and perhaps two traditional construction seasons in most of your contracts?

Mr. FOSTER. That is right. Of course some of our very biggest jobs will run 3 or 4 years. What we would like to do, if a building is going to take 1 year to build, is to get it closed in, get the structural work done, the roof on, and the walls up by October or November. Then we can continue without any slackening of indoor work.

I ran across an interesting case that the committee might want to just note as a curiosity. We have a small post office to be built in the Sequoia National Park, and we hoped to get it awarded in the late spring, say along about April or May, so that the contractor could begin work in June, which is about as early as you can start in the park.

Unfortunately the bidding was restricted. We didn't get much competition. The bids came in higher than we expected, and it took us 6 or 8 weeks to augment those funds. We had to scratch around and get some extra money and so the contract wasn't awarded and notice to proceed issued until August. The contractor worked until about the first of December and, faced with 50 inches of snow on the ground, he had to stop and didn't resume work until June 3 of this year. The building will be completed, hopefully, next month.

This is only a $90,000 building. It should have taken him about 6 months to build. Actually it is going to run us a year and a month or two.

Mr. O'HARA. Of course, you point out it is a curiosity.

Mr. FOSTER. That is just a curiosity.

Mr. O'HARA. That is a rather extreme case both in terms of climate and accessibility.

Mr. FOSTER. That is true.

Mr. O'HARA. You might be able to cope with 50 inches of snow in the city, but somewhere where you have a large-scale problem of transportation of materials along with that kind of weather condition, it would be about as bad as you can get.

You have done 75 to 100 market surveys, and you have yet to have your regional office involved in any of these reports to you that the work ought to be postponed because of unavailability of building tradesmen, right?

Mr. FOSTER. Only one case that I can recall.

Mr. O'HARA. Of course the availability of building tradesmen isn't the whole story. The typical pattern of employment in the construction industry in an area where construction is not depressed is that construction workers are working extremely long workweeks during the building season; 60 or 70 hours is not uncommon.

Mr. FOSTER. That is true.

Mr. O'HARA. So you run into overtime costs that perhaps you wouldn't have in the wintertime. But your surveys, stated in terms of availability, just show there are enough workers available to complete the job?

Mr. FOSTER. That is one of the factors in the survey.

Mr. O'HARA. Does the survey ask at all whether the employment of overtime would be significantly lessened if the job were done at another period of the year?

Mr. FOSTER. Not per se. The reason for that, Mr. Chairman, is that 99 percent of our projects—and the exceptions you can almost count on the fingers of one hand—are lump-sum contracts let after competitive bidding. The overtime costs, if any, are contractors' costs, you see.

What we are trying to predict through out market surveys is whether the bidding will be tight and competitive, whether the contractors will really sharpen their pencils or whether, knowing that they are going to compete for scarce labor and have to work overtime to meet the completion date, they will throw an overtime allowance, if you will, into their bids.

Our market surveys cover three things essentially: the labor market including the availability or shortage of the various trades involved; second, construction bid results, including information obtained from local contractors, local architects-engineers, local governments, a comparison with the preaward.

We go to the city, to the State, to the highway department and ask them what they have awarded lately; did it come in under or over the estimate. We talk to the local chapter of the associated general contractors.

Then finally we look at what other jurisdictions and private enterprise are planning to market within the next few months because the contractors are keeping track of these things and the outlook is going to influence their bidding.

I would not suggest that we have paid proper attention to the labor market as opposed to the other two facets of our market survey.

Mr. O'HARA. Because you have other problems, the need for the buildings.

Mr. FOSTER. That is correct.

Mr. O'HARA. Lots of other things that you have to take into consideration.

Mr. FOSTER. We sometimes take a very parochial view because of the shortage of money.

Mr. O'HARA. Then also you are faced with a rising cost trend of bids so that any time you delay in accepting a bid, your horseback estimate is that if you try to get them in a year it is going to cost a lot more?

Mr. FOSTER. That is correct, sir.

Mr. O'HARA. Do you ever use contract provisions? In other words, you don't actively try to promote off-season construction?

Mr. FOSTER. No; we do not, Mr. Chairman. It might be helpful for me to very briefly explain the way in which we develop a project. We have the requirement stated. We select a professional services contractor, an architect-engineer, and give him these requirements in physical terms, in space limitations, and in dollar terms.

He designs the building using guide specifications and standard specifications. These are all aimed at securing maximum quality at minimum cost.

By virtue of the fact that they are standard, he has to modify them for a particular project. We review his work. It is approved,

accepted, and then those plans and specifications are advertised to the construction industry for a period of 30 to 60 days.

Bids are then received and publicly opened, and if they are within the money available, if the low bidder is responsive and responsible, we award the contract to him. He is entitled to increased return over his bid only for things beyond his control, such as acts of God.

If he is in a climate where there is abnormal rainfall, we know that this is going to be allowed for by the bidder so that we allow for it in the completion time we allow. We give him a completion date and charge him liquidated damages if he doesn't meet that.

I think I must say in all candor, Mr. Chairman, that GSA has not paid as much attention to seasonality as we could, and I think it is time we rectify that.

Mr. O'HARA. I think that is right. You would have to sort of shuffle your priorities around because it is entirely possible that you would run into some higher costs.

Mr. FOSTER. Yes, sir. I must point out that we have, first of all, the mission of getting the space provided when and where it is needed by our Federal customers.

Mr. O'HARA. And that is the most important.

Mr. FOSTER. That is overriding.

Mr. O'HARA. You might have to, for instance, write into the contract a provision that would permit additional payments within certain limits for work undertaken during winter months, for instance in the North. That might have quite an impact.

Mr. FOSTER. It might have a salutary effect.

Mr. O'HARA. But under your existing authority I don't know if you could do that.

Mr. FOSTER. Well, this does not bother me, sir, the fact that we may not now have authority to do it. If it is right I think the Congress would grant us the authority in due course. I was intrigued by the exchange you had with Secretary Reynolds on the possibility of subsidizing, if that is the proper word, some of these increased costs through the unemployment insurance funds.

Mr. O'HARA. Right.

Mr. FOSTER. This might be to the best interests of the Government as a whole and to the people as a whole. It could be done through the taking of appropriate alternates in our bidding. We do this all the time. We will have a base bid and certain additive or deductive alternates for which we get a separate figure. I can recall one case where we took bids on two different time periods.

The agency which was going to occupy the building was in a vast hurry. In order to satisfy them that to gain 6 months' occupancy would cost them several million dollars we had to advertise it that way.

Mr. O'HARA. There is no reason, I guess, why you could not do that as a standard matter and have alternates to try to fit the time period to a slack season of employment and if you could be made whole out of some other fund you would certainly be happy to do so.

Mr. FOSTER. Yes, indeed.

Mr. O'HARA. You are a little reluctant to spend your own appropriation for it.

Mr. FOSTER. Mr. Chairman, I have gotten so that I guard that money even tighter than my own personal funds.

Mr. O'HARA. I understand that. I am not critical.

Mr. FOSTER. Sixty percent of the jobs that we have appropriations for today are now estimated to cost more than the appropriations we have. This keeps me awake nights.

Mr. O'HARA. Do you have some coordination with other Federal agencies and what form does it take?

Mr. FOSTER. Yes, sir. There is the Federal Construction Council of which the Commissioner is a member and that has representation from all of the Federal agencies that do construction; the military services, the Veterans' Administration, AEC, Bureau of Reclamation, Bureau of Public Roads, and so on. There is the Buildings Research Advisory Board under the National Academy of Sciences which sponsors research by Federal agencies on building and construction problems.

Mr. O'HARA. Presumably they could be a little more active in terms of spreading out the Federal work

Mr. FOSTER. They could. They could take this on as a major field of investigation and perhaps may have already looked at it. Of course, the Bureau of the Budget, I think, has a place to play in this too.

Mr. O'HARA. I am sure they do. I think what has to happen—and it is the fault of the Congress rather than the agencies—is that if we think this is a serious problem we have to build into this entire system an urgent priority for reducing seasonality in the industry so that administrators will have a directive, a policy guideline that has a high place in their priority of values: Is this important and, if so, we ought to say so and tell them that this is very important.

Mr. FOSTER. That is true.

Mr. O'HARA. With respect to whether or not we do that I presume you would rather not either urge or discourage it. You are going to leave that to us.

Mr. FOSTER. I defer to your wisdom, sir.

Mr. O'HARA. Thank you very much, Mr. Foster, for your testimony. We have appreciated having you here today.

Mr. FOSTER. It has been a pleasure, Mr. Chairman.

Thank you very much.

Mr. O'HARA. Could you supply us with a copy or copies of your labor market survey materials. In other words, if I were a regional administrator of GSA, and I were about to let a contract for a public building, I would have a set of forms on my desk and certain questions would have to be answered. I would like to see just what those questions are and what the instructions to the regional administrators are.

Mr. FOSTER. I have Xeroxed copies of two memorandums dated in the fall of 1966, one of which was an anonymous sample attached, a hypothetical example, if I may put that in the record.

Mr. O'HARA. Yes; we would appreciate that.

Without objection, that will be entered into the record at this point

Mr. FOSTER. Thank you very much, sir.

(The information to be supplied follows:)

SEPTEMBER 23, 1966.

MEMORANDUM

To: All Regional Administrators, GSA (attention all Regional Directors, PBS).
From: Acting Commissioner, Public Buildings Service.
Subject: Market survey.

In numerous instances we have been receiving bids on construction projects higher than the Government and/or AE estimates, and frequently in excess of the appropriation or the funds budgeted for the project. Private industry also has been experiencing high bids, due to the extremely tight labor market, but their procedures are more flexible than those of the Government.

Because the construction industry is subject to great fluctuation, our statistics on construction manpower are inadequate nd we must depend upon local sources for accurate and timely information regarding market conditions.

Before any project involving $200,000 or more (new construction, R&I or transfer) is put on the market, I want to be advised as to the AE and GSA estimates, the funds available, and current market conditions. This market survey shall include the following:

(1) Labor market, including the availability or shortage of the various trades involved,

(2) Construction bid results, including information obtained from local AE's, local governments, and private industry regarding contracts recently awarded, with comparison between the contract price and the pre-award estimate, together with information as to the general escalation of costs in the immediate area within the past twelve months, and

(3) Work presently contemplated, including a list of projects which are scheduled and which may affect the market conditions for GSA projects.

With respect to R&I projects involving $200,000 or more, it is requested that the above information be transmitted to the Construction Division thirty (30) days in advance of placing the specific project on the market.

Market Survey information for new construction projects will continue to be obtained on an individual basis by a telephone call from the Construction Division.

This procedure shall be effective immediately and shall continue until rescinded.

WILLIAM A. SCHMIDT.

OCTOBER 3, 1966.

MEMORANDUM

To: All Regional Administrators, GSA.
From: Commissioner, Public Buildings Service.
Subject: Market survey.

In reference to my memorandum of September 23 concerning subject above, an administrative procedure has been established to insure that complete and timely information is provided regarding Central Office projects.

When the region receives notification from the Professional Services Contract Division that a specific project will be issued, the region shall submit within ten (10) days after this notice a market survey. The market survey shall include the information as described in items (1), (2), (3) and (4) of my previous memorandum.

Since the AE and GSA estimates, and the funds available for Central Office projects are not normally available in the regions, I shall obtain this data from the Centrol Office Estimates Division.

It is desired that the market survey information be submitted directly to me in the sample format attached.

WILLIAM A. SCHMIDT.

MARKET SURVEY INFORMATION

(1) Labor market:

(*a*) Engineering News Record reports shortages in several critical trades.

(*b*) Region reports that there is a critical shortage of the following trades: bricklayers, carpenters, iron workers, marble setters, reinforcing steel workers, stonesetters. There is an acute shortage of electricians, steamfitters, and

tile setters. Overtime is required of cement finishers, plumbers, and sheet metal workers.

(2) Construction bid results:

(1) Sears, Roebuck and Co. negotiated an approximate $1,000,000 contract for which bids were 10% high.

(2) Dodge Report of 15 projects over $1,000,000, 2 contracts were awarded 10% above the estimated budget.

(3) AE's for private industry in the general area have esculated their estimates 7% to 10% per year for the past two years.

(4) Civic Center estimated at $12,000,000 placed on the market in December 1965, required a listing of 9 separate components. Two bids were received and a composite of all the low components resulted in a price $700,000 high. Project was placed on the market a second time in February 1966 on a lump sum basis: 4 bidders responded and Bateson was $100,000 low.

(3) Work Presently Contemplated:

Residential construction has come to a standstill. Industrial construction appears to becoming bigger than ever and local contractors are selective in the jobs they bid.

A high rise apartment complex estimated at $2,000,000 is scheduled to go on the market next month. There are nine potential bidders but none have bid on GSA projects. In 30 to 60 days the University will advertise a $2,000,000 Dormitory and a $1,500,000 Science Building.

(4) Region Recommends: _____

Appropriation $_____.

*Region (or PCE) estimate, improvement costs $_____ _____
Date

AE estimate, improvement costs_____ $_____ _____
Date

Mr. O'HARA. Thank you, sir.

The Select Subcommittee on Labor of the House Committee on Education and Labor will now stand in recess until 10 a.m. tomorrow on the same subject in this room.

(Whereupon, at 11:20 a.m. the subcommittee recessed, to reconvene at 9:40 a.m., Tuseday, July 16, 1968.)

*Escalation is included (if applicable).

SEASONAL UNEMPLOYMENT IN THE CONSTRUCTION INDUSTRY

TUESDAY, JULY 16, 1968

HOUSE OF REPRESENTATIVES,
SELECT SUBCOMMITTEE ON LABOR
OF THE COMMITTEE ON EDUCATION AND LABOR,
Washington, D.C.

The subcommittee met at 10:15 a.m., pursuant to recess, in room 2261, Rayburn House Office Building, Hon. James G. O'Hara presiding.

Present: Representatives O'Hara, Meeds, and Steiger.

Staff members present: Jim Harrison, director; Dr. James R. Wason, Legislative Reference Service, Library of Congress, consultant; and Austin Sullivan, legislative specialist, full committee.

Mr. O'HARA. The Select Subcommittee on Labor of the House Committee on Education and Labor will come to order.

The purpose of today's meeting is to continue the consideration of H.R. 15990, a bill dealing with seasonality of employment and operation in the construction industry.

The first witness today will be the president of the Bricklayers, Masons & Plasterers International Union of America, Mr. Thomas F. Murphy.

Mr. Murphy, who is an old friend of mine, is also the president of a union of which I am an honorary member so that I might say, Mr. Murphy, if anybody tries to rough you up, don't worry. I'll take care of you.

We enjoy having you here always and are looking forward to your testimony today.

STATEMENT OF THOMAS F. MURPHY, PRESIDENT, BRICKLAYERS, MASONS & PLASTERERS UNION OF AMERICA

Mr. MURPHY. Apropos of that when the late John Fogarty was chairman of one of these committees my brother who is a bricklayer also testified and before he started John Fogarty let the members of the committee know that he was a member of the Bricklayers Union and so treat him kindly.

I am grateful for your remarks. I have a statement that goes into some detail about this seasonality of construction. It is quite lengthy and perhaps I can shorten it.

I have provided copies and to save the time of the committee I will try to talk off the cuff.

98-840—68——3

Mr. O'HARA. That will be fine and without objection the full text of your statement will be entered at this point in the record and you may proceed in any way you wish.

(The prepared statement follows:)

STATEMENT BY THOMAS F. MURPHY, PRESIDENT, BRICKLAYERS, MASONS & PLASTERERS INTERNATIONAL UNION OF AMERICA

Mr. Chairman, I consider it a sincere privilege to have an opportunity to make this statement before the Select Subcommittee on Labor—House of Representatives.

The problem of seasonality in construction is extremely serious and of much concern to the members of my organization.

We are grateful that the Select Subcommittee on Labor is investigating this matter and hope that your hearings will stimulate the necessary action needed to bring about a solution to this problem.

The members of the Bricklayers Masons and Plasterers International Union—whom I represent probably suffer more from lost time due to seasonality—than any other building craft. Because of this we have been very active in bringing this matter to the attention of key segments of the building industry and government and have cooperated with all of those who are attemping to solve this problem. I personally have been interviewed by the Engineering News Record Magazine and have brought this matter to the attention of the Members of the American Architects through an article that I authored and which was published in the May 1967 issue of the A.I.A. Journal. My organization is very active in participation with other members of the masonry industry in our "Masonry Industry All-Weather Committee". Through this committee we are studying construction methods and the development of new technology in materials and equipment that will assist us in the elimination of seasonal lost time for our craftsmen. I have mentioned these few examples of our activity to illustrate to the members of this Select Subcommittee on Labor, that we are not sitting on our hands, and furthermore, we have been vigorously attacking this problem.

To present to you a clear idea on the implications of seasonality to the masonry industry and to our craftsmen—I will offer the following facts:

Two years ago we surveyed our local unions with health and welfare plans, such plans are an excellent source of information on man hours worked. The information that we received showed that bricklayers worked an average of 1400 hours a year, or 35 40 hour weeks. If we assume that the national "norm" of full employment is 2000 hours, or 50 40 hour weeks, then the skilled trained craftsmen of my union are employed for only 70 per cent of the "work year".

For 15 weeks of the year, bricklayers are unemployed and have no opportunity to use skills acquired at considerable cost to themselves and the nation. Much of this is true of other construction craftsmen. This is an enormous waste, and it creates personal hardships and anxieties. This industry's skilled workers accept a pattern of employment that most Americans would find intolerable.

Seasonal fluctuations in construction employment affect not just the workers: They are a burden on the national economy. The Department of Labor says that the traditional pattern is for unemployed contract construction workers to receive about one-fourth of all unemployment benefits paid in the months of January, February, and March. In the summer months, these workers account for only one-tenth or one-eleventh of the benefits paid.

Total state unemployment benefits of $273 million were paid in March of 1965. Since construction workers draw higher than average benefits, they received at least $70 million of the total. In September of that year, total benefits amounted to $138 million—and construction workers received an estimated $15 million. Much of the $55 million differential between the amounts paid unemployed construction workers in the two seasons must be considered as waste due to "seasonality".

Another way of looking at the cost of "seasonality" is to consider the economic loss of manhours. When we fail to make efficient use of the skilled labor we do have, we mock statistical reports and forecasts of labor "shortages." If the 160,000 journeymen in the BM & PIU worked an average of 45 weeks in a year, rather than 35, the economy would gain an additional 64,000,000 skilled manhours. This would be the equivalent of having an additional 35,000 trained bricklayers producing over a 45-week work year. Multiply this effect many times in order to understand what this could mean to the entire industry, for nearly

all construction trades are in the same boat with bricklayers when it comes to seasonal employment.

Another major problem facing our industry is a shortage of skilled craftsmen. Today we are finding it more difficult to attract young men to our trade—and holding them once they enter into training. Many young boys start out as bricklayer apprentices and then drop out to enter into occupations where weather is not a factor and fuller employment is assured them.

If "seasonality" could be eliminated a substantial reservoir of skilled craftsmen would be added to our national work force virtually overnight. Our trades would then attract the additional manpower needed for continuing survival of our industry.

The solution to the problem, unlike many of today's solutions, does not depend on untried technology. Instead, it depends on the application of several tried and true principles which make it entirely possible to continue construction work in all kinds of weather. "All-weather" construction is not theory: It has been proved over and over again. In the United States, there have been enough separate cases in which it was successfully tried for us to consider the present technology as adequate. Indeed, the planning and the tools that are necessary for "all-weather" construction are well known to many general contractors, mason contractors, other specialty contractors, and to architects and engineers as well.

The Mason Contractors Association of America has held many seminars for its members on this subject. The Associated General Contractors of America has promoted the technology of all-weather construction to its members. Technical magazines that are widely read by contractors, architects, and engineers, have called attention to the "ways and means" of construction under adverse weather conditions.

The two technical keys to all-weather construction are cheap, easy enclosure, and mechanical heating or cooling. A variety of enclosure materials and methods have been used with success. Most often the material is lightweight, transparent plastic which frequently can be re-used. Heating or cooling can be provided by gas, oil or electric space air conditioners that are readily available.

Some contractors have built even very large buildings in winter by enclosing the entire structure. At Brampton, Ontario, Canada, a 22,000 square foot, single-story structure was built this way in eight weeks. In Winnipeg, Canada, another contractor completely enclosed a six-story building with polyethylene and wood-fiber board. At Calgary, Canada, a builder used bowstring timber trusses to support a plastic roof over a 10-story structure. (The contractor estimated the actual cost of this kind of shelter at 10 cents per square foot—against which should be offset increases in productivity due to comfortable working conditions and the economic advantages of early completion.)

But where it is not possible to enclose an entire structure, other techniques have worked well. An eight-story building was constructed in Winnipeg in the winter after the contractor developed an enclosed swing scaffold which was hung on cables from roof outriggers. The platform was enclosed with plastic and heated, so that masonry work and glazing could continue throughout the winter.

Construction of the Fine Arts Building at Northern Michigan University was a good example of the practicality of all-weather construction. The contractor erected scaffolding and placed a plastic covering over it in two weeks. Steam heaters were used to heat the three-story building to 50 degrees F., even when outside temperatures were 35 degrees below zero. The contractor estimated that his heating costs were $30 a day.

It is no longer necessary to prove the point that if construction work is properly planned and scheduled, it is a relatively simple matter to use one of several available materials to enclose all or part of the structure, use available space heaters to warm the enclosed space and thus continue to work in cold and/or wet weather. Neither is it necessary to prove that the ingredients used in brick and concrete work can be handled satisfactorily in cold weather. We have, in fact, advanced to the point where serious consideration is being giving to enclosing and cooling construction sites in hot weather, thus increasing productivity and reducing on-site mishaps.

The evident reluctance of the construction industry to go all-out for all-weather construction must, therefore, be ascribed to some factor other than practicality—perhaps a belief that all-weather construction is costly, or that it lowers quality, or that it is not worth the trouble. The broad experience of Canada should dispel any such beliefs.

Canadians have long had an interest in, and a need greater than ours for, all-weather construction. Since the mid-1950's, Canada has made a concerted drive to raise the volume of winter building, and they have succeeded to a marked degree. In the process, they developed many of the all-weather construction techniques now being used on a limited basis in this country. They quickly found that the keys were advance planning, and a cheap enclosure.

It was discovered that the Canadian winter was no bar to construction of large and small buildings, lengthy bridges, tall dams, or big-scale earth-moving projects. It was also found that with proper planning, even large construction sites could be completely enclosed with plastic, creating comfortable working conditions during sub-zero weather.

Just as importantly, Canada has proved that winter construction is of as good quality as construction done at any other time of the year, and that the cost of advance planning and site-enclosure is negligible. The Canadian Contractors Association surveyed more than 100 contractors and found that the average additional cost of winter construction ranged from approximately three-quarters of one per cent to 1.5 per cent of the contract price. This small added cost was more than compensated for by the economic advantages of early completion of projects.

The Canadian Government, recognizing that the general public welfare was improved by increased winter construction, took several measures which have encouraged the building industry. One of these is the Municipal Winter Works Incentive Program which provides for rebates to localities which construct public works in the winter months. Another measure is a "bonus" system under which the government pays $500 to the purchasers of residential units "substantially completed during the winter months."

The important point for us here is not that these are government-sponsored incentive programs, but that the Canadians decided to spur their construction industry toward increased winter work by rewarding the industry's clients.

If Canada, with winters that are longer and harder than ours, can build the year round, then it is obvious that the United States can do likewise. And if Canada has found that the economic benefits of all-weather construction outweight its difficulties and cost, then we in the United States, where the difficulties and the cost will be less, should reach the same conclusion.

I think that we must learn a lesson from the Canadians and see that all-weather construction is "sold" to the clients of our industry. For this to be done, the construction industry must ask for leadership from architects—from the professionals who stand closest to, and indeed represent, the owners.

The rest of us in construction have a great deal to do in order to be completely ready for all-weather construction. We have to become more broadly familiar with its techniques than we are now, and contractors, suppliers and craftsmen must join in trying to make it as efficient and economical as possible.

As I mentioned previously we in the masonry industry have banded together and are actively working on our problems.

There are several specific actions which would be most helpful. One is for architects to convince their clients of the multiple advantages of all-weather construction, including most importantly the advantages of early completion. At the same time, they should attempt to dispel any fears that owners may have concerning the cost and quality of all-weather construction. Architects should act to require all-weather construction as a bid item so that bidders may include the minor cost in their bids without fear of injuring their ability to compete for the job.

However, I feel that the most important action to be taken—action that will move the building industry off dead center—is for the U.S. Government to initiate leadership in this matter and show the way. If government construction agency's were to schedule their construction throughout the year it could then set an example for private construction to follow.

That the federal government should exercise leadership in promoting all-weather construction is, I believe, both logical and reasonable. Its role in construction enables it to undertake the task and its interest in full employment and economy of construction—demand it.

I am convinced that contractors will readily bid for all-weather projects, and that skilled workers and materials will be available. In fact, contractors will have fewer manpower and material delivery problems on all-weather projects than they now have on projects which shut down in cold weather.

All weather construction will help put our industry's house in order for the bigger building challenges which lie ahead. As industry which is accustomed to having labor shortages at one time of the year and high unemployment at another, which endures delays in the delivery of materials at one season and swollen inventories at another, which has too few bidders for work in the spring and too little work for bidders in the winter, is hardly in a position to meet greater demands for its services.

Mr. MURPHY. Fine.

As I indicated, I am president of the Bricklayers & Masons Union and our members suffer more from seasonality, along with the laborers, than any trade that I know of.

We are exceptionally concerned about the winter construction but we are not unknowledgeable about the heat of the summer, too. I don't want to go into too far about air conditioning buildings but I think it essential in the wintertime because of the fact that when you go around buildings in this country you will find that they are almost at a standstill because the basic trades needed to erect the buildings are unable to work because of job conditions caused by weather.

We think it is a simple thing to cover the buildings in and I was grateful for a comment from Walter Heller, the late President's chief economist, who said at the University of Minnesota he was amazed and somewhat surprised that he was in his office and looking out at building going under construction at that time and the weather was 20 degrees below zero.

Yet the bricklayers were covered in and the job was done without any delay because of that sort of coverage. So that I think is almost essential that in the area of not only public but private construction we can find that by covering in the wintertime we lengthen the building season, increase the productivity of the bricklayer, and provide a mortgage financing that is not so costly because of the delays in construction.

It is an essential concern on our part. Naturally we extend the workweek or year of the bricklayer and this will give him added income, reduce his applying for unemployment insurance during the wintertime, and save the public expense in that regard.

The productivity of the bricklayer is known. He is fortunately or unfortunately the only man in view you might say because he is steadily at work in one place on the scaffold.

Without finding fault with other trades when you walk around a job in the wintertime you keep warm but when a bricklayer is stationed in one spot, as he must of necessity because of the type of work, he has a tendency to get colder and as the day progresses his productivity lags.

He cannot, in a sense, increase his productivity because he is at the height of it during the entire part of the day. So that while activities of men in construction trades would lengthen their time of employment because of their activity on the job, standing in one place as a bricklayer does almost makes it impossible for him to endure the cold weather.

It is essential that some method or means be done by public construction authorities such as the Federal Government to lead the way in having private construction follow.

We have an argument with our mason contractors who are firmly convinced that this is an answer to all-weather construction by clos-

ing in jobs but they are reluctant to put it in as a bid item unless it is specified by the architect in order that the one trade, for instance the mason contractor, is not saddled with the entire expense of covering in for all trades.

We are not unselfish in the fact that if we do cover in for the bricklayer we cover in the entire job and the mason contractor is the only one that bears the cost. So it is essential that in public construction that perhaps some item be made in the bid to insist that the job be covered, funds be provided for that purpose, and the architect make it a part of the bid item so that we won't have just one trade bearing the expense.

With that statement and to shorten the time of the committee and take up less of their time, I will leave my prepared statement with you, Mr. Chairman, and I hope that the committee will give it every consideration, as I know they will.

I just want to tell you how much I appreciate the opportunity to come here and testify today before this committee.

Mr. O'HARA. Thank you very much, Mr. Murphy.

As you point out, your trade is one of the trades that suffers most from the seasonality of the industry. Those workers who do much of their work inside the building once the building is enclosed can work all the time—plumbers, electricians, and some others—but your work, being almost entirely outside work, is very gravely affected by seasonality.

I would like to underscore another point of your testimony that I thought was very impressive. We have heard a good deal in the newspapers and in the trade journals recently about a shortage and an impending greater shortage of skilled building tradesmen.

The numbers entering and finishing apprenticeship programs are not sufficient for replacement. Well, it has even been suggested they are not sufficient to replace those dying or retiring much less take up the additional construction work that is going on.

But as you point out in your testimony, one way you could tremendously increase your supply of skilled building tradesmen is to have the ones that are now working half or two-thirds of the year working a full year. That would effect an immediate increase of about 50 percent in the number of days that a skilled bricklayer, for instance, would be working.

It would be just like adding half again as many people to the work force.

Mr. MURPHY. There is no question about it. There is no attraction for a young man to become an apprentice bricklayer when he is faced with 3 months of unemployment during the winter season.

While the emphasis on education is certainly worthwhile, there is some need for those people to follow a skilled craft and become indentured as apprentices. If they are faced with 3 months of unemployment because of weather conditions, they are not liable to go into our trade and go to seek some sort of other employment such as in a factory where they could possibly get full-year employment or at least desirable conditions.

But that is a fact of life. If we can attract them by giving them a reasonable assurance that they will have full-time employment, we can certainly increase our apprenticeship ranks by hundreds without question.

Mr. O'HARA. One of the questions that came up yesterday, and we might as well squarely face it, is the suggestion that to some extent this pattern of employment becomes a way of life for a building tradesman and that he is not always eager or willing to give up.

Let us take another trade as an example. I am acquainted in the Detroit area with many skilled tool and diemakers. There are two ways one can work in the Detroit area as a tool and diemaker: The traditional way of working in the small tool and die shop, or the relatively new development of working in what are known as captive shops that are owned by the large auto companies or other large manufacturers who do their own work in tool and diemaking.

Many of those who have stayed with the small shops rather than going to the captive shops have done so in part because the pattern is this: In the captive shops the wage rates are higher and the pattern is that when work is available they work a great deal of overtime, they work maybe for a month or 2 months and then perhaps there won't be a big job in the shop and they will be off for 2 or 3 weeks or for a month and then a new job will come in and they will be back on and working 6 and 7 days when they are back.

Then they will be off again for a while. Some of them who started out in the business that way have told me they prefer it that way, they would rather do that than work a 40-hour week 50 weeks a year.

Now, I imagine there is some of that in your trade.

Mr. MURPHY. There is no doubt that working in a shop and working steadily becomes a bore and I think some people go on strike for the sheer reason that they are bored with working and must have an excuse to go on strike, but the reasons for much work stoppage in the building construction industry is for the reason of seasonality because they have been out of work all winter and nobody is interested in negotiating agreements.

They sit back and say, "What is the sense of talking about the new wage rates or schedule because there is no work anyway."

All of a sudden April 1 comes around and we get the business of no contract, no work and everybody is in a hurry to get something built and each sits back and does nothing about negotiations.

We find that then the added business of no negotiations during the winter is prolonged because of the fact that they said, "Now that the season is right we won't go to work and the contractor won't sit down and talk to us."

So the argument seems to be "I have been out of work all winter and another month or two won't make much difference." If we could avoid that sort of thing by the seasonality thing or covering in jobs, we would be able to provide continuity of employment and then go on to the fact that, "If you are bored with work, we will give you a vacation and get it out of your system rather than be on an enforced vacation because of that negotiation impasse that occurs every spring and summer."

At one time we could negotiate during the winter months and be all set for the season. Now the employers and unions have started their negotiations in the building season because each wants to take advantage of the need and demand.

Then we find ourselves running into overtime and the expense of trying to get the jobs finished. There seems to be some idea that if we can prolong the job and in that way get overtime it might be a

good idea but I always thought overtime was a penalty rather than a reward but I guess it has become a reward now because you just don't work during the wintertime and you have to make it up in the summer and what you lost in the wintertime you surely don't make up in the summer.

Mr. O'HARA. I think that is right although you might have to convince some people. You evidently have been working in your trade with a committee which you mention here in your testimony, the Masonry All Weather Committee.

Mr. MURPHY. And the Structural Clay Products Institute, the Portland Cement Association. Every form of industry in the masonry industry has established an all-weather committee made up of the Masons Contractors Association of America, the Bricklayers International Union, the Laborers' International Union, the Concrete Masonry Association, the Portland Cement Association and the Structural Clay Products Institute, everyone that deals with masonry because masonry is a delicate material that must be kept plastic in order to be worked with.

So we have to join with our counterparts in the construction industry in order to provide this type of all-weather coverage.

Mr. O'HARA. Then you also speak of the fact that the Mason Contractors Association of America has held many seminars for its members on this subject. The Associated General Contractors of America has promoted the technology of all-weather construction to its members. Technical magazines that are widely read by contractors, architects, and engineers, have called attention to the ways and means of construction under adverse weather conditions.

So that I would gather that the principal block is not that you lack the technology or the knowledge. It must be something else.

Why have these private efforts between yourselves and the contractors not been more successful?

Mr. MURPHY. As I say the mason contractor feels that if he covers in a building he is the one that bears the entire cost of it. It is not a bid item. It is not specified by the architect and he does that for his own convenience in order to keep the job going and to try to keep the bricklayers working.

So he says, "When I cover in the bricklayers I cover in the plumber, electrician and everybody else."

This is the reason why it is not considered part of the bid item and nobody wants to do it. It is an expensive item in some instances where one contractor has to bear the cost of it.

But if public agencies such as the Federal Government, for instance, showed the way and made it a stipulation in their specifications that the job shall proceed regardless of weather conditions, this would be a stimulus to the private sector to say, "Well, they want to follow the lead" and this is what usually happens. If a public agency shows the lead, the private sector goes along with it.

Mr. O'HARA. In other words, you feel that if the Government were, in its contracts, to make it clear that this is what they want done and make this a bid item that that in itself would contribute a great deal to evening things out and that it would also encourage other people who let contracts to follow that lead.

Mr. MURPHY. There is no question about it and we find the Government particularly in this area for instance give a contract out and lease

the building and if they said to the private contractor, "We want this building built and regardless of the weather conditions we want you to cover it in" this would be another added effect because there is a tremendous amount of building around here that during the wintertime just laid idle and these are Government jobs under Government contract and being done by private organization.

I have seen them around here and I suppose you have in your travels seen them just laying idle during the winter weather. There might be a handful of men on the job but these are not in the sense erecting the building. They are just coming in an hour or two a day to maybe wander around and take a little shot at something but if you can keep the full crew working the Government would certainly profit by it.

Mr. O'HARA. Mr. Meeds.

Mr. MEEDS. Thank you, Mr. Chairman.

Mr. Murphy, I am wondering if any studies have ever been made of the effect not only on bricklayers or carpenters or some other trade but also on the total economy of a given area.

When the bricklayer is out of work during the winter he is not buying as much bread down at the bakery and so on.

Mr. MURPHY. Exactly, sir.

Mr. MEEDS. I am just wondering if these studies ought not take that into consideration. It would seem to me that it would be a big economic factor in areas where construction lags during these seasons.

Mr. MURPHY. I cover that in my statement, sir, that it would increase the availability of manpower in an area and consequently their wages would be a factor to buy the goods that are produced by every other part of the economy plus the fact that it would eliminate their unemployment insurance.

As soon as the weather gets bad the average building trade mechanic immediately files for unemployment insurance and it is the idea that he would say, "Well, it might get better next week or next month so that I will stay on unemployment insurance until the weather gets better."

Mr. MEEDS. I have areas in my district where the unemployment rate will vary from 2 percent to 11 percent between summer and winter when loggers are employed and can't get into the high country because of snow. That is an example of seasonality in perhaps a different sense. It would be hard to cover for the whole North Cascades but on the other hand I think it shows clearly the effect on the economy.

Skagit County, Wash., for instance, has an economy that runs an unemployment rate between 2 and 11 percent and in the winter Skagit County, Wash., is dead because of the unemployment problem brought on by the snows in the high country.

In a construction area this could have the same effect.

Mr. MURPHY. Imagine what would happen if they couldn't work in the woods in bad weather and there was building construction in town where they could be available to work on those jobs. That would reduce your unemployment situation out there because these men are looking for work.

If they don't work in the woods apparently they go on building construction sites and if they are also tied up because of bad weather condition then the whole system breaks down.

Mr. MEEDS. It seems to me, Mr. Chairman, that with the consideration of this bill certainly the Secretary ought to do something in

terms of looking at least in a cursory manner into the economic effects in areas which are affected by seasonality. This would do much toward selling the bill or at least toward selling the necessity of doing something about this situation.

Mr. O'HARA. I would agree with that. It was pointed out here yesterday that the total additional cost of year-round construction would probably be considerably less than the amount paid in unemployment benefits to the construction workers alone.

Mr. MURPHY. There is no question about it.

Mr. O'HARA. Without looking to any other economic benefits.

Mr. MURPHY. Just to give you the cost of one item of construction of covering in a job at the construction of the Fine Arts Building at Northern Michigan University, the contractor erected scaffolding and placed a plastic covering over it in 2 weeks. Steam heaters were used to heat the three-story building to 50° F., even when outside temperatures were 35° below zero. The contractor estimated that his heating costs were $30 a day.

This is not impractical. It has been done and done and done but it is a question of if we can show the way by the public agencies, the private agencies will follow.

Mr. MEEDS. It happens that Canada has done quite a bit in this regard and I assume that necessity is the mother of invention.

Mr. MURPHY. They would be out of work all winter in Canada.

Mr. MEEDS. Has the Canadian Government made any studies?

Mr. MURPHY. Yes; they have made studies and also subsidized buildings. We are talking about everybody having their own home. President Johnson the other day came out with a demand that somebody build a home for $6,500 or $7,500. We do have plans to that effect.

We can build them a brick home for $7,500. Now, the Canadian Government says to the homeowner, "If you build in the winter season we will give each homeowner $500 toward his efforts." So this would be a stimulus to the homebuilding program that we are all talking about.

Everybody wants their own home, and by saying "build it in the wintertime and you get $500," and you could do it as a tax deduction or something of that nature, it would certainly stimulate building construction in the winter.

Mr. MEEDS. This tends to level out the economy, too.

Mr. MURPHY. No question about it.

Mr. MEEDS. I believe that is all I have, Mr. Chairman.

Mr. O'HARA. Mr. Murphy, I want to thank you again and in all fairness I want to mention that this problem of seasonality is neither a new one nor a new one to me because a number of my friends in the construction industry including officials of your organization and members of your organization have been after me for years saying that something ought to be done.

Mr. MURPHY. I know that.

Mr. O'HARA. I feel a little remiss that I didn't take a little more initiative in this field but waited until some of the other organizations in the building construction trades contacted me.

It certainly is an old problem, but like many other old ways of doing things we have to keep looking at it, examining it to see if it is adequate to our modern situation and the problems we face today.

I think that your organization and the others represented here ought to be commended for the initiative they have taken in getting public attention on this problem. I hope we can make some progress.

Mr. MURPHY. Thank you, sir.

If we can put a man on the moon we certainly ought to be able to cover in a bricklayer at 30°.

Thank you.

Mr. O'HARA. Our next witness will be Mr. Maurice Fancher who is vice president of the Laborers' International Union.

Mr. Fancher, we are very happy to have you with us and I want to start right off by commending you for the initiative your organization has taken in this field.

I will be free to admit that it was Jack Curran and others from your organization who had a lot to do with getting these hearings going. We are looking forward to what you might have to say.

Mr. MEEDS. Mr. Chairman.

Mr. O'HARA. Yes.

Mr. MEEDS. Could I have the pleasure of introducing one of the other members at the table?

Mr. O'HARA. Yes.

Mr. MEEDS. The research director of the Laborers' International Union is James R. Sheets who is the son of Bob Sheets, one of our labor leaders.

Mr. O'HARA. In the State of Washington?

Mr. MEEDS. Yes; he is. Jim is also a very well regarded member of the labor movement in the State of Washington and now nationally and it is a pleasure to have him back here in Washington, D.C., at this time.

Mr. O'HARA. Does he maintain his legal residence out there?

Mr. MEEDS. I hope in the second district.

Mr. O'HARA. Thank you very much, Mr. Meeds.

Mr. Fancher, why don't you introduce your colleagues and then you may proceed with your testimony in any manner that you wish.

STATEMENT OF MAURICE FANCHER, VICE PRESIDENT, LABORERS' INTERNATIONAL UNION OF NORTH AMERICA, ACCOMPANIED BY W. VERNIE REED, VICE PRESIDENT; ROBERT POWELL, VICE PRESIDENT; JACK CURRAN, LEGISLATIVE DIRECTOR; AND JAMES SHEETS, RESEARCH DIRECTOR, LABORERS' INTERNATIONAL UNION OF NORTH AMERICA

Mr. FANCHER. Thank you, Mr. Chairman.

This gentleman on my right is Robert Powell, vice president of our international union, and on my left is Vernie Reed, a vice president of our international union whom I am sure you are acquainted with.

Then, of course, Jim Sheets has been introduced and I am sure you know Jack Curran. That is the group.

Mr. O'HARA. Yes; I am acquainted with these gentlemen, and Mr. Reed and I share an interest in international labor problems, you know.

Mr. FANCHER. Yes; I heard that you did have a mutual interest.

Mr. Chairman, my name as you have indicated, is Maurice Fancher and I am the vice president of the Laborers' International Union of North America.

General President Moreschi, who unfortunately could not be available for this hearing, has asked me to extend his appreciation to the committee for this invitation to speak to you on H.R. 15990, which covers a matter of vital concern to our more than one-half million workers in our organization.

As previously indicated by President Murphy, we have also prepared a complete statement which has been submitted to your committee and I will, of course, be brief in my remarks and leave the reading of the full text to your convenience.

Mr. O'HARA. Mr. Fancher, without objection the complete text, including tables, of the statement that you have submitted to the subcommittee will be printed at this point in the record and then you may proceed with your oral summary.

(The prepared statement follows:)

STATEMENT OF LABORERS' INTERNATIONAL UNION OF NORTH AMERICA

Mr. Chairman and members of the select subcommittee, my name is Maurice Fancher, I am a Vice President of the Laborers' International Union of North America. General President Moreschi, who unfortunately could not be available for this Hearing, has asked me to extend his appreciation to the Committee for this invitation to speak to you on HR 15990, which covers a matter of vital concern to our more than one-half (½) million members.

Undersecretary Reynolds, in his appearance yesterday, described the magnitude of the seasonality problem in the construction industry. It is our purpose, in this Statement, to discuss the impact of seasonality on members of our International Union and to indicate some of the costs of seasonality and the benefits available to our members, and to society as a whole, from meeting this problem.

Many factors, other than weather, go into creating the characteristic seasonal pattern of employment in construction. We will see later in this Statement that members of our Union have the same characteristic pattern of unemployment in the sunny Southwest and the wintery Northeast. Therefore, it must be understood that, when we address ourselves to "seasonality" in the construction industry, we allude to this annual pattern of employment and unemployment, regardless of its cause.

If we could describe all of the factors which contribute to seasonal unemployment and weigh their importance as contributors, this Hearing would not be necessary. Although we cannot answer all of the questions relating to this problem, we would like to suggest some of the lines of inquiry which should be followed in an investigation of seasonality. Foremost, of course, would be the effects of weather and the available technology for counteracting those effects. The limiting effects of antiquated building codes will be a fruitful area to study. The increased cost of off-season construction should be measured as precisely as possible. Finally, and this is perhaps as important as any of the others, special attention should be paid to the effects of both public and private fiscal and building practices on the timing of employment swings in the construction industry.

At the outset, perhaps it would be best to say a word about the composition of our membership in the construction industry. Although, in the general sense, we can be described as an Organization of unskilled and semi-skilled workers in our industry, such a generalization would be far from fair to our membership. Within the compass of the Laborers' Jurisdiction in the construction industry fall a varied list of classifications, many of them highly skilled and of great importance to the employers of our members. For example, our membership includes miners who, in the initial phase of tunnel construction, do the work that above the ground would be done by a number of other crafts. Blasters and dynamite men are also a part of our general membership, as are rock drillers and a wide variety of other machine operators in the construction industry. Our helper and tender classifications are of vital importance to the operations of many contractors, for it is upon

their ability to deliver materials of the right type and to the right place on the job that much of the production of the skilled crafts depend. Thus, in our discussion of the Laborers' in the construction industry, the Committee should be conscious of the fact that, in addition to "unskilled and semi-skilled workers", we are talking about a group of people with a wide and important range of skills.

While we have always known that the seasonal employment factor was greater for the Laborer than for other crafts in the construction industry, it has only been recently, with the wide-spread growth of health and welfare plans, that we have been in a position to measure, with any degree of accuracy, the number of hours of work our members enjoy. In order to build a factual base for this Statement, General President Moreschi ordered the Research Department of the International Union to take measures of hours worked by members of our International Union under a selected group of health and welfare plans. The results of that survey appear in the table below, and I must confess that many of us were surprised by those results. As we can see, for the survey year of 1966, members of this International Union worked an average of eight hundred fourteen (814) hours. This constitutes, on the whole the equivalent of only five (5) months full-time employment for the entire year.

There is, of course, a casual factor in our membership which does not exist to the same extent in the skilled trades. Since most of the training for our classifications takes place on-the-job, rather than through apprenticeship programs, we absorb large numbers of people, each year, who do not intend to pursue construction work year around. Perhaps the largest bloc of people falling within this category are students and, regrettably, teachers who find it necessary to supplement their income during the months that school is not in session. Later in this Statement we will speak to the problems of efficiency and manpower utilization raised by the necessity for using such casual entrants into the labor force in order to meet peak seasonal demands.

TABLE I.—COVERED EMPLOYEES BY NUMBER OF HOURS WORKED—SELECTED HEALTH AND WELFARE PLANS—1966

	Number of covered workmen	Total hours	Average hours, by class	Cumulative percent distribution	
				Covered employees	Covered hours
172 or less	36,532	2,765,645	76	26.4	2.5
172 to 345	16,236	4,126,092	254	38.1	6.2
346 to 518	11,741	5,006,533	426	46.6	10.6
519 to 691	9,167	5,424,935	592	53.2	15.4
692 to 864	7,563	5,855,400	774	58.7	20.6
865 to 1,037	7,082	6,726,789	950	63.8	26.6
1,038 to 1,210	7,297	8,192,975	1,122	69.1	33.9
1,211 to 1,383	7,153	9,138,652	1,278	74.3	42.0
1,384 to 1,556	6,965	10,240,902	1,470	79.4	51.1
1,557 to 1,729	7,046	11,550,486	1,639	84.5	61.4
1,730 to 1,902	7,606	14,287,278	1,878	90.0	74.1
1,903 to 2,080	8,195	16,275,073	1,986	95.9	88.5
More than 2,080	5,678	12,924,051	2,276	100.0	100.0
Total surveyed	138,261	112,514,811	814		

Source: Research department, Laborers' International Union of North America.

If we eliminate this casual category by leaving out of our calculations all of the covered employees working five hundred eighteen (518) hours or less (approximately three months), the average hours worked during the survey year increases to one thousand three hundred sixty-four (1,364), which, while it is some improvement, still does not represent anything aprpoximating full utilization of the skills of our permanent membership. In addition, of course, it falls considerably short of providing the construction laborer with the kind of income we think he needs and deserves to maintain a standard of living consistent with his contribution to our society.

Just to estimate the kind of living that our members can make on the whole from the construction industry, we can use the $3.77 average hourly wage rate which the U.S. Department of Labor gives for the building laborer. In using this figure, it should be pointed out that the building laborer is but one (1) classification in the spectrum of laborers' skills. Although he probably constitutes the most significant portion of our membership, there are both lower and higher

wage rates in our classifications than that of the building laborers'. Be that as it may, the gross earnings of a building laborer, for eight hundred fifteen (815) huors of covered employment, the average in Table I, above, would be $3,072.55; barely above the generally accepted poverty level. Again, eliminating those covered employes with five hundred eighteen (518) hours or less, we find that the average earnings of our members rises to $5,142.88; considerably better than the overall average, but still not a generous return from what is supposedly a full-time occupation. This level of earnings, incidently, is a bit more than two thousand dollars ($2,000,000) below the average earnings for all construction employees.

It is not our intent to present a statistical statement to this Committee. However, one further result of our survey throws some light on an aspect of the seasonality problem which we mentioned earlier in this Statement. Our survey reinforces the conclusion that seasonality in construction employment is not entirely a function of weather. Table II clearly shows, by comparing the hours worked by covered employees under our health and welfare programs on a regional basis, that there is very little difference between the number of hours worked by our members North or South, East or West. Only the figures from the West Coast, which include Southern California, show any significant deviation from the eight hundred (800) hours described as the average for our membership in Table I.

TABLE II.—AVERAGE HOURS WORKED, BY REGION, 1966

	Covered workmen	Total hours	Average hours
Northeast	16,895	14,659,786	868
Middle Atlantic	27,959	21,894,104	783
Midwest	40,578	27,636,008	681
South Central	14,962	10,841,198	725
West Coast	36,782	37,027,224	1,007
Southwest	1,085	566,491	522
Total	138,261	112,624,811	815

This bears out the experience of many countries that have attempted to develop construction seasonality programs. It is clear that a major problem, in addition to technological solutions to weather imposed shut-downs, is to overcome a certain inertia in the habits of the construction industry. Inertia which effects not only employers in the industry, but the buyers of construction work.

Thus, we can see that seasonality in the construction industry levies a staggering cost on a laborer and condemns him, through no fault of his own, to a marginal participation in what we in this Country have come to consider the "good life". The Laborers' International Union gives its most ardent support to any effort by the Federal Government to eliminate this evil factor in the lives of our membership. These efforts will not only benefit our membership, but will rebound to the benefit of the economy as a whole, which must now bear the cost of this criminal waste of the skills, ability and willingness to work of millions of Americans.

For the remainder of this Statement, we would like to touch upon some aspects of seasonality as it affects the operation of the construction industry, the costs of construction work and manpower policies established by Congress.

Seasonality imposes both a public and private loss on the American economy which, we must confess, is beyond our ability to measure accurately, but which we submit amounts to millions of dollars in direct operating costs and lost income to construction contractors, construction workers, construction buyers and Government, at all levels of the State and Federal System.

Consider, to begin with, the construction contractor who operates a business having year around costs on the income that he must generate in six (6) to eight (8) months of feverish activity. His highly expensive equipment continues to depreciate at all seasons of the year, his insurance costs continue, he must maintain his offices and, should he have employees in his construction force whom he deems it desirable to keep, he must continue to pay them during the off-season. Extending the construction season would not only permit him to spread these costs over a longer period each year, but would reduce his in-put into specific projects by eliminating the seasonal gaps which now exist between the starting of a major construction project and its completion and delivery to

the buyer. In an era when construction costs are on the rise at a faster rate than almost any other costs, we should be conscious of the possibility of savings resulting from the elimination of seasonality in the construction industry.

An equally direct cost is levied upon the operations of the construction industry by the flood of casual employees entering our ranks during the peak season. Such people are, by no means, as experienced and efficient workmen as the full-time construction laborers in our membership.

Thus, in order to support the seasonal pattern of construction employment, the contractor must accept a measurable degree of inefficiency in his work force during peak periods of employment, giving rise not only to questions of higher costs in his operations, but to serious questions of safety as inexperienced and perhaps, incautious workers are added to the labor force in an industry which has one of the highest accident rates in this Country.

Before we can be accused of trying to limit education in America by eliminating summer construction jobs for students, let us assure the Committee that there will always be a place for casual workers in construction. There are some kinds of work that will not prove amenable to the kind of site protection necessary to all-weather construction; road work and giant hydroelectric projects are good examples. Even in those areas, some improvement in the seasonal picture is possible, but, by and large, these jobs will have to run in the summer. Thus, even if the Federal Government instituted deseasonalizing policies which achieved the maximum possible success, there would still be some peaks and valleys in construction employment and a place for summer workmen.

The final aspect of private costs connected with seasonality which we would like to point out goes directly to the buyer of construction work. Although we hasten to point out that all of the costs arising from seasonality are eventually imposed upon the buyer and through the buyer, the public, the cost associated with delayed income from a construction project and the freezing of capital invested in the construction projects arise directly from the buyer. When an industrial or commercial construction project closes down because of weather, or simply in response to a habitual pattern of construction operations, the buyer is called upon to support a heavy burden of carrying charges on his investment. In a recent speech before the Building Research Advisory Conference, Mr. Otto Nelson of New York Life Insurance Company estimated the financial carrying charges, alone, on a hypothetical construction project could amount to as much as $45,833 a month for the difference between a thirteen (13) and twenty-four (24) month construction cycle. From the buyers' point of view, of course, all of these costs will ultimately be returned, either through depreciation or rental income, or a combination of both. From the point of view of the public, however, it would be far better to eliminate this factor of construction costs entirely by extending the construction season to cover the whole year, rather than merely a part thereof. One benefit of the study called for by H.R. 15990 could be to develop measurements of these cost factors and make them public in an attempt to inspire a demand for all-year construction on the part of buyers.

Thus, we can see that seasonality imposes substantial private costs on the construction industry, the buyer, and the public, in addition to the problems it creates for construction workers. We cannot, however, stop in our analysis of the effects of seasonality with these costs, for there are both costs and lost income to consider in the public sector, which would make a significant contribution to defraying the cost of an all-year construction subsidy program, should one be enacted by the Federal Government.

The first charge levied by seasonality in the Government area is obviously to the unemployment compensation funds of the fifty (50) states. We are not in a position to attach a figure to the losses these funds suffer covering the construction worker. We are sure, however, that this cost is both a measurable one and a tremendous drain on the unemployment compensation system. It could be argued, of course, that alternative sources of employment are used by construction workers to support themselves in the off-season, rather than the unemployment compensation system. While, to some extent, this may be true, it has not been our experience that our members are able to find significant amounts of alternative employment, nor do we know of any information available from Government sources which would indicate that such employment is available to construction workers, generally. To illustrate this point, let us introduce one more table, showing the number of non-farm laborers employed in construction and in other industries in 1967.

If there were any significant movement between the construction industry and other industries for our members, it should show itself in the table below, by increases in the number of laborers employed in manufacturing and other industries at times when the number of laborers employed in the construction industry is reduced. On the contrary, however, the seasonal variation in employment levels for laborers in all three (3) categories moves in the same direction, although at different levels of magnitude. For example, between January and July of 1967, the number of construction laborers employed increased from 559,000 to 952,000; or about seventy per cent (70%). In the same period, the number of laborers employed in manufacturing rose 12.2%, and in other industries, 33.9%. It is clearly evident that the construction laborer finds little opportunity for alternative employment in the off-season. What is true for our members, appears from all we can find out, to be equally true of other crafts. Thus, I think it is fair to say that the seasonal variation of employment among construction workers is almost exclusively compensated for by the unemployment compensation system. Examination of OASI data reveals that all persons employed in construction draw an average of 63% of their gross annual earnings from construction employment. Full-time employees—those who draw 50% or more of their earnings from the primary employment source—in the construction industry, average 90% of their gross annual earnings from construction employment.

TABLE III.—NONFARM LABORERS EMPLOYED, BY INDUSTRY OF EMPLOYMENT

1967	Nonfarm laborers	Construction	Manufacturing	Other industries
January	3,098	559	1,037	1,502
February	3,186	544	1,105	1,537
March	3,130	637	988	1,505
April	3,431	683	1,062	1,686
May	3,570	692	1,101	1,777
June	4,007	872	1,163	1,973
July	4,170	952	1,206	2,012
August	4,041	864	1,162	2,015
September	3,560	759	1,122	1,679
October	3,508	762	1,131	1,614
November	3,359	748	1,126	1,486
December	3,337	711	1,079	1,546

Source: "1967 Employment and Earnings," U.S. Department of Labor.

Since it can be demonstrated that the vast majority of our members, and presumably construction workers in general, cannot compensate for the seasonal employment factors by finding alternative employment, it is safe to say that seasonality in the construction industry costs the Federal Government millions of dollars in tax income each year. To illustrate this point, let us return for the moment to Table I, in which we showed the average working year of construction laborers at 815 hours, if casual employees are included; and at 1,364 hours if such workmen are excluded. On the earnings from these hours, the average construction laborer paid $109.00 and $449.00 in Federal Taxes, respectively. Let us assume that we succeed in increasing the number of hours worked by a mere per cent (10%) for an experienced, career construction laborer. This would raise the hours worked by such laborers from 1,364 hours to 1,500 hours per year; and increase their payment of Federal Income Taxes from $449.00 to $532.00, thus, a ten per cent (10%) increase in the number of hours worked would yield an 18.5% increase in Federal Income Tax. When the effects of this ten per cent (10%) increase for experienced construction laborers is extended to the whole survey group, we find that the average Federal Tax Payment rises from $109.00 to $144.00, while the average number of hours worked increases from 815 to 886, thus a seven per cent (7%) increase in hours worked yields a thirty-two per cent (32%) increase in Federal Tax Payments. If the pattern of hours worked by our members is typical of the whole body of 700,000 construction laborers, this means that seasonality imposes a tax loss on the Federal Government of more than twenty-five (25) million dollars in personal income taxes which could be paid by construction laborers, alone. This same argument applies with equal force to corporate taxes and to the Social Security System. It is clear that a large part of the Federal investment, in an effective Seasonality Program, would be returned in the form of tax revenue.

Since the passage of the Employment Act, the Federal Government has been dedicated to the promotion of stable, full employment in this Country. It is, in our opinion, inconsistent with this policy to leave the construction industry which, in total, is the largest single employer in America, to experience the wide seasonal swings that have characterized the construction employment for many years. We are nearly the only industrial nation that does not have some form of national program to de-seasonalize employment in the construction industry. Passage of H.R. 15990 will be a first step toward bringing the construction industry into line with the purposes enunciated in the Employment Act and a Federal Program to de-seasonalize employment in the construction industry would, unquestionably, be a significant step toward creating the kind of situation contemplated by Congress with the passage of that Act.

We have already discussed the implications of stabilizing construction employment throughout the year from the point of view of costs and efficiency. At this point, however, I should like to deal with this question in terms of the public policies enunciated by Congress in the manpower field. Stabilizing construction would, without question, stop the tremendous waste of trained and skilled manpower that is now idle during the off-season. In addition, it would make the recruitment of new entrants into the construction industry substantially easier than it is at present, and their retention once recruited more of a certainty.

We have already pointed out that the classification of construction laborer contains a wide range of skills, most of which have traditionally been learned on-the-job as the individual worker gains experience in the industry. Recently, however, it has been found to be practicable to introduce an element of formal training into the construction laborers' craft. Under the Manpower Development and Training Act, our International Union has recently completed a highly successful training program for construction laborers. So enthusiastic was the reception of contractors, members and affiliates of our Union that we now find ourselves bargaining for training funds in many of our local agreements. So, it appears that training programs will now become characteristic of entry into the construction industry at the laborers' level, just as it has been in the crafts. However, our records indicate that problems develop in recruiting high quality trainees into our programs, although young men are attracted by the high hourly rates which they know construction laborers earn, they soon find that the lack of year-round employment nullifies much of the benefit of those rates. If we could find a means to eliminate the seasonal factor in employment for our members, we could assure the industry and the public of a steady flow of high quality skilled workmen into the construction industry. Thus, such a program would not only benefit our people, but would have a major impact on public policy objectives in employment, manpower, civil rights and economic stability.

The Laborers' International Union of North America wants to put on record its unqualified support for H.R. 15990, as well as to urge the Congress to follow through with a full-scale Seasonality Program for the construction industry. For too long, workmen in the construction industry have borne an entirely unnecessary burden of annual unemployment. Equally unnecessary is the burden of higher costs and hidden taxation placed on the American Public. The technology and the capitol needed to eliminate this burden all exist in America. H.R. 15990 is an appropriate first step toward mobilizing these resources for the benefit of all our people.

Mr. FANCHER. Thank you.

I would like to state at the outset, Mr. Chairman, that many of the remarks and perhaps practically all of them of President Murphy would also apply to members of our organization who are the tenders for the brick masons and I was very interested in some of his statements and I do believe that when you get into this subject, as you no doubt have, that it opens many fascinating possibilities, the deeper you go into the subject.

The effects of seasonality on the members of our organization are far greater and far more damaging to their economic well-being than it is to members of other crafts in the construction industry.

Based on our experience with health and welfare programs negotiated by our affiliates, we place our estimate of the average hours worked during the year for all laborers in the industry at about 814

hours, little more than half of the 1,600-hour target that is normally used to evaluate full employment in the construction industry.

A good part of this low average arises, of course, from the large number of casual employees in our ranks. Our union has traditionally been a source of employment for the summer workers in the construction industry, who never intend to devote more than a few months of any year to working as a construction laborer.

When we eliminate that portion of our membership, we find a significant change in the average number of hours worked. The career construction laborer works an approximate 1,364 hours during the year.

While this is considerably better than the average for all laborers, it falls short of being a full year's work and is substantially short, still, of the 1,600-hour target.

The income generated by this low annual participation in the work force bears no relation to the efforts or skills expended by construction laborers in pursuit of their employment.

For 814 hours worked by all laborers surveyed, the average income is $3,072.55 per year, very little more than the generally accepted poverty level. The permanent work force among our members earns about $5,142.28 per year which is, at least, a living wage. We do not feel, however, that it represents adequate payment to our membership for their efforts.

The costs levied by seasonal work in the construction industry are staggering and we are convinced that they represent a significant portion of the high construction costs in the United States. Without attempting to estimate dollar values for these costs, we would like to summarize, briefly, some of the most important elements of high construction prices arising from seasonal work patterns.

The contractor must support his permanent establishment of equipment, office force, et cetera, on earnings generated in 6 to 8 months of feverish activity.

Leaving aside for the moment, questions of overtime pay which he must figure in his bids in order to work the normal construction season, this aspect of his operation places a high cost input on individual projects in terms of depreciation of idle equipment, maintenance of insurance and bonding costs.

The elimination of seasonality, while it might increase the cost of specific operations on the job would, we feel, reduce the contractors' input into projects since they would not be called upon to pay for large amounts of idle time.

Similarly, the buyer of construction work bears a high cost for seasonal shutdowns. To take one important aspect alone as an illustration, the buyer must pay carrying charges on his financing based on the amount of time required to finish the project.

Year-around work in the construction industry would not only eliminate such charges to the buyer, but would also permit him to begin drawing income from his investment much sooner than is presently the case.

It is our feeling that this factor, alone, if commonly known to construction buyers, would make an important contribution toward increasing the demands for year-around work.

A word should be said at this point about limitation of deseasonaliz-

ing programs. We feel that the greatest effects of such programs will be in the industrial and commercial construction segments of our industry. Road and highway work and giant, heavy construction projects are, at this point, beyond the reach of any reasonable efforts.

Thus, we do not expect that high seasonal demands for construction workers can be eliminated, entirely, but we do feel that great progress could be made.

On the Government side, there are both added costs to certain Government operations arising from construction seasonality and losses of potential income which amount to hidden costs levied on the general taxpayer by seasonality.

The major portion of additional costs to Government operations arises, of course, in the unemployment compensation system. I think President Murphy and the chairman touched on the subject and it does have great possibilities.

The construction worker, with his short working period each year, cannot possibly contribute to unemployment compensation funds an amount equal to what he draws. This, of course, is true not only for the construction laborer, but for all crafts in the construction industry.

It could be said, of course, that it is the purpose of the unemployment compensation system to provide support for workmen in this position. We do not believe, however, that in an era when the technology exists to eliminate this drain on the unemployment compensation system, that it should be allowed to continue merely because we are accustomed to it. Of course, savings to this system would be an important return on the investments made by government to deseasonalize construction work.

Construction workers do not generally find themselves able to find alternative employment which would keep them off of the unemployment rolls.

First, the pattern of demand for labor in the construction industry, while it fluctuates seasonally to a much higher degree than in other industries, moves in the same directions as the other industries.

Therefore, there is little opportunity for a construction worker to transfer to other industries during the slack season. This contention is also borne out by an examination of social security data which clearly shows that the permanent workforce in the construction industry—that is, those who draw 50 percent or more of their earnings from that industry—average 90 percent of their gross annual earnings from construction employment.

Neither our experience, nor the evidence that we can obtain, indicates that any significant contribution to cover the costs of unemployment for construction workers is borne outside of the unemployment compensation system.

The most important hidden costs which seasonality levies on government, and through them on the general taxpayers, lies in the area of lost tax income. Deseasonalizing the construction workforce would, at the same time that it increases the income of our members, increase the tax revenue of the Federal and State governments through the personal income tax system.

It is our estimate that the Federal Government loses at least $25 million a year that it could receive from construction laborers, if an effective construction seasonality program were instituted in the

United States. This argument, of course, applies with equal force to corporate income taxes and to the social security system.

The manpower policies of the United States, as enunciated by the President and Congress, call for the creation of a stable work force at full employment levels, to whatever extent is practicable.

It is inconsistent with this objective that the industry, which is the biggest single employer in this country, should be left in the state we have described for the construction industry.

We submit to this committee that deseasonalizing the construction industry should be undertaken if, for no other reason, than to preserve and enhance the pool of skills represented by the construction labor force.

We urge this committee and Congress as a whole, to pass H.R. 15990 and to follow it with effective attempts to eliminate the costly evils of seasonal employment in the American construction industry.

Mr. Chairman, that is the statement.

I was tremendously interested in some of the comments that took place between you and President Murphy who immediately preceded me and I do agree that perhaps to some extent the construction worker over the years in the past has perhaps developed some habits and some practices that perhaps he likes this kind of business but, agreeing with President Murphy, if we get into this subject and show that it is much more practical to have average level of employment year round I think the construction worker and primarily his family are going to be much happier people for this way of employment.

Mr. O'HARA. I agree with you completely on that. I also agree with your analysis that from having worked this way over a period of years they do develop living patterns that are geared to this cycle of employment and unemployment.

I know some of the fellows that are friends of mine figure every year on their annual deer hunting trip when they know they aren't going to be working and, if all of a sudden you said to them, "Look, you are going to have to skip that hunting trip from now on" they wouldn't like that.

Others develop other patterns. That is just an example.

Mr. MEEDS. Will the chairman yield?

Mr. O'HARA. Yes.

Mr. MEEDS. As Jim Sheets would tell you in our State we might have to establish a steelheaders international because the steelhead season comes in the off-season and some of these people are avid steelheaders and we might have to do something about that.

Mr. FANCHER. Mr. Chairman, I would like to make it perfectly clear that I would not be advocating full employment to the extent that it would interfere with deer hunting. I would not like to give that impression.

I happen to be a native of West Virginia and come squirrel season we go squirrel hunting. That is all there is to it.

Mr. O'HARA. I think that is right.

I think that people to an extent do, some of them, become habituated to this. That is perhaps one reason that we have not had the kind of outcry that I think we should have had about the continuance of that pattern of seasonal employment is that people start accepting it as inevitable and adjust their living habits to it.

But it is not inevitable. I think you have demonstrated that in your testimony. Not only is it not inevitable but it is a very costly process to our economy and to the construction industry particularly.

I have a hypothetical example.

You quoted Mr. Otto Nelson of the New York Life Insurance Co. on page 6 of your statement. He estimated the financial carrying charges, alone, on a hypothetical construction project could amount to as much as $45,000 a month for the difference between a 13 and 24 month construction cycle. That must be a pretty big project.

Is it one of a size that is unusual or is it one that is ordinary size?

Mr. FANCHER. We have, of course, figures developed on different sized jobs. The one that you asked about is a 27-story office building and is a rather sizable project.

Mr. O'HARA. Even so, that is a lot of money.

Mr. FANCHER. Well, it is a lot of money but that is why I indicated at the beginning that this subject has really proven to me that once you get into it and study it there are so many fascinating possibilities in this thing and some of the costs that are incurred because of this seasonal operation are in some cases almost unbelievable.

I mean they do appear a little bit illogical but actually this is what develops.

Mr. O'HARA. For $45,000 a month even on a 27-story office building you could do a lot of heating I might suggest.

Mr. FANCHER. We certainly could.

Mr. O'HARA. That is just the carrying charge on the financing of the job.

Mr. FANCHER. But, Mr. Chairman, of course the cost factor is really important in this subject but I personally lean to the good that can be accomplished in furnishing people steady employment so that they can develop different living practices. I mean to live as ordinarily we do in this society.

Mr. O'HARA. And make more money.

Mr. FANCHER. Because the construction worker is a person apart so to speak because of the seasonal way, the strikes that President Murphy referred to and the long stoppages and this sort of thing, and I think this is all brought about in a way by the seasonal aspect of this work.

I think once we cure the seasonal aspect we will develop new living patterns, new ideas, and today I am sure that the way we envision the elimination of seasonality today, the way President Murphy and myself are accustomed to covering in the bricklayers, I am sure that if we got into this subject and got interested enough in it we would develop entirely new methods that we are not even thinking about today so that you could enclose entire buildings maybe in a practical sense in order to build them.

I think there are so many possibilities in this field but we need somebody to start it as President Murphy has indicated.

It is a competitive situation. You know that employers and contractors who build buildings are real gamblers and they have to take chances and as a result, unless you have guidelines established by architects or owners that insure everybody will bid on an equal and the same basis, the same competitive proposition, therefore you are

always going to have that fellow say, "I won't figure closing the building in because I will take a chance that it will be a mild winter" and all this sort of thing.

If this is a part of the specifications and a part of the accepted work practice then I think in the eventual long run we are going to develop some really remarkable new methods of closing in buildings so that you can work in the bad seasons.

Mr. O'HARA. I would heartily concur in that.

I would like to highlight the fact that you may not even, in many cases, have to enclose the site. I have been very impressed by some of the tremendous technological strides that were made in heating the open spaces.

Mr. FANCHER. Very much so.

Mr. O'HARA. You know about these infrared blower heaters. A number of examples come to mind but a lot of new buildings are being built with plenty of open spaces and sort of a doorway. You have an open entrance with a blast of heat that sort of forms a wall.

Mr. MURPHY. Don't go too far with that.

Mr. O'HARA. It is not the kind of wall you build. I might suggest though that when I was over in Great Britain a few years ago I happened to be chatting with the president of the bricklayers union over there and I got talking to him about apprenticeship and training programs and so forth and it was interesting to hear his observation. He said, "We are having difficulty getting enough apprentices and have taken a number of steps to try to make apprenticeship more attractive." He said, "But we just find that it is terribly hard to compete with some of the newer trades and skills that have year-round employment indoors where it is comfortable. We are having difficulty competing." And then he spoke of some of the steps they were taking to eliminate the seasonality factor.

His analysis of the situation was very much like the analysis you gentlemen have made with respect to the ability to attract new people to the trade and keep them.

Mr. FANCHER. Mr. Chairman, I think again you indicate your knowledge of this subject, and you have touched on what I consider a really important subject. It is, as President Murphy indicated, a little difficult to induce young people to come into a business that has the possibility of 3 or 4 or 5 months of not working.

Now, there is today in my estimation a sufficient work force of skilled people in this country to handle the construction industry if we can cure seasonality.

Now, if we can cure that, then we have no shortage of skilled people because they will work year round and production will be much higher and we will solve that problem.

Of course, we would have the additional inducement of getting young people to come in because they would have full employment. Every young fellow today who is entering the work force and planning on getting married is naturally looking for a way to take care of his family and there is nothing wrong with that.

We would like to offer him a better opportunity in this business and we can, if we can cure this one thing, this seasonality in the construction work.

Mr. O'HARA. I might mention that Great Britain has made many more strides in getting year-round construction work than we have.

One other point and then I am going to quit and let Mr. Meeds take over and grill that fellow Washingtonian. One of the most interesting aspects of this you commented on in your statement. That is that, except for southern California, the pattern of seasonality appears throughout the country in pretty much the same whether it is a moderate or a severe climate.

Now, I wish you would amplify on that problem and speculate a little with us about why that is and what might be done.

Mr. FANCHER. Well, I think, Mr. Chairman, you will find and I am sure when I call this to your attention you will realize that seasonality, of course, we generally think of as a cold weather thing, that you can't work, but there are many other factors in seasonality. There is bad weather as far as rain and this sort of thing, and maybe I am sort of visionary about this sort of thing but that is why I say that I think once we get into this matter and do a sufficient amount of research that we are going to develop some really revolutionary methods and means by which you can work in any kind of weather.

I think that it is not only the cold weather. In some areas, of course, you don't have the really cold weather that you have in the northern parts of the country, but it is awfully disagreeable to work in rain, cold, and all of these other things, so that it isn't only the cold part of the weather. It is the rain and just the many other things that enter into it.

For some reason or other in our research into this matter—and perhaps Mr. Sheets could go into it just a little more—we find that weather doesn't have to be remarkably cold to stop construction workers from working. They sometimes just quit when it begins to rain a little bit, also.

So that there are many other factors rather than the cold weather.

Mr. O'HARA. Mr. Sheets.

Mr. SHEETS. Yes, sir.

In addition to weather entirely, this aspect of construction operations, we have become habituated to a working season in the construction industry and that habituation seems to affect operations in areas where it is not necessary to close down for climatic conditions or not as necessary.

Mr. O'HARA. Custom plays a large part.

Mr. SHEETS. Custom; yes. Bidding practices are adjusted to this. Most of your bids are offered or called for in the very early spring with starting dates in June on an assumption that there will be a close-down during the latter part of the year.

Of course, Mr. Foster yesterday in his testimony indicated that while much Government appropriation is going on on a no-year basis, that is, you get an appropriation for a project for its full life, that on the other hand these appropriations are normally made so that bids can be let at peak seasons, and I think that an examination of bidding practices on the part of public agencies would reveal that there is a substantial contribution here.

Basically, I think the problem is that the assumption that the working season in construction amounts to about 6 or 8 months and that

beyond that point it becomes either impossible or difficult or more expensive to operate, is so well fixed that it contributes, or it promotes, the seasonal pattern of employment in areas where it is entirely unnecessary and intensifies it in areas where there is a real climatic problem.

Mr. O'HARA. I am sorry. I want to apologize to you, Mr. Meeds for continuing, but there is one other aspect I want to touch on. You mentioned the fact that, although it may not be a major factor, one of the factors of seasonality, might be antiquated building codes in a number of communities.

Some building codes, for instance, will prohibit the pouring of cement between certain dates, and I gather that there are other practices that are no longer consistent with the technology which has developed.

That is something that the Federal Government would find awfully hard to change. Perhaps one of the things we ought to do is assist in the promotion of some labor-industry council here that would work together on getting some sensible changes in local building codes. I think they might have more influence on that than the Federal Government would.

Mr. SHEETS. There are a number of such organizations such as the Building Officials Council of America, which I believe is the full title of it. There is ex-Senator Douglas' Commission on Urban Problems which is getting into this code area. Many of these codes were written quite realistically at the time they were written, but they have never been amended to take account of the fact that other methods are practicable at this point or that new materials are available which really render the code obsolete.

As you say, this is not exactly something that the Federal Government can control in 50,000 code-enforcing jurisdictions.

On the other hand to a certain extent it is an educational problem and it could be handled under the terms of H.R. 15990 as a research and educational program to try and update some of these code considerations.

Mr. O'HARA. I think that certainly ought to be one of the things that we would ask that some emphasis be given to.

Mr. FANCHER. Mr. Chairman, may I say at this point that I am not at all convinced that the Federal Government can't do something about this situation of codes because I think that as we get into seasonality then we do get into the area where you could influence codes. I think the Government could have a tremendous influence on local people. If you are coming out here to develop this pattern of full employment then certainly you would naturally get into how the building is constructed.

What I am trying to indicate is that I think just the very fact that we showed a great interest in this subject would have a beneficial effect on the code situation and I am sure this is a matter that is being given much attention because there has been a great deal of talk in the last few years and a great deal of study given to codes.

I am not discouraged. I think that we will have some remarkable advances in the field of codes because I think our industry demands these things and I think they will come about.

Mr. O'HARA. Mr. Meeds.

Mr. MEEDS. Thank you, Mr. Chairman.

At the outset I would like to compliment you, Mr. Fancher, and your entire staff on what seems to me to be a very, very well prepared and well presented piece of testimony.

Mr. FANCHER. Thank you.

Mr. MEEDS. I have to confess to substantial ignorance in this field because no one had ever really brought it and its effects to my attention like you just have in your statement.

Second, I would like to express my extreme interest in this from the standpoint of a substitute for the 10-percent surtax.

I notice on page 6 that a 10 percent increase in activity in the Laborers' International Union would result in an 18½ percent income tax increase for the Federal Government and I just wish I would have known about this sooner.

I sure hated to vote for that tax bill and if I had had a good substitute I could have used it. I am being facetious, of course, but aren't we really faced in this situation with somewhat the same thing President Kennedy was faced with in 1960 and 1961, when he came in and found this country functioning at about 70 percent of its industrial capacity and through various tools raised that industrial capacity some 16 percent and produced about $30 billion in additional revenue for the Federal Government and a better living for millions of Americans. Isn't this the same type of problem?

Mr. FANCHER. It has a remarkable similarity.

Mr. MEEDS. And as we used to operate on the economic theory that there had to be peaks and valleys and economic cycles and we lived with them, we have now discovered that we don't have to live with it. Isn't there a similarity here?

Mr. FANCHER. That is true, sir. I think that you can say that this is what happens when you devote time and attention and study to a subject. This is an industry that does not operate at peak efficiency.

Mr. MEEDS. Absolutely.

Mr. FANCHER. And I think that we are certainly overlooking a great possibility if we don't give this subject a great deal of our time and attention in order to correct this situation and to create an industry that will operate at peak efficiency. I think your remarks are very well taken.

Mr. MEEDS. Isn't it true further that the best way to sell this program is the economics of it. It makes sense. It just makes good economic sense.

Mr. FANCHER. Well, sir, the economics are tremendously important but I just think the impact that correcting this subject, the impact that it would have on the family lives of thousands and thousands of people I think also is a tremendous thing. I think it will be a tremendous thing for our entire country to develop a better pattern for this group of people.

Mr. MEEDS. Well, Mr. Chairman, I certainly am impressed with this testimony and the eye-opening effect it has had for me. I hope that we can get behind something like this and push it so it can have the same eye-opening effect on the other Members of the Congress and hopefully the Nation.

Mr. FANCHER. We appreciate your efforts.

Mr. O'HARA. Thank you.

Thank you very much, gentlemen.

Mr. REED. We might add just hastily, Mr. Chairman, and Mr. Meeds, that there are some contingencies in the cost field here that the construction industry is not absorbing today but it is a factor you must consider in analyzing our program here as submitted and this is a desire especially among the younger people for supplementary unemployment insurance.

Now this hasn't been fully developed in the construction industry but you can see that the seeds have been planted, generally speaking, all over the country and it has arrived in agreement form in some areas, the need for that.

Mr. Sheets told me that we now have six areas covered by supplementary unemployment insurance and of course like all young people starting out in our business, with the high wages in the summer they overextend themselves and the banks don't hibernate in the wintertime and those payments must arrive timely at the bank and we find ourselves contributing to our spiral of increased living costs and the unemployment insurance program does not meet their full demand, full needs during the winter months. So this is a growing demand and will be a tremendous cost factor to the industry.

I think it can be slowed down and perhaps even prevented if we can assume that we can make headway in arriving at a more continuous work program for those forces in our industry.

Another cost factor, as you know, is that we have some exciting training programs and we find that we lose a great number of our young trainees in this manner.

Contrary to the old philosophy that people like time off, we build a plant and many of our young fellows go to work in the plant, become production workers not by desire but by necessity. They check with the union hall, find that the employment opportunities are diminishing and the unemployment ranks are increasing and so, to maintain their stability of living which they have obligated themselves to, they leave the industry.

Our last increase of affiliation to the AFL–CIO was 50,000. During that same year we organized or readmitted over 400,000 people. We do have a retention rate of less than 11 percent. This is a cost factor again to the industry because you have to train people to become accustomed to the manner in which you work on construction sites in a safe and orderly manner and yet on a productive basis and this is a direct cost to the contractor, to the consumer and also to the Government on training and retaining individuals.

As to the comments by President Murphy concerning our component parts of the masonry industry, we expect great things from this in developing new materials following on his remark about the delicacy of handling new materials. We know that this can be done. We have done it in the concrete industry, with the retarders and accelerators depending on the weather conditions, and I am sure we will develop it to a greater degree in the masonry industry, which is somewhat different from the concrete industry.

We have seen this on the highway program. In the asphalt industry our agreements in the Northwest used to be written so that on showup time the one individual that determined whether a man received showup time was the inspector. He would leave his home and the sun would

be shining and when he got to the job the conditions would be such that they couldn't successfully lay asphalt.

Then a few years later we were laying asphalt in rain and water and under all sorts of conditions. We have not only extended our work year on asphalt paving but also improved the safety conditions of that type of road construction with better ballast, more machinery, better compaction and the rock is now crushed differently with additives to the asphalt where we could almost say that we have an all-weather construction opportunity on asphalt.

Need has always been the one question which has offered us improvements. Just east of the Cascades in the city of Spokane a few years ago a bank was under tremendous pressure to have new facilities. It was a matter of clearing out the whole area for freeway construction. They had a time schedule. So they wrote into the specification complete coverage of the building and the building was delivered, to specifications, sanitary, durable, ahead of schedule.

Now, in this particular instance they had financing for it. In other areas we may prolong the construction of a similar facility until the following year or a year later.

Now, as we increase our ability and our desirability through specifications and orders covering our worksites, adding heat and improvement in materials, we will find again that the cost factor will go down because as we increase the volume of this type of preparation, generally speaking, in our industry we will find that it will not be a one-shot deal where the costs are prohibitive or exorbitant but we will have a cost factor that will be within reason and constantly improve as we increase the use of these materials and this type of safeguard as far as the building and workmen are concerned.

Another dangerous factor is, where you have construction sites unattended, you will frequently find youngsters, unauthorized personnel visiting those sites. This again is a cost factor which we must consider when we maim or cripple a child, plus the natural and the human destruction to the building site itself which again has to be repaired and reworked by the craftsmen involved in the particular damaged area.

These are real cost factors that we will be faced with in the construction industry, a cost factor to the Government as well as the private sector and particularly so as far as supplementary unemployment compensation benefits.

You are well aware of the cost factor on the Federal unemployment compensation program which is very helpful but again you will be faced with an additional cost.

The consumer always pays our bills and the demand is very prevalent and increasing in popularity among the younger people in our movement today.

Mr. O'HARA. I agree with everything you have said, Mr. Reed, and I might just observe in passing that a few years ago this subcommittee had before it witnesses from the United Automobile Workers on a different kind of problem but in our discussion of the problem that they then faced which had to do with a number of auto workers working large amounts of overtime while others were laid off, the auto workers witnesses made the following observation: That the practice in their industry for many years had such that when you started

producing a new model you produced full speed ahead until you made enough cars to handle all the demand for that year and a little more besides and you probably do that around May or June and then at that point all the automobile labor would be laid off and they would be out of work all summer and then they go back around late August or the first of September.

They commented that when they got the concept of supplemental unemployment benefits financed by the employer into their collective bargaining agreement that the layoffs for model changeovers were suddenly rapidly decreased to the point where now they are practically nonexistent.

There is a very, very small layoff period on model changeover days now in the auto industry. For whatever it is worth, the auto workers witnesses said that they felt that the development of this supplemental unemployment benefit program in their collective bargaining agreements made a major contribution to that change in scheduling in the auto industry and I imagine it would make a helpful contribution in the construction industry as well.

We have enjoyed talking to you.

Thank you very much.

Mr. FANCHER. Thank you, sir.

Mr. O'HARA. Our next witness will be Mr. William E. Naumann who is chairman of the Legislative Committee of the Associated General Contractors of America.

Mr. Naumann, we have been thinking of awarding you some kind of trophy. I am going to have the staff check on this, but I think you have appeared before us more times in this session of Congress than any other witness.

STATEMENT OF WILLIAM E. NAUMANN, CHAIRMAN, LEGISLATIVE COMMITTEE; ACCOMPANIED BY SCOTT SHOTWELL, DIRECTOR, LEGISLATIVE INFORMATION; AND ART HINTZE, DIRECTOR, GOVERNMENTAL LABOR RELATIONS, THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA

Mr. NAUMANN. Thank you, Mr. Chairman. If it would be sort of an attendance award, maybe it would stand me in good stead as to whether or not I do a good job.

I want to say at the outset that while we have not always 100 percent agreed in the committee, it has certainly been a pleasure to make these appearances, and I feel that I have always been fairly treated.

Mr. O'HARA. We have enjoyed having you, and we are glad to see you back again. You are going to have to move your residence here, I am afraid.

Mr. NAUMANN. I found out that I have to work awful hard to make the number of appearances in Washington that I do and still carry on quite an extensive construction business at home and abroad in some cases, but I am very grateful for the kind of organization that my company has developed over the past 78 years that allows me to do some of the good-of-the-industry things that I think are very important and certainly have to be taken care of.

Mr. O'HARA. Thank you. I would agree with that. I think that the fact that you and others in your industry are obviously devoting

considerable time and attention to the problems of the industry as a whole, as distinguished from the problems of your company as a corporate entity, is a good sign in the construction industry, and we are glad to have you back.

Mr. NAUMANN. Thank you, sir. Mr. Chairman, I have with me this morning, on my left, Mr. Scott Shotwell, our secretary to our national legislative committee and, on my right, Mr. Art Hintze, the director of our government relations department in AGC nationally on labor matters.

I have a statement that is not too long, and with the permission of the chairman, I would like to read it. Conceivably beyond that, there might be some questions that might be of interest to the committee, because they are certainly of interest to AGC, as representing the construction industry.

With your permission, I will proceed.

My name is William E. Naumann. I am chairman of the Legislative Committee of the Associated General Contractors of America, a trade association of over 8,500 of the Nation's leading general contractors, who perform the greater part of all highway, heavy engineering, and building construction done in the United States each year. I am also a member of the heavy division and a member of its executive and labor committees.

We, at AGC—and, personally, I might add—agree with the general purposes of H.R. 15990. We would like to see a good study made of all phases of seasonality in the construction industry, and we would like to see constructive solutions developed. However, we disagree with some phases of this bill.

We disagree with the fact that the bill would limit the responsibility and authority for making a seasonality study to the Department of Labor. We believe the broad scope of seasonality touches upon the activities and interest of other departments of Government as well, and that any legislation would be remiss in not including those departments specifically as having a responsibility and an authority for such a study.

At this point, I would like to refer to a seasonality bill introduced in the Senate by Senator Prouty of Vermont. I would like to suggest that some consideration be given to the kind of approach taken in that bill to bring in other departments, and private parties for that matter, in an overall study of the seasonality problem. The Prouty bill would establish a Federal Construction Advisory Council composed of the Secretary of Labor, Secretary of Commerce, Secretary of Health, Education, and Welfare, Secretary of Housing and Urban Development, Secretary of the Interior, the General Services Administrator, and the Director of the Bureau of the Buget. The Prouty bill would include, in such a Council, representatives of labor and management in the construction industry and representatives of the architectural and engineering professions.

While the Prouty proposal would make the Secretary of Labor Chairman of the Council, we would like to recommend that such group be cochaired by the Secretary of Labor and the Secretary of Commerce. These various departments and parties would have a substantial contribution to make to this kind of study. We believe

their inclusion in the legislation would help ensure their continuing interest and cooperation.

The deadline in H.R. 15990 for submitting proposals by March 1, 1969, appears to us to be unrealistic, and we would like to suggest that in any legislation the deadline should allow at least a year following its enactment.

In making a comparison between H.R. 15990 and the Prouty bill, however, we would prefer the brief statement in H.R. 15990 providing authority to investigate, conduct research, and propose remedial action as compared with the checklist of matters to be considered in any study under the Prouty bill. We see no necessity for a checklist in view of the necessity for a comprehensive study that would be required in any case.

The Associated General Contractors has been long interested in dealing with the seasonality problem in construction, and our organization has continued its research to the best of its abilities and has encouraged its members to utilize the ingenuity and technology to the extent of the state of the art.

For example, in northern areas it is a common practice to do construction work in cold weather in building operations by the use of various types of temporary enclosures along with temporary portable heaters. But, as far as heavy and highway construction is concerned, general conditions in these types of construction are not adaptable to this kind of solution.

An unsolved problem in all types of construction is the difficulty in pouring concrete in cold weather and, in some areas like Arizona, in hot weather. Solving these problems will, of course, require additional research and development, which I am sure will eventually come.

We have observed that there are opportunities for Government itself to take some initiative by way of scheduling the award of construction contracts to help alleviate seasonality problems. Proper attention to the scheduling of contracts should make it possible for the Government to schedule construction work during off-seasons of the year. We believe the fact that your committee is holding these hearings should have a beneficial effect in this respect.

I would add that appropriations legislation can also be a limiting factor in what contracting agencies can do by way of scheduling the award of construction contracts.

We would like to make another observation that the Government's engineering requirements are sometimes more strict in ruling out cold-weather construction than necessary. While there is room for improvement on the part of administrative agencies, we, of course, realize no relief can be expected in many phases of this problem until we can get new technological developments that would allow the same quality of the product under extreme weather conditions.

I would also comment on the limitation of H.R. 15990 to the subject of "Seasonality" as it might be interpreted to indicate cold weather. I would like to suggest that inclement weather as well as hot weather may be as great an impact upon reducing construction working time as cold weather, and we would hope that all such factors would be included within the scope of any seasonality study.

Finally, I would like to mention an additional factor that reduces the total construction worktime which is probably not within the

scope of your study but should be. This factor is the tendency of organized labor in the construction industry to go out on strike more than can be considered reasonable during the prime seasons of the year.

The strike problem seems to be getting more intense each year. This year, we believe, may be the worst year in a long time. For example, building construction in the entire State of Michigan and metropolitan areas of Ohio and Indiana has been shut down by strikes for more than 60 days. This, of course, is a greater loss than would normally occur during the cold-weather periods in some areas.

These facts raise the question as to how much benefit any seasonality legislation or study can provide to construction workers in this country by increasing winter employment, when there is an increasing tendency for them to engage in long strikes during the prime construction seasons of the year.

In spite of these realities, however, we realize that it is in the interest of labor and management both to do everything possible to reduce loss of working time due to seasonality and the fact that we have lengthy strikes during the prime season is a problem that must be solved and one which we hope your committee will not overlook. Unfortunately, your bill, H.R. 15990, does not specifically mention this important aspect, since it fails to provide for participation of labor and management in any seasonality study, although the Prouty bill covers that point.

Certainly, labor and management cooperation must be promoted if any overall solution to these problems can be expected.

Organized labor may be required to consider changing the expiration dates of their collective bargaining agreements, even to their temporary economic disadvantage, to insure that they and their employers will be able to take advantage of the prime construction season without work stoppages. We do not feel that this is too great a sacrifice for labor to make if they really want to extend the total number of hours they want to work during a year.

We feel certain that the kind of study of seasonality and its effects upon the construction industry contemplated by the spirit of H.R. 15990 can produce only good and beneficial effects to all segments of the construction industry if carried out on a comprehensive and forthright basis.

Mr. Chairman, that concludes the statement. I would like to make this observation in connection with the remark that I made with regard to the fact that AGC has been looking at the problem as a group for a long time. I was surprised this morning to look in the AGC office in their historical photographs department and notice a great big sign at a meeting of the executive board of AGC in 1925.

In a most prominent display there was a sign that said: "Winter construction is worth while * * * ." So I feel that there has been no reluctance on the part of AGC and representing the management portion of industry as far as the construction industry is concerned. And AGC has been thinking, has been suggesting, and has been trying to get its members to take advantage of whatever technological advancements have been made.

My concern is that as one group we haven't been effective by reason of the fact that we go at it alone.

Now, there is no question but what the work of the industry is divided into two segments, one of which is much easier to do something about. And there has been more done about it than the other. I speak of the distinction between heavy engineering construction and highway construction, as compared with building construction.

I believe that, as a general rule, AGC contractors have made an effort, because it is entirely to their advantage to make such an effort to extend their working period on building construction as far into and as completely into the off-season as possible. I know that the problems as presented by the completely outdoor and length of project in both heavy engineering and highway construction represent a greater problem, much greater, but I don't have any fear but what the intensity of consideration that might be very well given to these problems by the procedures that will be developed by this legislation will cause the developent of even more additives to asphalt that would give you the opportunity to do such things as seal-coat work when the temperatures were not as favorable as they are presently required.

I don't have any doubt but that conceivably one day that we will develop a chemical additive that would be cheap enough to conceivably add to either wet or frozen soils that could let you go forward with grading operations in the off-season. And I think that it is most commendable that the Federal Government, the people on labor's side and the people on management's side in this industry will have a greater opportunity to examine just some of the things that can be done in order to alleviate a situation which is, I believe, obviously deplorable any time that an industry is not operating at its complete capacity.

Mr. O'HARA. Mr. Naumann, I would like to ask a few questions with respect to matters mentioned in your statement.

You spoke of the fact that your organization has continued its research to the best of its abilities. I wonder if you could describe some of that research to us so that we get a notion of what you are doing in that area.

Mr. NAUMANN. Well, the AGC has pioneered the use of the cheaper materials that have come on the market recently that are used for enclosures in recommending and urging their people, especially their building contractors, to utilize these types of things.

In our discussions with the professional people, through our joint committees with the American Association of State Highway Officials, with the professional engineers, architects, the American Society of Civil Engineers, and these kinds of people, we have had a continuing discussion about the possibility of changing specifications, the use of additives, the use of any kind of a system that would make the particular portions of the work practical and with the same end result in the off-seasons of the year, especially toward cold weather.

For example, in my own home part of the country, where we have a different problem, we have a restriction in almost every set of specifications that says we cannot pour concrete when the temperature is above a certain limited temperature by reason of the quick dehydration and the failure to be able to cure this concrete to come up with the ultimate strength by reason of this extremely hot weather.

Now we have developed a system whereby we produce in many cases on mass concrete pours as much ice almost as we do aggregately, because we have developed a means in that part of the country of

cooling down the aggregate to where, with the temperature that the concrete goes into the form, it has the advantage then of not dehydrating as fast, and for this reason comes up with as good a cured end product as though the temperature were lower.

These are kinds of things that I talk about. While, as I say, there has been an effectiveness to my notion, the effectiveness of this type of research and encouragement hasn't been able to make enough of an impression on the general picture of seasonality as would the combination of the many things that are to be considered in the study as proposed by this legislation.

Mr. O'HARA. How do you conduct your research in AGC? Do you have a research department, or do you have contracts with private research groups, or what do you have?

Mr. NAUMANN. No. Amazingly enough, this has been a place where, to my notion, by reason of its final effect on the general economy of this country, AGC, as such, has not been able to afford this type of organized research.

Most of the research has come and most of the developments have come from the ingenuity of the individual member and necessity being the mother of invention. Obviously, we take the collateral effect or the ancillary effect of research that is done elsewhere.

For example, the construction industry didn't develop polyethylene, but our encouragement of the use of polyethylene has been a good thing.

Mr. O'HARA. You know, we have been talking and, in fact, you testified earlier this year, I think, on a joint industry promotion board, a joint industry-labor promotion plan and fund that would be created. I know that you don't favor that legislation, but I was just wondering, would that legislation permit the setting aside of collective bargaining for the establishment of these funds that would be used for research?

Mr. NAUMANN. Insofar as the legislation itself is concerned, it would neither help nor hinder, the whole point being that the legislation has more to do with the basic administration of the funds and the limitation with regard to this particular administration product improvement and product promotion.

Mr. O'HARA. I am familiar with that issue, but I am trying to remember if the product promotion fund that is described in the bill would be one that could be used for research as well as for advertising.

Mr. NAUMANN. Amazingly enough, much of the money that is presently collected in these industries for promotion funds goes toward a rather local type of research.

Now, I might point out that AGC has a national committee on research and on research activities. I am happy to say that there is now a foundation that has recently been formed and off the ground that the main purpose of it in AGC is to conduct research.

But, conceivably—and everybody, conceivably, should take the blame—I think it may be perhaps that the blame rests on the fact that for years and years and years we got used to the matter of seasonality, and for altogether too many years we didn't do anything about it. Now a considerable effort, as is indicated in this legislation, has to do some good, as I said in my statement—has to do a lot of good.

Let's don't get away from the fact that it is going to cost a lot of money to do some of the things that can be done. And, to my notion,

this gets down to a very exact science of weighing the amount that it costs against the good that it does.

Mr. O'HARA. It costs a lot not to do some of them, too.

Mr. NAUMANN. That is exactly right, and I don't think that there is any question of the fact that conceivably in our approach to the matter of seasonality that we perhaps in our examinations heretofore have not taken into account, perhaps, all of the areas of savings that could be made in coming up with a net additional cost.

Let me say this, that the overall study will probably produce practical applications. For example, there is no contractor that would be frightened of the actual enclosing of a building or a structure or something of this nature and carrying his work into the winter if it was a matter of the specifications and contract documents so requiring this and something that he can put a price on.

Mr. O'HARA. In his bid?

Mr. NAUMANN. That is right, put it in his bid.

Now, amazingly enough, there has been a great deal of freedom of choice as to whether or not a contractor works or whether he doesn't work. Conceivably, this will be an area that as it becomes more habitual to include by reason of an actual examination of the final result that it is beneficial not only to the work force but to the owner.

For example, I was much impressed by one of the statements that Mr. Fancher made or a question that you asked with regard to the carrying charges of $45,000 a month on a particular project while it was shut down. Certainly, this would only be one factor, and the denial of income for the same number of months to the owners and constructors is just as big a factor.

Mr. O'HARA. That is right.

Mr. NAUMANN. Conceivably, the overall broader look at the problem will of necessity produce some good results and, conceivably, some very shocking ones.

Mr. O'HARA. You mention in your statement, on page 4, that:

* * * the government's engineering requirements are sometimes more strict in ruling out cold-weather construction than necessary.

I am not going to ask you to detail that here, but I am going to ask you if you would submit to us a memorandum with respect to specific examples of that which you might be able to cite, because that is something that we could go into immediately, I think, in discussion with the Federal agencies.

Mr. NAUMANN. Very well.

(The information follows:)

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA,
Washington, D.C., August 1, 1968.

Hon. JAMES G. O'HARA,
Select Subcommittee on Labor, House Education and Labor Committee, Rayburn House Office Building, Washington, D.C.

DEAR CONGRESSMAN O'HARA: This is in response to your inquiry regarding some specific examples of engineering requirements that may be more rigid than necessary and which rule out cold-weather construction.

Limitations governing the placement of asphalt pavement vary significantly throughout the country. To the best of our knowledge, all states except one have a minimum temperature limitation for asphalt placement. Of these, 38 states specify a minimum temperature of 40° F. for either the ground or the air. Twenty states also have calendar date restrictions.

One northern state has a temperature limit of 50° F. whereas Florida can conditionally place material as low as 30° F. We have discussed this subject with the National Asphalt Pavement Association (NAPA) and it has been recommended by the NAPA–AGC Joint Cooperative Committee that an air temperature of 33° F. be substituted in lieu of calendar dates or other temperature requirements.

We recommend the adoption of 33° F. as a uniform standard.

In recent years in the state of Washington we have embarked on an extensive research program jointly sponsored by the Department of Highways and the Asphalt Paving Association of Washington. We are finding some interesting facts particularly when thicker lifts, which retain more heat, are used.

Now that greater uniformity is reasonably assured through the use of automated plants, thicker lifts and improved compaction techniques, we have arrived at a point where we can satisfactorily use material with lower temperatures.

Our experimental work and conclusions are of such a short life span that we have not had enough experience to demonstrate conclusively that the useful life of our pavements are being extended. More study should be made of the possibility of reducing the temperature.

Although we have calendar date placement limitations we also have an escape clause which permits the engineer to extend the length of time when asphalt placement is permitted.

Attached is a list of the various state limitations of pouring asphalt. I hope that this information will be of some interest to you.

Sincerely,

WILLIAM E. NAUMANN,
Chairman, Legislative Committee.

STATE LIMITATIONS ON ASPHALTIC CONCRETE PLACEMENT

State	Calendar dates	Minimum temperature	Spec. ed.	Section	Page
Alaska		40° F. or bad conditions	65	401.07	72
Alabama		Surface 40° F.; air 40° and rising; stop, air 45° and falling.	64	325.06	
Arizona		Only when weather conditions suitable.	60	41–3.06	142
Arkansas	Mar. 15–Dec. 15, except w. p	40° F., air 3 ft. up	59	608.13	210
California		Air 40° F., open graded 60° F	64	39–6.01	181
Colorado		Air 40° F, w.p. at lower temperature.	66I	401.07	113
Connecticut		Air 40° F. except w.p	63	4.02.03–8	125
Delaware		do	65	11.19	156
Florida		Air 30° F. for 24 hrs. If freeze, air 60° F. No freeze, 40° F.	66	330–3.1	191
Georgia		Air 40° F.; surface 40° F	66	350.07	322
Idaho		Air 40° F., rising; 50° F. falling except w.p.	66S	407.12	221
Illinois	Oct. 15 except w. p. (until)	Air 40° F. except w.p	66S	46.4	229
Indiana	Apr. 2–Nov. 1 except w. p.	Air 40° F	63	D305. 10	236
Iowa	Nov. 15 except w.p. (until)	do	64	2303. 20	286
Kansas		do	66	E11–7	295
Kentucky	Apr. 1–Nov. 15 except w.p	do	65	306. 3. 1	156
Louisiana		Air 40° F. rising or 45° F. falling except w.p.	66	501. 06	108
Maine		Air 40° F	65	401. 07	97
Maryland	Mar. 1–Nov. 15	do	62	33. 12. 3(17)	277
Massachusetts	Apr. 1–Nov. 15 except w.p	Air 40° F. under 50° conditions	65	B18. 34C	188
Michigan	May 15–Nov. 1 (LP)[1] June 1–Oct. (UP)[2]	Air 40° F	65	4. 12. 03p	226
Minnesota		Air 33° rising; surface 32°F; 36° F. falling.	64	23331. 3	289
Mississippi		Air 40° F. rising except w.p	56	121. 07	171
Missouri	May 1–Oct. 1 except w.p	Air 40° F	61	43. 4. 4. 1	198
Montana	Apr. 1–Nov. 1 except w.p	Air 40° F. rising	66	30. 05A	129
Nebraska		Air 40°	65	66. 07	225
Nevada		Air 50° F., open graded 60° F	64	40. 6	239
New Hampshire		Air 40° F. rising except w.p	60	250–35	142
New Jersey		Air 40° F. except w.p	61	3. 10. 3	178
New Mexico	Mar. 1–Dec. 1 except w.p	Air 40° F. rising, 50° F. falling	63I	48. 10. 2	153
New York	May 15–Oct. 15; Apr. 1–Nov. 1 in 7 counties.	Air 50° F. rising and surface 45° F.	62	----------	263

[1] LP—Lower Peninsula w.p.
[2] UP—Upper Peninsula w.p.

Note: w.p.—"with permission" or "or with permission"

STATE LIMITATIONS ON ASPHALTIC CONCRETE PLACEMENT

State	Calendar dates	Minimum temperature	Spec. ed.	Section	Page
North Carolina	Mar. 15–Dec. 1 except w.p.	Air 40° F.	65	54–3.8	155
North Dakota		Air 35° F. except w.p.	65	506–4.12	204
Ohio		Air 40° F.	65	401.05	82
Oklahoma		Air 35° F. rising, 40° falling	65S	411.04	237
Oregon		Air 40° F. rising, 50° falling	64	320–3.1	187
Pennsylvania	Apr. 1–Oct. 31 except w.p.	Air and surface 40° F.	60	5.9.3(3)	220
Rhode Island		Air 38° F.	65	401.03.1	79
South Carolina		Air 37° F. rising, 40° falling	64	43D2	165
South Dakota	May 1–Nov. 15	Air 35° F. rising	63	351.4	226
Tennessee	May 1–Dec. 1	Air 40° F.	60	104.06	378
Texas		Air 40° F. rising, 50° falling	62	340.6	269
Utah		Air 50° F.	61	4–4.14	141
Vermont		Air 40° F. except w.p.	64	361.04F1	239
Virginia	Apr. 1–Nov. 15 except w.p.	Air 40° F., 50° for layer less than ½ in.	66	320.03	255
Washington	West of Cascade, Mar. 1–Dec. 1; east of Cascade, Apr. 1–Nov. 1.	Air 40° F.	66S	32–3.19	184
West Virginia	Apr. 15–Nov. 1 except w.p.	Air 45° F.	60	2.28.2M	157
Wisconsin	May 1–Oct. 15 except w.p.	Air 40° F.	63	405.1.1	223
Wyoming		do.	65S	401.07	86
District of Columbia		Air 40° F. except w.p.	63	5.1.7B	151
Hawaii		Air 50° F.	57	39.3	161
BPR		Air 40° rising, 50° falling			

Mr. NAUMANN. We have to be real honest in our discussion of the requirements of specifications, not in pointing the finger of scorn in the matter of these people being responsible for the way that they are written, because they have a responsibility, too, the end product. In other words, if there is a weather or temperature variable that would affect the final quality of the end product, it is their responsibility to see that this is taken into account.

If there is a concern, the concern is with the process of updating these specifications just the same as we spoke a short time ago about updating building codes to take advantage of the improvements in technology that we could take advantage of now.

Mr. O'HARA. Finally, Mr. Naumann, with respect to your comments on the impact of labor-management dispute work stoppages during the prime construction season, surely you wouldn't seriously suggest that labor would resort to the strike only when the employers are shut down anyway.

Mr. NAUMANN. Perhaps not that. Perhaps not that, because I am not naive enough to think that our wonderful friends in labor don't take these things into account. I can tell you one thing, and that is why I say all segments of this industry have to take a forthright look.

In other words, somebody might have to give up something, and it may be a little ridiculous to say that it is perfectly all right to lose 60 days in the construction industry of prime construction time and it is wrong to lose 60 days in the off-season of the year, when it is more complicated and takes more effort and thinking and planning to be sure you carry on the job.

This is just a matter, to my notion, of just being absolutely fair with the situation. We have to take an honest look. I know in my own home State our basic contracts with the basic crafts expire the 1st of June, and if you don't think this is an economic disadvantage to the employer, you are mistaken. So we haven't gotten together, and most

of our people that we negotiate with say: "Well, there is probably going to be a little strike. We had intended to go on our vacation, anyway. The kids are out of school. This is a good time."

If we had our expiration date the week prior to Christmas, for example, there might be a different attitude. But this is a fact of life that most of our construction collective bargaining agreements expire in the spring, and this has been an operating thing that has existed.

I am very honest in saying that the changing of these may be a temporary disadvantage to labor's side of this industry. I even say that in my statement because I know this to be a fact.

Now, if we are going to do something about increasing the number of hours they work in a year by doing something about the bad seasons of the year, then isn't it just as honest and just as reasonable to say: "What can we do about not losing any time in the prime construction period?"

Mr. O'HARA. Except that the effect of that would be for us to throw our weight in on one side of the present collective bargaining situation. Obviously, it would be to the advantage of the employer and to the disadvantage of the labor organization and its members for us to get into the question of when that contract expires.

Mr. NAUMANN. No, but the point that I make is that it is worthy of study. Maybe there has to be a different kind of a solution other than just the contract expiration date.

Mr. O'HARA. I want to see you fellows working together, and I don't want to throw something in the pot that is going to cause you to start fighting when you get into this issue.

I am a little reluctant to even engage in it.

Mr. MEEDS. Would the chairman yield at that point?

Mr. O'HARA. Yes.

Mr. MEEDS. Let me say first that I was very impressed by your statement, until I got to page 5, and then it seemed to me that you are, in effect, defeating the purpose of the entire thing.

Assuming that you really want to be successful in this, what is going to be your prime season?

Mr. NAUMANN. Well, the prime season, without any question, is the period wherein there is not the problem of cold weather and in the areas that are affected by cold weather.

Mr. MEEDS. What are we trying to eliminate by this bill?

Mr. NAUMANN. We are trying to eliminate any cessation of construction in those periods where it normally ceases now by reason of the weather and the conditions.

Mr. MEEDS. If we were successful, there wouldn't be such a thing as a "prime season," would there?

Mr. NAUMANN. Well, there will always be a prime season, and I think the reason that there always will be is that the inconveniences and expense of solving the problem for the off-season will always make it least advantageous as a prime season than the same period when the additional costs and methods are not necessary.

Mr. MEEDS. This is what impressed me, Mr. Chairman, about the inconsistency of this statement.

Mr. O'HARA. I am sure that the labor organization would be happy to change the expiration dates if there were no prime season.

Mr. MEEDS. That is what I am saying, and to really have a feeling that we can be successful in our endeavor to eliminate or substantially eliminate seasonality, which you appear to be for, then there will be no such thing as prime seasons.

Mr. NAUMANN. As I said, conceivably this could be the solution. Conceivably, adding to the numbers of hours that these people all work during the year would make less of a controversy at what ever time the labor contracts expired.

Mr. MEEDS. That is precisely what I am trying to bring out.

Mr. NAUMANN. This I endorse. Let me make this statement in this regard.

In my own home part of the country, we have some very fine people in the building trades who haven't missed over 4 days in the last 20 years, because in my part of the country we don't have the basic problem, and it is probably the most fortunate State of the world, because in the above 6,000 feet altitude of northern Arizona, where the work shuts down in the winter, these people move to the southern part of the State in the winter. And a lot of our people, when the weather gets good and hot in the summer, move to the prime areas in the northern part of the State, so that we are really fortunate.

But when these wonderful people come to the bargaining table, they still bring the fact that seasonality has a tremendous effect on the fact that they have to have higher wages, and this is an honest thing. They may bring whatever argument that we have to have, and that is why I talk about forthrightness and being comprehensive—is that we examine this thing. And I can see tremendous possibilities that by extending the normal work period for the building trades that we could get out of conceivably a great number of our problems at expiration of contract.

Mr. O'HARA. Fine. One last question.

You suggest on page 3 that "it is a common practice to do construction work in cold weather in building operations by the use of various types of temporary enclosures along with temporary portable heaters. But, as far as heavy and highway construction is concerned, general conditions in these types of construction are not adaptable to this kind of solution."

I gather that you are suggesting that a seasonal pattern of employment in construction work is much more prevalent in highway and heavy construction than in building construction.

Mr. NAUMANN. As of right now, it is one of the reasons that the impact over the last 8 or 9 years in the United States is so apparent, is with the increase in amount of money that came from the interstate highway program. And in many areas of the country where these programs have to shut down during the winter, it made this come to the fore.

There is no question but what, even though nobody is satisfied with the result, we have been able to do more about building construction. We have been able to do but very little about highway construction.

I have here—and with the permission of the chairman, it will be attached to our statement—a survey made by A.G.C. in 1966 of every State highway department in the United States, asking them for their procedures and limitations on cold-weather work, on winter work.

Mr. O'HARA. That is very useful, and without objection, it will be entered into the record at this point. It will be very helpful, I think.

Mr. NAUMANN. Thank you.
(The document referred to follows:)

HIGHWAY CONSTRUCTION UNDER WINTER CONDITIONS

(By Charles I. Folk)

THERE IS one aspect of highway construction that is looked upon in unanimous agreement by all groups who are involved in this great public works program. Far too little is known about each and every aspect of winter highway building to allow any major construction program to proceed into what is today considered highly unfavorable climatic conditions. With only few exceptions, highway construction work comes to an abrupt halt as the first cold wave moves into a region, and usually does not begin again until warm conditions return with the coming of spring.

Considering the advancements that are being made today through the use of new and improved equipment and methods, why are we in the highway field unable to continue our work in cold weather as the other divisions of the construction industry proceed? When discussed a myriad of replies are at once presented depicting the major obstacles to this winter work. "Winter work costs too much" or "our industrys work is too spread out" are the first points raised as the greatest factors opposing this work.

AGC SURVEY

AGC in an effort to gain greater insight into the industry's experience with cold weather construction has undertaken a survey of the administrative segment of the industry—the state highway departments. With the cooperation of each state highway administrator and his construction staff a questionnaire concerning the following four points has been completed and returned to the National AGC:

What portion of your highway construction program is performed during your winter period (From To)?

What do you consider to be the limitations on winter work?

Approximately how much more does it cost than if it were done in a temperate climate? Why?

What major problems are involved? (protection, materials, personnel, equipment)

The following alphabetical tabulation presents the main points emphasized by each state consulted. The states of Florida, Hawaii and the territory of Puerto Rico were not asked for their experiences because of their favorable year construction climates.

Alabama: Considered to be in a temperate climate, Alabama does not close down work during its winter months from December to March. Concrete is not placed when the temperature is below 35 degrees F. or 40 degrees F. and falling (except in emergencies). Bituminous plant mixes with liquefiers require air temperatures of 60 degrees F. or above. Hot bituminous mix placement requires a surface temperature of 40 degrees F. or greater. Construction costs are not considered to be higher because of winter work.

Alaska: Winter months range from October 1 through May 1, with winter construction activity varying greatly from year to year according to the location of specific regions and to the severity of the annual climatic conditions. Work does not proceed on clearing, rock excavation, bridge construction, channel changing and placing of rip rap. Embankments are never constructed, and common excavation must always be ripped.

Though no specific comparative cost figures exist, bridge construction is often cheaper in winter. Pile driving, foundation excavation, steel erection, channel changing, rock and gravel hauling are often undertaken in winter because at times these items are considered to be an impossible undertaking during the summer months. Wear and tear on machinery is increased many fold under extreme cold conditions. Personnel efficiency is lost, especially in the repair of equipment, and lighting must be provided for most of the working day.

Arizona: Only 15% of Arizona's entire program is fully affected by winter conditions from October through April. In the remaining areas only restrictions on asphaltic work are used. At elevations above 6,000 feet, between December 15 and April 15, grading and concrete structure projects are usually not attempted.

State estimates and contractors' bids reflect a winter shutdown. State officials estimate that it costs approximately 20% more to perform work above 6,000 feet because of the loss of time during the winter shutdown. No major problems exist because work continues at the lower elevations. It is felt that the cost of winter protection of structures and materials is unjustifiable.

Arkansas: Between December 1 and March 31 only 10 to 15% of the construction program is undertaken with contractors avoiding bridge deck construction during freezing weather. In areas earthwork is not undertaken in winter, but in mountains it continues in normal fashion. Major problems encountered consist of protection of concrete from freezing, excessive moisture and freezing in earthwork compaction, and loss of labor efficiency.

California: From December through February, California in 1965–66 winter paid out 18% of its yearly construction money. Work in the northern part of the state is curtailed in winter, but work in the southern portion is not. During these colder months the greatest limitation is one of unsuitable weather (rain) in the coast range and the Sacramento Valley areas. Heavy snows and low temperatures limit work in the Sierra Nevada range. Blasting, drilling and construction of rock fills is accomplished under frozen conditions; and the placing of base materials and surfacing is allowed to continue as the temperature rises above freezing and sufficient drying takes place.

Figures regarding increased costs for winter work are not available, but a reasonable certainty exists that it is expensive because of spasmodic production and loss of efficiency of both labor and equipment. There is also a great risk involved with the loss of completed work due to floods, snow, etc. and contractors consider this in their bids on winter work.

Colorado: Approximately 30% of the construction work is performed during the winter months from November through March. Earthwork is extremely limited, and protection of concrete against freezing weather is the major difficulty. Costs would increase because of equipment and manpower efficiency losses.

Connecticut: Contractors can continue work year-round or suspend operations with temperature limitations being placed on both flexible and rigid pavement work. Paving operations are usually suspended because of the impracticality and expense of protecting such large areas. Cost figures are not available, but these are presumed to be only a little higher because contractors choose to continue their operations through the winter. Principal difficulties encountered consist of the protection of concrete structures with insulated forms and heaters.

Delaware: Highway building is kept to a minimum during the months of December through March. Some structural work is performed along with other items that are not affected by cold conditions. Cost comparison figures are not available, but it is estimated that the contract costs would be increased by some 10 to 20%. The higher cost would result from the necessary material protection, loss of efficient production of both equipment and personnel. Some loss in quality might also result. Protection of roadway material is the greatest difficulty encountered in Delaware.

District of Columbia: Between December 1 and March 31 approximately 28% of the work on large jobs is completed. Small jobs are usually left to warmer weather. Awards are unaffected, and overall restrictions because of winter conditions are not made. Specifications restrict work by items involving concrete, asphaltic, stonemasonry work, and painting, etc. Comparative cost figures are not available, but it is felt that the variation in techniques and procedures used by individual contractors under winter conditions greatly affects the cost of this work.

Idaho: The state allows sufficient time on its contracts so that cold weather operations are not forced on contractors, and any winter work performed is at the contractor's choice. Temperature restrictions are placed on asphalt and concrete work, and frost restrictions are placed on roadway subgrades and bases. Cost comparisons are not available; however, there appears to be little variation in costs within the state because of climate.

Illinois: Between December 1 and March 15 approximately 11% of Illinois' highway funds have been expended. Winter work is required principally on substructures where completion of the structure will permit a traffic facility to be used at an earlier date. Contractors often carry on their construction operations in wintertime to keep their key employees. Standard specifications allow for adjusted unit prices ranging from 103 to 120% for required winter work. The per cent paid depends on the type of protection required, type of construc-

tion and the date of work. The adjusted prices are to cover protection costs as well as all others.

Indiana: Less than 10% of Indiana's highway program is performed between December 1 and April 1. Concrete work and bituminous paving are considered to be unfeasible after initial freeze-up. Work accomplished on existing highways in winter months does not justify the cost of providing necessary detours. Clearing, structural concrete, peat treatment and rock excavation can usually be performed in the winter. Because of the efficiency loss, rock excavation probably costs 10% more, whereas structural concrete may go 30% higher. One major problem for the contractors is keeping equipment in first class mechanical condition so starting and efficient operation are possible.

Iowa: Though its winter period is considered to be from December 1 to March 15, paving work is usually closed down by November 10. Grading is usually stopped between November 15 and December 1. Substructural bridge work is performed the year through, but decking is banned from December 15 to March 15. Concrete costs in cold weather are increased approximately 15% with the major difficulty encountered being that of protection of structures and personnel.

Kansas: Only 5% of the year's production is performed by Kansas between December 15 and March 15. Protection of concrete, frost on grade jobs, and operating temperatures on hot mix asphalt work appear to be the principal limitations to cold weather operations. Concrete work is normally shut down by contractors because it costs approximately 10% more than under more temperate conditions.

Kentucky: Though 13% of fiscal 1966 work was accomplished between November 1 and March 31, it is felt that 10% of the year's highway work is a more realistic annual estimate. Limitations are spelled out in specifications by item. No bituminous concrete can be laid between November 15 and April 1. Bituminous surfacing and seal coat treatment are not permitted between October 31 and May 1. Winter work is predominately limited to rock excavation, constructing rock embankments, stockpiling materials, construction of bridges and drainage structures, and clearing grubbing.

Winter work is estimated to cost from 15 to 25% more. Some contractors proceed in winter to keep permanent payroll men working. Major problem encountered involves the protection and processing of concrete materials both during and after incorporation into structures.

Louisiana: The winter months in Louisiana are considered to be December through February. Work on placing asphaltics and painting of structures are the principal items affected by low temperature. Hot bituminous concretes are restricted by a minimum specification temperature that is not often reached in Louisiana's climate. Earthwork is often shut down during these months because of the rain and wet conditions. It is estimated that it would cost from 10 to 20% if work were required in winter months rather than at the option of the contractor.

Maryland: Between December 1 and March 1, Maryland performs approximately 10% of its highway work, which consists primarily of bridge and drainage structures and some rock excavation. Paving work is not permitted from mid-November until March except by special authorization. Comparative costs for winter work are not available. Major difficulties encountered consist of protection of concrete to insure proper hydration, consolidation of soil because of high moisture content and the loss of personnel efficiency.

Massachusetts: January 1 through March 31 is considered to be a period during which outside construction cannot reasonably proceed. Between 2 and 3% of the year's highway work is completed during these three months. Controlled and protected concrete work is allowed, along with some clearing and grubbing. Excavation of peat, unsatisfactory material and some rock is undertaken if weather conditions permit. Breakdown of equipment working at low temperatures, protection of structures and loss of labor efficiency account for added costs ranging from 20 to 50% more.

Michigan: From November through May less than 5% of the concrete paving is performed. Ten per cent of the substructure work is completed, and only a bare minimum of concrete superstructure construction attempted. Below grade concrete work is permitted when the temperature is above 0 degrees F.; and substructure concrete can be placed when air temperature is above 15 degrees F. Box culvert construction is performed when it can be completely enclosed.

Concrete pavement costs approximately 25¢ per square yard for protections; 3¢ S. Y. for paper curing; from 2 to 3¢ S. Y. for calcium chloride; and 3¢ S. Y.

for temporary sealing at joints. Substructure concrete costs between $4.00 and $5.00 per cubic yard for heating and concrete form insulation. Uniform heating of materials, protective coverings, loss of manpower and equipment efficiency appear to be the major difficulties encountered.

Minnesota: Between December 1 and April 1, 5% of the constructure program is undertaken. This work consists of swamp excavation, granular backfilling and substructure work on bridges. Limitations are on specification items and it is seldom possible to work above these limitations in the winter months. No estimate was made regarding added costs of grading and paving work, but 15% more was given as the added cost for concrete bridge work. Protection of work, preparation and storage of materials are major considerations.

Montana: Winter construction is looked upon as an integral part of usual construction in Montana's winter months between November and April. Work is generally limited to clearing and grubbing, rock excavation, and some bridge substructure construction. Earth embankment work is usually not attempted because of frozen materials. No information was available concerning comparative costs. Major problems—starting and maintaining equipment and loss of surveying efficiency.

Mississippi: Construction of lime-treated sub-base, cement-treated bases and double bituminous surfaces are not performed in winter, however, all other highway work proceeds the year-round. Wet soil presents the most difficult problem during this time of year. Information about comparative costs for winter work is not available, and protection of structures is the biggest problem.

Missouri: From December through April in 1965, 22% of Missouri's work was paid for. Winters vary considerably, with grading, laying of pipe, building of culverts and structural work on bridges proceeding under milder conditions. With extreme cold conditions contractors limit their work to clearing and grubbing. Cost figures are not available; protection of structures and heating of materials are the biggest problems from the state's point of view.

Nebraska: Mean average temperatures from December 1 to March 15 in Nebraska can be expected to be below freezing, and only 5% of the state's work is undertaken then. Work is usually limited to major culverts and bridge structures. Structure work costs from 20 to 25% more. Labor efficiency, protection and material preparation are the problems encountered.

Nevada: It was estimated that less than 10% of Nevada's work is performed between November 1 and March 1. No limitations are encountered in the southern portion of the state, and little or no work with cement-treated bases or asphalt plant mix aggregates is possible in the northern portion in winter. Concrete work generally requires protection throughout the state during these months. Concrete placement costs are increased by approximately 5%. Protection of materials from freezing and finding work for key personnel are major considerations.

New Hampshire: Approximately 14% of highway work is paid for between December 1 and April 1. Construction work is limited to those items which can be economically protected from frost: clearing, ledge excavation, and concreting of structures. For many reasons it was estimated that 20% of the time paid to labor on projects is lost. Protection and heating is estimated to increase structure costs by about 25%.

New Jersey: Rock excavation and embankments, drainage structures, and bridges are worked upon between December 1 and April 1 in areas that do not affect traffic. Cost figures are not available. Problems related to loss of production, structure protection, loss of manpower efficiency, and union requirement on payment are the most difficult ones to overcome.

New Mexico: Asphaltic concrete is the only item prohibited by calendar dates from December 1 through March 1. The amount of work performed varies greatly upon weather conditions and the location of particular projects. Work is at the option of the contractor and there is no way of knowing how costs are affected. Protection of subgrade and surfacing material from freezing, temperature limitations on concrete and road oil seem to be the most important winter considerations.

New York: From December to April less than 15% of New York's highway construction program is performed (mostly structural work in New York City). Earth work is banned after November 15. It takes ten times the compactive effort to obtain equivalent densities in cold weather. Principal difficulties encounted are loss of manpower production, frozen moisture in material stockpiled, and protection of equipment.

North Carolina: Very little profitable work can be accomplished during the

three winter months from December 15 through March 15. In portions of the state only two months are considered to be non-profitable for structure contracts. Approximately 12% of the structural work and possibly 20% of the entire yearly highway program is completed in winter. North Carolina is considered to be in temperate zone. Protection of structures and conditioning of materials are the major considerations in North Carolina.

Ohio: From December 1 to March 1, 5% of Ohio's roadway excavation is completed, along with 10% of the construction of rock embankment. Some bridge concrete work is attempted. Protection must be provided on concrete work so that the structure does not drop below 50 degrees F. Concrete work on bridges varies from $3.00 to $12.00 more per cubic yard depending on type of protection provided. Protection and weather forecasting are the major problems.

Oregon: Between November 1 and March 31, approximately 30% of the construction program is completed (major portion is that done east of the Cascade Range). West of the Cascade during winter some crushing and structure work is performed, but no paving anywhere in the state is allowed. Very little cost increase is involved with work in winter. Winterizing of equipment is a major consideration.

Pennsylvania: A large portion of the construction program in Pennsylvania is performed in winter, but operations are limited and can be completely suspended. Base courses, pavements and surface courses are usually not built during the period from November 1 through April 15. It is felt that it could cost 50% more to cure structural concrete properly. Biggest problem is maintaining proper temperature of structures and materials prior to their incorporation.

Rhode Island: During the period from December 15 through March 15 work in Rhode Island proceeds at from 65 to 80% of the normal construction rate, with from 16 to 20% of the year's work being completed. Pavement, fill and minor structural work are not permitted. Cost figures are not available. Insulating and heating of structures, as well as protection of equipment and personnel, are the major problems.

South Carolina: From December 1 to March 15, 30% of the yearly program is completed. Bituminous surfacing is not permitted between October 1 and March 15. Placing of Portland Cement concrete and bituminious plant mixes are restricted by unfavorable weather conditions and temperature limitations which are evaluated at the local level. There are no increases in prices bid by contractors because of the temperate climate of South Carolina.

South Dakota: Two and one half per cent of the year's program is undertaken between November 15 and April 1. In heavy cuts and fills grading sometimes proceeds until January, but work in cold weather is limited to bridge structures with no deck work. Though a contractor works in winter, time count on contracts is not made on work performed between December 1 and March 31. No cost figures are available, and no major problems are encountered.

Tennessee: Very little work is performed between December 1 and March 1 unless a contractor is working in rock cuts. Clearing and grubbing, small drainage structures, and some bridge work are undertaken. Concrete work requires 35 degrees F. and rising or 40 degrees and falling. Hot plant mix asphalts are not permitted during this period, and seal coat work is suspended between November 1 and April 1. Contractors often work with their straight time men to keep their organizations intact even though it would be more economical to shut down. Protection of concrete is the biggest problem.

Texas: Construction is continued on a twelve month basis, and the four questions did not apply.

Utah: From December to April, 10% of Utah's highway work is performed, consisting primarily of structural concrete and excavation in rock cuts. Cold weather structural concrete work costs are higher, but cost comparisons are not available. Rock work costs substantially the same. The major problem encountered is that of providing the necessary heating and protection for concrete materials.

Vermont: Little construction is performed between December 1 and April 15. Concrete work, rock excavation and clearing and grubbing are sometimes attempted. During January and February temperatures of 20 to 30 degrees F. below zero are not uncommon. It is estimated that winter work costs from 15 to 20% more than when performed under warmer conditions. Major problems involved in winter operations are those of protecting work using insulation and artificial heating. Equipment is difficult to start, with breakdowns occurring more frequently.

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: Fom 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

be constructed below twenty-eight (28) degrees F. on rising temperatures or below thirty-six (36) degrees F. on falling temperatures, without temporary heated enclosures or without heating materials or other precautions necessary to prevent freezing. No frozen materials shall be used nor shall frozen masonry be built upon."

National Building Code, 1967, page 137;

"909.2. Construction.

"a. All masonry shall be protected against freezing for at least 48 hours after being placed. Unless adequate precautions against freezing are taken, no masonry shall be built when the temperature is below 32° Fahrenheit on a rising temperature or below 40° on a falling temperature, at the point where the work is in progress. No frozen materials shall be built upon."

Southern Standard Building Code, 1965, pages 14–17

"1409.7 Protection Against Freezing.

"All masonry shall be protected against freezing for at least 24 hours after laying. No masonry shall be built upon frozen material." *Uniform Building Code*, 1967, page 147;

"Sec. 2416. (a) Freezing. All masonry shall be protected against freezing for at least 48 hours after being laid. No masonry shall be built upon frozen material."

National Building Code of Canada, 1965, Part 4, page 19

"4.4.6.6 No frozen materials nor materials containing ice shall be used in masonry.

"4.4.6.7. (1) When the mean daily temperature at the job site falls below 40° F, mortar, water and masonry units shall be maintained at a temperature not less than 40° F during laying.

"(2) Masonry shall be protected from freezing for 48 hours after laying."

American Standard Building Code Requirements for Masonry USASI A41.4, 1953, page 18

"11.9.3. Protection Against Freezing.

Masonry shall be protected against freezing for at least 48 hours after being laid. Unless adequate precautions against freezing are taken, no masonry shall be built when the temperature is below 32 F on a rising temperature, or below 40 F on a falling temperature, at the point where the work is in progress. No frozen materials shall be built upon."

Building Code Requirements for Reinforced Masonry, USASI A41.2, 1960, page 7

"6.7. Cold-Weather Requirements.

"(a) Adequate equipment shall be used for heating the masonry materials and protecting the masonry during freezing or near-freezing weather. No frozen material or materials containing ice shall be used.

"(b) Sand shall be heated in such a manner as to remove frost or ice. Water or sand shall not be heated to a temperature above 160° F. When necessary to remove frost, the masonry units shall be heated.

"(c) Whenever the temperature of the surrounding air is below 40°F, all newly constructed reinforced masonry laid in mortar, in which high-early-strength portland cement is used, shall be maintained at a temperature of at least 50°F for not less than 24 hr by means of enclosures, artificial heat, or by other protective methods as will meet the approval of the building official. When any cementing material other than high-early-strength portland cement is used, this temperature shall be maintained for at least 72 hr.

"(d) All methods and materials for the protection of the fresh masonry work against freezing shall be subject to the approval of the building official. In general, the methods and materials now commonly accepted as suitable for the protection of reinforced concrete construction in freezing weather shall be used. Salt or other chemicals for lowering the freezing temperature of the mortar shall not be used."

Recommended Building Code Requirements for Engineered Brick Masonry, SCPI, 1966, page 31

"5.14.1 No brick masonry shall be laid when the temperature of the outside air is below 40 F, unless means approved by the architect or engineer are provided to heat and maintain the temperature of the masonry materials and protect the completed work from freezing. Protection shall consist of heating and maintaining the temperature of the masonry materials to at least 40 F, but not

more than 160 F, and maintaining an air temperature above 40 F on both sides of the masonry for a period of at least 48 hours if type M or S mortar is used, and 72 hours if type N mortar is used. These periods may be reduced to 24 and 48 hours, respectively, if high-early-strength cement is used."

BACKGROUND FOR REQUIREMENTS AND RECOMMENDATIONS

A review of the requirements contained in masonry standards which are widely used indicates considerable variation. SCPI has published seven issues of *Technical Notes* on "Cold Weather Masonry Construction" since January 1950; each, after the first, superseding the previous one. Variations in recommendations were made based upon observations and/or on additional information. A review of the source material for these various recommendations indicates that many of the requirements were developed from standards and research relating to cold weather concreting. Data were obtained from work dating back to the 1920's as well as those from recent publications, such as ACI Standard 306–66, Recommended Practice for Cold Weather Concreting.

All the recommendations and requirements listed above are equivalent to or exceed the following requirements: "Masonry shall not be built when temperature of materials or surrounding air is below freezing and shall be protected from freezing for a minimum period of twenty-four hours."

Nevertheless, many observers have publicly and privately reported the construction of masonry at temperatures below freezing with little or no auxiliary source of heat and with no apparent adverse effect upon the masonry. Over the years, very few situations have been called to the attention of the Structural Clay Products Institute in which early disruption or disintegration of masonry has been attributed to freezing prior to curing. Similar observations have been noted by Canadians. In Technical Paper No. 87 of the Division of Building Research, National Research Council of Canada, "Advances in Winter Construction Methods Extended Building Season", C. R. Crocker states:

"Most building codes in Canada require that all masonry materials be at temperature not less than 40 degrees when laid up, and that the temperature of the masonry be maintained at no less than 40 degrees for at least 48 hours. In practice, however, it is quite common to see brick masonry being laid up in warm mortar, but without protection at temperatures below zero. In some areas, bricklaying proceeds until the weather becomes so cold that the mortar freezes before the brick can be placed in it.

"Some builders working under rigid inspection asked the Division to look into this matter, since, in their experience, masonry laid up without protection in winter appeared in many cases to be superior to that laid up in summer."

Winter visitors to Scandinavia and Russia report seeing masonry construction continuing at temperatures well below freezing without protection or the use of supplementary sources of heat. In the March 1967 issue of *National Geographic*, on page 310, Mr. Dean Conger discussed construction in Siberia:

"Vladimir Dynin, construction director of the Yakutsk Autonomous Soviet Socialist Republic, took us in his jeep to an apartment house being erected, where bundled-up men and women were laying bricks in spite of the 50-below-zero temperature. 'The mortar is heated,' he told us, 'but if the weather gets much colder, the crane that lifts the mortar won't operate properly. That stops us.'

The USSR Building Standard, NITU 120–55, Chapter XII "Design of Masonry Constructions Built in Wintertime" has requirements which permit construction in outdoor temperatures below freezing and in some cases well below 0 F. There are six different methods of construction in freezing weather which are covered in the general conditions as follows:

"*General Constructions:*

"240. Masonry construction may be carried on in the wintertime by various methods in accordance with the type of masonry and the character of its performance in the construction, as follows:

"(a) by method of freezing which permits early freezing of the mortar in the masonry and subsequent thawing under natural conditions which are taken into account in calculations of strengths and stability of the masonry;

"(b) by method of freezing with a subsequent artificial complete or partial thawing of masonry and its aging under positive temperature (above freezing) for a definite length of time which assures initial hardening of the mortar up to development of a minimum required strength;

"(c) by method of freezing using mortars with chemical additives (antifreezes) which assure improved monolithic nature and stability of masonry

after thawing, of improved bond of the facing with the backup masonry and also partial hardening of the mortar during the exposure to frost and thawing of the masonry which leads to reduced shrinkage during thawing;

"(d) by application of electrical heating or steam heating to freshly laid unfrozen masonry during the time required to assure initial hardening of the mortar in the masonry up to the point of development of minimum required strength;

"(e) by application of rapidly hardening mortars having a blended cement which develops considerable strength prior to the time of thawing of masonry;

"(f) by using enclosures which insure hardening of the masonry in unfrozen condition in which the mortar develops the minimum required strength."

In the National Research Council of Canada, Technical Translation TT–583, "Winter Construction" by Bertil Naslund, "Statens Kommittee for Byggnadsforskning, Stockholm, Broschyr 5, 1952", Mr. Naslund stated: "In order to build masonry during the winter it is essential that the bricks be kept absolutely dry. Bricks must be protected against precipitation irrespective of the season. Furthermore, during the winter the mortar must be heated. Taking these measures, outdoor building can be carried out at temperatures down to —10°C" (14 F).

From these observations it is evident that research and construction requirements relating to cold weather concreting do not necessarily apply to masonry construction. Generally, concrete is placed in forms so that there is little loss of water due to absorption to the forms or evaporation to the atmosphere. In masonry construction, thin layers of mortar are placed between thicker absorbent units which, with the exception of very low suctions units, quickly absorb water from the mortar, stiffening it, lowering the degree of saturation and reducing the water-cement ratio.

The Portland Cement Association's Research Department Bulletin 148 "Prevention of Frost Damage to Green Concrete", by T. C. Powers, has the following introduction:

"There are indications that to prevent damage when green concrete is exposed to frost, time must be allowed for a certain degree of hardening of the paste. Accordingly, those concerned with conrete construction during cold weather have carried out various experiments to determine the *necessary prehardening time*. It has been suggested that the necessary length of the prehardening period is fixed by the length of time required for the attainment of a certain minimum strength common to all concretes, and it is therefore a function of the characteristics of the cement, the water-cement ratio, and the prevailing temperature. Expressing the state of hardening in terms of strength seems to be based upon the belief that cement paste is able to acquire enough strength to withstand the forces associated with freezing.

"In view of the magnitude of stress that can be produced by the freezing process, we must conclude that immunity to damage after a certain time is not due to the development of strength but to absence of destructive force during freezing. Absence of destructive force can be accounted for by the decrease in the degree of saturation of the paste that occurs during the early stages of hardening."

Mr. Powers also shows that, where there is no exchange of water with environment, fresh concrete is immune to damage by freezing when the saturation coefficient of capillary spaces is below approximately 97 per cent. For most concretes this coincides with a compressive strength of about 430 psi.

RECENT RESEARCH

Although several organizations in the United States and other countries have and are conducting research on the effect on properties of masonry frozen at an early age, there is little published data at this time. The primary considerations of the effect of freezing temperatures on masonry are the influences on compressive strength, bond strength, durability and permeability. In a recent effort by the Research Department of the Structural Clay Products Institute, a program was started to define the minimum protection conditions required to prevent cold weather damage to freshly laid brickwork. Damage was detected by comparing compressive and bond strengths of frozen specimens with control specimens. The specimens were built of portland cement-lime mortars and 10,000 to 11,000 psi compressive strength brick with suctions of 5 to 8 g. The variables investigated were:

Cement: Type I and type III.

Mortars: M, S and N.
Protection period: 0, 1, 2, 3 and 4 hours.
Prior to freezing: 1, 2, 3 and 4 days.
Temperatures: 0 F, 15 F, 30 F, and 70 F.
Cure period (after freezing): 3 hours and 28 days.
Admixtures: None, calcium chloride, ethyl alcohol and methyl alcohol.

Research work is continuing on the effect of freezing temperatures on clay masonry. However, the progress report, "Effect of Freezing Temperatures on Strength of Clay Masonry", September 1967, states: "In summary, the general trend of the data reviewed here suggests that neither the compressive strengths nor the bond strengths is significantly affected by the protection periods when exposed to the standard freezing conditions employed in the test program, namely a temperature level of 15 F held for a period of three days. However, when compared to controls, the compressive strength is about 70 to 80 per cent that of the 28-day strength. At 120 days, however, type I cement approaches control values but type III is roughly 85 per cent of control. Ultimate bond stress is not affected statistically by the freezing action. The temperature level and duration period were determined from a preliminary investigation which indicated these were the minimal conditions for obtaining discriminating test results. The preliminary testing indicated that, had the temperature level been held at a lower value, say 0 F, there may have been a greater delay in achieving high strengths; i.e., there is an expectation that at 28 days the strength results would have been less than those obtained in this program. However, from the winter exposure tests during which the specimens were cured over a period of 120 days, improved strength values are eventually expected, indicating that the freezing action tends to delay full hydration but does not necessarily destroy it. This is in agreement with the influence from not exceeding the critical degree of saturation, the benefits from the heat of fusion of the water, and the delay in lowering of the mortar temperature due to the heat capacity of the materials themselves, if they are laid at room temperature. Statistically, there is less influence on bond strength than there is on compressive strength from the freezing conditions of the test program. Concerning the use of admixtures, calcium chloride or alcohol, it appears that neither significantly reduces strength from a statistical viewpoint, although there is a trend toward the lowering of strength both compression and bondwise with increasing percentages of the admixtures."

In a paper, "Investigations on the Properties of Lime-Cement Mortars at Low Temperatures", by Tenho Snect, Lauri Kinnunen and Laila Koski of the State Institute for Technical Research, Otaniemi, Finland, the following appears in the introduction: "Frost damage is dependent upon the amount of water in the mortar during freezing. Concrete and bricklaying mortars differ, as water is removed from the fresh mortar by the suction of the bricks. It should thus be expected that freshly laid mortars and, consequently, masonry constructions would be less sensitive to frost than green concrete." This is confirmed by the test which they conducted. In the summary, they state: "In the opinion of the authors the results indicate that a mortar does not necessarily have to be detrimentally affected by freezing. The water content of the mortar at the moment of freezing is of importance and it can be effectively reduced by the use of bricks with a high suction."

Cold Weather Masonry Construction—Construction and Protection Recommendations

GENERAL PROTECTION REQUIREMENTS

Current code requirements, research and observations on cold weather construction are covered in *Technical Notes*, No. 1 Revised, December 1967, "Cold Weather Masonry Construction, Introduction." The following recommendations are made, based upon cited and uncited research, observations of masonry performance when built under freezing conditions and the procedures used in other countries for cold weather masonry construction. It is believed that these recommendations are conservative and probably will be revised as a greater understanding of cold weather masonry construction is gained.

Construction projects vary greatly in size, height, design, location in relation to adjoining structures, and many other respects. Consequently, the most economical methods of protecting and heating a particular project can be deter-

mined only after a detailed study of the job. For this reason, it is recommended that the contractor be given wide latitude in determining the protective methods to be used. In general, items to be considered for the protection of masonry construction in subfreezing weather are: storage and preparation of materials, special precautions and protection of masons and recently constructed masonry.

STORAGE OF MATERIALS

All masonry units and mortar materials should be completely covered with tarpaulins, felt paper, polyethylene sheet or the like. Loose plank covering is not advisable. Masonry units should be stored in a high dry location, preferably on plank platforms of adequate size. Planks should be either raised or of sufficient thickness to prevent absorption of moisture from the ground. Masonry units and mortar materials should never be allowed to become coated with ice or snow. Careless material storage increases the cost of laying masonry, because the removal of ice and snow and the thawing of masonry units are absolutely necessary before construction may be started.

PREPARATION OF MORTAR

Ingredients.—Mortar for use in masonry construction when the mean daily temperature is below 40 F should be portland cement-lime-sand mortar conforming to ASTM Specifications for Mortar for Unit Masonry, C 270, types M, S or N (proportions for these types are given in Table 1).

TABLE 1.—MORTAR PROPORTIONS BY VOLUME[1]

Mortar type	Parts by volume		
	Portland cement	Hydrated lime or lime putty	Aggregate measured in a damp, loose condition
M	1	¼	Not less than 2¼ nor more than 3 times the sum of the volumes of the cement and lime used.
S	1	Over ¼ to ½	
N	1	Over ½ to 1¼	

[1] From ASTM specifications for mortar for unit masonry, C 270.

The required protection period for recently constructed masonry may be reduced by using high-early strength cement. It is significant to note that the use of high-early-strength cement in mortars does not appreciably alter their rate of set but does increase their rate of gaining strength.

Accelerators and Antifreezes.—The use of ad-mixtures or antifreezes to lower the freezing point of mortars should not be permitted. The amounts of such materials required to significantly lower the freezing point of mortar would be so great as to have deleterious effects. Mortar strength and other desirable properties may be seriously affected. Excessive salts added as antifreezes can contribute to efforescence and may cause spalling through recrystallization. The effectiveness of most commercial antifreeze compounds is due to their actions as accelerators, which in most cases result from the calcium chloride they contain.

In the past calcium chloride has been used extensively as a means of accelerating rate of set of mortar during the protected periods. However, recent investigations have indicated that the corrosion of metals embedded in mortar is intensified by addition of calcium chloride.

When metal ties for bonding masonry are used, or when other metal objects are embedded in the walls, the addition of calcium chloride to mortar is not recommended. When calcium chloride is used, it should not be added in amounts greater than two per cent of the portland cement, by weight. When used, it should be added to the mixing water. Care must be exercised to avoid combinations of high temperatures and calcium chloride percentages which will result in excessively rapid setting of mortar (flash set).

In the recommended amount, calcium chloride probably will react with chemicals normally present in portland cement, forming insoluble compounds. In this case, the possibility of calcium chloride contributing to efforescence is reduced.

The use of calcium chloride does not take the place of other protective methods. Its value lies in the rapid set and strength gain which it imparts to the mortar. The rapid setting action also means that heat of hydration is liberated at a faster rate, thereby keeping the mortar at somewhat warmer temperatures during the initial period.

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Heating.—Most contractors will provide heated sand for all masonry work at temperatures below 32 F, whether specified or not. This is done because mortar of the proper workability is thereby provided, promoting maximum production by masons.

Sand for use in mortar usually contains some moisture which will turn to ice if sand is stored in freezing temperatures. Before it can be used, sand must be thawed by heating to remove ice. Sand must be heated slowly and evenly to prevent scorching. Scorched sand (with a reddish cast) must not be used in mortar. Proper heating may be accomplished by piling the sand around a horizontal metal culvert or smoke stack section in which a slow fire is built. Oil drums, or the like, may also be used, provided they are thoroughly cleaned beforehand. An alternate method is to pile sand over steam pipes.

An easy method of increasing the temperature of the mortar is to heat the mixing water. Several methods are available for heating water. Any method which does not add deleterious matter to the water is acceptable. Rapid heating may be accomplished by the injection of steam, where available. Mixing water should not be above 160 F, because of the danger of a flash set when portland cement is introduced.

After combining all ingredients, the temperature of the mortar should be between 70 F and 120 F. If mortar temperatures are over 120 F, excessively fast hardening may occur, resulting in lowered compressive strength and reduced bond strength.

Mixing.—Batch concrete mixers are recommended on all large jobs; they are sometimes economical on smaller jobs. Some modern mixers are equipped with a skip hoist, water tank and water-measuring device, which control the mix and produce well-mixed mortar of the proper workability.

Steel mortar boxes may be used for hand mixing on smaller jobs. These should be raised above the ground on piers of masonry units laid dry. Fires of waste building wood or steam may be used to keep the mortar warm after mixing. Mortar should be delivered to masons at such rates that excessive cooling will not occur.

PREPARATION OF MASONRY UNITS

To prevent sudden cooling of warm mortar in contact with cold units, it is recommended that all masonry units be heated when the temperature is below 20 F. Masonry units should be heated to about 40 F. It is seldom necessary to raise their temperature much above this amount. Even when temperatures are above 20 F, it may be advantageous to heat units. With heated units greater mason productivity may be obtained.

During cold weather construction, brick having excessively high rates of absorption should be sprinkled with warm or hot water just before laying; those with low rates of absorption should be laid dry. Under typical summer conditions, walls built with units having suctions of 20 g or less at time of laying exhibit greater resistance to rain penetration than like walls built with units of higher suctions. During winter months the loss, to the atmosphere, of moisture from mortar and newly laid masonry is less rapid, so units might be laid with slightly higher suctions. Where maximum resistance to rain penetration is not required (interior walls or in areas of moderate rainfall and wind) or where the wall design is barrier type (grouted) or drainage type (cavity or furred and flashed), it may be permissible in the winter to lay units with suctions up to 40 g and still obtain walls with high strengths.

PROTECTION OF MASONS AND MASONRY

Protection requirements will vary with weather conditions. With warm mortar and mean daily temperatures above 25 F, tarpaulins covering the masonry may be sufficient. When mean daily temperatures are between 20 F and 25 F, covers of insulating blankets may suffice for the completed wall. Masons may work in the open with salamanders as a source of heat at temperatures down to 20 F. When wind velocities are above 15 mph, and temperatures are below 25 F, windbreaks should be provided to protect the masons. Also, the windbreaks will assist in preventing rapid loss of surface heat from the masonry being worked upon.

It is recommended that the air temperature be above 20 F when masons are working in the open. In addition, consideration should be given to the protection of the masonry based upon the mean daily outside temperature.

The mean daily outside temperature is determined by adding together the maximum temperature for each day (24 hr, midnight to midnight) and the minimum temperature for the same day and dividing by 2.

There are many types of equipment which are available to use as sources of heat. The type selected will depend upon availability of equipment, fuel source and economics, size of project and severity of expected whether. In the past, salamanders have been widely used as a source of heat on scaffolds and, in some cases, in enclosures. However, for projects where complete enclosure of the work area is provided, oil-burning or gas-burning space heaters with electric blowers are recommended. In some cases, contractors have employed groups of infrared lamps for heating walls. They have the added advantage of not requiring attention during the curring period. A method which recently has been employed is the use of commercial electric blankets that cover the walls during the curing period. These also have the advantage of requiring no attention after being put in place and secured. Walls should not be heated on one side with no protection on the other. If enclosures are used, they should be arranged to allow a circulation of warm air on both sides of the wall.

When a building is enclosed and only partitions and inside walls are being constructed, the manner of protection is reduced to the closing of doors and window openings, stairwells and elevator shafts. After taking these precautions, a few carefully placed heaters should produce the required temporary heat.

Contractors have used several different methods for complete enclosure of buildings. For small structures such as houses, large tents have been used. Some contractors have enclosed complete job sites with inflatable lightweight plastic enclosures. These are raised into place and secured by a flow of warm air which not only protects the masonry from freezing, but provides optimum working conditions for the masons as well.

Some sites have been completely enclosed with temporary wood structures covered with plastic sheets and tarpaulins or insulating sheathing.

A technique which appears to be gaining wide acceptance is the use of temporary shelters built of prefabricated panels which are covered with polyethylene plastic sheets. Often these sheet are of reinforced polyethelene to increase the life of the panel. The transparency of the plastic permits solar radiation to contribute materially to the heating of the enclosed space.

Partial enclosures are often used on structural frame buildings and consist of enclosed swinging scaffolds which may be moved from floor to floor.

Scaffolds on the outside of low-rise, loadbearing buildings are desirable. They provide a frame for enclosing the work. However, for the construction of tall loadbearing buildings, where overhand bricklaying is most often employed, special outriggers and tarpaulin or plastic covers may be used for protection.

The December 19, 1963 issue of *Engineering News-Record* contains an article, "In Winter: Under-Cover Construction Speeds Projects", by Robert F. Legget, Director of the Division of Building Research, National Research Council of Canada, in which the author describes "new techniques" used by contractors for winter construction in Canada. He indicates that the adoption of these techniques, together with a national educational campaign, has resulted in a steady advance in the amount of winter construction in Canada.

Dr. Legget states that cost figures show the slight extra cost for cold weather construction is more than offset by the time saved and reduced interest on caiptal. A survey by the Canadian Construction Association of over 100 contractors showed average extra cost of winter construction ranging from about ¾ to 1½ per cent, "but the extra revenue from earlier completion far more than offset the extra cost."

SPECIAL PRECAUTIONS

There are two reasons why masonry should never be placed on a snow or ice-covered base or bed. There is danger of movement when the base thaws. Bond cannot be developed between the mortar bed and frozen supporting surfaces.

If the walls are properly covered whenever work is halted, there should be no necessity for ice or snow removal from walls. However, in the event that the covering is displaced, the bed may be thawed with live steam or portable blowtorch, carefully applied. The heat should be sustained long enough to thoroughly dry out the masonry. If it is frozen or damaged, defective parts should be replaced before starting new work.

GUIDE SPECIFICATIONS

When planning protection, consideration must be given to the temperature trend (increasing or decreasing) as well as the outside air temperature. Protection which is adequate in mid-afternoon may not be sufficient during the colder predawn hours of the following morning.

Recommendations helpful to the specifications writer follow.

GENERAL REQUIREMENTS

Protect masonry units, cementitious materials and sand so that they are not wetted by rain, snow or ground water.

Cover tops of masonry at all times when work is not in progress. Cover shall extend a minimum of 2 ft down both sides, and shall be securely held in place.

Units with suctions in excess of ——g[1] per 30 sq in. shall be sprinkled with heated water just prior to laying. Water temperature shall be above 70 F when units are above 32 F. Water temperature shall be above 120 F when temperature of units is 32 F or below.

High-early-strength portland cement and type S hydrated lime shall be used in mortars and grouts. If type I portland cement is used, increase protection period from 24 hr. to 48 hr. Use type M (1:¼:3), S (1:1½:4¼) or N (1:1:6) mortar. Keep mortar temperatures less than 120 F to avoid flash set.

Grout shall be placed in masonry at a minimum temperature of 70 F and a maximum temperature of 120 F. The grouted masonry shall be maintained above 32 F for 24 hr following placement of grout.

Construction Requirement (masonry being worked on.)

Air Temperature 40 F to 32 F:

Heat sand *or* mixing water to minimum of 70 F and maximum of 160 F.

Air Temperature 32 F to 25 F:

Heat sand *and* mixing water to minimum of 70 F and maximum of 160 F.

Air Temperature 25 F to 20 F:

Heat sand *and* mixing water to minimum of 70 F and maximum of 160 F. Use salamanders or other sources of heat on both sides of walls under construction. Employ windbreaks when wind is in excess of 15 mph.

Air Temperature 20 F and Below:

Heat sand *and* mixing water to minimum of 70 F and maximum of 160 F. Provide enclosure and auxiliary heat to maintain air temperature above 32 F. Temperature of units when laid shall be not less than 20 F.

Protection Requirements (completed masonry or sections not being worked on)

Mean Daily Air Temperature 40 F to 32 F:

Protect masonry from rain or snow for 24 hr.

Mean Daily Air Temperature 32 F to 25 F:

Completely cover masonry for 24 hr.

Mean Daily Air Temperature 25 F to 20 F:

Completely cover masonry with insulating blankets for 24 hr.

Mean Daily Air Temperature 20 F and Below:

Maintain masonry temperature above 32 F for 24 hr by enclosure and supplementary heat, by electric heating blankets, infrared heat lamps or other approved method.

Cold Weather Masonry Construction Winter Building Techniques in Europe

INTRODUCTION

The demand for structures for housing, education, manufacturing, offices, and research is real and considerable. All of the acceptable indicators agree that this demand will persist and is likely to increase in the foreseeable future.

In order to meet this challenge, the building industry must train additional craftsmen and increase its manufacturing capacity. To do this is costly in terms of time and money. This should be and, to a large extent, is being done. In the meantime, the demand for buildings grows and costs rise.

There is a way to begin to alleviate the situation immediately through the more efficient use of the existing manpower and productive capacity of the building industry. By removing the seasonal fluctuation of demand for man-

[1] See section "Preparation of Masonry Units."

power, equipment, and materials that is an historic fact in the construction industry, more structures could be produced at lower cost and, for the present with the existing craftsmen.

One method of doing this is to utilize cold weather masonry construction methods. Current building code requirements and recent research on cold weather masonry construction are obtained in *Technical Notes*, No. 1 Revised, December 1967, entitled 'Cold Weather Masonry Construction, Introduction'. *Technical Notes*, No. 1A, January 1968, entitled 'Cold Weather Masonry Construction, Construction and Protection Recommendations', sets forth the SCPI recommendations based on this research and study.

This issue of *Technical Notes* is devoted to the present practice being successfully used in various European countries where they have employed 'Winter Building' construction methods, in some cases, for many years. This *Technical Notes* covers, in general, the winter building techniques and practices in Northern Europe. The purpose is to document the attitudes, planning, techniques, methods, and equipment that are currently being successfully used in that part of the world. It is hoped and anticipated that some of these methods, techniques, and equipment will be adopted or adapted for use in this country.

Typical European Programs: There are several orders of winter building programs in Northern Europe. Some are governmentally organized and supported; others are less official but equally as effective, being part of union contract agreements. In many of these countries, trade associations, design organizations, and, in some cases, government bodies are continuing research into technical and other aspects of winter building.

The United Kingdom has had a formal government program on winter building for approximately five years. The program was originated by the Minister of Public Building and Works in June of 1963 with the appointment of a technical group designated the *Committee on Winter Building*. At present, the program is administered by the Ministry of Public Building and Works, with the cooperation of the Building Research Laboratories and the advice of the *Committee on Winter Building* which includes representatives of the design professions, the building contractors, and material suppliers.

The Government of the United Kingdom is continuing research and investigations into improved methods, techniques, and equipment. In the meantime, they are promoting continuous building through educational efforts, project specifications, and limited subsidy as incentive for contractors. They also have a staff of advisors available for consultation and assistance to contractors and designers. A major effort has been the area of research, design, and development of suitable clothing for the British construction worker. The clothing is to be waterproof, warm, durable, and to allow freedom of movement. They have met with some success, but the work continues.

In Denmark, 'Winter Building' is a way of life. The Danes approach winter building in a logical and systematic way. The Danish system had its beginnings in construction labor union contract negotiations in 1908. It was at this time that the first 'rules' for a winter building site were set down. Most of the technical requirements of Danish winter building are based on long experience and research done by others.

The Danish government also actively promotes their winter building system through education, consultation, and, in some instances, increased term and/or amounts on mortgages for housing construction that continues through the winter.

In Sweden as in Denmark, continuous building is the accepted way. The regulations in Sweden closely follow those in Denmark with a few minor exceptions.

The Swedish government is also active in promoting continuous construction by means of education and consulting through the National Swedish Institute for Building Research. The government also has incentives of longer time or increased percentage of mortgage financing for housing that continues through the wintertime.

The Swiss have been engaged in extensive winter building for only a short time. As in other countries, this move was necessitated by a growing shortage of housing units. Even today they do not have the formal organization and government involvement in this field that exists in some other countries. The Swiss have performed some studies and have done some research in this field, but to date they are only actively engaged in issuing 'advisory bulletins' to architects and engineers through the Swiss Federal Materials Testing Laboratory (EMPA).

THE WINTER BUILDING SYSTEM

As practiced in Europe, 'Winter Building,' as the system is called, is primarily a matter of awareness and planning. For the successful pursuance of winter building, the planner must first be aware of the critical portions of the activity and how they may be accomplished. He then must plan for their occurrence within the schedule of the construction.

Among the critical operations of winter building in Europe are the concrete work and the masonry work. These are critical because they are subject to harm if not properly accomplished. Because they are widely used, their term and location are important to the schedule and completion of the structure. It is also true that masonry and concrete are usually employed together in a building or structure, making their successful use independent. For these reasons, this discussion will include the techniques and methods for both of these materials as they are practiced.

Planning and Scheduling: It is the practice, especially in Scandinavia, to plan and schedule the entire building operation from start to finish prior to beginning work. The length of operations and tasks are estimated and the critical areas, portions, or times are thus pinpointed. This is much like Program Evaluation Review Technique (PERT) and Critical Path Method (CPM) systems.

When the critical points of the building sequence are known and the starting date is established, it is immediately apparent which operations will have to be done in the questionable weather period. Thus plans can be made for protection or suitable working methods. At this point, the contractor places orders for materials and their delivery to fit the schedule and assure continuous operation.

Site.—A site plan of the operations is suggested in all cases and is required in Denmark. Preparation of this plan includes study for drainage, access roads, parking, workers' warm-up shacks, power sources, lighting, material storage, site operations, and heating. An example of a typical winter building site plan is shown in Fig. 1. This plan was adapted from the Danish Brick Association publication on winter building.

As shown in Fig. 1, the roads, parking area, stockpile of each material, the batching plant, material hoists, tower crane, office, and warming sheds are all carefully located. In addition, where snowfall can be expected to be considerable, there will be designated areas for the snow to be pushed and piled to keep from disturbing the building activity, the access, or parking.

The power source is located and installed, and the lighting and heating requirements are estimated. Also, the site is provided with any necessary drainage and roads to maintain access for men, materials, and equipment.

Excavations and foundations.—Every attempt is made to complete necessary excavations and foundations prior to the onset of winter, since building on frozen ground is not permitted. When this is not possible, the excavations are carefully dug, formed and dried out. Then, the excavation is covered with insulating mats to keep it dry and the earth unfrozen until foundation material is placed.

Figure 2 shows the foundation of an apartment building near Stockholm, formed and insulated, awaiting the placement of heated concrete. Attention is directed to the partially enclosed masonry apartment building in the background. Figure 3 shows a slab on grade being placed near Copenhagen, Denmark. As indicated by the steam, the concrete is batched with heated materials, placed, and immediately covered with 4-in. thick mineral wool enclosed in polyvinyl chloride waterproofing. The insulating blankets are approximately 40 inches wide and 10 feet long. These are called 'winter mats' and are widely used to hold heat in walls, slabs, and other building elements during construction.

Scheduling and Storage of Materials. One of the first acts of a contractor upon being awarded a contract is to place orders for his material needs and his expected delivery schedule. In some instances, penalty clauses are written into orders to assure continuous supplies of brick, mortar, aggregate, etc., as needed throughout the project. Also, in some instances, there is a winter discount for certain materials delivered between set dates. This suggests increased efficiency of the manufacturing process and of the transportation facilities.

Figures 4 and 5 show small job-site enclosures for the fabrication of formwork and reinforcing steel on an apartment near Copenhagen. Also, note the covered stockpiles of material.

Material delivery schedules may be altered from time to time, but there are required minimum notices for such changes.

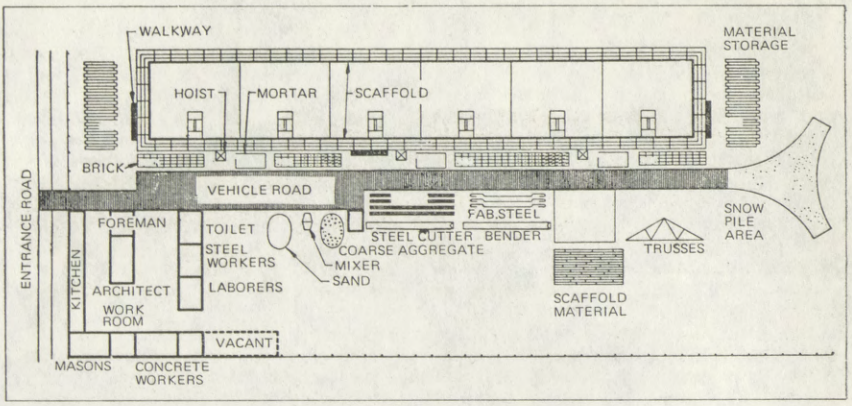

FIG. 1
Example of Winter Building Site Plan

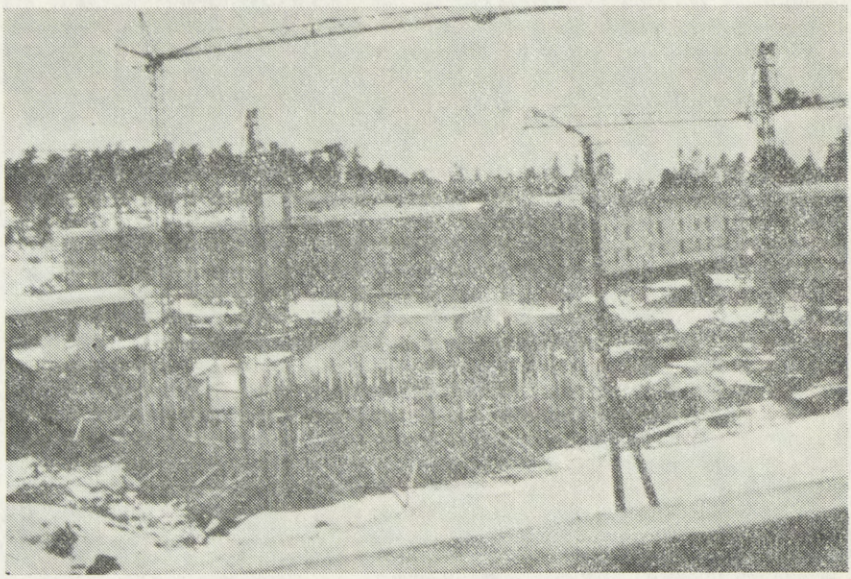

FIGURE 2

As a general rule, all masonry and concrete materials are stored on the site under cover, with the occasional exception of mortar and concrete aggregate which may be stored in open bins or areas only polyethylene film or tarp covers on the piles.

CONCRETE

Batching and Mixing.—Much of the concrete is mixed in a batching area on the project site. Sweden is the exception to this rule. In Sweden, concrete is plant mixed and trucked to the project site in open hopper trucks. There are certain limitations to this, depending on the air temperature, time, and distance to the project site from the plant. If the truck time is over on hour, it is recommended that rotating insulated drum trucks be used to reduce the heat loss

FIGURE 3

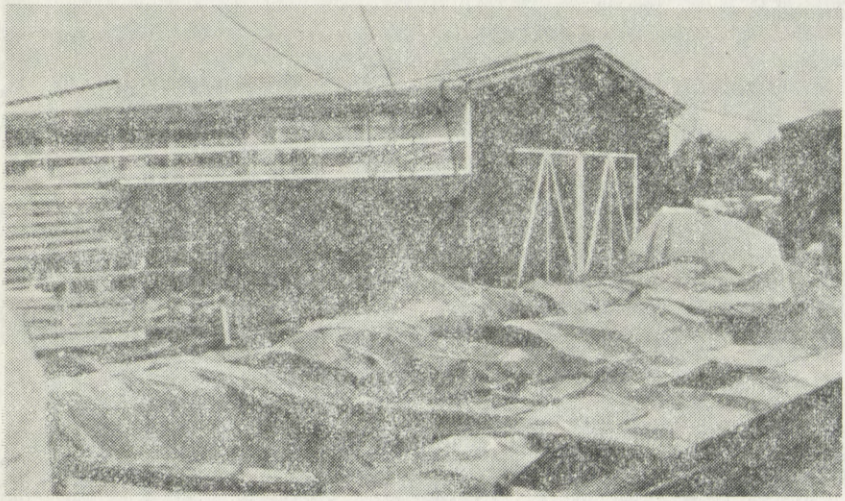

FIGURE 4

of the mix. To facilitate the rapid delivery and a continuous pour, the trucks often deposit the heated mix into an insulated, and often heated, temporary storage hopper at the site, from which the mix is distributed to the final placement apparatus.

Placing of concrete.—The placement of concrete is not unlike normal construction practices, except that the forms are carefully cleaned of ice and snow and warmed, usually with steam lances, and the resulting water is drained. Concrete is placed at the site by various means, including crane-lifted hopper

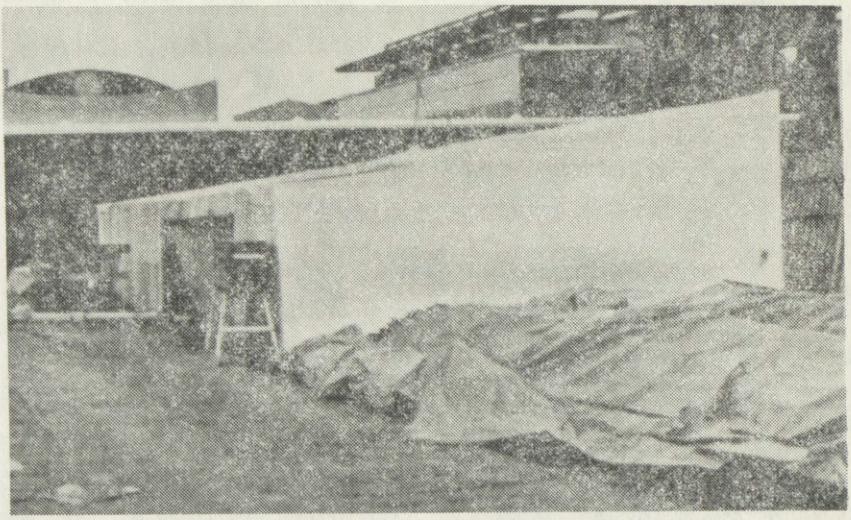

FIGURE 5

buckets, buggies, and, in some instances, wheelbarrows. Wood forms are widely used for their insulating value in holding the heat. When metal forms are used, more care is taken to warm the forms, and they are usually insulated with suitable coating to reduce heat loss during the critical period of curing.

As a general practice, columns, walls, and foundations are not enclosed and warmed with space heaters. Usually they are merely covered with insulating winter mats and allowed to cure.

This is not the case, however, with slabs and beams. They are usually covered over the top with insulating winter mats and plastic impregnated tarps and are heated by space heaters from below. This condition is continued for several days, depending on the mass of the section, and the temperature maintained.

Figure 6 shows a typical job-site concrete and mortar material storage and batching operation. Also shown is the building partially enclosed with plastic tarps; the interior is heated for the purpose of curing a recently poured concrete slab. Much less of this type of enclosure is needed in the usual buildings since they are normally masonry bearing wall systems where the exterior and interior bearing walls are in place and provide enclosure except for window openings. An example of this can be seen in Figs. 7 and 8, where the window openings are enclosed with polyethylene film and the central heating system is running to "dry out" the construction.

MASONRY

Masonry work in the "winter building" system offers very few problems. In general, the winter building system for masonry consists of: dry units, heated mortar, and minimum protection with covers or insulating winter mats.

Brick.—One important item that is required in all of the systems is the delivery and storage of brick to be dry and to remain dry until laid. For winter masonry work, units of higher than normal initial rate of absorption (suction) are permitted and, in some instances, recommended. The brick units are delivered dry to the project site. This is part of the supply agreements made early in the planning and scheduling of the project. The units are then stored in such a manner as to remain dry. There are several ways in which this is accomplished. In all instances, the brick are stacked on pallets that are raised off the ground. In Sweden, England, and Switzerland, for example, the stacks of brick are carefully covered with polyfilm or tarps weighted and tied to remain in place (see Figs. 9 and 10). However, the Danes use polyfilm covers that fit over one stack of brick on an individual pallet (see Fig. 11). In this manner, the pallets of units may be moved and distributed easily and still kept dry and protected.

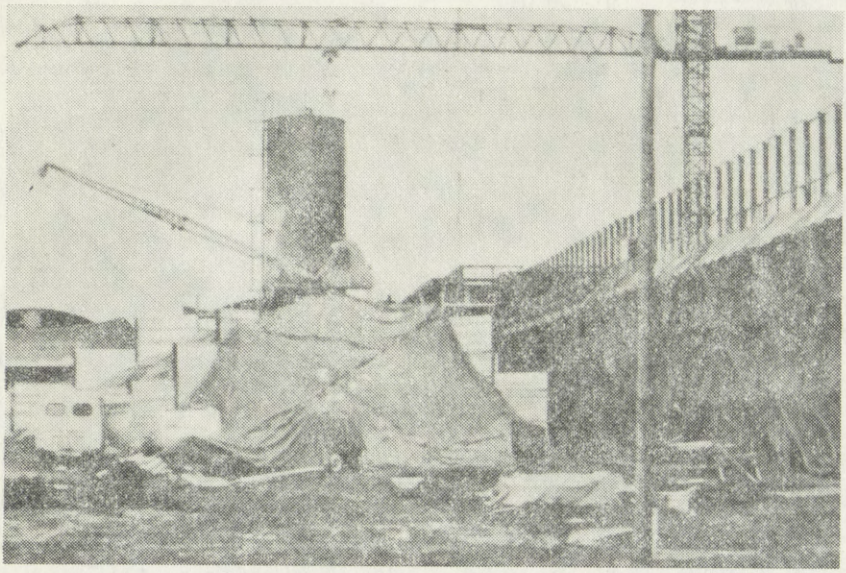

FIGURE 6

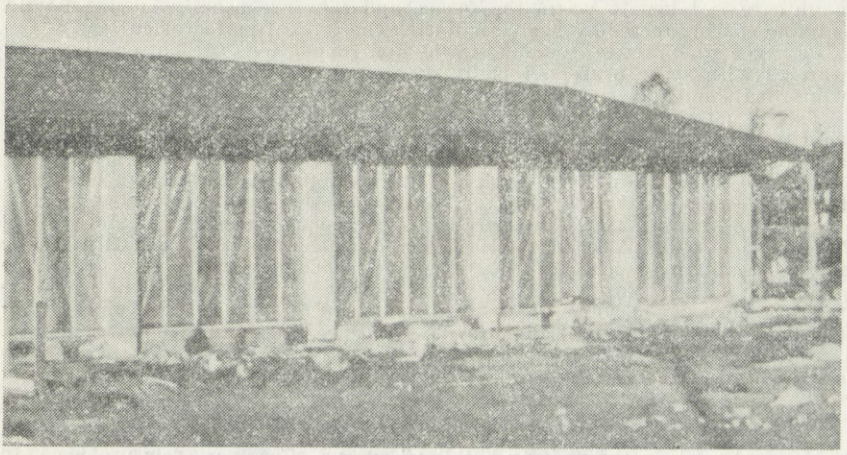

FIGURE 7

It is generally recommended that the temperature of the brick when they are laid be above 23 F. To accomplish this, in extremely cold weather one man arrives at the site early in the morning and starts one or more of the hot air blower-type space heaters, placing the end of a stove pipe or flexible tubing under the brick pile cover. This way, the entire storage pile is raised in temperature prior to the start of work. Note the blower and pipe in Fig. 9 that were used for this purpose.

Any units on the scaffold are returned to covered storage at night. Pallets are of a size that is easily handled with a small, one-man fork truck. One of these can be seen in the left of Fig. 10. Figure 11 shows the individual pallets covered with polyfilm "skirts" placed on the scaffold ready for work to commence.

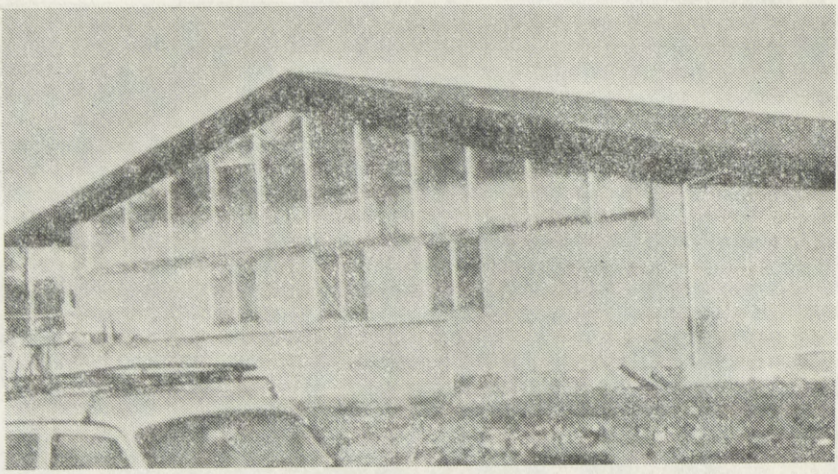

FIGURE 8

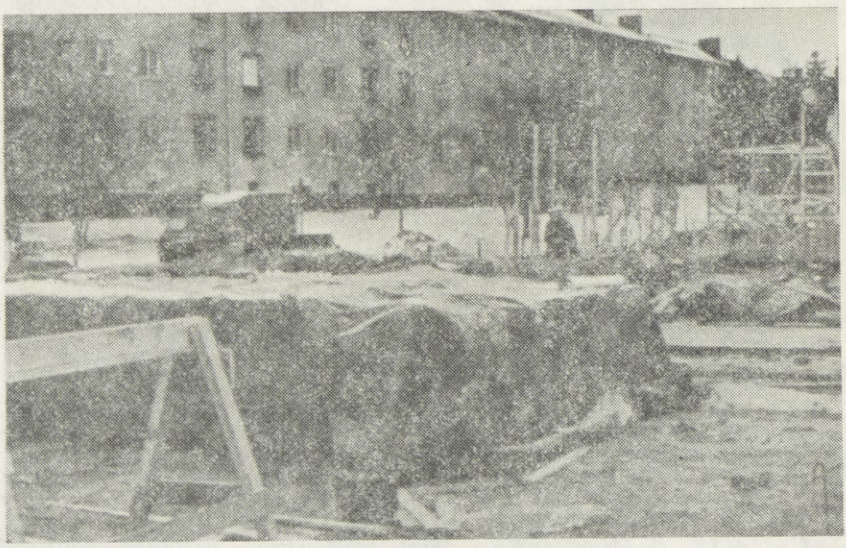

FIGURE 9

Mortar.—Cementitious materials for mortar are also carefully stored to remain dry. In most instances, an enclosed area is used for storage of the cement and lime and for the batching of the mortar. High-early-strength cement is recommended and used almost exclusively.

Figure 12 shows a mortar material storage and batching enclosure on a three-story brick schoolhouse near Copenhagen. Note the polyfilm-covered window openings in the completed portion in the background where the central heating system is being used to "dry out" the construction, and enable the interior finish trades to proceed.

Mortar is mixed using hot water and warmed aggregate. The combination of heated materials is batched and mixed on the site. The aggregate is generally

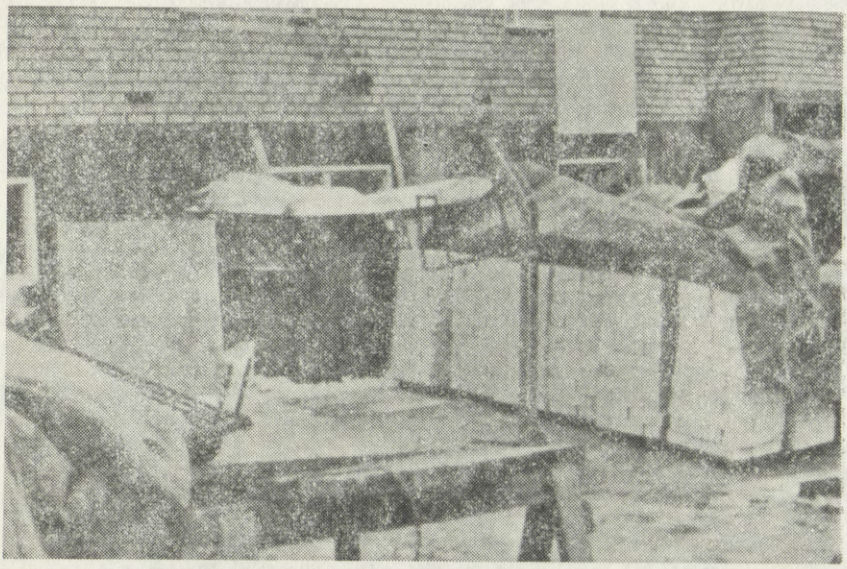

FIGURE 10

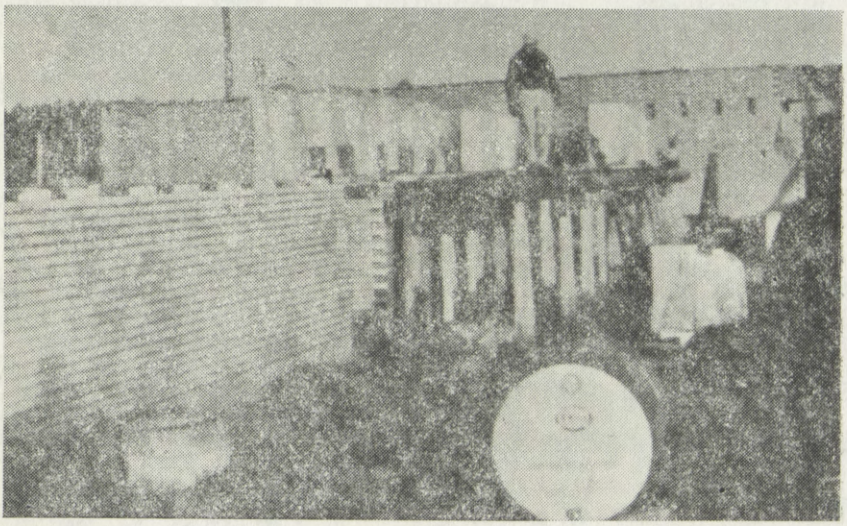

FIGURE 11

warmed with steam lances as shown in Fig. 13. The hot mixing water is drawn from the same source. Also shown in Fig. 13 are the measuring carts used in the careful batching process. Another type of batching operation is shown in Fig. 14. In this operation, the mortar materials are placed in the insulated and heated mixing hopper. There they are combined with heated water and kept until needed. As needed, the mortar is distributed through the gate into wheelbarrows, hoppers, or buggies.

The types and uses of mortar additives vary in several of the winter building systems. For example, in Denmark they permit the use of isopropyl alcohol up to 3 parts per 100 parts of mortar, but do not permit the use of calcium chloride.

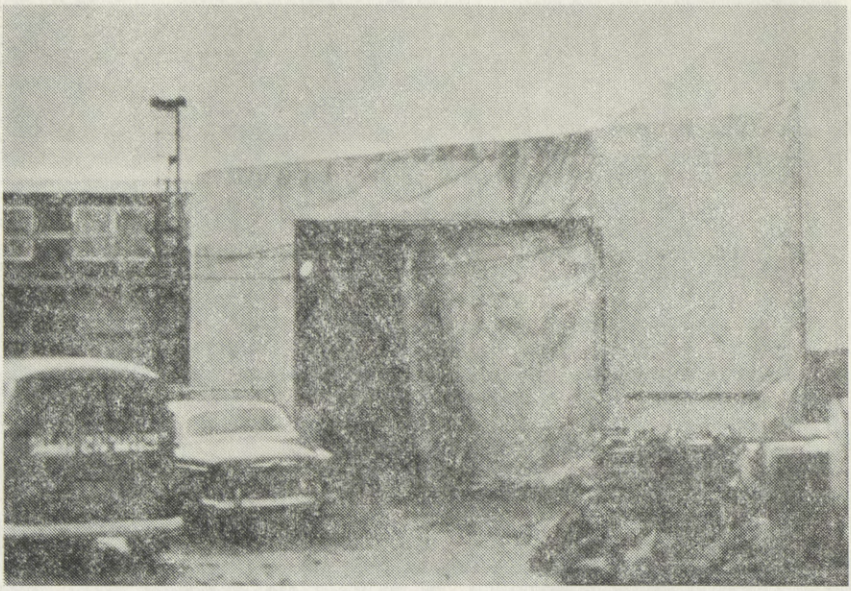

FIGURE 12

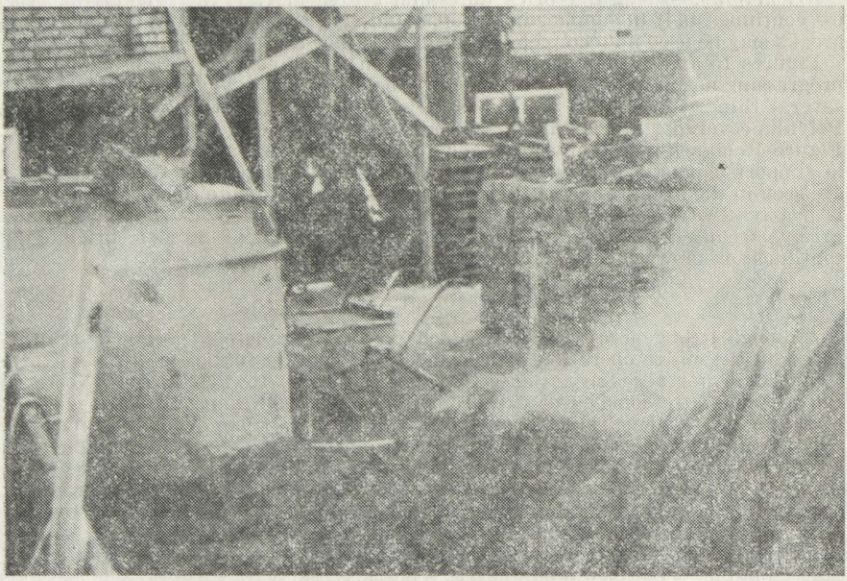

FIGURE 13

In Sweden, they permit the use of calicum chloride, as an accelerator, up to 2 per cent of the weight of the portland cement in mortar, but do not permit the use of alcohol. In Switzerland, they permit neither alcohol nor calcium chloride in mortar, but have developed other accelerators without calcium chloride that are permitted in some cases.

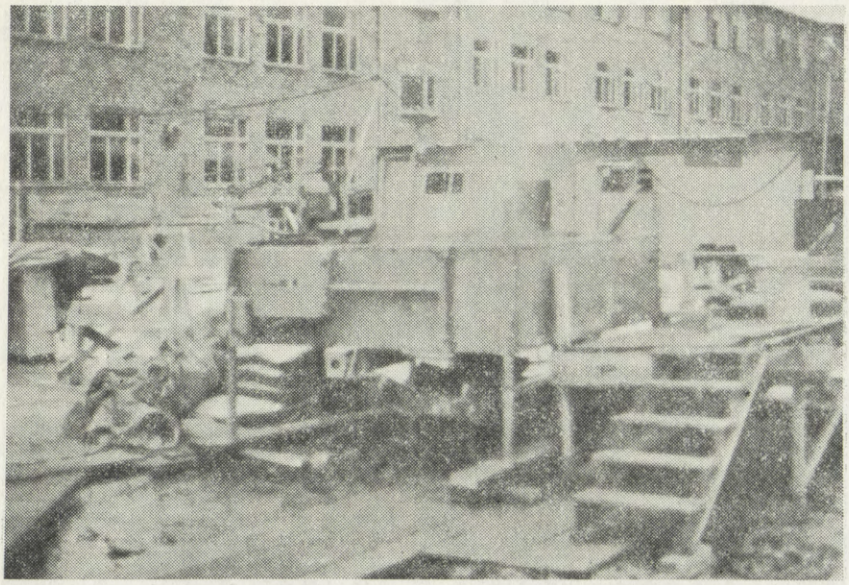

FIGURE 14

Bricklaying.—Using dry brick units and heated mortar, the bricklaying process continues as if in summer in the open and generally without enclosure. Windbreaks may be used but complete enclosure is rather rare.

Figures 15 and 16 show two project sites in Scandinavia where bricklaying is progressing normally at temperatures well below freezing. These two figures show several things of interest. The special clothing worn by bricklayers is evident. Polyfilm-covered stacks of brick can be seen distributed to the mason stations. Figure 16 shows poles being used for auxiliary lighting; these can also be used to support a plastic film windbreak if needed. Warning sheds for the workers are seen in the background of Fig. 15. It is interesting to note that work stoppage is nearly always the result of the comfort, or lack thereof, of the masons, and rarely is caused by technical issues. In the far north of Sweden, bricklaying continues, as shown in Fig. 17, down to 5 F without enclosure.

PROTECTION

Although it is generally acknowledged that the complete enclosure of a structure and the entire operation is desirable from many points of view, it is expensive and is not necessary. Consequently, the system that is used in Northern Europe generally consists of the protection of men with special work clothes; warm-up huts and warm food or drink from time to time, depending upon the temperature and weather conditions; provision for the erection of windbreaks; and provisions for keeping scaffolds, formwork, etc., free of snow and ice while the work progresses. Materials, as previously mentioned, are stored under cover; placed carefully (usually warm); and then protected by covering with insulating mats, tarpaulins, or polyfilm.

There are certain critical operations that entail special care or special methods that should be performed under cover. When necessary, they use various methods of covering part of the work for part of the time. One of these enclosures is shown in Figs. 18, 19, and 20, which are taken from Scandinavian publications on winter building. As can be seen from the sequence in Fig. 18, the building can be taken from foundations to roof, utilizing the same partial cover. It need not cover the entire length of the building, but may be moved from place to place to facilitate certain types of work in very bad weather. Figure 21 indicates an umbrella-type structure that may be of many shapes. The one indicated is a quonset shaped umbrella that can be picked up by a job-site crane and placed over any critical operation, and can be either heated or left unheated, merely enclosing the operation.

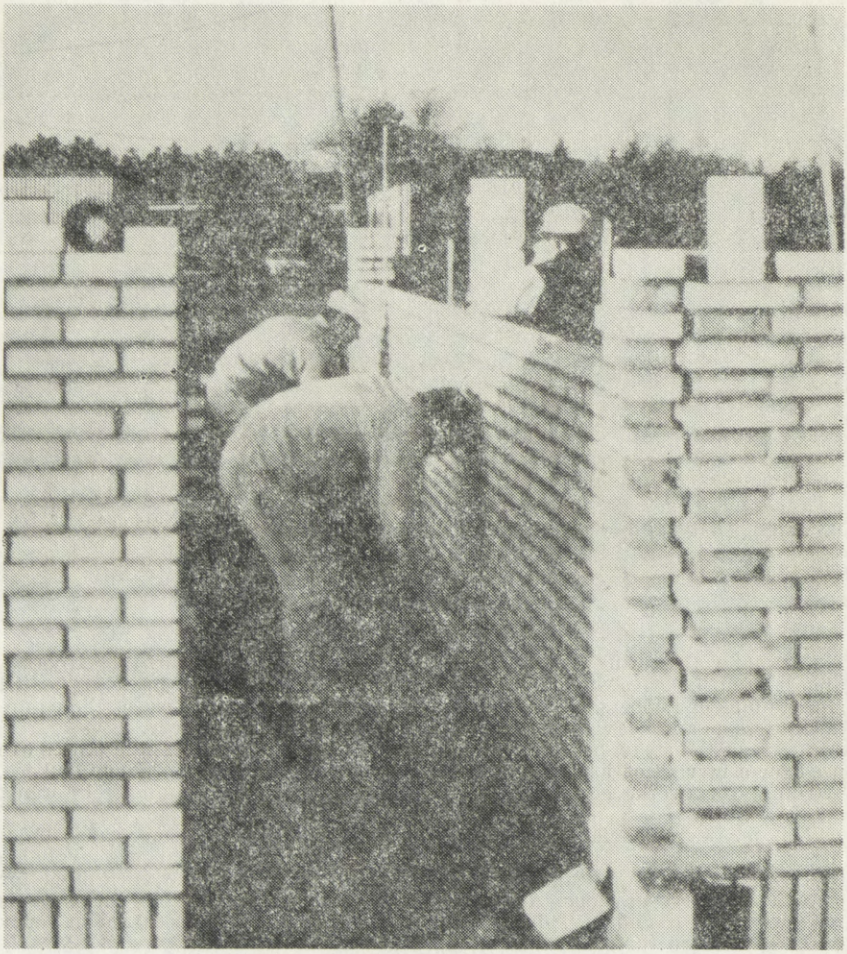

FIGURE 15

EQUIPMENT

The Europeans in their winter building activities make use of a great deal of specialized equipment. With a few exceptions, most of their special equipment consists of the imaginative uses of fairly normal and readily available building construction equipment.

Lighting.—The lighting types and methods available for winter building in Northern Europe are many and varied. As lighting is one of their most important and also most costly items, they have developed many alternative systems using all of the available energy sources—electricity, fuel oil, liquid propane gas, jellied alcohol, and others. In some equipment they make use of the light and the attendant heat of the appliance.

Heating.—The heating appliances and methods used in Northern Europe may be divided into two general classifications: (1) space heating; and (2) material heating.

For space heating they make use of all types of appliances that are available all over the world. Among these are salamanders, hot air blowers, and electric radiant heaters.

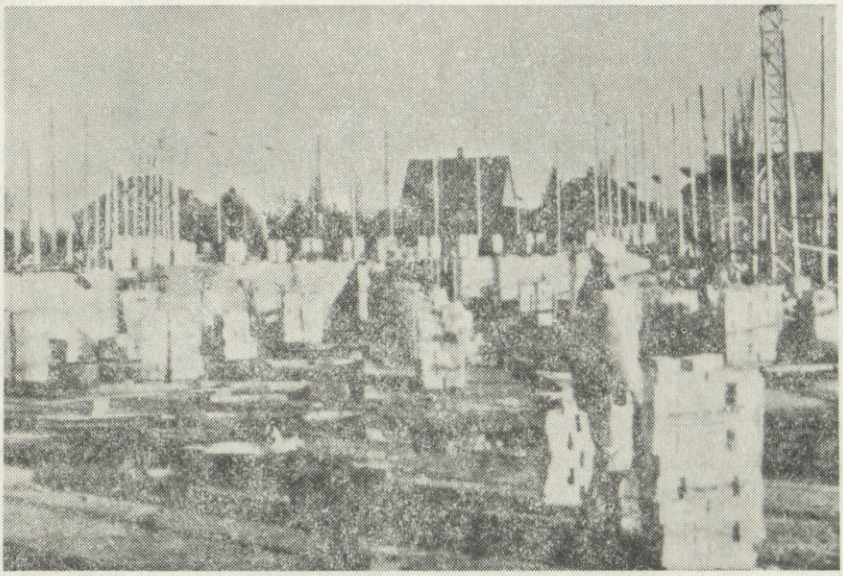

FIGURE 16

For material heating, except for brick which are warmed with hot air, they almost exclusively use steam and hot water. It is true they use electrical heated storage bins or hoppers for hot mortar or concrete; however, most of the equipment is steam and hot water boilers using many types of fuel energy.

A part of the steam-heating appliances is the "steam lance". These lances are used for a myriad of jobs—clearing scaffolding and formwork of snow and ice, warming formwork, heating aggregate and sand piles, cleaning reinforcing steel, etc.

Enclosure.—The enclosures that are used are for the most part normal scaffolding with outriggers and extenders similar to the types that are available everywhere. The Europeans are prone to use small portable enclosures for certain critical operations. An example of one type of portable enclosure is shown in Figs. 18 and 19. This type of enclosure is especially useful for masonry bearing wall structures, as shown in Fig. 20.

Covering.—The covering materials used are not particularly exceptional. They consist of polyplastic films, canvas tarpaulins, and plastic impregnated canvas tarpaulins. The one exceptionally useful covering they do have is the plastic film-covered insulated blankets—"winter mats".

Clothes.—In the area of winter work clothes the Danes and Swedes appear to be more advanced than others. The special clothing was developed through research. It is lightweight, water and moisture repellent, allows freedom of movement, and still keeps the wearer warm and able to perform his tasks safely. An example of the Danish bricklayer outfit is shown in Fig. 22. At the present time, these outfits are relatively expensive for the workers; however, they are finding wide acceptance.

ECONOMICS

The economics of winter building in Northern Europe are not directly comparable to a similar system were it put into use in this country. It might, however, be useful to examine the relative cost for their systems and thereby gain a working knowledge of the costs involved.

It is generally estimated in most parts of Northern Europe, including Scandinavia, that the cost of winter building ranges between one-half of one per cent of the total cost of the construction and five per cent. This considerable range of cost is the result of several variables. The starting date, the duration of winter, and the size of the project are among the most important. Concerning the starting date, winter building costs can be between one-half and one and

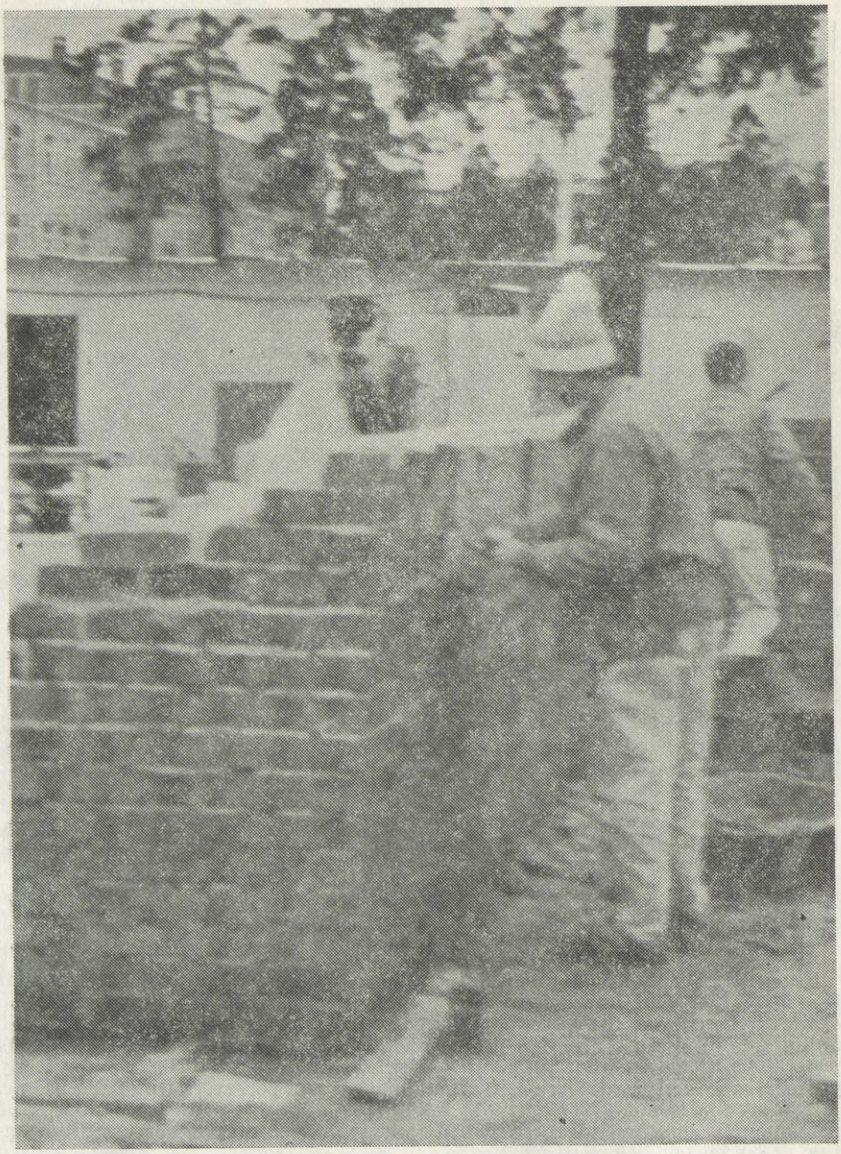

FIGURE 17

one-half per cent of total construction, providing that the schedule of work is properly handled; that is, that the site work, foundations, and excavations could be done prior to the onset of winter. The duration of the winter is primarily a factor of geography, and, in some instances in Northern Europe, winter may extend from October through April. The relative size of the project has a direct effect on the efficient and economic use of the materials and methods employed.

It is reported that up to 30 per cent of winter building cost in the northernmost countries is for auxiliary lighting alone, a factor that does not generally appear in winter building systems in the continental United States since there usually is ample daylight even in winter for a normal workday.

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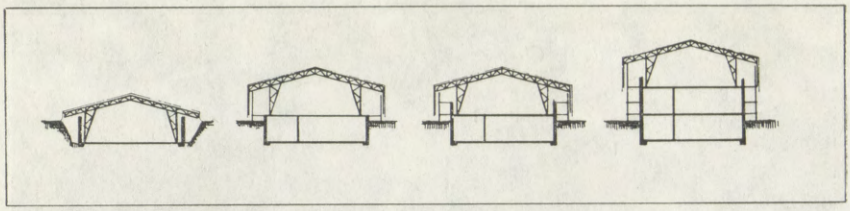


FIGURE 18

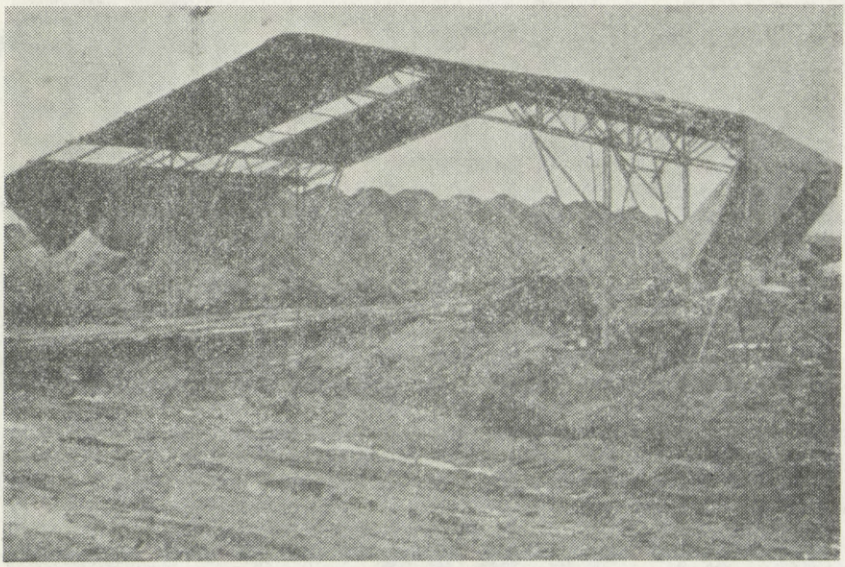


FIGURE 19

SUMMARY

The first most obvious reaction to the European winter building practice is that it is much less complicated and elaborate than expected. In spite of the duration of the winters and the extreme cold experienced in that part of the world, building is in fact a continuous process. This is true, in part, due to the various programs on winter building that in some cases have been in progress for many years. But it is also a tribute to the imagination and perseverance of the people.

The system is simply comprised of knowing what the critical operations or portions of a construction project are and planning for their successful execution under the conditions that are expected.

Masonry work and concrete work, which are widely considered as drawbacks to winter building in this country, are carried on successfully and at little added cost. Except for in the most extreme temperatures, below 5 F in the far north, masonry work continues in the open with dry brick, warm mortar, and simple covering. Concreting is accomplished with warm materials, insulated forms, and some partial enclosure with heat.

There is much that remains to be learned about cold weather or winter building construction, and research is continuing in this direction. However, with our present level of knowledge, the readily available equipment, and the European techniques, there is little reason for not doing more winter building in the United States.

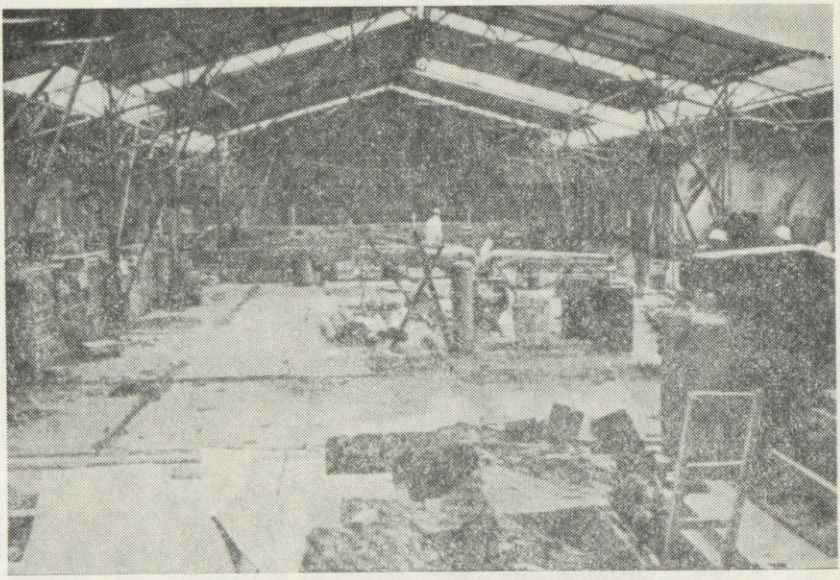


FIGURE 20

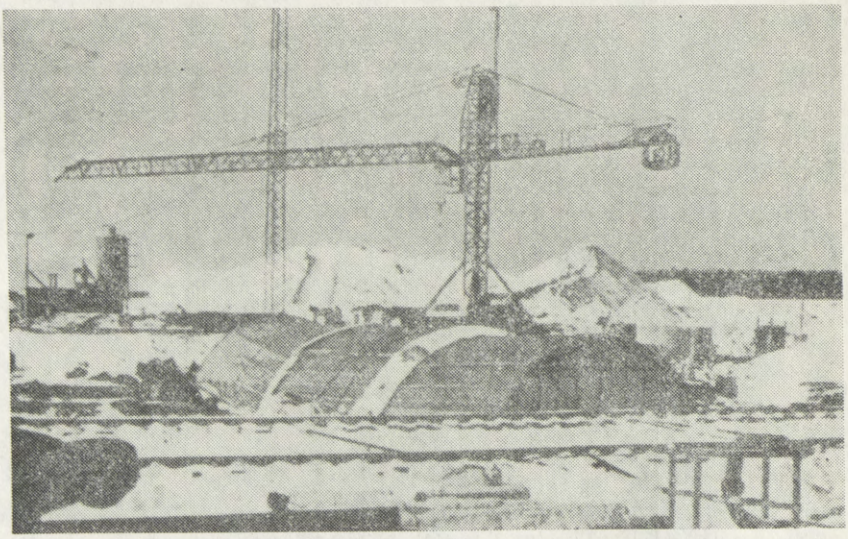


FIGURE 21

Mr. NAUMANN. It would be interesting for the chairman and members to see the number of places in the study in the answers from State highway departments, where they would permit the operations on substructures during the winter months, because ordinarily the substructure starts in a footing or excavation in an area you can heat. And in most cases you will note that the departments then preclude construc-

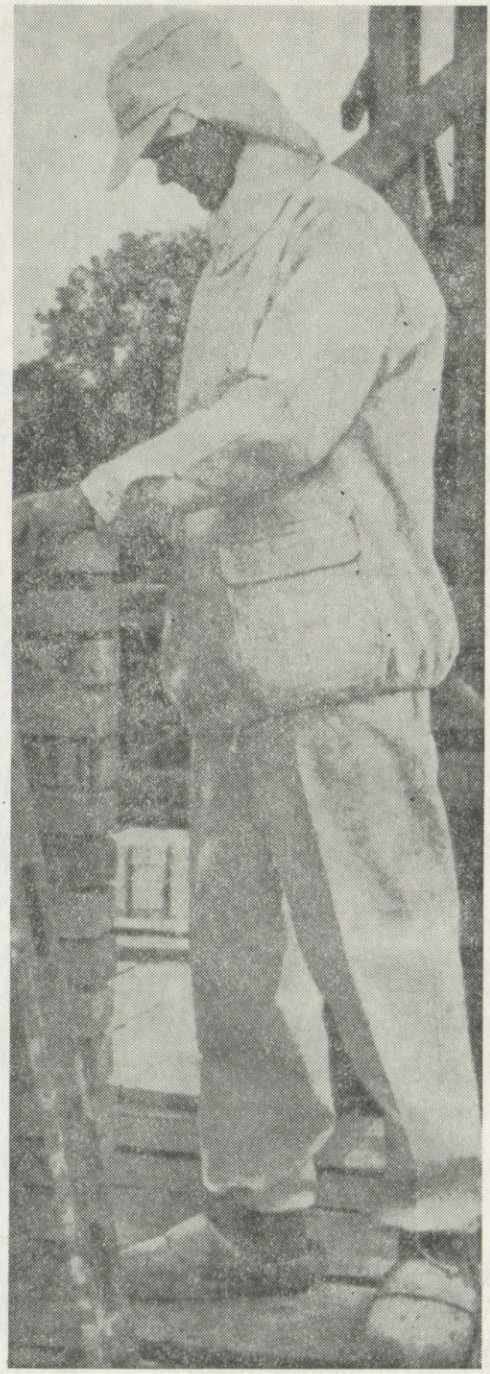


FIGURE 22

tion on the superstructure, by reason of the fact of the size of many interchanges and this type of structures, of the expense and impossibility in some cases of covering them over.

Obviously, you will see the members of States wherein there is a cold-weather problem that prohibits all types of excavation except rock, anything that requires any compaction. This is why I made the statement that conceivably one day, with the kind of effort that may well be directed toward this problem by this legislation, we may have a chemical additive that would remove the problem of excess moisture or frozen earth in the compaction process.

I think you will find a great deal of explanation as to why so very little has been able to be done within the highway and heavy type of construction, as compared to building.

Mr. O'HARA. Thank you very much, Mr. Naumann. We have enjoyed having you again.

Mr. NAUMANN. Isn't it a pleasure, Mr. Chairman, to have me in favor of something?

Mr. O'HARA. That is exactly right. I was looking forward to your appearance, and I don't say this because I thought we were going to be on the same side of this issue.

Mr. NAUMANN. We are.

Mr. O'HARA. Thank you.

I would now like to call our last witness this morning, Douglas Whitlock, who is the general counsel of the Structural Clay Products Institute.

Mr. Whitlock, if you will please take your place at the witness table, we will be happy to hear from you.

STATEMENT OF DOUGLAS WHITLOCK, GENERAL COUNSEL, STRUCTURAL CLAY PRODUCTS INSTITUTE

Mr. WHITLOCK. Thank you, Mr. Chairman.

My name is Douglas Whitlock and I am general counsel of the Structural Clay Products Institute which is an association of some 600 brick manufacturers in the country and we of course are greatly interested in seasonality in the masonry industry.

In order to conserve your time, like the other witnesses I have a statement which we could insert in the record and have attached to it certain exhibits that I think would be of advantage to the committee.

Mr. O'HARA. Mr. Whitlock, without objection your statement will be entered in full at this point in the record and the enclosures immediately following the statement.

Mr. WHITLOCK. Thank you.

(The statment follows:)

STATEMENT BY DOUGLAS WHITLOCK, GENERAL COUNSEL, STRUCTURAL CLAY PRODUCTS INSTITUTE

Mr. Chairman, I appreciate the opportunity to be able to make this statement before the Committee on Education and Labor, House of Representatives.

We in the masonry industry are very pleased that the Select Subcommittee on Labor is examining the effects of seasonality in the construction industry. We estimate that in the masonry industry alone approximately 800,000 workers are employed. This includes bricklayers, laborers, mason contractors—plus 30,000

employees of 600 clay products manufacturing plants and 30,000 dealers and salesmen.

It is appalling to realize that America's largest industry, the multi-billion-dollar construction giant each spring performs a primitive rite that follows the same pattern year after year. After a winter of inactivity, suddenly spring arrives and millions of people, architects, engineers, contractors, manufacturers, craftsmen and laborers leap into a state of confused action, attempting to make up for at least some of the three or four months they have just squandered.

This kind of operation is expensive, chaotic and largely unnecessary.

In the light of current technology—which makes it possible and practical to continue building operations the year around, construction is reduced to a pleading tradition. It is a wasteful tradition; and the waste of human resources is so great that it is difficult to measure. For example—here are some of the problems facing a brick and tile manufacturer. Every fall he must prepare for a winter slow down because building activity is curtailed. Most of his employees are laid off for several months depending on the duration of unfavorable weather. This is not his only problem. It takes time to gear up production once building activity begins. Therefore, out of necessity he is required to have large storage facilities in order to carry huge inventories if he is to service his clients promptly.

If he has read his crystal ball properly he will have enough of the right kind of material to satisfy the demands of his customers. Many times he guesses wrong, which results in further delays to construction or loss of business to him.

If the traditional construction pattern were changed from a seasonal operation to a year around operation—just think of the economies manufacturers and suppliers could achieve through more efficient production, inventory and shipping operations. Waste could be eliminated throughout the industry. Architects and engineers would benefit by a more regulated year around construction activity, rather than eight-or-nine-month haphazard operation. Contractors, by working year around could stabilize their overhead and manpower requirements. Owners would benefit by having their projects completed several months earlier than is possible at present.

There is no question that the cost of "seasonality" is enormous. A study by the Department of Commerce found that the annual loss to the construction industry due to weather is a minimum of $3 billion and a maximum of $10 billion.

The masonry industry has been greatly concerned about this problem for several years. We don't know all the answers but we are learning, and as we discover new and proven technology, we are changing our recommendations and keeping each other informed. The Mason Contractors Association has carried on outstanding work in conducting seminars to inform their members on all the methods for covering buildings with the many kinds of lightweight, transparent plastic materials that are available, also the many kinds of scaffolding methods used for temporary shelters, how to care for their materials, equipment and machinery in bad weather, how to operate portable heating equipment that is available, which is safer, cleaner and provides healthier working conditions for construction workers, than the old type coke or oil salamanders.

We have all joined together, the Mason Contractors Association of America, The Bricklayers International Union, The Laborers' International Union, The Concrete Masonry Association, The Portland Cement Association and The Structural Clay Products Institute, in joint cooperation through the "Masonry Industry-All-Weather Committee". This Committee is studying the "State of the Art" and reviewing all of the available technology so that our industry will have the most efficient and economical information to build in all kinds of weather. Winter time is not our only problem. We also have the problem of protecting men and materials during wet weather and excessive heat.

As a further contribution to the effort of obtaining information and finding answers to our problems the Structural Clay Products Institute is continually researching methods of All Weather Construction. This includes research into the effects of freezing and thawing, and the effects of heat and moisture on brick and mortar in building practice. This past year we have sent our engineers to Europe to investigate European methods of All Weather Construction. We also have documented a field study we made on winter construction in Boston.

Because of our findings to date we have issued new recommendations for masonry construction in cold weather. Copies of our recommendations, our field study and our European investigation is attached to this statement.

I have briefly explained to you industry action now underway within the masonry industry. I would also like to inform this Committee that steps have

been taken to stimulate concern and action by the entire construction industry regarding this problem, by the Building Research Advisory Board of the National Academy of Sciences. BRAB conducted a Research Correlation Conference April 30 and May 1, 1968, on Year-Round/All Weather Construction. This Conference was attended by all segments of the construction industry, both government and private. The subjects that were covered included weather forecasting as a tool, state of the art experiences, economics of year-round/all weather construction and application considerations. The proceedings of this Conference will be published in the near future and will contain a wealth of information to all concerned in this matter.

It is needless for me to point out to you that the future of the brick and tile manufacturers depends on the prosperity of the masonry industry. This brings me to another extremely important matter. A matter that is also of concern to your "Committee on Education and Labor", and is very relevant to this whole question of seasonality. This is the matter of manpower.

The brick and tile manufacturers have suffered in obtaining sufficient workers to manufacture brick because of seasonal lay-offs. Because of the many job opportunities that exist today, most workers can obtain steady year around work, and do not have to rely on seasonal employment. Many of our manufacturers have to rely on students in the summer months and because of hazards involved, they can only employ them in certain non-hazardous occupations around the plant. This is causing many of our manufacturers to go to automated manufacturing operations. In fact, one, General Shale Products, Inc., has recently constructed the first fully automated brick manufacturing plant in the country, at Knoxville, Tenn.

Beyond this we also are dependent on the supply of bricklayers. In the last few years we have observed a sharp decline in the interest shown by young men in following bricklaying as a career. Many start out as apprentices and soon drop out when they experience lost time due, largely, to weather. Our industry depends on an adequate number of trained bricklayers to service the manpower needs of the industry. If the shortage becomes more acute, we will be forced to enter into more expensive, pre-fabrication methods of getting brick into the building wall. Some countries in Europe, especially Denmark and France, have found themselves in this position because of bricklayer shortages. You can readily understand why we are so concerned about seasonality. We need year around construction to attract and hold necessary manpower.

The United States Government certainly has a stake in this whole matter, because of their large dollar expenditures for public construction. If this wasteful method of construction is costing 3 to 10 billion dollars, as the Department of Commerce claims, then many of those dollars are taxpayers dollars.

Our industry is taking positive action in developing technology to eliminate "seasonality." Therefore, we welcome and support an investigation in this matter as called for in Bill H.R. 15990. The technology that is available can be used by government construction agencies in scheduling their construction projects year around. They can also help us in developing better technology. This will save taxpayers money, not only through efficiency, that can be achieved through continuous scheduling, but will keep craftmen and laborers more fully employed and off unemployment roles. It will also make construction careers more attractive to the youth of America.

Economies of Year-Round/All-Weather Construction as Viewed by the Building Owner

(Otto L. Nelson, Jr., Vice President in Charge of Housing, New York Life Insurance Company at Building Research Advisory Board Conference, Mayflower Hotel, Washington, D.C., May 1, 1968)

The financial advantage of all-weather construction, whereby a building is completed and becomes income-producing sooner, is so obvious that it hardly needs to be stressed or belabored. Too often, however, the obvious is overlooked and it is therefore understandable that the delays and stretch-outs in the building construction cycle are often accepted as inevitable. Any possible savings from better performance in this area is cynically regarded by many as illusory as the pot of gold at the end of the rainbow.

Theoretically, everyone in the building industry plans his work but only infrequently does one make the plan work. It can be argued that if we could only eliminate work stoppages or delays resulting from weather conditions, then we

could and would lick all of the other obstacles, such as delayed delivery of materials or shortages resulting from strikes in plants of building material suppliers. Naturally, the elimination of weather conditions as a factor in construction progress will not automatically solve all the other delay problems that beset the construction industry. It might, however, reverse the trend which seems unmistakably clear—which is that in all construction scheduling, more and more time is allowed as a necessary factor of safety because of all the delays seemingly beyond one's control that plague all our building activities.

It might be useful to spell out some of the savings that could and should be made if all unnecessary delays could be eliminated. At least this will give us a goal toward which we might work and will remind us of possibilities that most of us have forgotten. To be as specific as possible, I propose to take as an example the construction of an 18- to 20-story apartment building with a total estimated completed cost of about $7 million, including a land cost of $700,000.

Starting off with land assembly, one should—if one could plan on an optimum basis—secure a 90-day option to purchase the site, during which time all the necessary market surveys, financial analyses, and preliminary plans could be completed. Allowing nine months as a reasonable time to complete plans and specifications, the optimum cost of carrying the land up to the development period might be around $15,000 for the option and $35,000 for taxes and interest-carrying charges for the six months of ownership. Here, then, is a total cost of carrying the land up to the beginning of construction of about $50,000. Very often as much as a year and a half elapses between the time the land is acquired and the construction contract is awarded. In such a case and using our assumed example, this would entail a carrying cost of about $105,000 if you assume that real estate taxes and interest-carrying charges are about 10% annually—which is on the low side. Here, then, is a possible savings of about $55,000 which, of course, has nothing to do with time economies during the construction period.

Next comes financing, a procedure which typically is very time-consuming. First, one usually arranges a commitment for the permanent financing with or without an FHA insurance provision. This traditionally involves much red tape and an excessive time delay but let us not belabor this or try to put a dollar cost on this phase. It should be noted, however, that very often the permanent financing arrangements require a 70% to 90% occupancy rate before the permanent financing can become effective.

The costs of construction financing naturally vary with the times and with the credit rating of the owner-developer. During construction there is the greatest risk, and the loan rate generally reflects this. In addition, the cost of the construction includes the payment of such normal costs as title insurance premiums, attorneys' fees, inspection and certification fees to engineers, architects, etc. Frequently, the interest rate is equal to the note rate on the entire note amount from the date of closing to the take-out by the permanent mortgage financing. For instance, in our assumed example, if a construction loan of $6 million was negotiated at a current rate of 7½%, the developer would pay interest equal to 7½% on the entire $6 million, commencing on the date of closing even though the $6 million would be funded over a period of time as construction proceeds. The effective yield of such a construction loan would be determined by the average daily balance during its term. Because of slow starts and low initial draw-downs, it would be rare if on the average the average daily balance would be 50%, which is to say that on the average, $3 million would be outstanding during the entire term. This, of course, would mean that the effective yield would be 15%. To the developer, however, the yield rate is not nearly as important as the absolute dollar cost which would be $450,000 on a one-year basis, $675,000 on a year-and-a-half basis, and $900,000 on a two-year basis.

Let us leave for a moment these construction financing costs. What is pertinent for our discussion is the construction time period. Ideally—and this is admittedly a highly controversial judgment, one could assert that our assumed apartment project could and should be completed in one year. On the basis of our present average performance in the northeastern portion of the United States, at least two years would be required or at least must be planned from the time construction starts until the date of tenant occupancy. This is a terrific gap between what is and what might be. In our assumed example the difference in construction financing costs varies from $450,000 for a one-year construction period to $900,000 for a two-year period. Percentagewise, this of course means that here is a potential cost savings of 7.5% or $450,000 if we

could manage to reduce the construction time period from two years to one year. It is perhaps too much to expect that the perfection of year-round/all-weather construction techniques by themselves could produce such an improvement. Conversely, however, it is not too much to hope that, if we could first eliminate weather delays and then progressively move ahead to make additional improvements by tight scheduling and by eliminating work stoppages and material delays, we could make such substantial economies and reach such a goal.

Returning to our apartment development project, let us dream a little on how construction and occupancy should proceed. If we could prescribe an optimum schedule, the owner-developer would determine on a site on July 1st and secure an option to purchase at that time. Time for market analysis, preliminary plans and specifications, permanent and construction financing hopefully could be completed by December 31st. Completion of detailed working drawings, financial arrangements, the taking and analysis of bids might permit a construction contract to be awarded March 1st. Ideally, it should be possible for construction to be completed in 13 months or by the following March 31st. This then would provide an ideal occupancy period starting on April 1st, and if the project was well situated and designed, it could be fully rented and occupied by June 1st. This assumed 13-month schedule is fantastic and would leave the typical operator shaking his head in proper disbelief.

Let us now be a little more conservative and take a construction period of 17 months. As was assumed in our previous example, this would mean the closing of a 90-day option to purchase on July 1st, intensive study and work to complete the market analysis, detailed plans and specifications, financing arrangements and an award of the construction contract by March 1st. With a 17-month construction cycle, the apartment building would be available for occupancy by August 1st of the following year. In comparison with present performance standards, this would be an excellent accomplishment. However, you will note that a 17-month construction cycle increases the financial carrying charges by $150,000 as compared to the 13-month cycle.

At this point it may be appropriate to comment on two important considerations in apartment house construction and marketing. Ideally, all builders would like to be able to begin construction as early in the spring as possible, say March 1st. From the viewpoint of real estate management and marketing, the preferred time of completion and occupancy of an apartment building is early spring. Early fall completion is a second choice. July and August are typically slow months in renting or selling as is the period between Thanksgiving and Easter. Thus it follows that in our 13-month construction cycle example, a two months' tolerance is present. If this time schedule is missed, then insofar as renting or selling is concerned, you might as well accept the 17-month cycle with a two months' tolerance. Similarly, if you cannot make this limit, you might as well settle, insofar as marketing is concerned, on the 24- to 26-month construction cycle.

As would be expected, the financial carrying charges can and do vary very substantially with the variations in construction time. Thus, in our example, a 24-month construction cycle involves financial carrying charges that are $412,500 higher than the 13-month cycle and $262,500 higher than the 17-month cycle.

My personal judgment is that based on today's average or typical perforance, a 24-month construction cycle would be normal. Superior performance, fortuitous circumstances, and a considerable degree of luck might enable a good builder to do it in 17 months. Improvement in all-weather construction techniques, tighter work and material delivery scheduling, and the elimination of work stoppages and delays in material delivery should make possible a 12- or 13-month performance.

There are, of course, many other costs in addition to the financial carrying charges that result from construction delays. Certainly a very high dollar penalty is incurred as the price of wasted construction time. Local assessors are prone to place a progress assessment on a building under construction, so real estate tax costs become an additional financial burden with a stretch-out of the construction period. Likewise, the developer must begin his renting or selling promotion program long before the building is completed, if he expects to rent or sell his apartments quickly. Also, the renting or selling program must be started as early as possible if, as is frequently the case, the take-out permanent financing must await the achieving of 70, 80, or 90% occupancy. Thus, the vagaries of weather in delaying construction progress can prove costly, particularly to the extent to which you must allow a time factor of safety in establishing

firm move-in dates and a complicated move-in schedule if your renting or selling promotion has gone well.

Just to round out the picture, let me mention briefly some other building construction costs that are needlessly increased when weather or other circumstances delay construction progress. Even though this intrudes on what other speakers have covered, it is worth repeating the list of costs that continue when construction is stopped or delayed. These are:

1. Supervisory, field engineering, and timekeeping staff costs;
2. Watchmen, standby electricians, plumbers, steamfitters, and hoisting engineers;
3. Equipment rental;
4. Electric power, water, fuel, and telephone costs;
5. Insurance, storage charges, and miscellaneous;
6. Cost of protecting from the elements partially completed construction.

Obviously, there is tremendous room for improvement in shortening the construction period. No one expects that perfection can be achieved or that human beings will not continue to act like human beings instead of infallible machines. Nevertheless, the point that I would like to emphasize is that with interest rates at an all-time high and with little prospect of their going lower, there are greater rewards today than ever before in reducing the construction period by improving all-weather construction techniques. Finally, if substantial improvement can be achieved in this area, one might look forward with considerable optimism to similar improvements in scheduling, in eliminatng delays resuiltng from material shortages or delivery failures, and in reducing work stoppages resulting from either direct or indirect labor disputes.

Mr. WHITLOCK. I think in the interest of time I would like to point out about four or five points in my statement that I would like to call the committee's attention to.

In the first place the producers of building materials like labor and the contractor have a great deal of interest in this whole question of seasonality and are greatly affected by the seasonality of construction.

Sometimes overlooked is the fact that a producer has to produce his materials and be ready to supply the building industry when they are needed. We find ourselves having a winter slowdown in production which means layoffs of workers.

We also have to gear up again in the spring when this rather wasteful and traditional way of the industry begins to take place and our gearing up of course is costly and we have to find labor to replace those laid off.

To try to overcome that we build inventories about which we have to do a lot of guessing because you don't know exactly what your requirements are going to be.

All of this adds labor difficulties, cost difficulties, and business difficulties. If our demand could be spread over the whole year to eliminate seasonality would be very helpful.

Another important point that I want to call to your attention is an exhibit which is a statement by the Department of Commerce which says that the total U.S. dollar loss due to weather was quantitatively evaluated at a minimum of $3 billion annually. The maximum dollar loss was estimated as high as $10 billion. This is a governmental developed cost figure that the Department of Commerce in their document on weather in the construction industry has furnished us.

Now a third point is that we in the masonry industry have had a great deal of interest in seasonality for a great length of time. We have research facilities. We have research personnel. We have engineering personnel. We have had them all studying ways and means of improving masonry construction and trying to make it a year-round operation.

We have been studying the lightweight materials of the plastic

industry, scaffolds, heating equipment, and so forth. We have prepared guidelines for handling of our materials in inclement weather. We have inserted these in the record with our statement.

We have given these guides to the designers and to the contractors.

In this past few months we have sent one of our engineers to Europe to study cold weather masonry construction in Europe and his report is also attached to my statement and I would respectfully call the attention of the committee to these efforts.

We find that there is a lot more to be done and we are going to continue to work at it but we have been exerting all the effort we can in the research and engineering field to supply the contractors, architects and engineers, and labor with material to solve this problem.

Another point that I mention in my paper is that as a member of the Building Research Advisory Board, which is an arm of the National Academy of Sciences, we have been interesting them in this problem and in the past 2 months BRAB held a very comprehensive seminar on all-weather construction in which all phases of the industry were present and discussed this problem.

We find that this seminar has created a great deal of interest throughout the entire construction industry both in government and industry and I certainly recommend the committee's attention to that report which will be in print very shortly.

But basically our interest as brick manufacturers is that our profits and our success depend upon the welfare of the masonry industry.

We are completely dependent upon the masonry industry and of course we have joined with the bricklayers, the Portland Cement Association, the Masonry Contractors Association, and have formed a committee which is working to try to solve the masonry problem.

We think that this is going to effectively help the masonry industry, but as was pointed out this morning the mason contractor cannot carry the whole load and there should be thought given to spreading it over the other trades and other materials in the building.

Someone asked a question, I believe you did, Mr. Chairman, what the cost of this is. In one of these documents included with my statement, a mason contractor in Boston who uses all-weather construction says that the cost was about 1 percent of the contract cost. He keeps very accurate records and in this study which we have put into the record he estimates about 1 percent.

We are very interested in H.R. 15990 and the possibility of a study.

We also want to call your attention to a fact that has been noted in the press, and I think there is some semblance of truth to it, that there is a pending consideration of an Executive order to stimulate all-weather construction in the Government departments.

We believe that this would be an effective way to get the Government departments, and the Secretaries that Mr. Naumann was talking about, involved in this whole problem. If there was such an Executive order to give consideration to seasonality of construction it would greatly accelerate the study.

Mr. O'HARA. On that point, I have examined the proposed Executive order. It seems to me to make a great deal of sense. I would think it would make a considerable contribution to the solution of this problem.

Mr. WHITLOCK. It certainly would be a tremendous help to all of us who are trying to solve this problem to have the Government agencies required to consider the seasonality problem and work with us to the solution.

Mr. O'HARA. Maybe we ought to pick up the Executive order, put it in bill form and try to put that through. That might have a good effect.

I was interested in the European experience that you comment on in your technical notes, 1–B, published in May of this year.

You point out, and in your summary it is made very clear, that, while there is much that remains to be learned about cold weather building construction, with the present level of knowledge and the will to do it, a great deal could be done.

Mr. WHITLOCK. Right.

Mr. O'HARA. In other words, it isn't so much a lack of available knowledge and techniques as it is a continued resort to the ways of the past and a sort of inertia, a reluctance.

Mr. WHITLOCK. That is true. I think that we can continue to improve on the methods we now have and we are certainly going to continue to research improvements in methods and in chemicals and so forth to improve the job, but we find basically the problem mentioned here of the egg and chicken. It is a highly competitive field, the construction industry, and when you are bidding on a job you try to cut all costs you can and, unless it is specified that there have to be techniques for all-weather construction, it is bypassed, it is forgotten regardless of cost because the bid is on the initial bid where if it were in the specifications and the contractor had to bid it in, it would probably be more effective.

Now, if the Executive order would require some specifications of that sort the Government could set the pace for private industry.

Mr. O'HARA. Well, now, the fellow from GSA who was here yesterday suggested a very simple solution, not a full solution, but a very simple step that would certainly enhance our knowledge and give us a little better focus on the problem. He said we could of course use alternatives.

In other words, when we are letting a contract for the construction of a building we could ask for a bid for 8 months' completion or for 2 years' completion.

Then you could ask whether you are going to curtail operations in the winter or if you are not going to curtail operations in the winter in addition to the advance completion date and then the Government of course has the option of accepting under either alternative.

My hunch is that if contractors were faced with having to really get out a sharp pencil and figure these things out in order to be the successful bidder, we would soon discover that the bids would be very little different under either option. I don't think the added cost would be too great.

Mr. WHITLOCK. I think that is true. There is also a factor in the savings in carrying charges which is indirectly related to contractors' costs.

Mr. O'HARA. They would start finding them.

Mr. WHITLOCK. The difficulty I find with Government contracts is that they try to get the most out of each appropriation. Therefore they try to get the lowest bid regardless of the ultimate costs and savings.

Mr. O'HARA. That is right. I am guessing there wouldn't be much difference after awhile, although there might be in the beginning.

Mr. WHITLOCK. Well, if they were required to study into and use this, I believe either your investigation or an Executive order might find out many of these things that we are talking about. The savings might well justify a demand that a building be built under seasonal conditions.

Mr. O'HARA. Right, and if we are going to be serious about carrying out the official policy of the U.S. Government as expressed in the Full Employment Act adopted 22 years ago, I think we ought to be willing to bear a little additional cost to get full employment.

Mr. WHITLOCK. We are spending billions of dollars on manpower training and we are finding in the brick industry that because of seasonality and only two-thirds of a year employment that it is hard to attract men into training. They look at the take-home pay for the total of the year and what they could get by going into some other industry.

The labor shortage is creating a problem which is increasing construction costs, and Congress is concerned about the increasing costs of construction as they are trying to solve the housing and urban problems.

Our shortage of manpower, because of the lack of year-round occupation is one that is giving all of us concern and we should be devoting time and money to research how to get around the manpower problem.

This is what has happened in Europe. The shortage there of manpower following World War II drove the brick industry to panelization and the elimination of labor.

Mr. O'HARA. Yes; I noticed in Denmark what they are doing in part to make up for the fact that they don't have any masons around, or not many, is that they are putting a good deal of emphasis on the construction of these poured cement walls, and so forth.

Mr. WHITLOCK. We are finding the same thing happening in this country. The explosion in San Antonio put up Palacio Hilton with poured units just set in place by cranes, which eliminated much of labor.

Mr. O'HARA. In Denmark they are developing a technique of building poured cement homes.

Mr. WHITLOCK. That is right.

Mr. O'HARA. I have seen their training programs training people to do this kind of work, building forms, great forms that are little houses and then they just pour the cement in and they have built themselves a house.

In part I would gather that they have gone to this because of the lack of a very skilled tradesmen.

Mr. WHITLOCK. We have had a representative studying these methods in Europe; however, the monotony through a lack of color and texture has indicated a growing acceptance of brick.

We are working with Denmark and other European countries as well as in our own laboratories to find out how to do the same thing with the traditional brick.

Mr. O'HARA. Right.

Mr. WHITLOCK. All of which is done even though we know we can do the conventional bricklaying cheaper but we can't get the bricklayers. We haven't got them in training because we don't have an attractive trade because of seasonality.

Mr. O'HARA. I think your testimony and the work that you have done is very impressive. I assure you that we are going to be giving this matter very serious consideration and we are going to do the best we can to promote year-round activity in the construction industry.

Thank you very much.

Mr. WHITLOCK. We will be very glad to help in any way we can.

Mr. O'HARA. Without objection at this point in the record there will be entered a statement submitted by Gordon M. Freeman, who is international president of the International Brotherhood of Electrical Workers, with respect to the subject that is under consideration by the committee.

(The prepared statement follows:)

STATEMENT OF GORDON M. FREEMAN, INTERNATIONAL PRESIDENT, INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS, AFL–CIO

Mr. Chairman, my name is Gordon Freeman. I am President of the International Brotherhood of Electrical Workers, which represents nine hundred thousand members of which two hundred thousand are engaged in construction work throughout the United States. The IBEW appreciates this opportunity to present its views in support of H.R. 15990 with certain modifications and suggestions which we feel will further carry out the intent of this Bill.

H.R. 15990 proposes a comprehensive study of all the aspects of seasonality on the construction industry and possible remedies to this situation. This subject has long been of concern to the IBEW. We have participated in previous studies of lesser scope, where possible, and observed the results of these studies with great interest. We have undertaken an employment survey of our own. We are awaiting the results of the BLS study now underway on the subject.

We are aware, as I am sure you are, of the ravaging effects of this phenomenon on the economy and the construction industry. The expanding and contracting of the labor force, the higher costs, the unnecessarily high unemployment rate of eight percent or higher in the winter months are only some of the effects. But the most devastating effects are on the individual who is idled or forced to seek employment elsewhere during the slack period through no fault of his own.

In order to assure a realistic development of the program and a fuller understanding of the problems involved, we would suggest the following language in place of line six on page one of the Bill:

"SECTION 108. The Secretary of Labor is directed to appoint an advisory committee from the construction industry representing labor and management and with their concurrence and the assistance of the Bureau of Labor Statistics investigate * * *."

Our reference to the Bureau of Labor Statistics is made in light of the present study on seasonality they are now conducting and because of their long experience in studies of this nature.

In conducting this study, one area which we feel must be covered is the timing of all government contracts. Public construction expenditures amounted to twenty-five billion dollars in 1967. This is more than one third of total new construction put in place for the year. More knowledge is definitely needed on this subject.

We feel that by controlling the timing of the construction start of these contracts in conjunction with the labor market situation of the area, a step would be made toward alleviating this seasonality problem. Should it be found our contention is correct, we would hope the Secretary of Labor would have the authority to regulate Federal contract starts. Surely the Federal Government would take the lead in overcoming this situation if it expects others to cooperate in a final solution.

In concluding, the IBEW sincerely requests the Committee's favorable action on this proposed legislation and the suggestions we have made, and we hope this will be the first step in eliminating a problem which plagues us all.

Mr. O'HARA. The subcommittee will now adjourn and will meet tomorrow morning at 10 a.m. in this room to continue our consideration of H.R. 15990.

(Whereupon, at 12:25 p.m., the subcommittee recessed, to reconvene at 10 a.m., Wednesday, July 17, 1968.)

SEASONAL UNEMPLOYMENT IN THE CONSTRUCTION INDUSTRY

WEDNESDAY, JULY 17, 1968

HOUSE OF REPRESENTATIVES,
SELECT SUBCOMMITTEE ON LABOR
OF THE COMMITTEE ON EDUCATION AND LABOR,
Washington, D.C.

The subcommittee met at 9:45 a.m., pursuant to recess, in room 2261, Rayburn House Office Building, Hon. James G. O'Hara presiding.

Present: Representatives O'Hara, Gibbons, Hathaway, and Steiger.

Staff members present: Jim Harrison, director; Dr. James R. Wason, Legislative Reference Service, Library of Congress, consultant; and Austin Sullivan, legislative specialist, full committee.

Mr. O'HARA. The Select Subcommittee on Labor, of the House Committee on Education and Labor, will come to order.

Our leadoff witness today on the bill H.R. 15990, dealing with seasonality in the construction industry, is the very distinguished president of the Building Trades Department of the AFL–CIO, Mr. Haggerty.

Mr. Haggerty, I understand you have another engagement and are going to have to be leaving us. I think without further ado I am simply going to ask you to proceed with your statement.

STATEMENT OF C. J. HAGGERTY, PRESIDENT, BUILDING AND CONSTRUCTION TRADES DEPARTMENT, AFL–CIO, ACCOMPANIED BY WALTER MASON, LEGISLATIVE DIRECTOR, AFL–CIO; AND JAMES R. SHEETS

Mr. HAGGERTY. Thank you, Mr. Chairman.

I appreciate your assistance in this matter.

My name is C. J. Haggerty and I am president of the Building and Construction Trades Department of the American Federation of Labor and Congress of Industrial Organizations.

In the name of the building trades department and its affiliated unions, I wish to thank the chairman for affording me the opportunity to appear before you in support of H.R. 15990.

The issues raised by this bill are basic to the future progress of the construction industry and are, by virtue of that, of overwhelming importance to the economic health and stability of the United States of America.

I come here today to speak for approximately 4 million workers who depend upon the construction industry for their living. These

men and women deserve well of their country; for, upon their work, their abilities, and their efforts, depends the building of the physical plant upon which rests our strength as a nation.

Although no one would question that they deserve well of this country, I submit to this committee that they have not received the consideration that they deserve in a most basic matter. Their need for stable, continuous work has not been given the attention that it deserves.

H.R. 15990 is the first step in bringing to these 4 million building trades men the benefits which we consider basic to the American way of life.

The American construction work force is a pool of skilled workers that is the envy of the world. They have, through the exercise of their skills, contributed to a construction industry that is second to none in efficiency, economy, speed of operation, and quality of product.

In spite of this great contribution, our people face an annual ordeal of unemployment at a rate more than twice that of any other group of American workers. This burden, which nullifies their years of training and devoted services and depresses their income each year, drives some of our best and most promising young people out of the construction industry in a search for more stable employment. This is a price we can no longer afford to pay and we, in the building trades department, urge the Congress to bend its best efforts to finding a solution to this pernicious and inequitable situation.

Whatever historical justification there may have been for the seasonal pattern of employment in the construction industry, it is no longer necessary. Construction technology has advanced to a point that allows significant steps to be taken toward year-round operation.

Work can be enclosed, either partially or on a whole site. Additives which have been developed in recent years can be put into mortar and concrete that will allow them to set at temperatures and under conditions which formerly would not have been possible.

Portable heaters are available which will, in cold weather, protect the comfort of the worker and the strength of materials and eliminate much of the necessity for closing down jobs in the winter.

We could go on and on with a list of technological advances that make possible year-round work in the construction industry; but suffice it to say at this time that no technological problems exist which would prevent the development of stable all-year construction employment in this country.

What factor then promotes the continuation of seasonal ups and downs of construction employment? Why, in parts of our country where climatic conditions do not demand seasonal shutdowns of construction work, do we see the same pattern of seasonal peaks and valleys in construction employment?

We suggest that there are a number of factors which combine to project what may have been historical necessities into our modern era.

First, of course, there is a very human inertia which prevents old habits from being easily broken. Building codes based on obsolete considerations of material strength and the effects of weather strengthen that inertia.

Fiscal practices of governments at all levels, with their annual appropriations and July through June fiscal years, tend to perpetuate

these practices by making money come available only during peak periods of construction demand.

Basically, the problem is one of insufficient attention to the possibilities of year-round construction and the benefits which could be gained by promoting such policies.

We turn to the Federal Government to relieve the situation, because it is a national problem requiring a national solution. Only at the Federal level do we find the resources assembled to properly handle the research, the technological, and the educational aspects of the problem of relieving seasonality in the construction industry.

H.R. 15990 and S. 2938, cosponsored by Senator Prouty, offer this country an opportunity to remedy a situation that is increasingly burdensome and increasingly unnecessary in modern America.

Passage of either of these bills and their implementation will contribute to the body of public understanding of the problems of seasonality. By so doing, demand for year-round construction activity could increase to the point where a significant change might be felt by the construction worker and the public.

By calling for Federal Government assistance in this vital matter, the building trades department does not mean to suggest that the construction industry is not attempting to help itself.

The Masonry Industry All-Weather Construction Committee is a good example of an industry self-help program, which promises to help alleviate seasonality problems in at least one portion of the construction industry.

We take great pride in the forward looking and innovative thinking that led to the formation of this group and extend to them our warmest good wishes for their success. We wish to point out, however, that the masonry construction industry is but one small portion of our whole industry and they cannot alone bear the burden of solving the problem of seasonality.

The benefits of eliminating seasonal fluctuations in construction activity are so extensive and so broad in their implication as to strain the imagination. The promise of a more efficient use of skilled manpower alone, in our minds, justifies the investment of time and resources in this problem.

The buyer of construction work will enjoy additional profits arising from his ability to take possession more quickly. Finally, it will make it possible for our construction industry to undertake a higher volume of construction within a fixed time period since the industry will not sit idle for long periods during each year. We are convinced that all of these factors together will contribute to reducing the cost of construction in the United States to the great benefit of all of our people.

We do not necessarily suggest that a program of subsidies, such as many other nations have developed in this area, is appropriate for the United States.

However, should such a program be tried, it is our feeling that it would more than pay for itself: First, through increased tax collections generated by higher annual earnings on the part of both construction workmen and construction companies; second, through savings to the unemployment compensation system, by virtue of the limitation or elimination of seasonal shutdowns in construction work; and

third, of course, by the savings inherent in bringing construction jobs to fruition as productive facilities in a shorter period of time.

Recently, the building trades have been severely criticized for the magnitude of their wage settlements. An impression has been created, in the public mind, that the construction worker is rewarded for his efforts at a rate unduly higher than that of other workers.

I regret to say that this impression has even been fostered at the highest level of the Federal Government by the pronouncements of a Cabinet committee appointed by the President of the United States.

We wish to point out that, when all facts concerning the eroding effects of seasonal employment are taken into account, you cannot sustain such an idea.

In their last report on employment and earnings by industry, the Department of Commerce showed the average gross earnings of the construction worker, in 1966, at $7,016. This was lower than four of the other 11 major industrial categories reported on, and certainly is not an unduly high income when you consider the amount of skill and effort the construction worker brings to his job. We suggest that there is very little purpose in criticizing the level of construction settlements without doing something to ease the strain of seasonality which has the effect of cutting in half wage gains realized from collective bargaining agreements.

For all of these reasons, the building trades department strongly supports H.R. 15990. We urge the Congress to pass a seasonality bill this session, and bring to a speedy end a condition that is an undue and unnecessary burden on our members in the industry and on our country.

Mr. Chairman, I have a statement from Peter Terzick who is general treasurer of the Brotherhood of Carpenters & Joiners. May I submit that along with my statement?

Mr. O'Hara. Without objection, the statement of Mr. Terzick will be entered in the record in full at the conclusion of your appearance here today.

Mr. Haggerty, I find that the testimony seems to indicate to me that I didn't go far enough when I introduced this bill, 15990. I am coming to agree with you that we already know enough to effect a substantial improvement in the seasonality pattern of the industry and that the principal reason we have not done so is not a lack of knowledge but is a lack of will to go ahead and do it.

I find this at all levels, and the blame doesn't rest solely with any particular group in this respect.

I don't think Government, those who let construction contracts, and the construction industry generally, have placed a high enough priority on this and it seemed to me that perhaps we might move a little faster than this bill provides for us moving.

I became aware yesterday that there had been some discussion of a possible Executive order within the administration which would provide for the creation of a Construction Contract Scheduling Committee or Council which would have considerable authority with respect to the timing of Federal construction contracts.

Do you think such a development would be feasible and useful?

Mr. Haggerty. Yes, Mr. Chairman.

One of the great problems we have, I think, in the construction industry is the matter of timing by the sponsors of these large projects

and I think the Federal Government probably is guilty of not paying attention to what goes on in the private sector of our industry in that they will schedule and appropriate large sums of money for construction at the same time that the private sector is spending billions in their program of construction so that you have at one time a great press for the skill to get these jobs going and sometimes a shortage of men for a short period of time.

I think that if the Federal Government can be called upon to look at the whole pattern and the whole availability of funds for construction and sort of schedule their allocations and programs accordingly it would draw out I think longer employment for the worker as well as more speedy construction and finishing of these large projects.

Mr. O'HARA. I think that we ought to encourage that development. It has been suggested in some private conversation with the staff that we ought to think twice before we report this bill because it might serve as an excuse to delay action in the Federal Government of that type which the evidence before us indicates is required.

Do you share that concern or do you feel that this bill should pass?

Mr. HAGGERTY. I think the bill should proceed on its logical, natural course without being held back by reason of the other bill.

Mr. O'HARA. You wouldn't object if we went beyond that?

Mr. HAGGERTY. What can you sell? That is the question.

Mr. O'HARA. That is what we are trying to figure out, what we can sell. I completely agree with your statement, Mr. Haggerty. I would like to ask just one further question.

You favor both the bill before this subcommittee and S. 2938 which is before the Senate. Would you be prepared to comment on the differences between the bills and what your view might be on those differences?

Mr. HAGGERTY. I would rather refer that to my young colleague on my left here because I haven't been in close touch. I have just returned from a trip out in the west coast and have been 15 days away.

Would you supply that for me?

Mr. SHEETS. Thank you.

Mr. Congressman, the bill before the Senate, like H.R. 15990, is an amendment to the Manpower Development and Training Act.

In its first section it calls for the same sort of study of both the public and private sector of the construction industry that your House resolution does.

In its second section it calls for the establishment of a Cabinet level Federal construction council that would perform this function of studying the effects and directing the effects of distributing Federal and federally aided construction over a longer period of time, so that it does have the factor that you were just talking about.

Now, from our point of view, there are a couple of items that it would seem to me could usefully be added to the Senate bill. One of them is already in 15990. That is the time limit for studying this problem of seasonality.

The Senate bill doesn't have any kind of reporting date such as you entered in your introduced House resolution.

Also, we think it takes a rather too limited view of both the costs and benefits available from eliminating or limiting seasonality in the construction industry.

The bill speaks specifically only of studying construction costs and could, I think, be interpreted to mean simply contractor costs and I think it is clear from the material that we have heard in this hearing up to now that there is a social cost and a buyer's benefit and all sorts of costs and benefits that should be considered in addition to mere contract costs in this seasonality issue.

Mr. O'HARA. I thank you for your observation. I think it might be possible, if we get that far, to meld these bills in such a way that we could come out with something better than either one of them. There are some aspects of the Prouty bill that I think are a little bit better than our bill and there are some things that I don't think are as good.

I appreciate having your comments.

Mr. Gibbons, did you have any questions?

Mr. GIBBONS. Only to say that, having lived in a part of the country where it is more pleasant to work in the wintertime than in the summer, I wasn't aware of this problem that you have and I think it needs correcting.

Mr. O'HARA. Will the gentleman yield?

Mr. GIBBONS. Yes; I will be glad to.

Mr. O'HARA. We didn't have any comments on Florida per se, but the statement was made here yesterday and not challenged that this seasonal pattern of construction is approximately the same everywhere in the country. It is approximately the same in International Falls, Minn., as it is in Key West, Fla.

Mr. HAGGERTY. But for different reasons.

Mr. O'HARA. The exception being southern California where they seem to have less seasonal unemployment than anyplace else. I didn't get a specific figure on Florida. Perhaps you might want to inquire on that.

Before you do that, may I say to Mr. Haggerty that I have a meeting of the Interior Committee which I must be at involving a park in Michigan. I am going to ask Mr. Gibbons to assume the chair. I am very happy to have heard your testimony.

Mr. GIBBONS (presiding). Do you have any figures on Florida?

Mr. HAGGERTY. Not as such we don't. We more or less are inclined to just off the top of our head class Florida and southern California along the same lines. There again the problem is not seasonality with weather so much as the programing of jobs and the availability of funds to start these projects.

We are told in the Federal Government now, if the words of the Senators' committee come true, that they are not going to spend millions or billions but are going to spend trillions. That is beyond my imagination so that I just repeat the word of the Senators talking about what is going to be available now.

If that is true and there was a $5 billion bill recently talked about as an appropriation of funds for the Congress for housing and all that goes with it, that being the case, to inject that into the market without some planning and recognition of the whole problem could be a little bit harmful as to time and continuation of employment and completion of jobs.

Mr. GIBBONS. I have noticed that you mentioned a while ago that there were some problems that weren't weather that made it seasonal. Certainly on a governmental level we ought to be able to move to

straighten that out. I do realize now, having looked back, that even in Florida, often the plans have been lying around for a few months before the appropriations become available to begin construction.

I don't know why we can't straighten that out.

Mr. HAGGERTY. You have a problem around Louisiana and Florida and so forth where they spent billions on erection of chemical plants all at one time and, of course, requiring about 1,000 pipefitters and you just didn't have 1,000 pipefitters available in that area so that we had to go out and dig them out.

If that had been planned between those companies that would have been better but, of course, the American system doesn't permit that.

Mr. GIBBONS. Do you think the extension of the working year would have a beneficial effect on wage settlements and so forth?

Mr. HAGGERTY. Yes. One of the considerations of the committee and the organization involved in these negotiations is wage conditions and so forth.

Mr. GIBBONS. It is certainly not a very good idea to have skilled people idle when they ought to have the opportunity.

Mr. HAGGERTY. They get a bad habit.

Mr. GIBBONS. Mr. Steiger.

Mr. STEIGER. I have no questions.

I want to associate myself with the remarks of the gentleman from Michigan and the idea of trying to put the two bills together because I think there are some things in the Prouty bill that really we ought to try and work into the O'Hara bill as introduced.

I appreciate Mr. Haggerty's comments on both pieces of legislation.

Mr. GIBBONS. All right.

Mr. Hathaway?

Mr. HATHAWAY. Thank you, Mr. Gibbons.

Mr. Haggerty, I wonder are there any problems with respect to migration of construction workers so that even if we provide incentives for them to work in a cold climate such as Maine they would be leaving for warmer climates in the winter anyway and we wouldn't find any workers?

Mr. HAGGERTY. They would probably if the jobs weren't scheduled in such a way as to be an incentive to keep them there. We are hopeful that a study of this whole problem can be made in places like Maine. I learned my trade in the city of Boston which is almost as tough a climate as Maine but a little bit warmer and I worked in Maine, and New Hampshire, and Vermont in the winter where they put on salamanders, which is an old can full of coke which resulted in many people getting dizzy and falling down and so forth.

The last hotel I worked on was in Vermont—it is a long time ago—and I am not looking forward to going back to it, by the way. They wanted to get it done in a hurry and money meant nothing. So importation of mechanics from Boston, Providence, and so forth was wholesale and they closed the building in as fast as they could and kept it going all winter long. That can be done but it is expensive.

Mr. HATHAWAY. Does your research indicate that they can dig foundations, for example, in Presque Isle, Maine, in January?

Mr. HAGGERTY. If they start early enough and go through the frostline they can do it with the machines they have today and the methods; yes.

Mr. HATHAWAY. Are there any State or local governments providing any help along this line that you know of?

Mr. HAGGERTY. I don't think so, not that I can recall. I imagine it would be quite some work for us to impose upon them the necessity of doing it, and they would do it in some cases.

Mr. HATHAWAY. I take a final question from your statement that you feel that the industry has gone about as far as it can and needs some Government incentives to bring this plan to fruition.

Mr. HAGGERTY. That is approximately correct; yes, sir.

Mr. HATHAWAY. Thank you, Mr. Haggerty.

Mr. HAGGERTY. I would like to have my colleague on my left, Mr. Sheets, cover that, too.

Mr. SHEETS. With regard to the question about local governments and other levels of government aiding in this area, one of the striking things that we found out as we looked into this was that this aspect of seasonal construction, this aspect of the industry, is so accepted that it hasn't ever been questioned in spite of evidence such as the job that Mr. Haggerty just referred to where it was possible to keep a hotel job going in Vermont through the wintertime.

When Mr. Foster was here testifying for GSA about their market surveys prior to doing Government buildings under the supervision of GSA, it was perfectly obvious that their survey assumed the rightness and appropriateness of a construction season.

So that, really probably one of the first and most important things that could result from the Federal Government's activity in this area would just be to increase the consciousness of possibilities on the part of the construction buying public, if you will, of the fact that work can go on in the winter, that there is a whole new area of technology that can be used to extend this construction season to the great benefit of the buyers, the public, and the construction worker.

Mr. HATHAWAY. Thank you.

Mr. GIBBONS. Thank you, sir.

We appreciate very much, Mr. Haggerty, you and your associates coming to be with us this morning.

Mr. HAGGERTY. Thank you.

(The statement of Mr. Terzick follows:)

STATEMENT OF PETER E. TERZICK, GENERAL TREASURER, UNITED BROTHERHOOD OF CARPENTERS AND JOINERS OF AMERICA

My name is Peter E. Terzick. I am General Treasurer of the United Brotherhood of Carpenters and Joiners of America, an affiliate of the Building and Construction Trades Department of the AFL–CIO.

The United Brotherhood, the organization I represent, is made up of 700,000 workers in carpentry and all its branches in the United States. On their behalf, I strongly urge passage of HR–15990.

Seasonality is an obstacle which greatly hampers the effectiveness of the construction industry. It adds substantially to construction costs, even as it lowers the annual earnings of construction workers. Largely, it is a man-made obstacle which is amenable to man-made solutions.

To the best of my knowledge no one has made an authentic study of the added costs which seasonality imposes on the construction industry. However, they must be very substantial. Therefore, such a study is long overdue.

When work is impeded for any reason, the cost of a construction project climbs rapidly. Interest charges on construction loans go on whether work is in progress or not. The same is true of insurance. These items alone have considerable impact.

In modern construction, the rental of special equipment is inevitable on projects

of any size. Some of the larger pieces, such as cranes, involve charges of hundreds of dollars per day. Each day such a piece of equipment remains idle costs the contractor considerable money from which he receives no return.

There are many, many factors involved in seasonality which have plagued the construction industry for generations. Weather, of course, is one factor which no one can control. However, proper planning and scheduling of construction can ameliorate some of the worst effects of bad weather. Getting projects under cover before bad weather sets in makes it possible for construction workers to carry on inside work during inclement weather.

Seasonality in the industry is partly a matter of custom. In bygone years it was impossible to pour concrete in cold weather. Improved cements have largely eliminated this factor, but the industry still sticks pretty much to the traditional pattern of working feverishly in the summer months and slowing down considerably in the winter season. This practice adds intangible costs as well as those mentioned above.

For one thing, unemployed construction workers draw unemployment insurance when they are out of work. This means that they are receiving money from the government instead of paying income taxes during winter months.

The problem of seasonality is not confined to the United States. The construction industry in Europe faces the same problem. However, many European nations have taken steps to eliminate the most drastic handicaps imposed by seasonality.

In Austria, the federal government provides special subsidies to municipalities for construction projects undertaken during winter months. In Canada, a similar incentive program is in operation to encourage municipalities to schedule their construction projects for the winter months. In Finland, special consideration is given to public projects employing full complements of workers during winter months. An incentive plan is also in effect in Norway and Denmark. In Germany, a subsidy amounting to 11% of wages paid is granted for all types of work on government-supported private housing sites.

Many nations also have one form or another of subsidy for private builders who do all or part of their work during the winter months. A notable example is Canada, where a subsidy amounting to $500 per unit is provided to private owners erecting residential buildings during the winter months. This applies to structures containing as many as four units.

All the subsidy programs to encourage winter construction are too complicated to be presented in depth here. They are all spelled out in a study published last year by the "Organization for Economic Co-operation and Development." The study is published in book form and is entitled, *Reducing Seasonable Unemployment in the Construction Industry.* Even a brief perusal of this comprehensive work shows that the United States is lagging far behind European countries attacking the problem of seasonality in construction.

Therefore, we strongly urge that Congress promptly enact H.R. 15990, so that a start can be made in reducing the penalties which seasonality imposes upon contractors, the workers, and the economy of the nation.

Mr. GIBBONS. Now Mr. Allan Turner Bone, of Montreal, Canada, who is chairman of the National Joint Committee on Wintertime Construction.

Come forward, sir. We are glad to have you.

STATEMENT OF ALLAN TURNER BONE, B.S., MEIC, MONTREAL, CANADA, CHAIRMAN, NATIONAL JOINT COMMITTEE ON WINTERTIME CONSTRUCTION

Mr. BONE. Thank you, sir.

Mr. GIBBONS. We welcome you to our Congress and to this committee and look forward to your testimony.

Mr. BONE. Mr. Chairman, I am not promoting the bill or anything like that, because I am only here to give information.

Mr. GIBBONS. We understand that.

Mr. BONE. I hope that you will ask questions because I think in

many cases questions will bring out things better than what a statement will give.

Mr. GIBBONS. Let me say that we don't on this committee particularly worry too much about the niceties of international relations. We are all stuck with this continent. You have the colder part than we have and perhaps could give us some good information as to what you have done.

You may proceed as you wish.

Mr. BONE. There is a fairly long statement here and I will read part of it and just call attention to other parts.

(The statement of Mr. Bone follows:)

STATEMENT BY ALLAN TURNER BONE, B. SC., MEIC, MONTREAL, CANADA

My name is Allan Turner Bone. For the past seven years I have acted as chairman of the National Joint Committee on Wintertime Construction. This is a body comprised of representatives of national organizations of construction employers and unions, architects, consulting engineers, business and finance. Representatives of Canadian Government Departments and Agencies are Associate Members of the Committee. Its prime purpose is to promote higher levels of wintertime construction and employment, primarily by means of recommendations to its constituent bodies, the Canadian Government and other organizations.

The formation of the National Joint Committee took place in 1955, under the sponsorship of the Canadian Construction Association, of which I am a past-president. This is a nation-wide and industry-wide association of construction employers—general building contractors, road builders and heavy construction firms, trade contractors and manufacturers and suppliers of construction materials and equipment—plus a hundred affiliated regional or specialty associations.

My own background is that of a general contractor. After graduating in civil engineering at McGill, in 1916 much of my work was with the George A. Fuller Company of Canada Ltd. When this subsidiary was closed down in 1932, its manager, the late J.L.E. Price and a number of us established a company bearing his name. I became its president upon his death in 1945 and retired a year ago. The company operates throughout Eastern Canada. Its head office is Montreal, where the temperature frequently falls below zero during the winter and we may have to contend with the combination of, say. —25° F. and strong winds. A good deal of our company's work has been carried out in Newfoundland, which is also well-known for its fresh, invigorating winters.

The invitation to appear before you today is greatly appreciated. We do not presume to have all of the answers but our experience is summed up in the CCA Policy Statement,

"The Association believes that wintertime construction has not only been proved to be practicable by the industry but that an increased volume and its accompanying employment are essential to the strengthening of the Canadian economy. With modern techniques and materials and with proper planning and supervision there is no loss in quality and most types of work can be carried out at comparable net cost to the owner."

Much of the problem has been due to the out-moded prejudice against wintertime construction. The use of incentives and a continuing publicity and educational program, however, have been very helpful in reducing this resistance.

It is my intention to describe briefly some of the construction techniques, some of the means taken to encourage greater use of them, and some of the economics of the whole matter; and then to endeavour to answer any questions that you may have.

CONSTRUCTION TECHNIQUES

Firstly, I should stress that there is nothing really new about the basic techniques of building in the wintertime. They have been known for many years. However, the demands for larger construction programs during World War II and the post-war period were such that we could not afford the luxury of closing down for a three-to-five month period in many parts of our country.

Moreover, a large proportion—upwards of a third—of those claiming unemployment insurance benefits under the Canadian social security program during the winter months were classified as construction workers. (Previously many

construction workers laid off in the winer took seasonal work in the lumbering industry etc. or lived on the premium wage-rates they had earned as construction workers. Work in our lumber camps, however, has also tended to become year-round and specialized and winter jobs are not available as in the past. Many construction workers needed income in the winter months and even those that were not to anxious in this regard were eligible for unemployment insurance benefits if construction employment was not available to them).

Finally, new materials and equipment greatly facilitated working in the wintertime, compared to a generation ago. The combination of these three main factors—aided by incentives and publicity—has lead to a steady and significant increase in the application of wintertime construction techniques to the point where more work is actually put in place during the winter months than during the whole year a decade or two ago.

The two main principles for wintertime construction are *pre-planning* and *protection.* Careful pre-planning is of course necessary for efficient construction at any time of the year but it is vital for winter operations. If the construction of a building can be scheduled so that it is "closed in" before the really extreme weather is experienced, most of the problem has been solved. Failing that, it is necessary to provide protection from the elements in the form of a temporary enclosure. This enables the builder to create his own climate.

Initially enclosures were made with canvas tarpaulins or plywood but more recently polyethylene has been widely used because of its low cost and ability to transmit solar radiation, thus reducing both lighting and heating charges Enclosures are designed to fit the job and range in size from a small lean-tc around a house to huge structures such as the one used this past winter at a power project on the Nelson River in northern Manitoba. This shelter encloses an area 580 feet by 120 feet to a height of 140 feet. Within this enclosure 750 men work in their shirtsleeves constructing a generating station while temperatures outside drop to —40° F or lower.

Among the new materials and equipment facilitating winter work (in addition to polyethylene mentioned above) are rippers and other excavating equipment and attachments which make short work of frozen ground; portable space heaters; heated ready-mix concrete and pre-cast concrete; and the wide range of prefabricated components which reduce on-site assembly and construction time.

Montreal received many visitors last year in connection with Expo '67. Many of the pavilions there were built in whole or in part during winter conditions. All of the skyscrapers along Dorchester Blvd. were built without let up during the winter and this included the foundation work in some instances. (Incidentally, the enclosures used to protect workmen in the winter months from snow and cold temperatures were used throughout the year on one skyscraper to protect the men from high winds and rain). Similarly, much of the overpass and cloverleaf work on the new highways leading to Expo was done during the 1966–67 winter and so were some of the related paving operations.

One can also see the start of the St. Lawrence Seaway in Montreal. It will be recalled that major hydroelectric installations were also built as part of the overall development along the St. Lawrence and Great Lakes. The international power dam at Barnhardt Island provided an interesting comparison on dam-building techniques on a grand scale inasmuch as half of it was built by U.S. contractors and engineers and the other half by Canadians. On the Canadian side the placing of concrete in high lifts made possible uninterrupted construction in spite of temperatures as low as 40° below zero. On the U.S. side concrete was placed in shorter lifts and the job was closed down during the winter. I should add that the American crews caught up during the summertime, but the point that is relevant here is that the requirements for manpower and materials were more stable year-round on the Canadian half due to the wintertime building.

The comments made so far may leave the impression that winter construction in Canada presents no problems at all. This is, of course, not true. Building in winter does have some peculiar hazards. The frost heave of soils under foundations or basement floor slabs is a particularly serious one. High concentrations of carbon dioxide from unvented oil or gas fired heaters will damage the surface of freshly placed concrete floor slabs. Air leakage through partially completed walls can saturate porous materials that are subsequently displaced due to frost action. All of these hazards can, however, be prevented provided the proper procedures are followed. The problems are no more serious than those encountered in summer and in many cases are more easily controlled. The penalty for inadequate execution or supervision of the work is sometimes greater than in sum-

mer but with careful planning and a competent and knowledgeable work force a contractor need have no more fear of a winter project than any other operation. The quality of the work need not suffer; in fact conditions in winter are often more favourable for the production of high quality construction than those that exist in hot weather. Our scientists tell us, for example, that concrete placed and cured at low temperatures above freezing will attain a higher strength and greater resistance to exposure than when subjected to the higher temperatures of summer.

INCENTIVES AND PUBLICITY

The Canadian Government has shown much leadership in promoting higher levels of wintertime construction and employment. Internally, a directive from the Federal Cabinet was sent to all government departments and agencies in 1954 requiring them to arrange their construction, maintenance and procurement programmes so that the maximum employment of the construction trades would occur in the winter. A large-scale "Do-It-Now" campaign was initiated by the Department of Labour directed at homeowners, business and institutions to carry out repairs and renovations during the winter. The Minister of Labour convened a National Winter Employment Conference in July, 1958. Films were produced showing how both housing and non-residential building projects could be built in the winter months, using proper techniques. The National Research Council's Division of Building Research published technical information. The Winter Work publicity material was used by a good many firms in institutional advertising and tie-in campaigns. In summary, it is fair to say that "Do-It-Now" and "Why Wait for Spring?" are part of Canada's popular speech.

Exhortations alone, however, do have their limitations and the Federal Government was urged to provide financial incentives to encourage owners to schedule their construction work in the winter months. Commencing with the winter of 1958–59, the Federal Government made available to Municipal Governments grants equivalent to half of the payroll cost of certain municipal projects incurred during the designated winter period. Most of the Provincial Governments also picked up part of the payroll cost so that the Municipalities' share averaged only 25% (in Quebec it is only 10%). This "Municipal Winter Works Incentive Programme" has been expanded in scope from time to time in the light of experience and is now a built-in feature of many municipalities' construction programme. The Federal share of payroll costs was increased to 60% in 1963–64 in areas with high wintertime unemployment conditions. In the ten-year period, some 57,300 projects have been included, with an estimated total cost of $2,323 million. Over 35 million man-days of work have been provided and it should be noted that most of this work would formerly have been scheduled in the so-called building season. The total cost to the Federal Government to date has been $282 million.

Other programmes involving the joint financing of public works projects have—on a smaller scale—contained winter works incentives. For example the Federal Government offered to pay half of the labour cost of picnic and camp grounds built during the winter alongside highways by the Provincial Governments.

Much of the seasonal unemployment in the building trades has been in the housebuilding sector. As an incentive to encourage wintertime housebuilding, a bonus scheme was introduced for the winter of 1963–64 whereby the purchaser of a house substantially completed in winter received a cash bonus of $500, which could be used as part of the down payment. While this programme did not significantly increase the volume of housebuilding, it did have a very marked effect on the starting dates, from spring to the fall. Some 95,500 dwelling units qualified for the bonus in the three winters in which the Winter House Building Incentive Programme operated. Because of a shortage of mortgage money, the scheme was not offered in the winter of 1966–67 but a somewhat similar effect was achieved by the Canadian Government by providing direct loans to housebuilders that fall.

It will be noted that these grants and bonuses are directed at the Owner rather than offered to the Contractor. This reflects the philosophy that the construction industry is not looking for subsidies itself and, indeed, should not require any special inducements—but is willing to provide construction services at any time of the year. The Canadian Government, for its part, feels that the funds spent internally and externally on wintertime construction and promotion have paid off handsomely in terms of business activity and reduced outlays from the Unemployment Insurance Fund and in unemployment assistance.

I should add in passing that our National Housing Act, like your housing legislation, provides for Home Improvement Loans. Prior to the above-mentioned shortage of mortgage funds, the promotion of home improvement loans was stepped up during the winter months with good results. Similar action was taken with respect to Farm Improvement Loans and Small Business Loans under their respective statutes.

NATIONAL JOINT COMMITTEE ON WINTERTIME CONSTRUCTION

Perhaps a few words on the National Joint Committee itself would be in order. Increased wintertime construction became a major project for the Canadian Construction Association in 1953. Considerable publicity was given to the desirability and feasibility of increased wintertime operations, with the result that, when requested in 1955 by the Federal Department of Labour to sponsor a Joint Committee to further wintertime construction, the CCA was additionally pleased to do so. Accordingly the National Joint Committee on Wintertime Construction was formed, with representation from the following organizations:

The Canadian Chamber of Commerce
The Canadian Construction Association
The Canadian Labour Congress
The Canadian Legion (veterans)
The Canadian Manufacturers' Association
The Confederation of National Trade Unions
The Engineering Institute of Canada
The National House Builders' Association
The Royal Architectural Institute of Canada

The Federal Department of Labour, the National Research Council and Central Mortgage & Housing Corporation (a Federal agency administering the National Housing Act) have acted as Associate Members. In recent times, the Federal Department of Manpower & Immigration has participated, following the transfer to it of the administration of the Municipal Winter Works Incentive Programme.

The National Joint Committee's major functions have been threefold:

1. The Promotion of Wintertime Construction and Employment—both collectively in the name of the Committee and individually by the member organizations of the Committee.

2. Acting as an Unofficial Advisory Council on Wintertime Construction Matters to the Federal Government and Federal Agencies—both with regard to government policies and to the mechanics of executing government publicity programs of a general or technical nature.

3. The Exchange of Viewpoints concerning Various Aspects of the Wintertime Construction Program—both with a view to formulating new policies as a Committee and to encouraging member organizations to discuss certain proposals within their own memberships.

The National Joint Committee early decided that the two main factors discouraging many owners from having their construction work carried out in the winter months were the outdated fears that it would be of inferior quality and of excessive cost. In addition, tradition led many owners to schedule their construction projects for the so-called building season and many had never been called upon to give serious consideration to wintertime construction.

Emphasis was accordingly placed on the following short statement endorsed by members of the National Joint Committee:

"Habit and tradition are largely responsible for the idea that winter construction is more expensive and not of the highest quality. New materials and equipment have resulted in the development of construction techniques which in effect control the weather on a building site. Proper planning of all stages and protection during the progress of certain parts of the work have made it feasible to carry out during the winter months construction of equal quality to that of other seasons. In addition, factors such as the greater availability of skilled labour, construction materials and equipment during the winter months and earlier completion of the project can result in a saving in net costs."

Similarly, a brief leaflet entitled "Winter Construction—Why Not?" was distributed in the name of the National Joint Committee in large quantities to lending institutions for local use with potential owners.

Member organizations of the National Joint Committee also carried out an active promotional campaign through the medium of speeches, magazine articles, briefs and convention papers and resolutions emphasizing the need and feasibility

of changing our habits to bring about the practice of wintertime construction more in line with its technological possibilities. Local affiliates of the national organizations represented on the Committee were encouraged to participate in local wintertime construction campaigns conducted under the auspices of the National Employment Service and in the general publicity campaign.

The trade and professional press have similarly been most co-operative and helpful in printing articles and editorials in the field of wintertime construction. Several have published special issues on the subject. This materials has been most helpful in spreading wintertime construction methodology and in promoting acceptance on the part of the design professions. Back in December, 1961, for example, the Journal of the Royal Architectural Institute of Canada featured a message from the Royal Institute's president and an Editorial appealing to architects to counsel Owners as to the advantages of wintertime building:

"Because of the need to provide balance in our economy, members of the architectural profession throughout Canada recognize the desirability of developing building projects throughout the calendar year without regard to any threatened interference or stoppage by weather conditions. As a result, the volume of wintertime construction has increased so that now more Canadians are employed in construction operations during the middle of the winter than were employed during the middle of the so-called 'building season', a dozen years ago."

"Technological changes in the building industry and substantial improvements in winter building techniques now make it both possible and practical to carry on most types of construction throughout the winter, even under severe cold weather conditions. Architects can make a substantial contribution to the winter works program by counselling owners that construction can be carried on in the dead of winter without any sacrifice in quality of construction or any significant addition to overall costs."—HARLAND STEELE, FRAIC.

"..... the organizers of the Winter Employment Campaign have chosen to work largely through such organizations as the Canadian Construction Association, the National Housebuilders' Association, and other agencies who could speak with an authorative voice on the problems of outdoor building during the cold months. This has resulted in a tremendous increase in the general knowledge of the problem of winter building and a high degree of acceptability within the construction industry of the practicability of year-round operations."

"The greatest need remaining is to convince prospective owners of new buildings of the principles which are now generally accepted throughout the building industry. Here the architect can play a major role. As an early consultant on the building project, he is in the very best position to overcome the effects of out-of-date thinking, and to organize the planning and schedules in such a way as to ensure an efficient winter-time operation."

"Although it is generally accepted that wintertime building may be slightly more costly, these costs can be reduced to a minimum by proper planning, and prospective building owners can be encouraged to examine these extra costs against other charges which may result from his delaying the start of his new building. Savings in rents and earlier production schedules can often more than offset the additional costs of wintertime building."—Editorial.

ECONOMICS OF WINTERTIME CONSTRUCTION

What about the cost of wintertime construction? Governments may be expected to schedule public works in the winter for sociological etc. reasons, but how about private investors? It is difficult to be definitive on this subject, but generally speaking all of the evidence points to the financial benefit to the Owner of proceeding with his project in the wintertime, rather than waiting until next spring.

The important factor to remember is that wintertime construction costs should be compared to those that will be experienced in the *next* summer rather than the *previous* summer. Building costs indices have risen consistently each year over the past thirty-five years. The index in January is usually about 3% lower than in the following summer. This in itself indicates that it would be economical to spend quite large sums of money on wintertime construction rather than postpone the work until the spring.

The next point to remember is that the extra costs of wintertime construction are related only to those portions of the project carried out in the adverse winter period—not to the whole job. A few years ago the Canadian Construction Association conducted a survey among its general contractor members to find out how much extra they had provided in their bids for winter work—i.e. the amount that Owners had to pay. Over 100 medium-sized contracts were

covered and the average extra cost was in the neighbourhood of 1%. (cf.—Appendix).

When Owners consider the earlier entry into a market and/or the earlier return on their investment and reduced financing costs related to an earlier completion date for their construction project, the factors favouring winter work are usually very obvious.

There have been a number of cases when bids were called on the basis of a fall and a spring start. Usually the bids are the same. A contractor naturally prefers to keep his key personnel and work crews working year-round, rather than have to recruit a new work force during the spring. Overhead costs can be spread more evenly. In times of shortage, supplies are often easier to obtain during the winter. The need to pay costly premium wages for overtime work during the summer peak period is reduced. Some construction work is even easier to do in the winter.

These and other factors should encourage an Owner and his professional consultants not to be scared at the financial prospects of winter work. However, the specifications for winter-built projects should bear this in mind and competent firms should be engaged to execute the work. Under these circumstances, quality should not suffer either.

CONCLUSION

It is sometimes sobering to reflect that one of the Objectives of the Canadian Construction Association when it was formed in 1918 was to encourage Wintertime Construction. In Canada today the number employed in on-site construction work is still appreciably higher in August and September than in January and February, so we have yet to reach our goal. However, great gains have been made in the past decade and the acceptance of wintertime construction is now widely accepted. This in turn has been of great benefit to our overall economy.

Another quote that we sometimes use in an effort to encourage people to toss out prejudices against wintertime construction as being something new and dangerous is one from a Report of a study launched in the early 1920's by the late Herbert Hoover, while he was your Secretary of Commerce. This quote is:

"Summarizing the question of winter construction, it may be stated without fear of contradiction that both from an engineering and a quality standpoint any type of modern building construction can be accomplished fully as well, in the winter months as at other seasons, if the proper protection during the progress of certain parts of the work is provided."

APPENDIX

Winter Building Worthwhile for Project Owners

The Canadian Construction Association has long contended that wintertime construction is both feasible and economical for a business considering a new building or addition. This contention is now backed up by the results of a survey concerning the extra costs included in general contractors' tenders for construction contracts directly related to wintertime conditions—e.g., for heat, shelters, snow removal, etc. In other words, the extra costs actually paid by the Owner.

Figures for 106 buildings valued at nearly $50 million reflected an average extra cost of roughly 1% but these were offset more than two times over by the extra revenues received as a result of earlier occupancy due to not "waiting for spring" to commence construction. A copy of the Committee's report is attached.

The Association's Wintertime Construction Committee Chairman, W. G. Malcom of Winnipeg (a CCA Past President), stated that the survey results reflected the tremendous advances made in wintertime construction in recent years. While allowances should be made covering trade contractors' tenders and the possibility of a "sampling error", it was concluded that the results would still show a very strong case for having industrial and commercial projects commence or carried on during the winter months.

An extra incentive this winter favouring decisions against delayed starts is the scheduled doubling of the Federal sales tax rate on construction materials next April. In a number of centres, building costs would be increased next spring because of higher wages.

Report of Winter Construction Committee

Mr. Chairman: Your Committee has just concluded a series of questionnaires extending over the last two years which have been submitted to the members of the C.C.A. on the costs and benefits of carrying out the construction on buildings starting between September 1st and February 28th, with construction carried on continuously through the winter.

We wish to express our thanks and appreciation to the members of our association for their generous response to our requests for information. From the returns. covering projects extending from the Maritimes to western Alberta, we selected 106 which reported on contracts valued from $20,000.00 to $2,000,000.00 except for three projects valued up to $2,800,000.00 as it was felt that the larger projects would normally involve some winter time construction.

The purpose of the survey was to confirm our contentions, that it was not only feasible and possible to construct buildings throughout the winter season without lowering the quality of workmanship but, the extra costs incurred would be offset by revenue earned as a result of earlier occupancy and use. In some instances, in fact, there would be an added bonus in the reduction of financing costs during the construction period. Projects started after March 1st were not included in the survey as winter costs are negligible after the building is completely enclosed and permanent equipment is operating.

Due to the uniformity of extra costs and benefits throughout the entire surveyed area, the report has not been classified into types of construction or location. However, the returns do indicate that the relationship of extra winter costs generally vary in proportion to the size of the project.

In the interest of simplicity the following tables show:

A. Average costs and benefits of winter construction for the dollar value of the total survey covering all projects from $20,000.00 to $2,800,000.00.

B. Average costs and benefits of projects costing over $660,000.00.

C. Average costs and benefits of projects ranging in cost from $20,000.00 to $660,000.00.

The estimated extra costs of winter construction were taken from the reports, as well as the time saved as a result of continuous winter operation, however, where the return did not set rental or revenue value, we estimated the revenue values as follows:

A. Buildings costing $10.00 per sq. ft. or less, the annual rental earnings were set at 60¢ per square foot.

B. Buildings costing up to $20.00 per square foot, the annual rental was set at $1.20 per square foot.

C. Professional, office and institutional buildings and other buildings costing over $20.00 per square foot, annual revenue was averaged at $2.40 per square foot.

A. Total Value of contracts reported, $49,182,767.00. Est. total extra cost of winter construction, $479,073.00 or 0.97 percent.

B. Value of contracts reported costing over $660,000.00, $32,099,008.00. Est. extra cost of winter construction, $253,767.00 or 0.79 percent.

C. Value of contracts reported costing from $20,000.00 to $660,000.00, $17,083,759.00. Est. extra cost of winter work, $225,306.00 or 1.31 percent.

The following comparisons of extra winter costs and estimated revenue earned through earlier completion, were complied from the returns containing the necessary information. These returns covered 66% of the total volume of reported work.

A. Estimated winter costs in A, $339,732.00. Estimated revenue as a result of earlier completion, $834,398.00.

B. Estimated winter costs in B, $169,556.00. Estimated revenue due to earlier occupancy, $554,458.00.

C. Estimated winter costs in C, $170,186.00. Estimated revenue due to earlier occupancy, $279,940.00.

The above report reflects the tremendous advances made in winter construction in recent years. However, your committee feels that much more can and should be done to promote a greater uniformity in specifications and on site procedure for:

a. Mixing, placing and protection of concrete,

b. Placing of masonry,

c. Preparation of ground to receive footings or pavement with particular attention to frost problems

and suggests that we solicit the co-operation of the N. R. C., the Architectural

and Engineering Associations and the manufacturers of concrete and masonry products to accomplish this.

The results of this survey have more than confirmed the contentions of the association that winter construction is both feasible and economical and that the continued promotion of winter construction by every possible means is warranted.

Respectfully submitted.

WINTER CONSTRUCTION COMMITTEE,
W. G. MALCOM, *Chairman.*

Mr. BONE. My name is Allan Turner Bone and for the past 7 years I have acted as chairman of the National Joint Committee on Wintertime Construction.

This is a body comprising representatives of national organizations of construction employers, and unions, architects, consulting engineers, business and finance. Representatives of Canadian Government departments and agencies are associate members of the committee.

Its prime purpose is to promote higher levels of wintertime construction and employment, primarily by means of recommendations to its constituent bodies, the Canadian Government, and other organizations.

The formation of the National Joint Committee took place in 1955, under the sponsorship of the Canadian Construction Association, of which I am a past president. Actually I was president the following year.

This is a nationwide and industrywide association of construction employers—general building contractors, roadbuilders, and heavy construction firms, trade contractors and manufacturers and suppliers of construction materials and equipment—plus a hundred affiliated regional or specialty associations.

My own background is that of a general contractor. After graduating in civil engineering at McGill in 1916, much of my work was with the George A. Fuller Co., of Canada, Ltd.

When this subsidiary was closed down in 1932, its manager, the late J. L. E. Price and his two chief assistants established a company bearing his name. I became its president upon his death in 1945 and have been retired for about a year.

The company operates throughout eastern Canada. Its head office is at Montreal, where the temperature frequently falls below zero during the winter and we may have to contend with the combination of, say, −25° F., and strong winds.

A good deal of our company's work has been carried out in Newfoundland, which is also well known for its fresh, invigorating winters. Actually they love to have snow and 85-mile-an-hour winds there.

The invitation to appear before you today is greatly appreciated. We as the National Committee do not presume to have all of the answers but our experience is summed up in the CCA policy statement:

> The Association believes that wintertime construction has not only been proven to be practicable by the industry but that an increased volume and its accompanying employment are essential to the strengthening of the Canadian economy. With modern techniques and materials and with proper planning and supervision there is no loss in quality and most types of work can be carried out at a comparable net cost to the owner.

Much of the problem has been due to the out-moded prejudice against wintertime construction. The use of incentives and a continuing pub-

licity and educational program, however, have been very helpful in reducing this resistance.

It is my intention to describe briefly some of the construction techniques, some of the means taken to encourage greater use of them, and some of the economics of the whole matter; and then to endeavor to answer any questions that you may have.

I am going to hit highlights from here on.

On the construction techniques I think the point is that we could not afford the luxury of closing down from a 3 to 5 months' period in many parts of the country. We simply had to do something to carry on.

However, upwards of a third of those claiming unemployment insurance benefits under the Canadian social security program during the winter months were classified as construction workers.

Previously many construction workers laid off in the winter took seasonal work in the lumbering industry et cetera, or lived on the premium wage rates they had earned as construction workers.

Work in our lumber camps, however, has also tended to become year around and specialized and winter jobs are not available as in the past. Many construction workers needed income in the winter months and even those that were not too anxious in this regard were eligible for unemployment insurance benefits if construction employment was not available to them.

Finally, new materials and equipment greatly facilitated working in the wintertime, compared to a generation ago. The combination of these three main factors—aided by incentives and publicity—has lead to a steady and significant increase in the application of wintertime construction techniques to the point where more work is actually put in place during the winter months than during the whole year a decade or two ago.

The two main principles for wintertime construction are preplanning and protection. Careful preplanning is, of course, necessary for efficient construction on the basis that if you get the building enclosed before extreme winter then you can work all winter.

Initially enclosures were made with canvas tarpaulins or plywood but more recently polyethylene has been widely used because of its low cost and ability to transmit solar radiation, thus reducing both lighting and heating charges.

Enclosures are designed to fit the job and range in size from a small lean-to around a house to huge structures such as the one used this past winter at a power project on the Nelson River in northern Manitoba.

This shelter encloses an area 580 feet by 120 feet to a height of 140 feet. Within this enclosure 750 men work in their shirtsleeves constructing a generating station while temperatures outside drop to −40° F or lower.

Heated, ready-mix concrete is one of the things that has helped, along with a wide range of components which reduce on-site assembly and construction time.

Montreal received many visitors last year in connection with Expo 67. Most of the pavilions were built during the winter season. We built two, the Australian and Kodak ones, and they were built right through the winter.

Practically all the skyscrapers along Dorchester Street were built in the winter season.

On page 5 there is an interesting contrast. On the St. Lawrence Seaway at the Barnhardt Island Dam the U.S. contractors had one-half and the Canadian another half. The Canadians worked all through the winter and the U.S. ones did not, merely by a difference in the techniques that were employed.

We all finished up at the same time but we did it on a steady basis and they did it as a rush in the summer.

The comments made so far may leave the impression that winter construction in Canada presents no problems at all. This is, of course, not true. Building in winter does have some peculiar hazards.

The frost heave of soils under foundations or basement floor slabs is a particularly serious one. High concentrations of carbon dioxide from unvented oil or gas-fired heaters will damage the surface of freshly placed concrete floor slabs. Air leakage through partially completed walls can saturate porous materials that are subsequently displaced due to frost action.

All of those things can be taken care of. We have the answer to that. Scientists tell us for example that concrete placed and cured at low temperatures just above freezing will attain a higher strength and greater resistance to exposure than concrete cured at a higher temperature in summer.

We now come to the incentives and publicity which I think is one of the things that you are particularly interested in.

The Canadian Government has shown much leadership in promoting higher levels of wintertime construction and employment. Internally, a directive from the Federal Cabinet was sent to all Government departments and agencies in 1954 requiring them to arrange their construction, maintenance and procurement programs so that the maximum employment of the construction trades would occur in the winter.

I made an analysis for them back about that time of two jobs which were started just at the time that they would be properly closed in about Christmas time and in both of those jobs the maximum employment of man-hours was during the 4 winter months, so that the timing does have a big effect on what employment you get.

A large-scale "Do It Now" campaign was initiated by the Department of Labour directed at homeowners, business, and institutions to carry out repairs and renovations during the winter.

The Minister of Labour convened a National Winter Employment Conference in July 1958. Films were produced showing how both housing and nonresidential building projects could be built in the winter months, using proper techniques.

The National Research Council's Division of Building Research published technical information. The winter work publicity material was used by a good many firms in institutional advertising and tie-in campaigns. In summary, it is fair to say that "Do It Now" and "Why Wait for Spring?" are part of Canada's popular speech because we have been subjected to this by radio and everything else over the years.

Exhortations alone, however, do have their limitations and the Federal Government was urged to provide financial incentives to encourage owners to schedule their construction work in the winter months.

Commencing with the winter of 1958–59, the Federal Government made available to municipal governments grants equivalent to half of the payroll cost of certain municipal projects incurred during the designated winter period.

Most of the Provincial governments also picked up part of the payroll cost so that the municipalities' share averaged only 25 percent (in Quebec it is only 10 percent) because the Provincial government pays 40 percent.

This municipal winter works incentive program has been expanded in scope from time to time in the light of experience and is now a built-in feature of many municipalities' construction programs.

The Federal share of payroll costs was increased to 60 percent in 1963–64 in areas with high wintertime unemployment conditions. In the 10-year period, some 57,300 projects have been included, with an estimated total cost of $2,323 million.

Over 35 million man-days of work have been provided and it should be noted that most of this work would formerly have been scheduled in the so-called building season. The total cost to the Federal Government to date for this 10 years has been $282 million.

Other programs involving the joint financing of public works projects have—on a smaller scale—contained winter works incentives. For example, the Federal Government offered to pay half of the labor cost of picnic and camp grounds built during the winter alongside highways by the Provincial governments.

Much of the seasonal unemployment in the building trades has been in the housebuilding sector. As an incentive to encourage wintertime housebuilding, a bonus scheme was introduced for the winter of 1963–64 whereby the purchaser of a house substantially completed in winter received a cash bonus of $500. That is, the purchaser of the house got it, which could be used as part of the downpayment.

While this program did not significantly increase the volume of housebuilding, it did have a very marked effect on the starting dates, from spring to the fall. Some 95,500 dwelling units qualified for the bonus in the three winters in which the winter housebuilding incentive program operated.

Because of a shortage of mortgage money, the scheme was not offered in the winter of 1966–67 but a somewhat similar effect was achieved by the Canadian Government by providing direct loans to housebuilders that fall.

It will be noted that these grants and bonuses are directed at the owner rather than offered to the contractor. This reflects the philosophy that the construction industry is not looking for subsidies itself and, indeed, should not require any special inducements—but is willing to provide construction services at any time of the year.

The Canadian Government, for its part, feels that the funds spent internally and externally on wintertime construction and promotion have paid off handsomely in terms of business activity and reduced outlays from the unemployment insurance fund and in unemployment assistance.

I should add in passing that our National Housing Act, like your housing legislation, provides for home improvement loans which they promote in the wintertime.

A few words about our National Joint Committee on Wintertime

Construction. This was started in 1955. They asked the Canadian Construction Association to start it. The members in it are:

The Canadian Chamber of Commerce
The Canadian Construction Association
The Canadian Labour Congress
The Canadian Legion (veterans)
The Canadian Manufacturers' Association
The Confederation of National Trade Unions
The Engineering Institute of Canada
The National House Builders' Association
The Royal Architectural Institute of Canada

The Federal Department of Labour, the National Research Council and Central Mortgage and Housing Corporation (a Federal agency administering the National Housing Act) have acted as associate members.

In recent times, the Federal Department of Manpower and Immigration has participated, following the transfer to it of the administration of the municipal winter works incentive program.

I might mention at this point that the migration of workers comes under the Department of Manpower and Immigration and that is one reason they were called in on this because in winter there is some migration of workers.

The national joint committee's functions are listed here and I don't think I need to go into them. It is all detailed there.

The national joint committee early decided that the two main factors discouragaing many owners from having their construction work carried out in the winter months were the outdated fears that it would be of inferior quality and of excessive cost.

In addition, tradition led many owners to schedule their construction projects for the so-called building season and many had never been called upon to give serious consideration to wintertime construction.

So that now in our annual statement we come out very strongly for winter construction as being good and you can read how we say it.

Similarly, a little leaflet on winter construction has been distributed by the national committee and a promotional campaign through speeches, magazine articles, briefs, and convention papers.

On the bottom of page 11 there is an interesting copy of an editorial in the Royal Architectural Journal of 1961. We included this here because in so many cases architects have been fearful about the quality of winter construction and this is the head of the Royal Architectural Institute who put this letter out coming out very, very strongly in favor of winter construction saying that there is no reason why we shouldn't have it and architects should do their part in seeing that owners didn't shy away from winter construction.

At the bottom of page 12 we have the economics of winter construction.

What about the cost of wintertime construction? Governments may be expected to schedule public works in the winter for sociological et cetera reasons, but how about private investors? It is difficult to be definitive on this subject, but generally speaking all of the evidence points to the financial benefit to the owner of proceeding with his project in the wintertime, rather than waiting until next spring.

The important factor to remember is that wintertime construction costs should be compared to those that will be experienced in the next summer rather than the previous summer. Building cost indexes have risen consistently each year over the past 35 years.

The index in January is usually about 3 percent lower than in the following summer. This in itself indicates that it would be economical to spend quite large sums of money on wintertime construction rather than postpone the work until the spring.

The next point to remember is that the extra costs of wintertime construction are related only to those portions of the project carried out in the adverse winter period—not to the whole job. A few years ago the Canadian Construction Association conducted a survey among its general contractor members to find out how much extra they had provided in their bids for winter work; that is, the amount that owners had to pay. Over 100 medium-sized contracts were covered and the average extra cost was in the neighborhood of 1 percent.

There is an appendix attached here which gives a lot of details about that.

When owners consider the earlier entry into a market and/or the earlier return on their investment and reduced financing costs related to an earlier completion date for their construction project, the factors favoring winter work are usually very obvious.

I don't think I need to go into the details of the next.

In conclusion, it is sometimes sobering to reflect that one of the objectives of the Canadian Construction Association when it was formed in 1918 was to encourage wintertime construction. In Canada today the number employed in on-site construction work is still appreciably higher in August and September than in January and February, so we have yet to reach our goal. However, great gains have been made in the past decade and the acceptance of wintertime construction is now widely accepted. This in turn has been of great benefit to our overall economy.

In conclusion we quote from the late Herbert Hoover, who in 1920 said that there should be no hesitation in doing winter work, that it is just as good as the other.

Mr. GIBBONS. Thank you, sir.

Mr. BONE. With that in mind, we have other copies here, which I can leave with you, giving some detailed figures as to the amount of money spent on these municipal incentive schemes where the Federal Government pays 50 percent of the labor.

Mr. GIBBONS. We would like to have those, sir.

Let me tell the reporter here, after the preliminary opening remarks on Mr. Bone, would you put his statement in in full and, without objection, the other material that he has left us here I will leave that to the discretion of the staff as to whether to put it in in full or not.

Mr. BONE. I didn't think you wanted to read out all these details.

Mr. GIBBONS. We will leave that and you may decide what to put in the record. Your testimony is quite interesting, sir. I was taken by your figure that you in the construction industry who are largely representing the owner or having the interest of the owner at heart, say that there is only a 1-percent increase in wintertime cost.

Mr. BONE. I mean the actual work that is done in the winter may cost 10 percent more, but that is only about 10 percent of the total cost

of the job so that it is 1 percent of the whole cost of the job. You see, any job of any size usually takes about 12 months to do. It is a fairly small job now that you can finish up in 6 or 7 or 8 months. So that in a 1-year job, some of it has got to be done in the winter and this is where the Government tries to do the scheduling of jobs to get them started at the time that they will be closed in by the winter months.

You can do a certain amount of your closing in in the cold weather. We have the techniques for that, but once the building is closed in all the trades, the plumbing, the plastering, the marble tile and terrazzo work goes on in the building just as if it were summertime. This is the main way we keep the costs down.

Mr. GIBBONS. Yesterday we had some testimony from the Associated General Contractors here in this country about all-weather construction techniques, and they said that these techniques didn't lend themselves to heavy construction and highway construction. What has been your experience in Canada?

Mr. BONE. On highway construction they are doing grading now during the winter. On the concrete slabs it is a little more difficult to keep the frost out. There are certain parts of the heavy construction that can't be done but there is quite a lot of it that can be done that they didn't used to do.

Certainly the big jobs, the dam construction and things of that kind, up in the wilds, they go on summer and winter. It doesn't make any difference.

Mr. GIBBONS. Is that right; and you can construct dams?

Mr. BONE. I mentioned this dam where they had the complete enclosure 580 feet long and 140 feet wide and 120 feet high. This was done in 40 below zero weather all through the winter. Actually, this may interest you, but it is going over a little bit.

Way back in the early days, sometime around 1910 or 1911, the CPR in the Rocky Mountains burned down at Lake Louise and Carter, Halls, Aldinger were called on to rebuild it in the winter months. They built the hotel in the winter months in the heart of the Rockies, right through the winter, and had it ready for the spring occupancy.

So, it can be done. It could be done a long time ago. Actually it is more the matter of getting people used to the idea. Any of our contractors if they are faced with a problem can handle it all right.

Mr. GIBBONS. With respect to these Government subsidies that you talk about, what do they actually amount to as a percentage of a job?

Mr. BONE. Well, the figure was in here on these municipal grants, have the payroll cost. On work totaling $2,323 million the Government has spent $282 million which is about 12 percent of the total cost but, you see, that has reduced the drain on the unemployment insurance by at least that much money, I would say.

Mr. GIBBONS. Well, then, that 1 percent figure you gave was that including——

Mr. BONE. This 1 percent of course is not so much of interest to the Government as to private industry, but the Government where they plan their work and say it must be done in winter maybe spend 1 or 2 percent more for the building but no more than that.

In Canada now the Federal building programs are all very carefully scheduled so as to give as much employment in the winter as possible and the least competition with private industry. I think the lessening

of competition of private building programs with Government programs is one of the most important parts of it.

Mr. GIBBONS. You do the Government building in the winter and private in the summer; is that right?

Mr. BONE. Well, there is a great deal of the private which is in summer. Of course this is something that we can't control because the private industry year ends the end of the year. They get their annual statement about April and then they sit down and say, "What are we going to do this year?" Which means that if they have to do some building, they start in the beginning of the summer, whereas really the proper time to start is the beginning of winter.

Mr. GIBBONS. Mr. Steiger.

Mr. STEIGER. Thank you, Mr. Chairman.

Mr. Bone, I wonder if you could expand a little bit on the statement you make on page 3 on the unemployment insurance benefits under the Canadian social security program.

You said perhaps upwards of a third of those claiming the benefits were classified as construction workers. At what point is that today, for example?

Mr. BONE. Well, I think the construction workers are about 20 to 25 percent of the unemployed.

Mr. STEIGER. Still at this point?

Mr. BONE. Yes, but we have it pretty considerably I would say.

Mr. STEIGER. Do you know in your capacity as the chairman of the National Joint Committee on Wintertime Construction whether or not the Associated General Contractors in this country have come to you and asked for any information and guidance and whether or not this same type of joint committee could be established in this country?

Mr. BONE. They haven't come directly to us as a committee. I think they have been talking to the Canadian Construction Association as an association to an association, but there have been no representations to our committee as a committee.

Mr. STEIGER. Did I understand you to indicate on pages 8 and 9 of your testimony when you talked about the joint committee itself, that the impetus for this came from the Federal Department of Labor when they asked for the establishment of a joint committee?

Mr. BONE. Well, actually we asked them to do something about it and finally they asked us to form the committee. We provided the office space and the secretarial help and the permanent chairman. I am the second chairman. There was another chairman for a few years and I have been chairman for the last several years.

Mr. STEIGER. In other words, the contractors' association in Canada provides the funding for the joint committee?

Mr. BONE. Yes.

Mr. STEIGER. And is it established as an independent organization of the Department of Labor in Canada, or is it part of the Department of Labor?

Mr. BONE. The Department of Labor and Department of Immigration and the National Housing are associate members, and they sit in actually at our meetings now. The original meetings were very much promotional on our part to needle them to do this and do that. Now they submit to us a report of what happened the previous winter, what their plans are for the following winter.

We discuss whether we think we are going the right way or not going the right way. They come to us for our reaction, and we as a group study what their plans are, and sometimes they don't do all we needle them to do, but generally speaking there is a very good reaction on both sides of the fence.

Mr. STEIGER. Setting aside the question of subsidies, or wage incentives, or any of those things, which I am not sure at this point we are in any position to get into insofar as it relates to the United States versus Canada, you have indicated that it was extremely helpful when the directive went out from the Federal Government on the scheduling of construction work that they are involved in.

Mr. BONE. Yes. They have their own interdepartmental committee which sits down and discusses all their building programs and they themselves try to schedule them to give the greatest employment in winter. There is a directive to all departments of Government to schedule their building programs to give the greatest employment in winter.

Mr. STEIGER. I think your statement has been extremely helpful. Thank you for coming down. It certainly is going to be of great benefit to this committee as we look into this problem.

Mr. BONE. This information and probably lots more is readily available from either the Canadian Construction Association in Ottawa or any of the Government departments that are mentioned here. They are only too pleased to indicate what results they have had from what they have done, and I think they like to get people's reaction.

Sometimes they wonder whether they are really doing all they should or doing too much, and it is nice to get other people's reaction to it.

Mr. Gibbons, you remarked about the California work a little while ago.

Mr. STEIGER. He would only remark about Florida.

Mr. BONE. Florida. Pardon me. In our country the places that find it the most difficult to do construction in the winter are the places where our climate is the mildest.

Mr. GIBBONS. Why is that?

Mr. BONE. Well, here is the answer. In the very harsh climate areas they just can't sit down and do nothing for half the year so they have to work through the cold.

In the other places they say, "Oh, we have only a few days' bad weather. Let's not bother working in the few days of bad weather." And the few days stretch out. This is the attitude. If the climate is pretty mild, it is "Let's not do anything in bad weather."

Mr. GIBBONS. In other words, they don't plan or schedule or put up the protective structures and things like that?

Mr. BONE. That is right.

Mr. GIBBONS. Mr. Hathaway?

Mr. HATHAWAY. Thank you, Mr. Gibbons.

I wanted to highlight a couple of points Mr. Bone made. You say there is no difference in quality in the winter construction and the summer?

Mr. BONE. The quality is just as good or better. Actually this thing that I mentioned about concrete, the concrete really is better poured under controlled conditions in winter than in summer. It is very hard to keep the temperatures down in summer, but you can keep the

temperatures up in winter. Really concrete should be cured at a temperature of between 50° and 60°.

Mr. HATHAWAY. You say that, of this $282 million that the Government spends, that you are sure that they more than recovered that in the savings on unemployment compensation.

Mr. BONE. This would be a personal opinion.

Mr. HATHAWAY. We could get those figures, though, I presume if we needed to?

Mr. BONE. These are the figures given to me by the Government.

Mr. HATHAWAY. But we could get the savings on unemployment compensation?

Mr. BONE. I would think you could.

Mr. HATHAWAY. How do they work the closing in of the building? Here in the United States the masons complain that they have to pay the cost of closing in the building and the electricians and plumbers benefit.

Mr. BONE. The masons may say they pay the cost, but ultimately the owner pays the cost.

Mr. HATHAWAY. There is no question about that. Are there any incentives to individuals who want to build a home in winter rather than the summer to get a lower interest rate or something like that?

Mr. BONE. No; there is no lower interest rate. We have been pushing to have the sales tax on materials cut off for winter construction, but in the last election they were saying that they were going to take the tax off altogether so that that point is gone. This is one of the things that we have been trying to promote.

Mr. HATHAWAY. Thank you. I know they do it in some European countries.

Thank you very much, Mr. Bone.

Mr. GIBBONS. Well, Mr. Bone, we certainly appreciate your coming here to be with us. Your testimony has been very helpful.

Mr. BONE. Thank you, sir.

Mr. GIBBONS. We appreciate it.

(Other material submitted by Mr. Bone appears at the end of the printed hearings.)

Mr. GIBBONS. Our next witness is Mr. Ralph J. Johnson, staff vice president, National Association of Home Builders' Research Foundation.

Would you come forward, please, Mr. Johnson, and take a chair and take over. We welcome you here.

STATEMENT OF RALPH J. JOHNSON, STAFF VICE PRESIDENT, NAHB RESEARCH FOUNDATION, INC., NATIONAL ASSOCIATION OF HOME BUILDERS

Mr. JOHNSON. Thank you.

Mr. Chairman and members of the committee, I am Ralph Johnson, staff vice president and director of the NAHB Research Foundation, Inc., a subsidiary corporation of the National Association of Home Builders. NAHB is a trade association of nearly 50,000 members who build America's homes and who are organized in 447 affiliated State and local associations in all 50 States, Puerto Rico, and the Virgin Islands.

It is my responsibility to direct the activities of the foundation, which conducts research for the National Association of Home Builders and a number of building material manufacturers, trade associations, builders, and others in the industry.

I am indeed honored to accept your invitation to submit comments on seasonality in the construction industry and the problems of all-weather residential construction.

My comments will relate specifically to residential construction, which I believe is somewhat different than Mr. Bone's. I will refer primarily to residential construction.

(The prepared statement follows:)

STATEMENT OF RALPH J. JOHNSON, STAFF VICE PRESIDENT, NAHB RESEARCH FOUNDATION, INC.

Mr. Chairman and Members of the Committee, I am Ralph J. Johnson, Staff Vice President and Director of the NAHB Research Foundation, Inc., a subsidiary corporation of the National Association of Home Builders. NAHB is a trade association of nearly 500,000 members who build America's homes and who are organized in 447 affiliated state and local associations in all 50 states, Puerto Rico, and the Virgin Islands.

It is my responsibility to direct the activities of the Foundation, which conducts research for the National Association of Home Builders and a number of building material manufacturers, trade associations, builders and others.

I am honored to accept your invitation to submit comments on seasonality in the construction industry and the problems of all-weather residential construction.

Inclement weather is a significant problem for home builders in almost all parts of the country. Construction problems of rain, mud, snow, and freezing temperatures are readily apparent. However, even in some normally good climates, high temperatures and blowing dust and sand cause weather-related construction problems.

Inclement weather is a very significant and, perhaps, the primary reason for seasonality in residential construction. It increases the cost of residential construction in several ways: Bad weather adds direct labor time, increases scrap and waste materials, increases the use of some materials such as gravel, increases construction time, increases site equipment time, and increases supervision time. All of these add extra cost. In addition, in certain kinds of weather, alternate building methods must sometimes be used such as thawing frozen ground and heating concrete during freezing weather, and these add to construction costs.

I will examine the direct and indirect cost increasing factors in more detail later but would like to mention now two other factors that probably increase residential construction costs in relation to seasonality. First the unit cost of many building materials is probably higher due to seasonality because the manufacturer must make the capital investment in machinery and equipment to produce at the highest rate required by his customers, but this only occurs during peak production periods. This adds to the cost of producing building materials and products in the same way that peak power production capability to handle peak loads affects the cost of energy produced by utility companies. Second, it is probable that hourly wage rates are higher in the construction industry than they would be if workmen could be expected to be employed throughout the year. I have no rational way of assessing the extent to which these two factors increase cost of construction, but together, they probably importantly affect construction cost.

DIRECT AND INDIRECT COSTS RELATED TO WEATHER

The cost of a dwelling may be divided into the following categories: Sales, financing, overhead and indirect costs, land, and direct construction costs.

Sales

Weather and seasonality have only a slight effect on the cost of sales. There may be some extra costs related to bad weather such as supplementary advertising but these are probably small.

Financing

Financing costs are divided into the cost of construction or interim financing and permanent or mortgage financing. Inclement weather most certainly delays construction and, therefore, increases the cost of interest on construction loans. It is reasonable to assume that the *average* construction loan will be at least $10,000 during the course of construction. In today's market, the cost of such construction money is at least 8 percent counting points and discounts and requirements for compensating balances. Earlier this month, I obtained some specific information for this Statement from a builder in northern Indiana. He started construction of a 1300 square foot, 3-bedroom, 2-bath house with a partial basement in the last week of January and was not able to complete it until the last of May—approximately 120 days. On April 1, he started a similar house but with 1600 square feet and finished it the first of June—60 days. Specifically, he said bad weather delayed his schedule in the case of the first house by the difference or two months. Assuming then a $10,000 loan at 8 percent, the extra 2 months added approximately $130 to the cost of the construction loan.

The cost of mortgage money is not directly affected by bad weather except to the extent that the amount of the mortgage and the price of the dwelling must be increased to compensate for the cost of bad weather construction.

Overhead and indirect costs

Overhead and indirect costs are increased by bad weather and seasonality. Construction delays increase the cost of supervision, increase the cost of equipment that is either owned or leased by reducing the productive time of that equipment in the case of ownership or increasing the time charges if leased or rented. Delays in the production schedule cause a number of management and related overhead and indirect cost increases such as additional supervision time, reduced productivity, and increased interest costs on materials and equipment in inventory. In addition, weather-caused delays in construction reduce the rate of capital turnover and, therefore, reduce return on invested capital.

Land

The cost of raw land is not affected by weather. The cost of development of the land into a usable lot may be significantly increased because of bad weather. Land development involves grading, installation of utilities, and paving of streets and sidewalks. The cost on all of these can be substantially increased by bad weather.

Direct construction

Direct construction costs for both labor and materials can be increased by bad weather. Materials waste and scrap rises during periods of rain, snow, or either very cold or very hot temperatures. For the average priced home of about $22,000 including lot. I would expect the cost of materials and equipment to be about $8,000. Therefore, even a one-percent increase in waste and scrap would represent a cost increase due to bad weather of about $80—a reasonable figure.

The cost of labor is definitely increased by bad weather. This past week I obtained from a builder in northern Indiana some specific figures for this Statement. The table below sets forth the differences between estimated number of labor hours and actual labor hours for the two houses mentioned—one started in late January, the other started the first of April. The data are taken from the builder's weekly field labor reports which are a part of his internal management cost control system. The builder is well-known for his productivity and for his advanced management and record systems. This builder has sufficient experience to accurately predict the estimated labor hours for each of the operations required to build. Accordingly, there is a reason when actual labor hours differ significantly from estimated hours. The operations selected and set forth in the table show those operations that are most significantly affected by weather. Therefore, in these examples, the reason for the extra labor hours is bad weather.

COMPARISON OF THE DIFFERENCE BETWEEN ESTIMATED AND ACTUAL LABOR HOURS ON 2 HOUSES DUE PRIMARILY TO EFFECT OF INCLEMENT WEATHER

Operation description	1,300-square-foot house started in January		1,600-square-foot house started in April	
	Man-hours		Man-hours	
	Estimated	Actual	Estimated	Actual
Rough grading	23	53	50	58
Restaking	2	10	2	2
Weather labor[1]	10	62	12	2
Dig crawl space, pads and piers	6	18	15	11
Set and pour foundation walls, pads, and piers	12	28	35	37
Backfill foundation	11	40	11	9
Insulate foundation, lay vapor barrier, set beams	9	15	10	7
Total	73	226	135	126
Difference		+153		−9

[1] Weather labor is time allowed for items such as breaking frost, excavating mud and replacing with sand, setting up heaters, covering the site to thaw frozen ground prior to foundation construction, covering concrete against freezing, plowing snow, extracting equipment from mud, and related items.

The builder states that the difference in labor time between estimated and actual is the result of the effect of bad weather in the case of the house started in January. For the house started in January, mud, rain, snow, and frost increased labor time by 153 man hours. At the builder's average cost of $5.50 an hour including pension, welfare, insurance, social security, unemployment compensation, and related fringe costs, this amounts to a little over $840.00. The difference between estimated and actual hours for the house started in April for the items set forth above is minus 9 man hours which is not consequential and falls within the estimating tolerance. The house started in late January referred to in the table, represents nearly the extreme extra weather-caused labor for this builder. Three of his other similar homes started in mid and late March had extra weather-related times for the operations noted in the table of 37, 62, and 77 man hours. During the past twenty years this builder has developed a number of anti-bad-weather building methods. He also has alternate labor plans for inclement weather including a shop in which he fabricates components and can "store" labor. It is fair to say that his extra labor hours experience represents advance practice for his climate.

RESEARCH TO REDUCE THE EFFECT OF WEATHER

For the past 13 years, the National Association of Home Builders through its Research Institute and now the NAHB Research Foundation, Inc., have been designing and building research homes. For each such home, certain research objectives are established. For each of the 7 research house projects, one of the objectives has been to reduce the effect of weather. For the first 4 dwellings, panels and components were developed to allow the houses to be "closed in" faster to minimize the effect of weather. Today the state of the art is such that except during extreme weather conditions, builders can "close in" a dwelling in one or two days.

In our fifth research home, we used components, developed an all-weather foundation system, and utilized prefinished exterior materials. This home was started during the winter, and the ground was frozen. Pier holes were dug with a post hole digger attached to the back of a small tractor. The light gage steel foundation frame, beams and columns were set and suspended over the pier holes and a small pad of concrete was poured (below frost line) into the bottom of each pier. The next day temporary supports were removed, and construction proceeded

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.

Mr. JOHNSON. Inclement weather is a significant problem for home-builders in almost all parts of the country. Construction problems of rain, mud, snow, and freezing temperatures are readily apparent. However, even in some normally good climates, high temperatures and blowing dust and sand cause weather-related construction problems.

Inclement weather is a very significant and, perhaps, the primary reason for seasonality in residential construction. It increases the cost of residential construction in several ways: Bad weather adds direct labor time; increases scrap and waste materials; increases the use of some materials such as gravel, increases construction time; increases site equipment time; and increases supervision time. All of these add extra cost. In addition, in certain kinds of weather, alternate building methods must sometimes be used such as thawing frozen ground and heating concrete during freezing weather, and these add to construction costs.

I will examine the direct and indirect cost-increasing factors in more detail later but would like to mention now two other factors that probably increase residential construction costs in relation to seasonality.

First the unit cost of many building materials is probably higher due to seasonality, because the manufacturer must make the capital investment in machinery and equipment to produce at the highest rate required by his customers, but this only occurs during peak production periods. This adds to the cost of producing building materials and products in the same way that peak power production capability to handle peakloads affects the cost of energy produced by utility companies.

Second, it is probable that hourly wage rates are higher in the construction industry than they would be if workmen could be expected to be employed throughout the year. I have no rational way of assessing the extent to which these two factors increase cost of construction, but together, they probably importantly affect construction cost.

To comment rationally on your questions, I divided the cost of construction into the logical categories used in the residential building industry. These are sales, financing, overhead and indirect costs, land, and direct construction costs. After doing this, I tried to determine whether seasonality had any effect on these costs.

In our industry, of course, we are extremely concerned about costs because we continuously are trying to get the price cost of housing down and the value up.

Weather and seasonality have probably a very slight effect on the cost of sales. If you are having an open house and a parade of homes and spend a lot of money on advertising and the weather is very bad and nobody comes out and you have to do it the next week, there is a slight factor, probably small overall.

Financing costs, though, can be divided into cost of construction or interim financing and permanent or mortgage financing. Inclement weather most certainly delays construction, and, therefore, increases the cost of interest on construction loans. It is reasonable to assume that the average construction loan will be at least $10,000 during the

course of construction. In today's market, the cost of such construction money is at least 8 percent counting points and discounts and requirements for compensating balances.

Earlier this month, I obtained some specific information for this statement from a builder in northern Indiana. He started construction of a 1,300-square-foot, 3-bedroom, 2-bath house with a partial basement in the last week of January and was not able to complete it until the last of May—approximately 120 days. On April 1, he started a similar house but with 1,600 square feet and finished it the first of June—60 days. Specifically, he said bad weather experienced in January and February delayed his schedule in the case of the first house by the difference of 2 months. Assuming then a $10,000 loan at 8 percent, the extra 2 months added approximately $130 to the cost of the construction loan.

The cost of mortgage money is not directly affected by bad weather except to the extent that the amount of the mortgage and the price of the dwelling must be increased to compensate for the cost of bad weather construction.

Overhead and indirect costs are increased by bad weather and seasonality. Construction delays increase the cost of supervision, increase the cost of equipment that is either owned or leased by reducing the productive time of that equipment in the case of ownership or increasing the time charges if leased or rented.

I have no way of rationally estimating the amount of this but it certainly is an important factor.

Delays in the production schedule cause a number of management and related overhead and indirect cost increases such as additional supervision time, reduced productivity, and increased interest costs on materials and equipment in inventory. In addition, weather-caused delays in construction reduce the rate of capital turnover and, therefore, reduce return on invested capital.

Direct construction costs for both labor and materials can be increased by bad weather. Materials waste and scrap rises, we know, during periods of rain, snow, or either very cold or very hot temperatures. For the average priced home of about $22,000 including lot, I would expect the cost of materials and equipment, such as air-conditioning equipment, to be about $8,000. Therefore, even a 1-percent increase in waste and scrap would represent a cost increase due to bad weather of about $80—a reasonable figure.

The cost of labor is definitely increased by bad weather. This past week I obtained from a builder in northern Indiana some specific figures for this statement. The table below sets forth the differences between estimated number of labor hours and actual labor hours for the two houses mentioned—one started in late January, the other started the first of April.

The data are taken from the builder's weekly field labor reports which are a part of his internal management cost control system. The builder is well known for his productivity and for his advanced management and record systems. This builder has sufficient experience to accurately predict the estimated labor hours for each of the operations required to build.

Accordingly, there is a reason when actual labor hours differ significantly from estimated hours. The operations selected and set forth

in the table show those operations that are most significantly affected by weather. Therefore, in these examples, the reason for the extra labor hours is bad weather.

The table essentially shows that for the house started in January there are 153 man-hours extra. That is, there were actually 153 more hours spent than had been estimated for the operations of grading, restaking, weather labor, digging in the crawl space, pads and piers, setting footings, foundation walls, backfilling and insulating the foundation and laying the vapor barrier and setting the beams, whereas on the house started in April the difference was a negative 9 hours, which was within the estimated tolerance and is not consequential. The house started in late January referred to in the table represents merely the extreme weather that called for this labor.

Three of the similar homes started in mid or late March had extra times of 37, 62, and 77 man-hours respectively.

I think it is significant to note that at this builder's average cost of $5.50 per hour, including pension, welfare insurance, social security, unemployment compensation, and related fringe costs, the extra 153 hours amounts to a little over $840.

Weather labor is time allowed for items such as breaking frost, excavating mud and replacing with sand, setting up heaters, covering the site to thaw frozen ground prior to foundation construction, covering concrete against freezing, plowing snow, extracting equipment from mud, and related items.

We started building research houses some 13 years ago and one of our goals was to try to improve productivity in bad weather and reduce cost. We have just completed the seventh research house. For the first four dwellings, panels and components were developed to allow the houses to be "closed in" faster to minimize the effect of weather. Today the state of the art is such that except during extreme weather conditions, builders can "close in" a dwelling in 1 or 2 days, if they decide that they need to.

In our fifth research home, we used components, developed an all-weather foundation system, and utilized prefinished exterior materials. This home was started during the winter, and the ground was frozen. Pier holes were dug with a post hole digger attached to the back of a small tractor. The light gage steel foundation frame, beams, and columns were set and suspended over the pier holes, and a small pad of concrete was poured into the bottom of each pier below the frost line.

We covered this with a little straw. The next day we removed the straw and backfilled with earth which allowed the foundation to be put in so that the rest of the house could proceed at one of the worst times of the year.

The system would probably be in widespread use today except for the fact that a satisfactory economic coating for the galvanized steel has not yet been developed.

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.

By the way, our latest research housing project consists of six garden townhouses. They are located between North Capitol and First Street, Northwest, on K Street and were open to the public this past weekend and will be open this coming one. All have been sold to people who qualify in the urban renewal program of the Federal Government.

Panels for this project were cast in an outdoor yard in Richmond, Va., 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.

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. They have been developed by manufacturers, builders, and workers to try to minimize the effect of weather. 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. Homebuilders 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. Sometimes they do it too well I understand. 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 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 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 metropolitian community.

What happens in Rockville is certainly different weatherwise than what happens in Alexandria sometimes, to use an example here.

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 according to our information.

A great deal of research has been accomplished 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.

Mr. GIBBONS. Thank you, Mr. Johnson. I followed all your statement, and I think it makes a lot of sense to me.

I would ask a question, though, about the use of equipment. It would seem to me that the use of equipment in wintertime if it were owned by the contractor would allow him to charge the use off at a lower rate and would therefore actually save him money and if he had to rent it, perhaps the renter would be willing to make some concession because of the fact that traditionally that equipment sits idle in the winter. Is my thinking faulty there?

Mr. JOHNSON. Perhaps I didn't state what I had in mind clearly, Mr. Chairman.

What I meant was that the fact that you have to use the equipment extra hours increases the equipment time charges. If you have to use a front-end loader to remove snow, if you have it yourself, it is an operating cost and if you have to lease it, you have to pay extra for it. On the other side, you are quite right. If you do own equipment and can increase the number of hours that it is used, it tends to reduce the depreciation, it does reduce the depreciation charge hourly, but it still costs to operate it.

Mr. GIBBONS. Mr. Steiger.

Mr. STEIGER. I have no questions, Mr. Chairman.

I appreciate Mr. Johnson's coming to the committee. The statement has been very interesting.

Mr. GIBBONS. Mr. Hathaway.

Mr. HATHAWAY. Thank you very much.

I wonder in your example whether or not in the case of the Indiana builder proper planning might have avoided some of the extra cost he got into in light of the previous witness's testimony stating that the cost differential is only 1 percent in Canada.

Mr. JOHNSON. Yes. That is why I wanted to make the point that residential construction is different than building construction which I think Mr. Bone was talking about.

First off, an ordinary schedule time for a dwelling such as this is about 2 months as opposed to a building which might be a year or two. It is a quite different situation. The reason that I selected this particular builder out of thousands as an example is that he is so well

known for his advance management techniques, for his improved, increased productivity, that I thought this would be a conservative example.

For example, in addition to the other things that he has done, such as developing a precast prestressed concrete grade beam system so that he can put in a good foundation in the wintertime, he has a quite substantial shop and does have alternate bad weather plans which are part of his regular schedule, and during real bad weather, he tries to keep his men employed by fabricating his own components in his own shop and thereby storing labor.

So I think this is a conservative example.

Mr. STEIGER. If the gentleman would yield.

Mr. HATHAWAY. Certainly.

Mr. STEIGER. I saw Mr. Bone shaking his head on the point that you made that you do have to differentiate between residential construction for a home that would take 60 to 90 days to start and complete versus a major building which could go 8, 12, or 15 months, in which the techniques that are used in wintertime may be applicable because you can start it in the summertime and get the foundation work which may be critical because of cold weather which does not apply to residential construction.

I know certainly in Wisconsin seasonality plays a significant role in terms of when you can start the dwelling.

Mr. JOHNSON. Yes; it does indeed. The start time of course is partially determined in residential by the market situation. There is a tendency for people to be more interested in buying and moving when school is not in session and perhaps that has some contribution. There is a significant difference.

I think Mr. Bone said that 10 percent was a more likely figure of that portion of the work that was done during the winter and I think the numbers that I used here, the highest number, somewhat on the extreme side, would fall a little higher than that.

By the way, the 153 hours that I quoted would be roughly an increase of about 25 percent. It would be about 600 man-hours total for this particular house which, by the way, is a relatively low figure.

Mr. HATHAWAY. Of course, the cost for manufactured goods figures would drop off if the winter program is initiated.

Mr. JOHNSON. Yes; I think it would tend to even out, sir.

Mr. HATHAWAY. Thank you.

Mr. GIBBONS. I have one more question.

I didn't hear you mention anything about the effects of building codes. Do you have any problem with building codes in the cold winter construction? Do you run into any problems there?

Mr. JOHNSON. I think perhaps not so much with the codes themselves as perhaps the men who enforce its provisions who sometimes might be somewhat stricter in the wintertime. As a general statement I don't think this is a consequential problem, that is the enforcement of codes in the wintertime versus other types of weather.

Mr. GIBBONS. Thank you, sir.

Then, Madam Secretary, we will put his statement in completely right after his introductory remarks.

Thank you.

Our last witness is Mr. Charles Velardo, chairman of the All-Weather Committee of the Mason Contractors Association of America, and we are very glad to have you here, sir.

I see you have someone else accompanying you.

STATEMENT OF CHARLES VELARDO, CHAIRMAN, MCAA ALL-WEATHER COMMITTEE; ACCOMPANIED BY GEORGE A. MILLER, EXECUTIVE VICE PRESIDENT, MASON CONTRACTORS ASSOCIATION OF AMERICA

Mr. VELARDO. This is Mr. George Miller, executive vice president of the Mason Contractors Association.

Mr. GIBBONS. You may proceed as you wish.

Mr. VELARDO. Thank you.

The Mason Contractors Association has been vitally interested in this all-weather program for a great many years. It seems the prudent thing to do to prepare a broad statement for this type of a hearing and I will read what we have and hope that it opens up some lines of discussion here.

Mr. Chairman, on behalf of the Mason Contractors Association of America, we wish to thank you for this opportunity to present this statement to the Select Subcommittee on Labor, House of Representatives.

The construction industry has long been plagued by the serious problem of seasonality. There is no other field so adversely affected by weather as that of masonry construction. This was very graphically brought to our attention, some years ago, when this association, after considerable study, established for research, a committee on all-weather construction.

Most of us here will undoubtedly think that the main task before us is solving the cold weather construction problem. Our association has attempted to bring into focus all the various elements which can affect our operation—whether it be the intense cold with its biting winds and heavy snow, or the sweltering heat with its driving rainstorms. Each of these elements, in their extremes, play great havoc with our industry.

Some 2 years ago in Chicago the Mason Contractors Association of America sponsored its first all-weather conference to which leading experts of our industry were invited to participate. At the conclusion of this conference it was resolved that this was an area to which we must devote a tremendous amount of research, investigation, study, and money so as to bring to our membership the tools to overcome these adversities.

At these conferences a tremendous amount of preliminary discussions ensued; however, it was readily discernible that a positive program with the full efforts of everyone in our industry—contractor, manufacturer, and laboring force (bricklayers and laborers)—would be required if advancements are to be made.

We are bringing with this statement file folders containing the speeches of many of the experts who were present, along with other technical information which was provided to us by allied associations and manufacturers.

As of July 1 of this year the masonry industry has joined together in a cooperative effort and formed the International Masonry Industry All-Weather Committee.

It is composed of the Bricklayers, Masons & Plasterers International Union, Laborers' International Union of North America, Mason Contractors Association of America, National Concrete Masonry Association, Portland Cement Association, and Structural Clay Products Institute.

This committee, international in scope, will undertake research for new and improved methods so the industry's available manpower can be used to its fullest extent despite adverse weather conditions. I am sure President Thomas Murphy, of the Bricklayers, Masons & Plasterers International Union, will, or has already, discussed with you the great loss of manpower that our industry suffers due to lost time directly related to inclement weather.

This seasonal fluctuation greatly affects the scheduling, completion dates, as well as the entire work force that contractors have upon their projects, besides the great losses in revenue to all the parties concerned.

During this year of scarcity in skilled craftsmen this association and the international union are doing everything within their power to promote and conduct an ever-increasing apprenticeship program; however, there is no other single item that we know of that could add skilled manpower hours to our working force than the implementation of an all-weather construction program.

To search out and attempt to solve some of the problems on a local level, MCAA will again sponsor during the fall season a series of all-weather conferences, which will bring to the various communities in this country and Canada, speakers who will show them new ideas and techniques which will make weather enclosures and heating much more practical and desirable.

We might point out that there has been some reluctance on the part of the masonry industry to bear the entire cost of the enclosure. When a structure is enclosed by a mason contractor each and every trade that is working on this building will benefit, yet the burden of cost, no matter how large or small, has been resting solely with the mason contractor if no allowances have been made to offset this item.

I digress to say that when we talk about allowances there, we are talking about the allowances in the general conditions of the contract set up in one way or another to provide for the enclosure of the building.

The masonry industry has seen that there is a great benefit in an all-weather construction effort.

For example, I refer to the enclosure in our file folder produced by Structural Clay Products Institute entitled "Cold Weather Construction Techniques."

The Jordan Marsh Department Store at Braintree, Mass., was done by the firm of G. Salvucci Co., of which I am an officer. You will note that the estimate for the protection of this work to continue under cold weather conditions was approximately 1 percent of the total job cost.

In our files in the executive offices in Chicago we have photographs of projects that used enclosures and heating that date back to 1950. For example:

The TB sanitarium in Hancock, Mich., done during the years of 1950–51, used suspended scaffolding covered with tarps. The estimated

cost by the contractor was approximately 1–2 percent of the total job cost.

The same firm, Herman Gundlach, Inc., did the Holy Family Catholic Church in upper Michigan. They began the masonry work in the fall of 1959 and continued to work throughout the winter. The bricklayers worked in comfort while the outside temperature went from −16° F. to −26° F.

In the Midwest, two recent examples of how protection can assist our industry was brought to our attention by the H. W. Peterson & Sons Co. In downtown Chicago, during the winter of 1966, this firm completed a three-story addition to the IBM building by enclosing their scaffolds and heating the enclosure. On this project the masonry crews lost no time due to winter conditions.

The Peterson firm, during this last winter, completed a transformer building for the Edison Co. in the area of O'Hare Airport. The structure was 135 by 60 feet and 18 feet high. Here the entire building site was completely enclosed, including a ceiling, before it was started. This type of enclosure was required because of the severe winter conditions and the need to have the building completed on schedule by the utility firm. The contractor, H. W. Peterson, reported that of his men on the project, "not 1 hour was lost" due to weather conditions.

These few examples show that with the ingenuity of the contractor, the encouragement of the architect, and with the cooperation of the owner, buildings can be scheduled and completed during adverse weather conditions.

The Mason Contractors Association of America is firmly convinced that positive and aggressive steps must be taken to develop programs that will reduce the effect of seasonality. Bill H.R. 15990 is an important step in the investigation of this matter. We need the technology and the resources to provide the construction industry with the tools to accomplish this task.

We thank you for this opportunity to appear before you.

Gentlemen, that is our formal statement. I might say, now that we have read this, that the problem is a little more acute than what we are able to put on paper for this type of a program. The fact of the matter is that we are involved in the greatest single undertaking that our association has ever stepped into. Truthfully, it is not as genteel a subject as we perhaps might discuss it here today.

But we are involved in a no-holds-barred free-swinging contest to take some of the bitterness out of these many years of part-time construction.

I don't know who the previous speakers have been in your hearings here. If some were representing the international unions that we deal with, they might perhaps have had an opportunity to tell you of some of the lost time that takes place throughout every section of this country. We are able today to document completely, as a result of our health and welfare and pension programs, the actual hours worked by the construction people with whom we deal and if we were to use the figure of 2,000 hours as a norm that a construction worker, a bricklayer, a stone mason helper, might be expected to work, we find that in this country we have men who are working 1,100, 1,200, or 1,300 hours a year not because they don't want to work any more than that but because it has been impossible to work more than that due to weather conditions in the areas where they make this living.

This situation has been dealt with very lightly for a great many years. It became the accepted thing that a bricklayer or stone mason and his helper was going to pack in in October and November depending on the area that he lived in and not do anything until April.

I don't know, gentlemen, truthfully how many of you are thoroughly familiar with the construction industry and in a time of plenty in this country there have been many people in the construction industry without, and we are talking about skilled mechanics who have the ability in the area that I come from to earn $6.40 an hour, and these men should be utilized to their fullest.

We talk about the lack of interest of apprentices in the craft, and we sponsor tremendous training programs in conjunction with the Federal and State programs, and one of the big drawbacks in interesting young people in the program is the seasonality in construction, the lack of full-time employment.

We talk about the economically deprived which is an area of great concern for both industry and Government at this particular time, and we are trying to stimulate job opportunities for people who have been unfortunate in this regard, and we are faced again with the same problem of seasonality in construction.

You might say for someone who has no type of training or job that half a job and half the training might be good enough, but I personally and my committee and my association don't believe that that is good enough.

It is a positive pleasure for us and for me personally to find that your committee has taken this matter to heart. We as a contractors association and I as chairman of this committee—and it's a labor of love—will go anywhere to talk about this and produce as much technical information as is possible. I would like to put on a full-scale program for this group. I know that you can't do this with this type of hearing. It is really—an overworked phrase—a problem of education.

Sometimes I get tired of hearing it, but it is true that in order to overcome the problems that have beset the construction industry as far as seasonality is concerned, it does become a problem then of education.

I don't know how much the Federal Government and its various construction agencies are also involved with your committee. I have worked with many Government agencies who are totally dedicated to eliminating some of these problems, having done a lot of work with the Corps of Engineers for a great many years, having been associated with the housing program myself some years ago. We know that these buildings that are contemplated by the Federal Government and by private industry, not a line should be put on paper unless there is a need for these buildings and if there is a need for these buildings they should be built, and if they are going to be built, they should be built with all possible dispatch so that they can be occupied for the purpose for which they were intended, and I am sure the same thing holds true in private industry.

In order to get the most available use from the existing manpower and to encourage into the trades new people, new blood, we have got to have some direction on a Federal level, gentlemen. We talk about the protection of buildings. You may have noticed that briefly in my

statement I remarked about the masonry contractor bearing the burden of enclosures. There may be some who will take issue with this who are not thoroughly familiar with the contracting industry. This is no bed of roses, gentlemen.

There are two good days in the business, the day you get the job and the day you get rid of it, and everybody in the industry is looking for somebody else to pick up the cost for these additional items of work.

Mr. GIBBONS. Is that because of our system of subcontracting?

Mr. VELARDO. Yes; but it is a good system. This is the free enterprise system, but many of these problems could be resolved on a fair and clearcut specification on the utilization of the improved technology that we have in this country today.

There is no reason why in a government specification or a private specification going out that it shouldn't say:

> Knowing full well that this job should be processed through all periods of the year, clement and inclement weather, hot weather, cold weather, rainy weather, snowy weather, knowing that the job should be done in a decent fashion within our local codes and all concepts of good, sound construction, money has to be spent to do this. An allowance can be set up to be administered by some responsible party within the scope of that project, whether it be the general contractor or the masonry contractor or the owner's representative, x number of dollars. If you don't spend it, you don't get it. If you spend it, you are documented and recover on that basis.

This way here we are certain that it would be a start. I am not talking about the numbers of dollars that would be required for a particular project. We know what it costs to do this work. But studies can take place over a period of time so that finally the dollars that would be put down is an upset figure and you people are all familiar with that term, "an upset figure."

Finally it will come down so that that figure will be so close when it is in a specification that it won't vary a quarter of 1 percent on what it would cost to do the work.

Gentlemen, I have talked and if you have any questions, I would like to answer them. I could go on all day.

Mr. GIBBONS. The main trouble, as I see it, from perhaps your point of view, is that an architectural engineering firm turns out a set of plans and specifications, but they don't allow in there for the cost of weather and then the sub who happens to get that particular job gets stuck with the cost of it if it happens to hit when he is doing his particular work, is that it?

Mr. VELARDO. This is it precisely. The architect-engineer or the owner, as the case may be, knows full well that within the scope of this contract some weather of one type or another is going to hit and he covers the job and this is not to downgrade the architect profession, but in a time-honored way this is the way these things will be done, and he will say that under certain conditions this or that will not be done at a particular temperature, this and that will not be done, if the temperature is thus and so certain precautions will be taken, and this terminology is used in the specifications, has been repeated for 50 years and probably more, again I say without taking advantage of some of the more modern methods that we have to combat these situations and not defining particularly wherein the responsibility rests to protect the work so that it may proceed under all weather conditions.

There is no point in saying in my division of the specifications, which is masonry, that if the temperature is 25 and falling no work shall take place without such and such precaution being taken or if the temperature is 28 and rising the job may proceed under certain conditions, and that is what it will say, but it doesn't say that I should do this and it doesn't say that the general contractor should do this, and it does not say that the plumbing or heating contractor or anybody else shall do this, so that who is going to do it?

A subcontractor in bidding his job can only make his best judgment as to when that job is going to proceed. In the normal course of events in bidding work if a job came out for bid today and was bid today you would assume that within 30 days the award would be made on that particular job.

The general contractor should and would I presume in his bidding procedure for that job have formulated some schedule as to when he was going to do a particular piece of work.

This information is not necessarily available to all of the subcontractors who are interested in this particular piece of work. Therefore, they are gambling that they are going to do it in a particular time, and if a latent soil condition, for example, should develop on the job, a shortage of a particular material, revision of design delays that project or any phase of it for 2 weeks, 3 weeks, 3 months, the entire projected weather schedule now has been changed so that where is the area of responsibility?

So we can come down to some clearcut definitive programs here. I had the pleasure of addressing a group here in Washington a couple of months ago representing my industry, the National Academy of Sciences, relative to this particular matter, and there are many engineers there.

I did remark that day that we spend so much money in the construction industry preparing particular methods and procedures and progress schedules for jobs that there is no reason why this money couldn't be spent prior to the bidding of the job and the cost of it incorporated in the job study prior to bid, so when the job comes out for bid—and this is without taking away from the contractor or the contractors involved in the job the right and the exercise of judgment on how that job should be operated and built—but as a guideline that the job will start, award will be made such and such a date or within so many days of bid and the job will start at such and such a period of time, excavation or site clearance to proceed at once and a guideline of when the various trades who are involved in a particular project are going to do their work.

To me this is a very, very simple matter. It may never get done, but I would hope, gentlemen, that you would understand that this would simplify some of the problems in seasonality in construction.

Is there anything else?

Mr. GIBBONS. What should be the role of the Federal Government in all of this?

Mr. VELARDO. Well, the Federal Government could be a leader. It seems sad sometimes to think that some of the problems which beset our private industry are allowed to drift to the point where they have to have direction from the Federal Government, but it seems that it becomes necessary when there is no initiative from any other source.

We, believe me, gentlemen, as the Masonry Contractors Association are at this every day to correct some of the inequities so far as the seasonality in construction is concerned. This program of ours takes a tremendous amount of research. We have not asked the Federal Government for assistance in this matter.

We have the Portland Cement Association with their laboratories doing this research work. We are at the present time preparing an annotated bibliography on seasonality in construction. We are preparing a state of the art report, the first drafts of which are ready.

We are financing this program this way. The Portland Cement Association, our association, the National Organization of the Union for the Bricklayers and the Laborers, and the Structural Clay Products Institute are putting in matching funds, $5,000 apiece, to get this committee underway.

The Portland Cement Association with their laboratories today and the Structural Clay Products Institute with their facilities today, I would say have probably done since we started this program, $30,000 to $40,000 worth of laboratory work. We didn't ask the Federal Government for 3 cents for this.

But direction can come from the Federal Government. I notice that this bill, while it is a welcome bill, is a study to be reported out in 1969; without putting my glasses back on; and I hope that from the study of course is going to come a program and in the program I would hope that certain positive steps would be taken that it would be incumbent upon the various Federal agencies then.

As the Federal agencies do, so will private industry do as time goes by, so will State agencies do, and the townships, and municipalities. If some direction is included in the awarding of contracts and this becomes far reaching, then these other people will follow suit.

When you talk about direct contracts with Federal agencies, how about the federally assisted programs under Health, Education, and Welfare, regional schools, dormitories for colleges? An area control is exercised by the Federal Government in all of these jobs.

If I were to build a school tomorrow with Federal funds in it, I would have to be concerned with the Manpower Training Act. I would have to be concerned with all of the Executive orders that go with that. I would have to be concerned with an affirmative action program for the benefit of the underpriviledged, which we are delighted to do, but why can we not also be concerned—the same Federal money is there; the same area of control exists there—with some reasonable programing of the work to eliminate this horrible seasonality that exists there?

Why should a man in the construction industry, regardless of the fact that he can earn $6.40 an hour when he works, not be entitled to work 50 weeks a year in this present day of affluence in this country?

And I say with the advanced technology that we have this is an unfair burden on the construction worker and his family. I didn't come here to bring tears to anybody's eyes, but I go a long way back in the business as the son of a construction family, and I can remember when I was 5 years old seeing my father come back in the morning at 8:30 or 9 o'clock after leaving the house at 6 o'clock in the morning to go to work because it was too cold or because it rained. I can remember him one time working on a job across the street from the house, a new school, and he was called, the men hadn't gone to work. We used to wait

until noon time in those days hoping the temperature would rise so that we could create decent working conditions to go to work. I took my mother's cutglass pitcher across with hot coffee, and naturally it broke. We don't need that today. That was 45 years ago. Today I am 50 years old, and I was thinking on the plane coming down here this morning that it seems a shame that we, as a firm and we as an association have pioneered many of the steps in the construction industry to make it possible to work and one of the reasons I suppose that I am vitally interested, myself, is that I can remember as a young man not working because of seasonality. I can remember my father not working. I can remember my uncles not working.

I don't want my people to go through the same experiences that we had. We employ an average of 300 men a week during the year. When a man that works for me gets up at 5:30 or 6 o'clock in the morning to go to work, he gets up because he wants to work. Otherwise he would stay in his bed.

Therefore, it is incumbent upon me and others like me in our organization to do everything possible to make it possible for this man to work.

I don't think this is an unreasonable attitude. But I think it is high time that generally speaking in the construction industry some cognizance was taken of this instead of accepting the fact that it rained today and the men can't work. It is cold today; the men can't work. It is snowing; they can't work. It is too hot; they can't work.

It is time, gentlemen, that we do something for them. That is that phase of it.

Mr. GIBBONS. Mr. Steiger.

Mr. STEIGER. Mr. Chairman, thank you.

I have been fascinated by both your formal testimony, and more so by what you have said in your informal remarks. Let me ask, are you familiar with the so-called Prouty bill that has been introduced in the Senate on this same subject?

Mr. VELARDO. I have heard it mentioned but I am not familiar with it.

Mr. STEIGER. In the Prouty bill they establish a Federal Construction Advisory Commission composed of the Secretary of Labor, the Secretary of Commerce, the Secretary of HEW, Secretary of HUD, General Services Administration, and Budget Bureau Director, plus representatives of labor and management of the construction industry and representatives of the technical and engineering professions.

Would you think that this legislation now pending ought perhaps to be expanded to include such a council in order to bring together not only all the Federal agencies involved but as well those representatives of the private sector that do the work for the Federal agencies?

Mr. VELARDO. I would say yes.

Mr. STEIGER. In your packet of material that you have presented to us, you include this book by the Secretary of Commerce on weather and the construction industry. Are you prepared to submit, or are you aware of any further booklets, pamphlets, or information that the Secretary of Commerce has put together on this question?

Mr. VELARDO. I don't know particularly that the Secretary of Commerce has put together any additional ones. We tried to take advantage of what there is now and, gentlemen, we could fill a trunk with the pamphlets that we could present.

As I said earlier in my remarks, it seems like you come to these things with a broad type of statement. I personally don't know exactly what was wanted here. I don't want to get off of the subject but we do as an association issue monthly to our members prepared weather charts. We constantly try to keep abreast of these situations, and I might just say for a minute so that you will know of whom you are speaking, the background of the Masonry Contractors Association, that just by accident this was with my material left over from one of our previous meetings. It was a profile study of information to the contractors association. So that you will understand our concern and the impact on the economy of the country of the Masonry Contractors Association, a conservative study shows that we do a volume of $600 million per year.

Talking of information, we have collected this information from Canada, every State in the Union, and we could fill a trunk with it, believe me when I tell you. We present to our members drawings of how to make these temporary enclosures.

We give them cost studies. We solve their jurisdictional problems for all weather work. Information we have, gentlemen, and if we had known that you wanted it here we could have set up a projector here and put it right on the screen for you. There is no question about it.

Mr. STEIGER. You obviously feel very strongly about this, which I think is helpful to the committee. What led the masonry contractors specifically to go the route of the establishment of the cooperative effort with the Bricklayers, Masons, and Plasterers International, the Masonry Contractors, and the Portland Concrete, et cetera. Why, for example, did your organization take the lead in the problem and the Associated General Contractors did not?

Mr. VELARDO. Well, for some of the reasons that I touched on lightly. The awarding of contracts, the establishment of various burdens in a job is a time-honored, historic thing in this country and if you have the time it will take me 3 or 4 minutes to kind of fill you in on this.

As a masonry subcontractor let us say, for example, we will take a job that came up for bid that I didn't bid the day it was due for bids with nothing to do with my bidding procedures. Maybe I had no interest but a general contractor has a job.

Now, he elects to subcontract, sublet the masonry portion of the job which, as a rule will run from 10 to 25 or 30 percent of the total project. In so doing, of course, he wants to make the best deal that he can, No. 1, for himself. No. 2, presumably for the owner, and hopefully he will do something for the poor subcontractor, you see, but this is the way it is done.

Now you evaluate the job and as you look at it you say to yourself, "There are a number of things in this job that require some discussion with the general contractor prior to arriving at some agreement to do the job or not to do the job." This is where you have the advantage after the bid. You say, "What do you contemplate as a construction schedule for this particular job?" Well, let's say today is the 17th of July. "We're clearing the site. We're going to have equipment in there, foundations, September 1, all the material on the site. You will start the masonry September 5 and there is no reason why you shouldn't be at the 10th floor on three wings of this building by December 15 and no problem with winter work."

But there is always a problem with the winter work, gentlemen. "What happens if somewhere along the line we don't start this job until January 1? What happens with the cost of the winter protection?"

"Well, I don't think you need it but maybe you had better figure something for it."

So now you do this and it might come to taking a contract or $300,000. And bear in mind when I quote a figure for the winter work it has no relation to the total cost. You will find and we have found that it has very seldom run over 1 percent of the total job cost but relative to the masonry, of course depending on whether it is a concrete frame, steel frame or load-bearing structure, the cost of winter protection or summer protection or rain protection will vary, because the enclosure is similar.

"Well, it will cost you $40,000." Now, the man might have $50,000. I don't know. I don't say this facetiously. This is the way these things happen. "I will take care of the winter protection. Don't figure the winter protection, I will take care of it."

Fine. You negotiate a contract on that basis, black and white. The man is responsible for the winter protection. Now, I, the masonry contractor who bears the burden of putting up the protection structure, have nothing. As predicted, the job runs 3 or 4 months late and we make a winter start or perhaps we started just before the winter broke and the winter comes on. What do you do? Are you going to button up the job with $100,000 worth of material maybe stored at the site, $60,000 worth of equipment there, crews there, overhead already in action?

Now the people you are dealing with may say, "He will go with this job because he has already gotten underway, has the material on the site," and it might have been a job that you couldn't get paid for material stored on the site. If you could get 90 percent of the material stored on the site you won't worry. Actually there is no return to you yet on this job and you might have $150,000 or $200,000 tied up in the job. Are you going to let it lay there until next April? He is hoping that you are not going to. Therefore you are going to pick up the cost of the winter protection and move through it and everybody is free and clear except the masonry contractor.

It is no joke. This happens time after time. Our members throughout the country are faced with this whether in the North, the South, or the Central Plains. This happens. How do you cure this? Let's find a way of overcoming this seasonality of construction on a national level. How do you do this?

Then you get everybody that is involved in the industry. You need a concerted and joint effort to do it. Everybody is concerned here, the Portland Cement Association, they want to sell cement and want to sell it 12 months a year. The Structural Clay Products Institute wants to sell their products and sell them 12 months a year. We want to work 12 months a year as contractors.

Labor, both the helpers and mechanics, want to work 12 months a year. We put them all together and get the job done.

This is why we concluded that in order to combat this situation it wouldn't do us one bit of good if we came up with all the answers to seasonality of construction if we do not overcome the situation where I gave you what I thought was a complete example of who was going

to do what in the job. So we needed everybody and we have everybody and this is the first time in the history of this industry that we have everybody, the first time.

Did we mention that we also have the block manufacturers in there? This is the first time in the history of the industry that we have everybody.

Mr. STEIGER. I won't take up any more time because Mr. Hathaway, I am sure, has questions. We could go on for a good, long time. Thank you for coming today.

Mr. VELARDO. It is my pleasure, believe me.

Mr. HATHAWAY. I take, from your answer to Mr. Gibbons as to what role the Federal Government could play, that you would support some sort of Federal board or commission that would schedule Federal construction.

Mr. VELARDO. I certainly would.

Mr. HATHAWAY. Are there any ideas as to Federal subsidies that might be helpful?

Mr. VELARDO. Yes; I think the clarification of specifications, I think that study go along with us. We will have a recommended manual of procedure ready this year which we will make available to all of the engineering associations, the architectural associations, and the Government associations, and within each group, of course, everybody has their own idea of how to combat given situations.

We would like then the Federal Government to take an interest in resolving some of these historic prohibitions against all-weather construction. If there is a do or do not item in the specification, let there be a reason for it. If it says, "Do not work at a certain temperature," and there is no reason for it, let us get rid of it.

Now, the Federal Government with the volume of construction that they do and that they become interested in financially is in an excellent position to clean up the specifications. My area of the country is a marvelous area but has tradition up to here. We need a commonsense approach to the problem and I think with your help, gentlemen, we can get it and make this a better industry for everybody.

I am sure you all know the large part that the construction industry plays in the economy of the country. I can remember when I was a little kid going to the corner and getting a newspaper and as long as construction stays up there is nothing wrong with the country.

We would support certainly any effort by the Federal Government to clarify some of these situations and provide some direction because it seems with what we are trying to do we can't get it anywhere else.

Mr. HATHAWAY. Thank you very much.

Mr. VELARDO. You are welcome.

Mr. GIBBONS. Well, sir, it has been a great pleasure to have you with us.

Mr. VELARDO. It has been my pleasure to be here.

Mr. GIBBONS. We appreciate the enlightenment.

Mr. VELARDO. You are entirely welcome, sir.

Mr. GIBBONS. The chairman is going to ask unanimous consent to insert in the record following the remarks of Mr. Whitlock yesterday a speech delivered by Mr. Otto Nelson, former vice president of the New York Life Insurance Co. at the Building Research Advisory Board's conference on May 1 of this year.

Unless there is some further order of business, the committee will recess until 10 a.m. tomorrow when it will meet in executive session to consider pending business, including H.R. 15990 and H.R. 2567, in room 2261.

If there is no further business the committee is adjourned.

(Whereupon, at 11:55 a.m. the committee was recessed subject to call.)

(Material submitted for the record:)

STATEMENT AND EXHIBITS PREPARED BY THE INTERNATIONAL UNION OF OPERATING ENGINEERS

Of all the building trades union members, those suffering most from the adverse effects of seasonality are the men who work on "open" construction—highways, heavy projects (dams and levees), and airport runway construction.

Many specialty trades such as electricians, plumbers, sheet metal workers, and some painters, can work inside a finished building shell during inclement weather. Others, such as building carpenters, bricklayers and other trowel trades, can work within temporary enclosures surrounding a building as well as within the completed shell.

However, those construction workers employed on "open" construction are almost all members of the four basic trades, i.e., laborer, teamster, carpenter and operating engineer, and it is impossible to protect this type of construction from inclement weather. Rain, snow and sub-freezing temperatures make it impossible to remove or place earth. Wet earth becomes mud, snow melts or contaminates fill, and freezing temperatures affect the compactability of dirt. For these reasons, among others, several states have restrictions on highway paving. Some state laws have an absolute cut-off date for paving, others require a certain temperature before they permit concrete or asphalt paving.

Regardless of law, and even if there was some updating of such statutes, the fact remains that, using today's technology, it is impossible to work on "open" construction during many types of inclement weather.

This has resulted in short work years for basic tradesmen and in long periods of enforced idleness, and the corollary loss of hundreds of thousands of man-days of production.

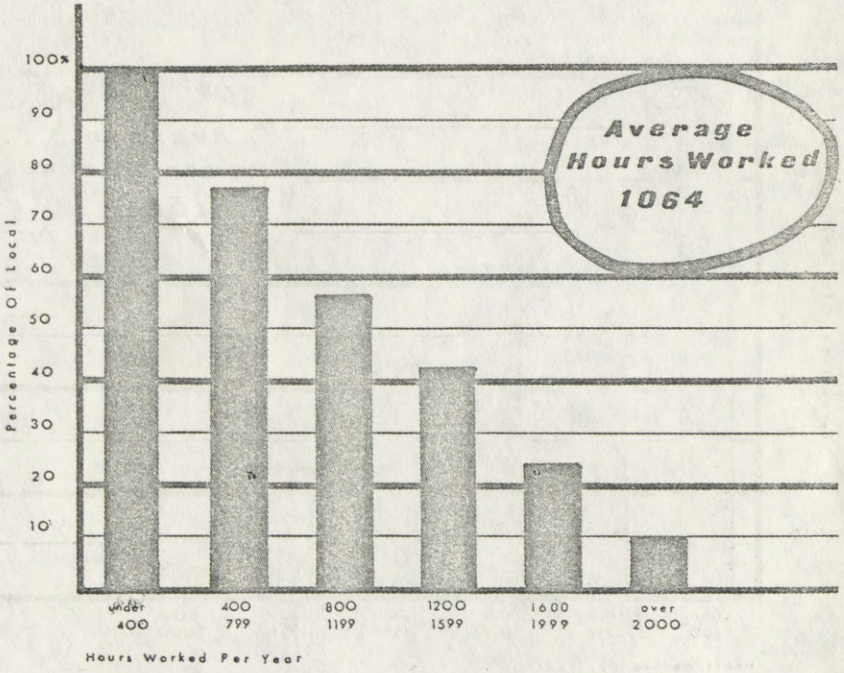
The accompanying charts have been developed from information obtained from pension fund records and are submitted to call attention to the fact that seasonality is a severe restriction on "open" construction and on the annual hours worked by craftsmen and laborers involved in this type of work.

Index

Local No. —	*State*
16	Springfield, Mo.
49	Minnesota.
103	Eastern Indiana.
181	Kentucky.
234	Iowa.
312	Central Alabama.
318	Southern Illinois.
369	Western Tennessee.
382	Arkansas.
406	Louisiana.
450	Eastern Texas.
474	Savannah, Ga.
537	Rock Island, Ill.
624	Mississippi.
649	Central Illinois.
819	Fort Worth, Tex.
841	Western Indiana.
917	Eastern Tennessee.
925	Tampa, Fla.
926	Atlanta, Ga.
953	New Mexico.
965	Central Illinois.

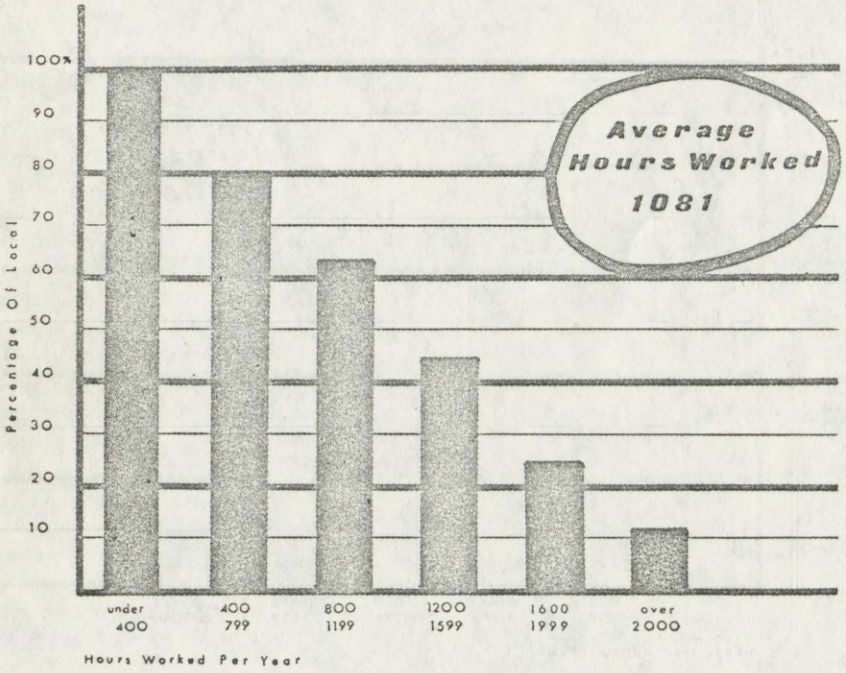
LOCAL 16 SPRINGFIELD, MISSOURI

Annual Hours Worked



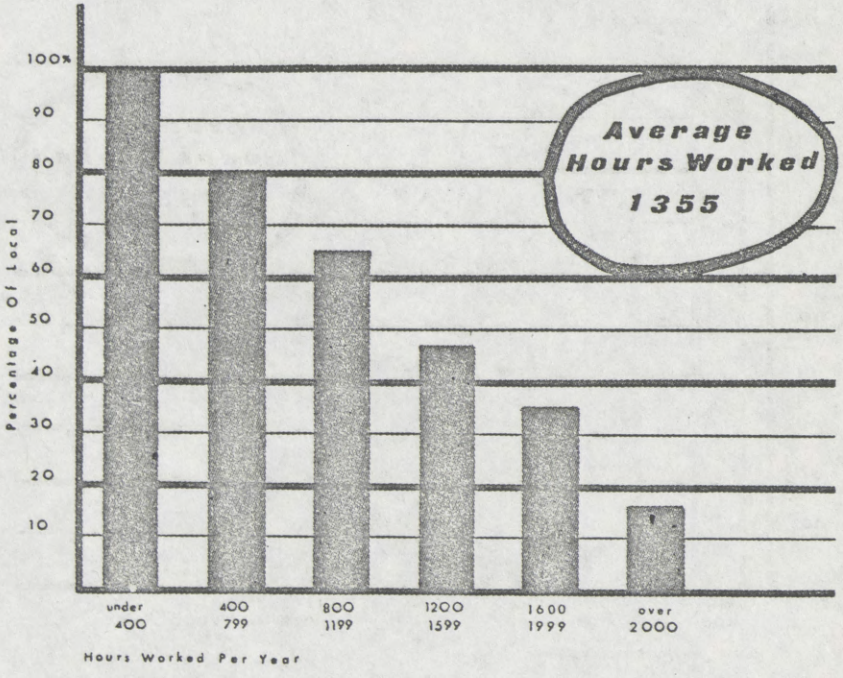
LOCAL 49 MINNESOTA

Annual Hours Worked



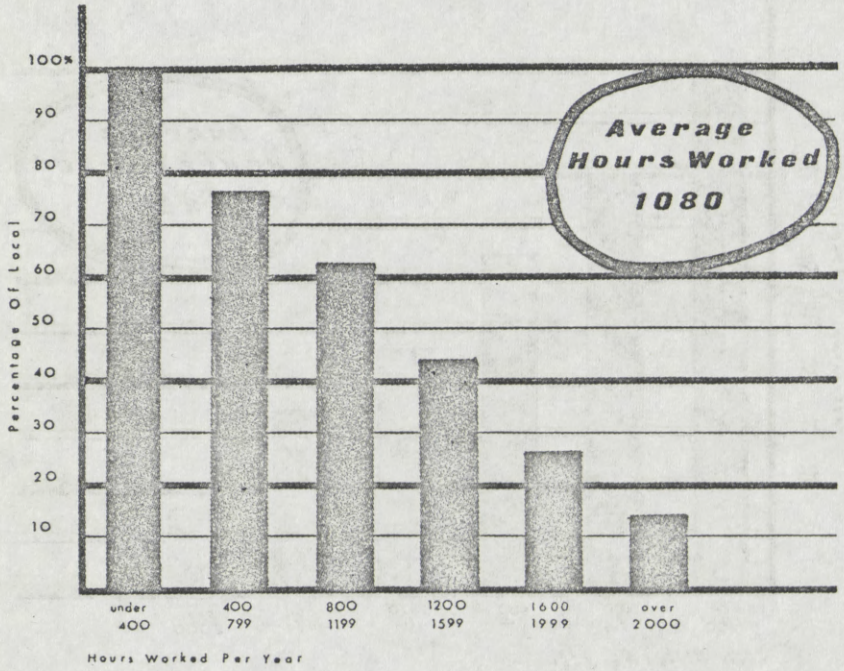
LOCAL 103 EASTERN INDIANA

Annual Hours Worked



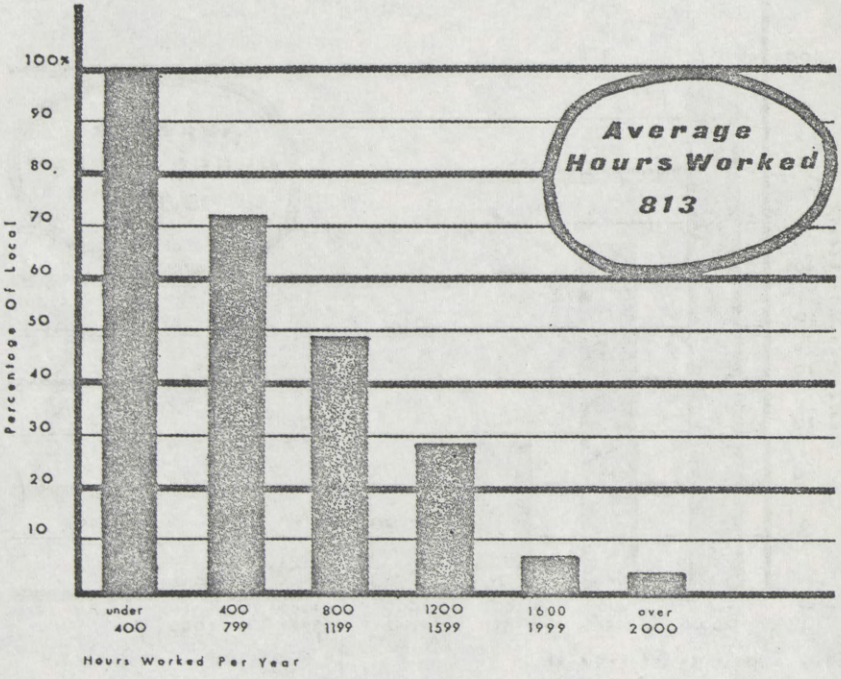
LOCAL 181 KENTUCKY

Annual Hours Worked



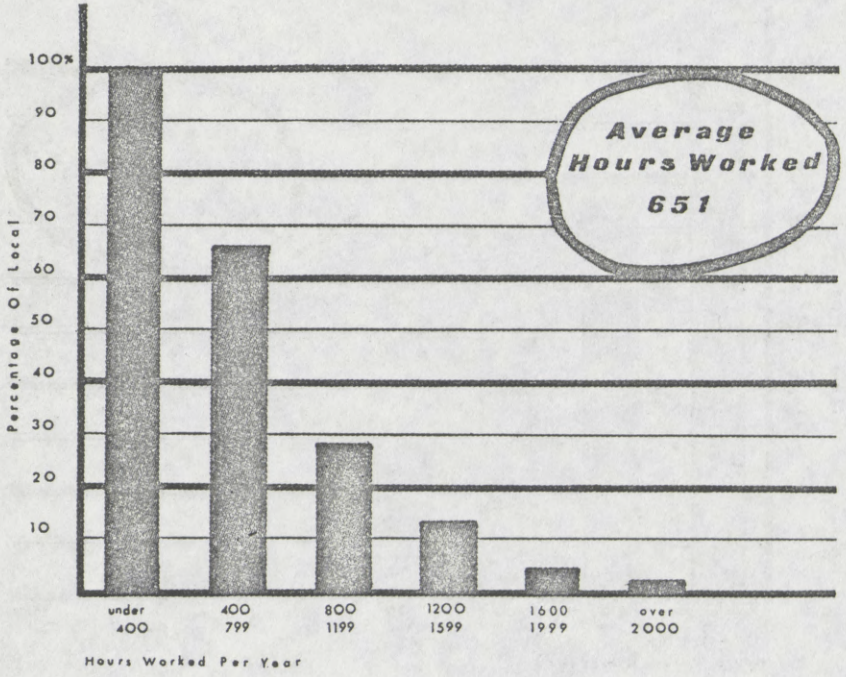
LOCAL 234 IOWA

Annual Hours Worked



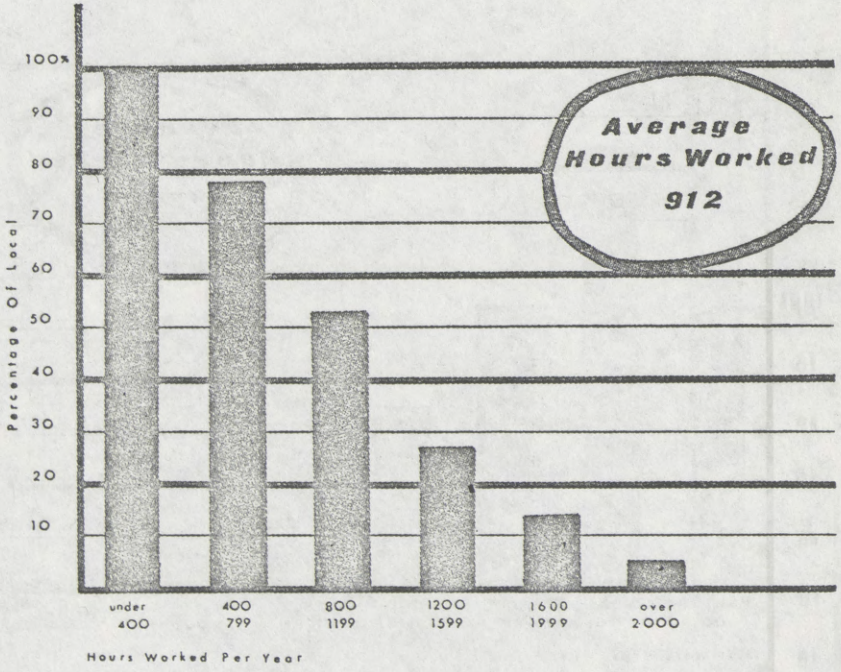
LOCAL 312 CENTRAL ALABAMA

Annual Hours Worked



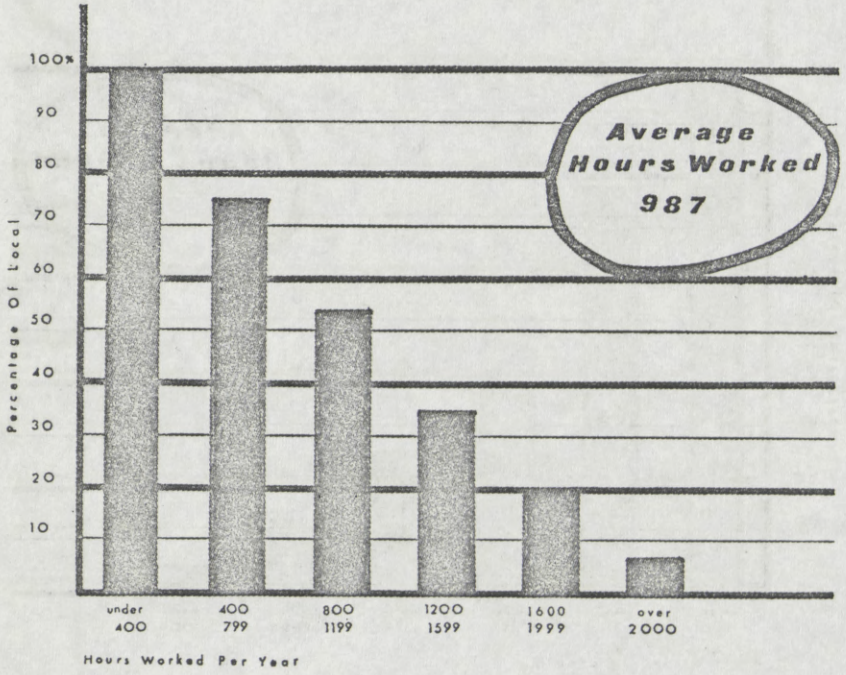
LOCAL 318 SOUTHERN ILLINOIS

Annual Hours Worked



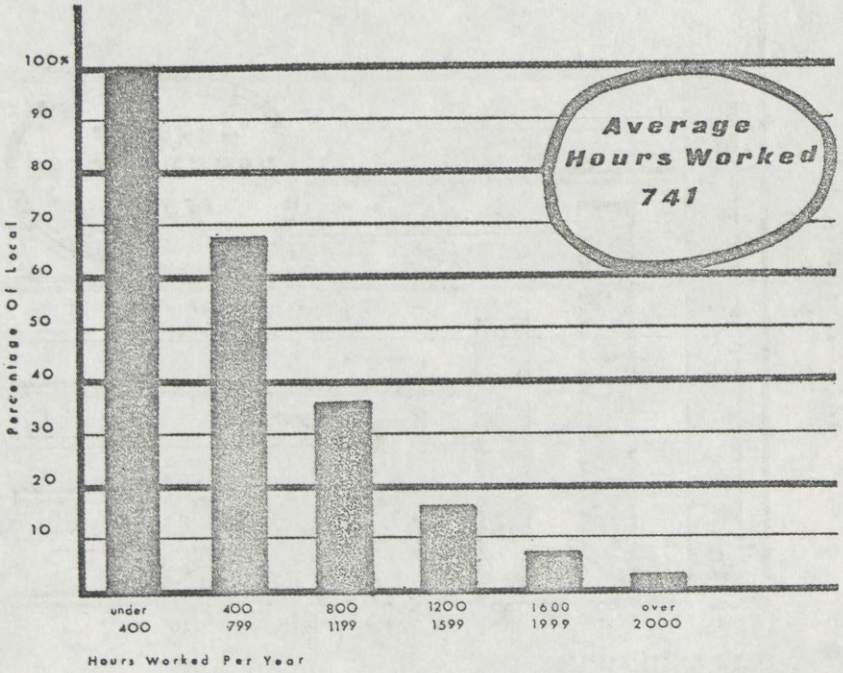
LOCAL 369 WESTERN TENNESSEE

Annual Hours Worked



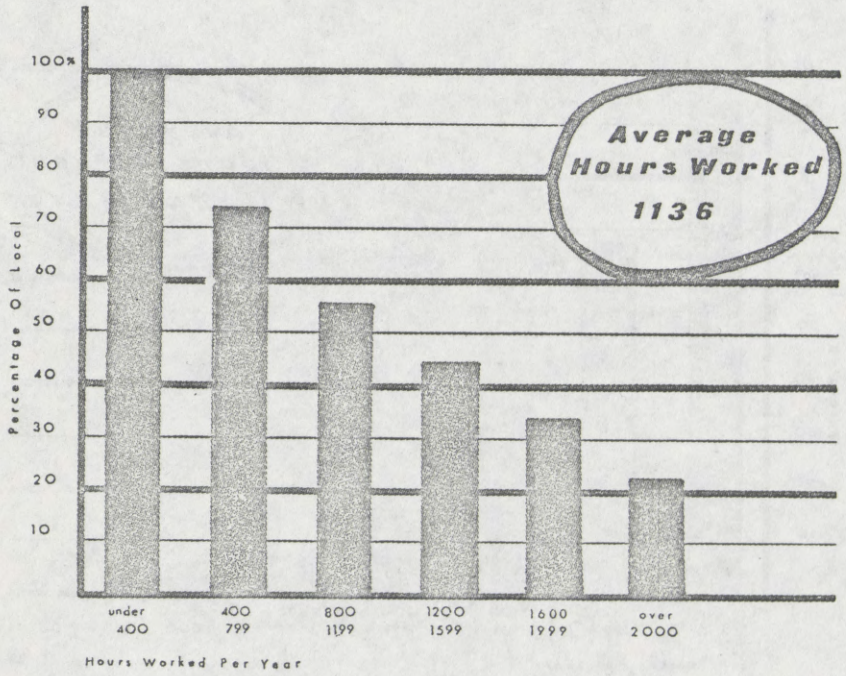
LOCAL 382 ARKANSAS

Annual Hours Worked



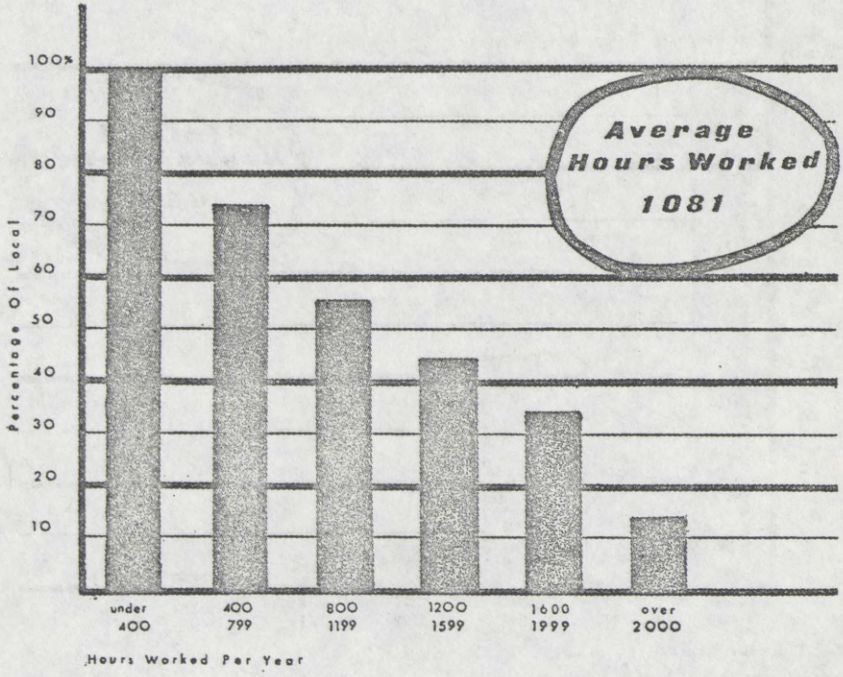
LOCAL 406 LOUISIANA

Annual Hours Worked



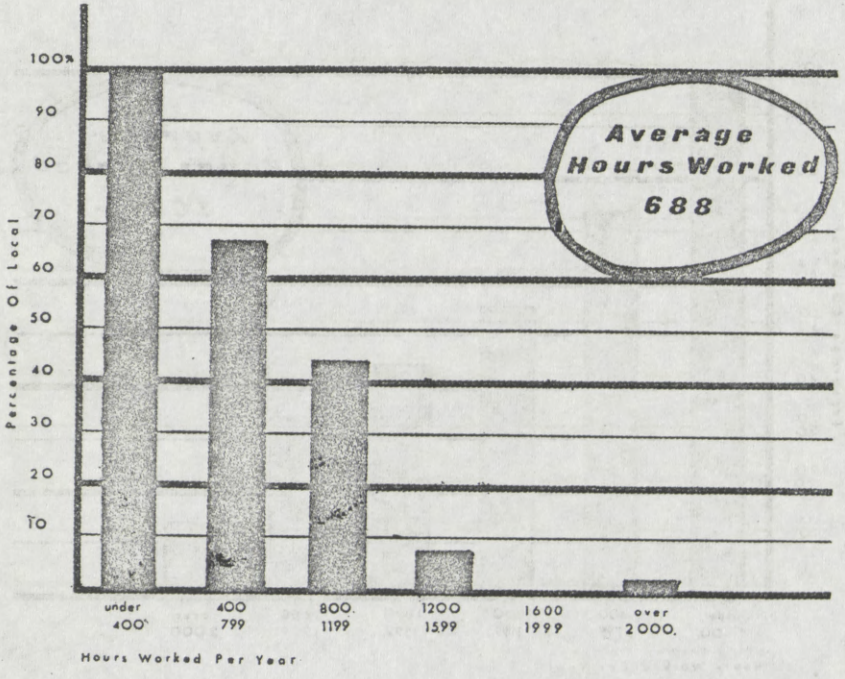
LOCAL 450 EASTERN TEXAS

Annual Hours Worked



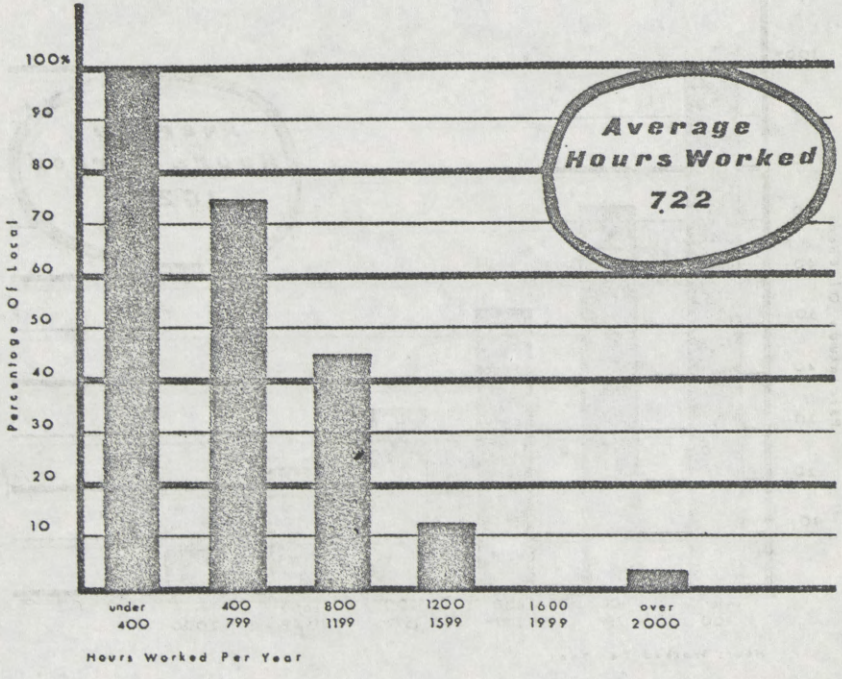
LOCAL 474 SAVANNAH, GEORGIA

Annual Hours Worked



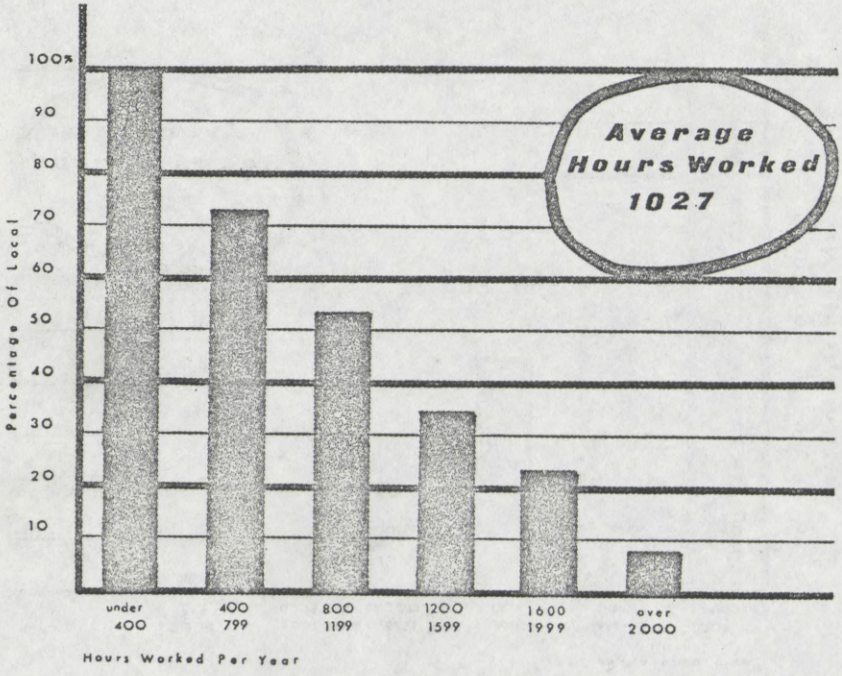
LOCAL 537 ROCK ISLAND, ILLINOIS

Annual Hours Worked



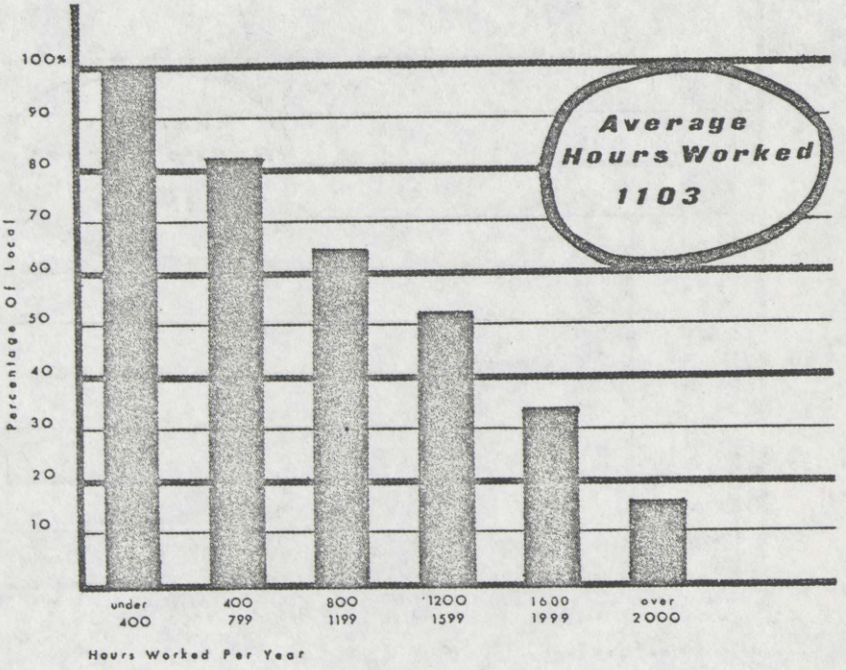
LOCAL 624 MISSISSIPPI

Annual Hours Worked



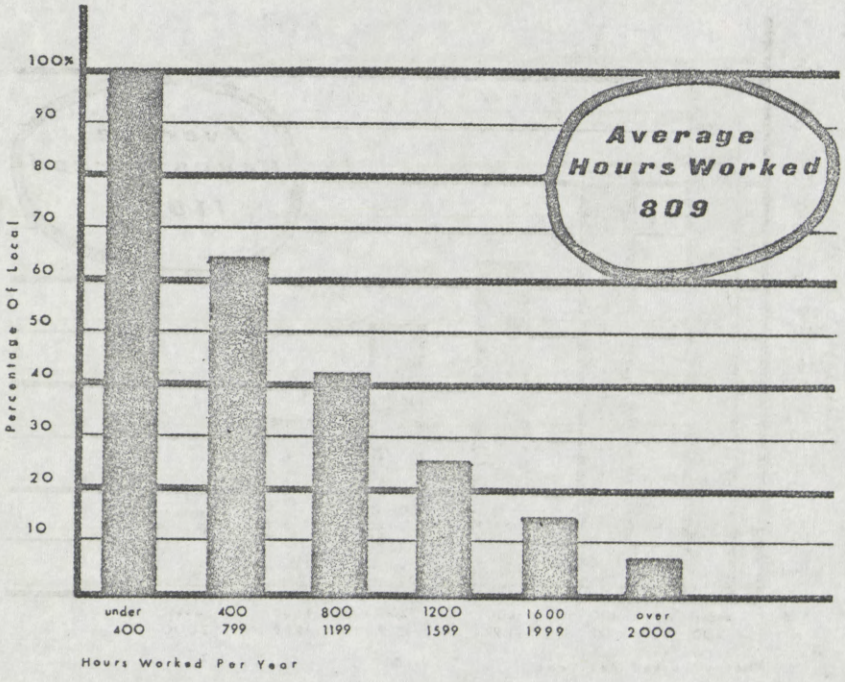
LOCAL 649 CENTRAL ILLINOIS

Annual Hours Worked



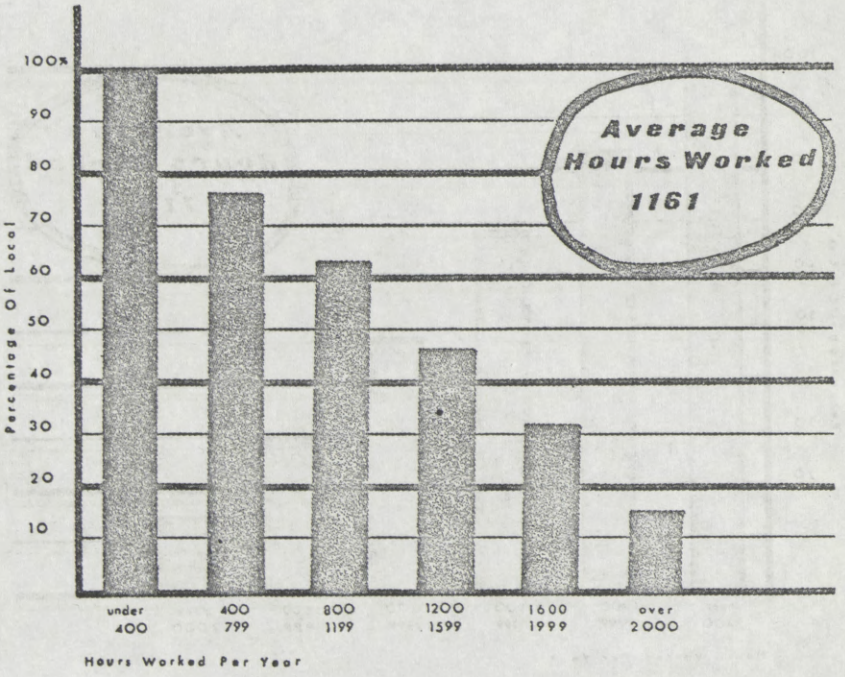
LOCAL 819 FORT WORTH, TEXAS

Annual Hours Worked



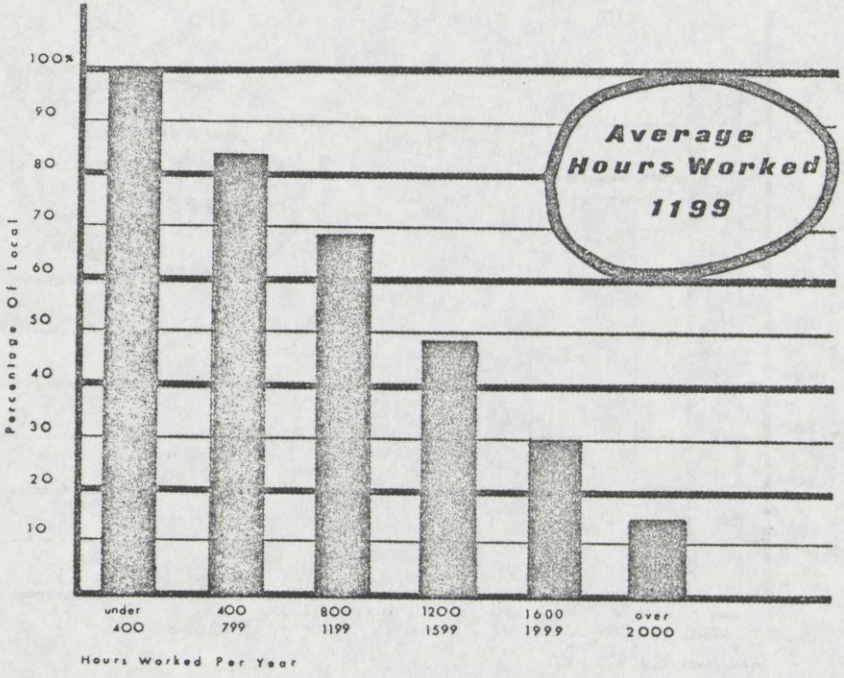
LOCAL 841 WESTERN INDIANA

Annual Hours Worked



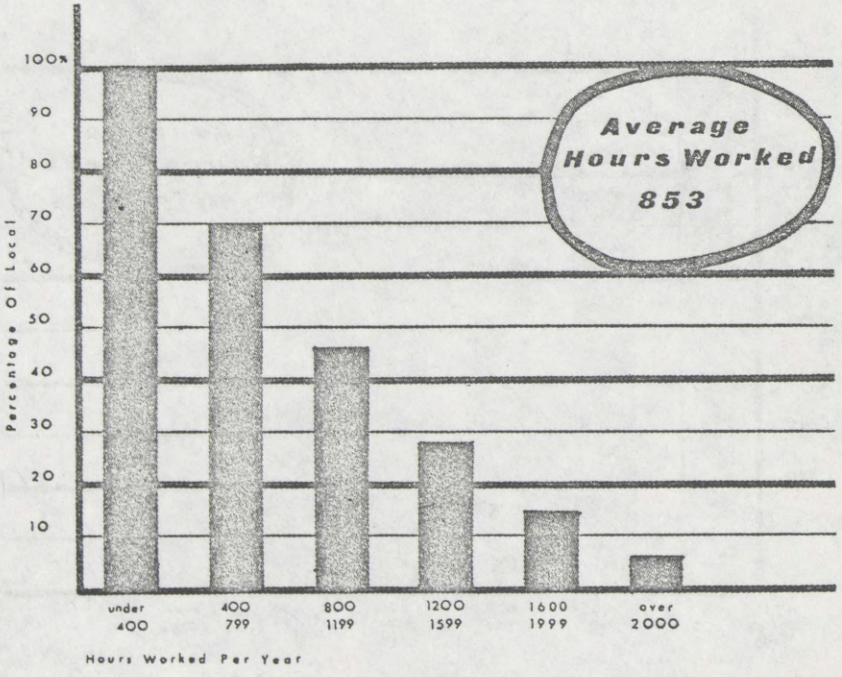
LOCAL 917 EASTERN TENNESSEE

Annual Hours Worked



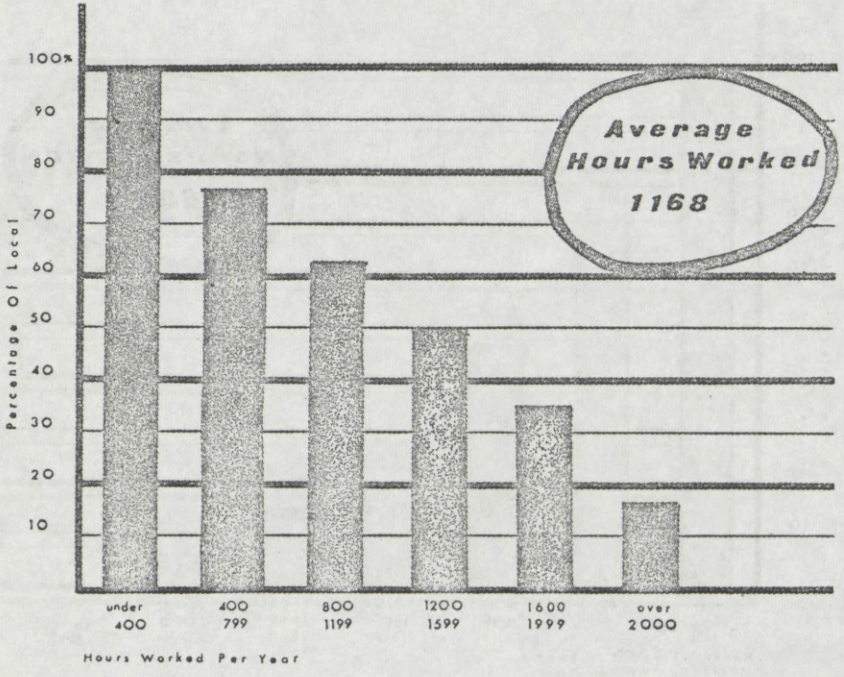
LOCAL 925 TAMPA, FLORIDA

Annual Hours Worked



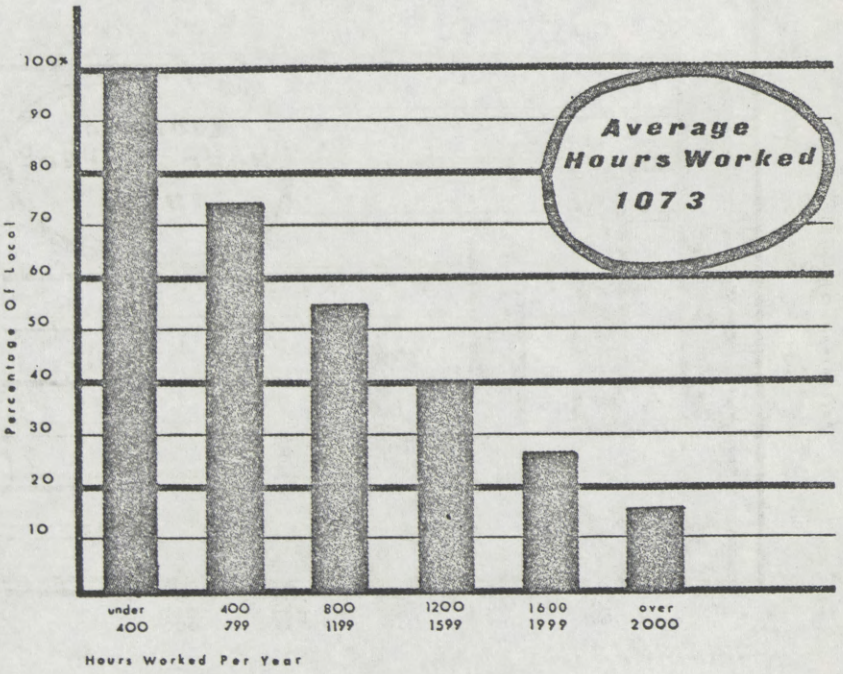
LOCAL 926 ATLANTA, GEORGIA

Annual Hours Worked



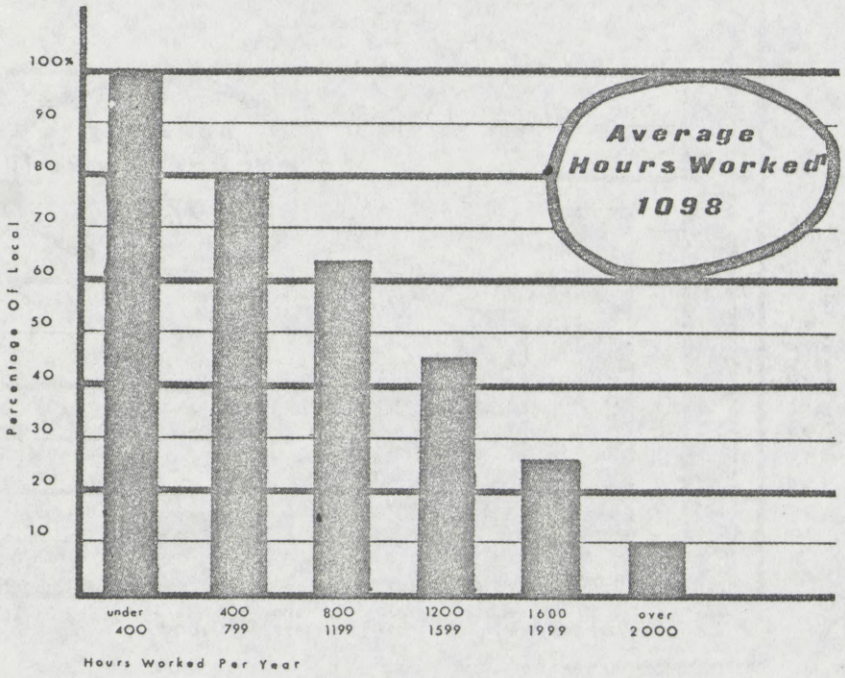
LOCAL 953 NEW MEXICO

Annual Hours Worked



LOCAL 965 CENTRAL ILLINOIS

Annual Hours Worked



COMMUNITY-WIDE PANEL,
New York, N.Y., July 18, 1968.

Re employment stability in the building industry.

Congressman ELMER J. HOLLAND,
Chairman, Select Subcommittee on Labor,
House Office Building, Washington, D.C.

DEAR SIR: The Community Wide Panel was formed at the end of 1966 and has as its members citizens throughout the greater New York area drawn from all backgrounds. The Panel was set up by persons who had been on both sides of the 1966 dispute here over the Complaint Civilian Police Review Board. It was felt that the energy displayed by the parties, all of whom were interested in fair and effective law enforcement, could be brought to bear on many other problems facing the metropolitan area. As a result, a number of committees were formed and much active work has been undertaken.

Obviously, the rebuilding of the central city is a crucial area and one of the problems is, of course, stability in employment, not merely across the construction season, which I understand is the subject of the recent hearing, but on a longer term basis as well. I am accordingly enclosing, in triplicate, pursuant to a discussion with Congressman O'Hara's office, the Panel's report, "To Break The Housing Bottleneck", together with letters of approval from both the labor and management sides of the building industry, for inclusion in the sub-committee record. I also enclose an article by Richards A. Givens, Esq. from the August 1967 issue of the Labor Law Journal, on this subject which I hope you and your staff will find helpful. Mr. Givens, a member of the Community Wide Panel, is Chairman of the Committee on Federal Legislation of the New York State Bar Association.

Yours very truly,

MARK K. BENENSON.

COMMUNITY-WIDE PANEL REPORT: "TO BREAK THE HOUSING BOTTLENECK"

Inadequate housing in our central cities continues to be a source of intolerable blight. It provides fuel for urban violence and contributes to the spread of decay in widening areas. Despite decades of effort, a breakthrough toward decent housing for all at costs within their reach has yet to be made.

At the same time, unemployment continues to remain high in the building industry. Even skilled workmen often have only intermittent and seasonal employment in many areas, while the less skilled or older employee has slimmer pickings. For this reason building trades employees under present conditions are entirely justified in resisting technological changes which could otherwise help to lower the cost of housing. An employee cannot be blamed for refusing to assist in use of methods which may put him out of a job without assurance of other equally well paying work. For the same reason, scarcity of jobs intensifies clashes among differing groups over those jobs which are available. The needs of urban minorities for jobs in rebuilding their own areas runs head-on into the problem of job insecurity for existing workers in the industry as long as underemployment and job insecurity continue.

In order to deal with job insecurity, end urban blight on the scale urgently required and make possible the ultimate lowering of building costs and extension of job opportunity, we propose that Congress appropriate adequate funds in advance for the rebuilding of the central cities of the nation over a 10 year period, such funds to be voted in the first year and to remain available until expended. There is no constitutional obstacle to this procedure. The Constitution limits the length of appropriations only in the case of funds for armies, and that to two years. Indeed the Demonstration Cities Act passed in 1966 contains a provision that funds under it remain available until expended. We are merely suggesting a bolder implementation of that principle on the scale required by the urgencies of today. As was said more than 100 years ago, ". . . the dogmas of the quiet past are inadequate to the stormy present." The procedure of limiting housing funds to year-to-year uncertainty will no longer do in the last third of the twentieth century.

On the basis of such known availability of funds, contractors engaged to rebuild parts of a city under private enterprise could be asked as a condition to use of federal funds to engage employees on a long-term basis as executives are now employed in many fields. It might then become possible for labor and management to negotiate for payment of an annual salary in return for work

during the whole year. There should be no erosion of labor's gains in wages, fringe benefits and working conditions. Such elimination of day-to-day and seasonal insecurity would permit all employees to gain in annual take-home pay while in some cases perhaps reducing cost per unit of work done. More important, it would open the way for fruitful discussion of uses of new technologies in a manner not threatening the livelihood of workers in the industry.

Such firm job guarantees will help to permit the full liberation of the powers of modern technology with gains to be shared by all: employees, tenants or owners, contractors and the public.

For this to be possible, the program must be implemented on a scale large enough to wipe out unemployment in the industry. Such a scale of effort is urgently required by the urban problems of the nation. A half-hearted effort will not do. There must be the same intensity of determination that the nation has achieved in dealing with other great crises in the past. We must do what was said in the State of the Union Message in 1942:

"We must raise our sights all along the production line. Let no one say it cannot be done. It must be done and we have undertaken to do it."

A lively diversity of types of ownership, occupancy and land use is indispensable to urban life. The drab monotony of building entire areas as public housing projects must be avoided. Although guaranteed federal funding for construction is necessary to the kind of large-scale rebuilding which must be done, private developers should be offered options to purchase many types of buildings in the rebuilt areas on liberal terms and to specify within limits the kind of building they want. For multiple unit dwellings, in exchange for subsidy in construction costs, operators can be required to agree to rent to those who cannot afford to pay full economic rents at a sliding scale of rentals based upon income. As more tenants can pay economic rents in a building, the operator could be required to begin to repay the subsidy out of part of higher rent proceeds so that these funds could be used for building other new housing. Similar arrangements could be worked out for condominiums and cooperative housing.

At present, urban renewal often hurts the very people it is designed to help. People living in rebuilt areas are forced out and cannot come back because costs in the rebuilt housing are too high. This tragedy cannot be allowed to continue.

Likewise, residents of public housing are usually faced with an absolute income limitation. If they work to earn more, they must leave—often to worse housing, especially if discrimination limits the housing available to them. Thus incentive to work is stifled and a high-turnover, low-morale and possibly high-crime area is insured. For these reasons as well we urge that the method of a sliding scale of rents in rebuilt housing be adopted as part of the proposed new program.

The function of the federal program should be to break the bottlenecks and liberate the resources of the nation to do what must be done, with maximum participation by all involved and the local community.

Can we afford the program suggested here? The true answer is that we cannot afford *not* to deal with the problem. A penny-wise but pound-foolish delay in dealing with urban needs has already cost the nation more than it can afford in many different ways. The resources needed are ready to be called into use: the unused power of modern technology, the unemployed, the underutilized industry.

All will gain from vigorous action. All will lose from inaction. The time is short: we urge the nation to seize it.

We represent a wide spectrum of differing views on many subjects. We do not seek to lay down precise details, which should be worked out by Congress. We are united in our firm belief as citizens that the great resources of this nation—first of all its people, their initiative, their skills, their willingness to act for the common good—are equal to the challenges before us. We pledge to do everything in our power to work for the use of those resources in the fullest manner, and invite our fellow citizens to do likewise.

Job Security in the Building Industry—And High Quality Low-Rent Housing

By RICHARD A. GIVENS

Reprinted from the August, 1967 Issue of
LABOR LAW JOURNAL
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Job Security in the Building Industry—And High Quality Low-Rent Housing

By RICHARD A. GIVENS*

This article is concerned with the labor and the urban renewal aspects of the problems of job security in the building industry and high quality low-rent housing. The author is an assistant United States attorney in the Southern District of New York.

THE SUPREME COURT DECISION[1] that collective bargaining agreements in the building trades may permit employees to refuse to work on prefabricated materials focuses attention on the problem of job security in the building industry—and how it can be protected at the same time that high quality housing at low rents is provided for those not now able to obtain it.

Groups Involved in This Problem

Building trades employees are vitally concerned about the security of their jobs which may be threatened by building methods which use less labor. This concern comes on top of job insecurity due to the ups and downs of construction, the seasonal nature of some types of construction work, and the fact that there is usually no permanent employer, but merely jobs on particular pieces of construction work.

Citizens living in overcrowded or dilapidated housing who cannot afford to pay luxury apartment rents are vitally affected by the high level of building costs. This is particularly true of those whose access to the housing market is limited by racial discrimination.

All citizens in metropolitan areas are affected by blight caused in part by substandard housing, which if not eliminated, tends to spread.

Taxpayers are necessarily affected by the amount of housing which can be obtained in return for public investment in housing programs.

The nation as a whole is affected both by the degree to which high and steady employment at good rates of pay can be assured in major industries of which construction is one of the most important, and by the degree to which the problems of our central cities can be effectively dealt with for the benefit of all and as an example pertinent

* The views expressed are solely those of the author and are not attributable to any governmental agency.

[1] *NLRB v. National Woodwork Mfrs. Assn.*, — U. S. —, 55 LC ¶ 11,842 (1967).

to the struggle for men's minds throughout the world.

The vital character of each of these interests is clear. The importance of job security to employees hardly needs underlining.[2] And one of the primary purposes of trade unionism has always been to promote job protection.[3] This function is particularly crucial in the building industry because of seasonal and other changes in construction activity and the absence of any single long-term employer for the particular employee. Employees in widely differing industries have reacted to the threat posed by job insecurity in a variety of ways, including:

Formal and informal restrictions on the amount of work an employee may do in order that the employees do not "work themselves out of a job," a danger which can affect the livelihood of each member of the group;

Refusal to work on prefabricated materials which pose a threat to jobs or to utilize technological devices such as paint rollers which might eliminate the need for labor;

Use of influence to obtain legislation requiring standards of various kinds which maximize the amount of labor needed — of which the "full crew laws" in the railroad field are an example;[4]

Inclusion of restrictions in union laws and constitutions dealing with who is to be allowed to do particular types of work and how it is to be done;

Limitations of various kinds on the possibility of outside employees competing for scarce jobs;[5] and

Efforts to compensate for periods of lack of availability of work, including seasonal slack periods, by obtaining high hourly wage rates for work performed.

Government Action Unsuccessful

Governmental action has been attempted from time to time to break up these practices, *but it has not been accompanied by any substitute means of assuring job security to the employees involved.*[6] Perhaps in part for this reason, it has proved unsuccessful.[7] On the other hand, in several industries in different situations, ways of protecting employees threatened with job loss due to technological change have been worked out so as to permit an end to practices otherwise con-

[2] For historical background, see Barnett, *Machinery and Labor,* 1926. Job insecurity is a particularly important problem in construction. In March 1967, 7 per cent of carpenters and other construction craftsmen and 16.3 per cent of construction laborers, as compared with 3.9 per cent in all industries on the average, were unemployed. *U. S. Dep't of Labor Employment and Earnings and Monthly Report on the Labor Force,* No. 13, April 1967, p. 15.

[3] See Selig Perlman, *A Theory of the Labor Movement,* 1928.

[4] *BLE v. Chicago, Rock Island & Pacific R. R. Co.,* 382 U. S. 423, 53 LC ¶ 11,011 (1966).

[5] See the facts involved in *CTU Radio Officers Union AFL v. NLRB,* 347 U. S. 17, 25 LC ¶ 68,111 (1954); *James v. Marinship Corp.,* 25 Cal. 2d 721, 155 P. 2d 329, 9 LC ¶ 62,475 (1945).

[6] For example, 61 Stat. 140 (1947), 29 U. S. C. Sec. 158(b)(6) (1964): ". . . It shall be unfair labor practice for a labor organization or its agents . . . to cause or attempt to cause an employer to pay or deliver or agree to pay or deliver any money or other thing of value, in the nature of an exaction, for services which are not performed or not to be performed." See also 60 Stat. 89 (1946), 47 U. S. C. Sec. 506 (1964) (restriction on requiring payment for work not "needed" in broadcasting industry).

[7] See *American Newspaper Publishers Assn. v. NLRB,* 345 U. S. 100, 23 LC ¶ 67,436 (1953); *NLRB v. AFM, Local 24 (Gamble Enterprises),* 345 U. S. 117, 23 LC ¶ 67,437 (1953); *United States v. Petrillo,* 75 F. Supp. 176, 14 LC ¶ 64,243 (DC Ill. 1948).

sidered necessary to maintain the number of available jobs.[8] The arbitration award in the 1963 railway dispute rendered under a federal statute providing for compulsory arbitration limited to the specific dispute[9] provided for elimination of some railway jobs but protection of jobs of existing employees. The additional positions when vacant were, in general, simply not to be filled. Such an approach could be considered because railroads are strongly stable institutions with identifiable employees who have built up seniority with particular carriers.

Present Methods Lacking

The vital and legitimate interest of building trades employees and their unions in job protection is of inescapable importance in considering how to promote high quality low-rent housing. But the consequences of our present methods of promoting job security in the building industry have serious implications which are likely to endanger constructive progress in housing and perhaps in the end to endanger job security itself. By preventing the use of labor-saving technology, present methods raise building costs. This tends to make it impossible to build decent housing at low or even moderate rents. Hence the rebuilding of dilapidated areas of our cities becomes most difficult unless the rebuilt housing is to be inaccessible to former residents of the area because of its high cost. The result is either that new housing for such areas is built at minimum rock-bottom cost and is deemed undesirable, giving a bad name to housing programs, or that former residents must be ousted from their homes and crowded into worse housing, new decent housing being unavailable due to its cost as well as to racial discrimination where the residents are members of minority groups.[10]

The wider ramifications of the blockage of new decent housing at low rents are plain. Former residents of rebuilt areas, often confined within a ghetto by discriminatory realty markets, must take the best housing offered. As soon as an area becomes integrated and open to minority occupancy, the pressure of desperate need for decent housing tends to bring about its resegregation as part of the ghetto—because of the shortage of new housing at rents within the residents' reach, among other reasons. Fear of incorporation into the ghetto causes residents outside the ghetto to strengthen their resistance to integration. This confines the market available to residents in the ghetto and increases the pressure upon them to move into any opening in previously unavailable housing which may become available.

Thus the vicious circle continues and expands. Fear and bitterness by outside residents who do not want to be incorporated into ghettos communicates itself. An entire climate of despair, frustration and anger is developed in what become opposing parts of a city. Crime, violence and riots born in part of frustration based upon attitudes on both sides and upon

[8] See, for example, Backman, "Cushioning the Impact of Technological Change," 13 LABOR LAW JOURNAL 731, Sept. 1962; Gomberg, "The Work Rules and Work Practices Problem," 12 LABOR LAW JOURNAL 643, July 1961; Fanning, "The Challenge of Automation in the Light of the Natural Law," 11 LABOR LAW JOURNAL 875, Oct. 1960; Hummers, "Protection of Employees Affected by Railroad Consolidations," 15 LABOR LAW JOURNAL 736, Nov. 1964.

[9] 77 Stat. 132 (1963), upheld in *BLFE v. Chicago, Burlington & Quincy R. R. Co.*, 225 F. Supp. 11, 48 LC ¶ 18,680 (DC D. of C. 1964), aff'd 331 F. 2d 1020, 49 LC ¶ 18,765, cert. denied, 377 U. S. 918, 49 LC ¶ 18,915 (1964).

[10] See Weaver, *The Urban Complex*, ch. II, III, VI, Anchor ed., 1966.

bitterness over conditions including housing intensify this unhealthy atmosphere.

Resistance to "urban renewal" which injures rather than helps residents of the areas to be renewed may well lead to loss of jobs in the construction industry. Job security may suffer in other ways also. Objection to the consequences of the measures now used to protect jobs may result in assaults upon these methods which could be successful in eliminating them without anything else being put in their place. The fact that four Justices voted to hold agreements not to use prefabricated materials illegal under present law[11] is an indication of this. (In Congressional debates on present provisions, Senator John F. Kennedy had said that exemptions from certain "hot cargo" provisions for the construction industry did not exempt "boycotts of goods manufactured in an industrial plant for installation at the job site."[12])

The dilemma is therefore clear. For highly specific reasons as well as for reasons applicable to other industries as well, means to assure job security are vital in the building industry. At the same time, present methods of doing this have consequences which will become more and more difficult to tolerate.

Comparison with Other Fields

A comparison to what is done in other fields may be helpful. A wide range of measures ranging from supplemental unemployment benefits[13] to retraining allowances[14] have been established in various industries, but these are merely palliatives. No union leader could accept such measures as a substitute for existing work restrictions and retain the support of the rank and file. In any event, we need more rather than less work in the building industry if the cost can be lowered to the residents of the housing to be built. This would mean more jobs and more job security, not less.

How can this potential be unlocked? One answer lies in the expectation that lower costs would widen the market, as they did for automobiles in the 1920s.[15] But again this offers no assurance to a particular employee or group of employees that they will be protected. Alone it cannot be a sufficient answer.

Executives are employed for an annual salary, often under a contract which guarantees them payment over a period of more than one year. If a building industry employee were offered a contract guaranteeing him payment of wages over a three-year period at an annual rate greater than the take-home pay he previously received during a similar period, he would gain financially and also obtain far greater job security than before. Such a transition to annual rather than hourly payment would also benefit the public through lower building costs, since the public now pays higher hourly wages than in other industries partly to compensate the employee for periods when he

[11] See footnote 1.

[12] 105 *Congressional Record* 17900, 2 *Legislative History of the Labor-Management Reporting and Disclosure Act* 1433 (1959); see also H. Rept. 1147, 86th Cong., 1st Sess. 39, 2 *Leg. Hist.* 943.

[13] See Note, 1962 *Duke Law Journal* 605 (1962).

[14] In addition to retraining programs under the Economic Opportunity Program, many other kinds of vocational education services have been established over a period of time, but none of these can replace the loss of a skilled job, especially by an older employee.

[15] See Adams, "The Automobile—A Luxury Becomes a Necessity," Hamilton, *Price and Price Policies* 27-82 (1938).

will not be working.[16] This might still not be enough, however, to assure continued job security for employees if the total amount of construction to be done were not guaranteed to be such as to employ the full work force. A situation in which some workers had three-year contracts at lucrative salaries while others were out of jobs would hardly be attractive. Further, there would need to be assurance that the high level of employment would be maintained into the future.

Federal Support

These conditions are obviously beyond the reach of a private contractor to guarantee on his own. No contractor now has sufficient financial resources or assurance of future construction work to undertake such guarantees. Such guarantees could, however, be made possible if an intensive long-term program to rebuild our central cities and make them truly attractive places to live were undertaken by the federal government in a systematic manner with private participation in a partnership seeking to bring both public and private resources to bear. How this could be done on a sufficient scale and what the benefits and prerequisites would be must now be considered.

Under the Constitution, the Congress has the power to appropriate funds for more than one year. The only restriction on the time appropriations may run relates to funds for armies.[17] Indeed, in the Demonstration Cities Act, Congress has in fact committed itself to the principle that funds for rebuilding urban areas are to remain available until expended.[18] The legal architecture thus exists for a long-term program upon which employment contracts for individual employees for more than one year could be based. Based upon long-term appropriations and programs, longer-term contracts could be made with contractors who, in turn, would be required to offer such contracts to employees.

In order to be effective in providing the necessary job security, the program would have to be large enough to assure—together with other clearly foreseeable construction—employment of the entire industry. This would require deletion of present limitations on amounts to be appropri-

[16] See Franklin D. Roosevelt, State of the Union Message, January 3, 1938: "For economic and social reasons our . . . interest . . . lies . . . in regularizing the work of the individual worker more greatly through the year—in other words, in thinking more in terms of the worker's pay for a period of a whole year rather than in terms of his remuneration by the hour or by the day." *3 State of the Union Messages of the Presidents* 2840-2841, Chelsea House 1966. See discussion by A. H. Raskin in "Pay by the Hour? The Week? The Year? For Life?" *New York Times Magazine,* September 4, 1966, p. 6. For a discussion of early work in this field see Jack Chernick, *Economic Effects of Steady Employment and Earnings: A Case Study of the Annual Wage System of George A. Hormel & Co.,* University of Minnesota 1942; Chernick & Hellickson, *Guaranteed Annual Wages,* Univ. of Minn. paperback 1945; cf. Jones, "Guaranteed Pay Proposed by United States," *New York Times,* June 27, 1966, p. 35, col. 1. Concerning seasonality in the construction industry, see the joint Determination of Secretary Wirtz and New Jersey Commissioner of Labor and Industry Male, July 13, 1966.

[17] "The Congress shall have power . . . to raise and support armies, but no appropriation of money to that use shall be for a longer term than two years." U. S. Constitution, Art. I, Sec. 8, col. 12. Compare 61 Stat. 105 (1947); 61 Stat. 134 (1947) (advance funding of emergency foreign aid prior to actual appropriations by authorization for borrowing from governmental institutions).

[18] Demonstration Cities and Metropolitan Development Act of 1966, Secs. 108, 206(b), 111(c), 80 Stat. 1259, 1260, 1264 (1966).

ated under the program[19] and the length of time it may run. The Congress would also need to appropriate sufficient funds under the Act (to be available until expended).[20]

At this point, the building industry could be asked to relinquish cost-raising practices in exchange for the new form of security offered. If this were attempted by fiat or compulsion, great resistance and severe difficulties would of course be inevitable.[21] However, the matter would not have to be approached in that way. In order to obtain funds or contracts under the program, a building contractor could be required by statute to certify that the most efficient means of construction would be used, and to submit waivers by construction unions representing his employees of technological restrictions or restrictions on types of work to be done by particular employees on this specific job. Once submitted, such certificates and waivers could be made enforceable by appropriate means[22] and would supersede any rules to the contrary which might otherwise apply.

Under such an approach, no union would be *compelled* to abandon any restrictions. It would be offered an *incentive* to do so in order to participate in an expanded construction program affording greater job security to its members.

In order for such an approach to be successful, its implications in the field of housing policy as well as in the field of job security would have to be understood. Large scale rebuilding of the central cities cannot be done unless residents are assured that they will not be ousted from their present homes and unable to live in new housing because the rents will be too high.[23] Old-fashioned public housing is no answer to this problem even if anyone wanted to build it again on a large scale.[24] Requirements for admission are often too stringent to permit many residents to qualify.[25] Furthermore, residents must leave once their incomes rise. This deprives them of the in-

[19] Demonstration Cities and Metropolitan Development Act of 1966, Secs. 111, 206(b), 80 Stat. 1260-61 (1966).

[20] A program of the magnitude required for the purposes discussed here would of course no longer be merely a "demonstration" program but a program of large-scale implementation.

[21] Compare Barnett, cited at footnote 2; Perlman, cited at footnote 3.

[22] Provision for federal judicial and administrative enforcement could be made. It might be necessary to specify that injunctive relief would be permitted if it is desired. Cf. *Sinclair Refining Co. v. Atkinson*, 370 U. S. 195, 45 LC ¶17,674 (1962). This would not contravene the purposes of anti-injunction legislation since enforcement would be possible only where a commitment had previously been entered into voluntarily in order to obtain the benefits of the program. This is analogous to the situation where the parties submit the issue of an alleged violation of a no-strike clause to an arbitrator; there it has been considered not to contravene the purposes of anti-injunction acts for the courts to enforce the award since the parties agreed to the tribunal which rendered the initial decision. See *Ruppert v. Egelhofer*, 3 N. Y. 2d 576, 148 N. E. 2d 129, 34 LC ¶71,243 (1958); 58 *Columbia Law Review* 908 (1958); "Report Concerning (1) The Role of Judge and Arbitrator in Labor Arbitration and (2) Injunctions Against Strikes in Breach of Contract," 20 *Record of NYCBA* 37, 41 (1965); 4 *Reports of Committees of NYCBA Concerned with Federal Legislation* 16, 21 (1965).

[23] See Weaver, cited at footnote 10.

[24] See Glazer, "Housing Problems and Housing Policies," *The Public Interest*, Spring 1967, p. 21.

[25] Requirements often include moral strictures such as a ban on unwed mothers. Such persons, if ousted from an area to be rebuilt and ineligible for public housing, may be forced into substandard housing with few options available to them, especially if subject to racial discrimination and effectively confined to a ghetto.

centive to work to raise their earning power.[26] It also causes the most up-and-coming tenants to leave the projects, keeping morale at a low ebb and turnover at a high rate.

One way of dealing with this dilemma which has been suggested[27] is establishment of a sliding scale of rents in housing to be built with federal funds, whereby residents whose incomes rose would pay more into a fund to aid further rebuilding rather than being forced to leave.

Greatly expanded rebuilding of our central cities will also necessitate steps to deal with the prospect that such rebuilding will perpetuate racially segregated ghettos. Programs to promote open occupancy regardless of race are an essential part of rebuilding plans. Similarly, attractive new housing in the central cities can pull residents in from the suburbs to create new integrated communities if sufficient amenities are provided.[28]

Possibility of National Building Code

In order to assure that large-scale construction of decent housing at moderate cost per unit would result, attention to building code requirements would also be necessary. Many such requirements are out of date. Some specify particular materials which have been bypassed by technological change. Others have been influenced by the need to protect jobs by precluding labor-saving materials and procedures. Still others may have been influenced by political pressures of particular contractors or suppliers who want to see their own products specified in one way or another. Each of these problems and purposes can be dealt with through a greatly expanded rebuilding program to which the nation would be committed over a period of years. Consequently, the need to rely upon restrictive building code provisions to assure jobs for employees or business for contractors should no longer be sufficient to make these provisions indispensable.

Further, savings might result if large-scale production of materials that meet national standards were possible. A national building code applicable to projects covered by a national rebuilding program would thus aid its effectiveness. It would appear well within federal power to supersede local building codes in projects falling within a nationwide program.[29] Such a national code would replace local building code provisions only on construction undertaken as part of the national plan. Local building code provisions would not be affected in other cases.

A wide range of uses and types of ownership would be possible in facilities constructed as part of a na-

[26] The consequences here are more than financial: ". . . if the organization and structure of economic life be such that the human dignity of workers is compromised, or their sense of responsibility is weakened, or their freedom of action is removed, then we judge such an economic order to be unjust, even though it produces a vast amount of goods, whose distribution conforms to the norms of justice and equity." Pope John XXIII, *Mater et Magistra,* Part II, par. 83 (1961); see also Drucker, *The Future of Industrial Man,* 1942; Drucker, *Concept of the Corporation,* 1946, 1960; NYCBA, Committee on Labor and Social Security Legislation, "Report on Bills to Permit Social Security Beneficiaries to Earn Income to the Extent of Their Abilities," 112 *Congressional Record* 10248, daily ed. May 17, 1966; Rosenthal, "Letter to the Editor," *New York Times,* March 20, 1966.

[27] See Savelson, "Panel Urges Reforms to Halt Slums," *N. Y. World Journal Tribune,* February 2, 1967, first page of second section.

[28] Weaver, cited at footnote 10, ch. II, pp. 72-73.

[29] See *San Diego Building Trades Council v. Garmon,* 359 U. S. 236, 37 LC ¶ 65,367 (1959).

tional program. Even though construction would have to be done with federal funds in order to permit the contractor to offer job security to employees, most structures could be sold to private developers for business or residential use in advance of construction, or contracts entered into for such sale, permitting the purchaser to vary specifications for construction within the terms of the overall plan of redevelopment. Contracts for sale of residential structures could contain in some or all cases restrictions on the computation of rents, for example providing for a sliding scale of rents as discussed previously in a suitable proportion of units. Where desirable, existing community institutions and good housing in a redevelopment area could and should be left standing, being rehabilitated where necessary.

Direct Relationship Federal Government-Contractor

This approach differs from existing programs in that a direct relationship between contractors and federal authorities is established in order to permit the necessary guarantee of job security to unleash the technological capabilities of the industry. Local communities and local authorities should still have the chief voice in the kind of buildings and the kind of redevelopment they want, and their consent could be required for the program to proceed.

If significant rebuilding is to take place within the central cities, with their high land costs, a considerable portion of new buildings will probably have to be high-rise, at least if rents are to be kept within limits.[30] In itself this should not be viewed

[30] In low-rise buildings, land cost is spread over fewer dwelling units. The drab quality of many high-rise developments is not due to their height, but to the absence of a "close-grained" diversity of kinds of facilities interspersed within each small community or substantial part of a complex. See Jane Jacobs, *The Death and Life of Great American Cities*, 1961. Mrs. Jacobs points out that to generate lively diversity there must be a mixture of primary uses such as work and residence in an area, short blocks to permit people to circulate freely to reach diverse businesses in the area, a high enough concentration of people to support diverse facilities, and a mixture of old buildings or other low-rent commercial space for a variety of new enterprises of differing sizes. She further points out that planning must be done with the participation and consent of those living in an area so that they come to value their neighborhoods more rather than less, if slums are to be replaced by better neighborhoods rather than merely moved elsewhere. For similar reasons, housing restricted to a single income level, including "low income," tends to create ghettos and inhibit diversity of population and raising of the status of residents; accordingly governmentally aided housing should have a sliding scale of rents rather than a maximum income limit. Cf. *Mass. Gen. Laws Ann.* ch. 121, Sec. 26MMM(b) (Cum. Supp. 1966), discussed in 80 *Harvard Law Review* 1811, 1817 (1967).

By offering opportunities to private investors to build in a favorable environment, incentive for such investment would be offered without creating dangers of distortion of the tax system and difficulties of distinguishing between aspirants for tax benefits. Cf. Cary, "Pressure Groups and the Revenue Code: A Requiem in Honor of the Departing Uniformity of the Tax Laws," 68 *Harvard Law Review* 745 (1955); Surrey, "The Congress and the Tax Lobbyist—How Special Provisions Get Enacted," 70 *Harvard Law Review* 1145 (1957); Surrey, "The Federal Income Tax Base for Individuals," 58 *Columbia Law Review* 815 (1958); Cary, "Reflections upon the American Law Institute Tax Project and the Internal Revenue Code: A Plea for a Moratorium and a Reappraisal," 60 *Columbia Law Review* 259 (1960); Paul, "Erosion of the Tax Base and Rate Structure," 11 *Tax Law Review* 203 (1956); NYCBA, Committee on Federal Legislation, "Tax Incentives for Political Contributions," 2 *Reports of Committees of NYCBA Concerned with Federal Legislation* 87 (1963). Tax concessions, local or federal obviously and necessarily increase the tax burden on all others who do not receive such concessions.

as inherently either good or bad. If we are willing to invest in the effort to make high-rise housing in the central cities attractive, it can be done. We can, for example, experiment with play areas within the buildings, as has been done in Sweden; roofs can be connected by bridges and used for protected gardens; shopping facilities can be included within building complexes; construction can be vaulted above automobile streets to create traffic-free upper promenades for children to play on without fear of traffic.[31] The use of three-dimensional space, both above and below ground, can be an asset rather than a liability if we have the courage to use it creatively.[32]

Costs and Benefits of the Program

What, then, would be the costs and benefits of such a program? In considering the cost, we must not fall into the ancient error of assuming that there is a constant supply of money in existence and that if we use funds for housing we must cut somewhere else.[33] On the contrary, our money supply and financial institutions are most elastic—it is *resources* which can be scarce and inelastic. If we expand the supply of currency without expanding our resources, the effect can be inflationary. In the case of the building industry, we have a reserve of unused resources in the form of unused technological advances and partial use of manpower (members of one trade are not allowed to fill in on the work of others during their own slack times on a job or during seasonal unemployment in their own trades, etc.).

If the need for these restrictions is eliminated by a program assuring job security and full use of resources, a great unleashing of capabilities is possible. It is also pertinent that the resources involved in a program of building of housing, schools and other such facilities are not in general the same as those involved in whatever military efforts the country may find it necessary to sustain.

The costs of such an effort aimed at making our central cities places of gravitational attraction rather than repulsion because of intolerable conditions allowed to exist there would thus not be material costs at all—they would be the intangible costs of giving up some of the long-accepted and time-encrusted practices of each of the groups involved in the problem. Each group would undoubtedly gain by making the change, but each would have to modify what have been regarded in the past as unalterable principles — such as the practice of appropriating funds for periods limited to one year, or of absolutely forbidding use of certain prefabricated materials.[34] The political courage necessary to make this

[31] See, for example, Savelson, "Housing Over Central Rails Studied by Civic Leaders," *N. Y. World Journal Tribune,* March 20, 1967, first page of second section.

[32] Compare "Town Houses in Sky Planned for Harlem," *New York Times,* May 30, 1965, Sec. 8, p. R1, col. 2; Mailer, "Cities Higher Than Mountains," *New York Times Magazine,* January 31, 1965, p. 16; Hechinger, "Rescue Operation for the Urban School," *New York Times,* July 16, 1967, p. E7; Jacobs, "What It's Like to Live in an Experiment," *New York Times Magazine,* June 4, 1967, p. 51. On use of space below ground, compare L. K. Edwards, "High Speed Tube Transportation," 213 *Scientific American,* 30, Aug. 1965; Clausen, "Sweden Goes Underground," *New York Times Magazine,* May 22, 1966, p. 23.

[33] Compare Givens, "The Coming Industrial Citizenship," 17 LABOR LAW JOURNAL 99, Feb. 1966.

[34] E.g., The rule involved in *National Woodwork Mfrs. Assn.* cited at footnote 1: ". . . No member . . . will handle material coming from a mill where cutting out and fitting has been done. . . ."

kind of sacrifice can be even greater than that necessary to make material sacrifices. We do not agree to surrender our Maginot Lines easily, even if they are already outflanked and we are offered more effective guarantees of security.

The benefits of making the effort would accrue to each group involved in the situation. Each would have to give up some of its present defenses only in return for better guarantees.[35] Each would share in the advantages of developing better cities. In particular, building trades employees would obtain year-round job security and assurance of full employment in the industry. Building contractors would obtain long-term commitments and freedom from technological restrictions. Residents of the central city and of the suburbs who might wish to move to the city in the future would obtain better housing at more reasonable cost.[36] The cities would benefit from better environments. The Congress would obtain more benefits for the tax dollar spent on housing programs and the credit for a far-seeing approach to a difficult problem. Each of these advantages *could* flow from such a program *if* the necessary effort and determination were forthcoming.

To obtain the maximum benefits from such an effort, the widest community participation and efforts to bring together all of the interests at stake would be necessary.[37] With a greatly expanded program of construction, for example, it should be possible to employ central city residents previously not in the building industry without threatening the job opportunities or job security of any of its present employees.[38] It should be possible to permit each area to participate in planning changes to take place within it. The legitimate needs of no group affected would have to be ignored.

Conclusion

Perhaps one of the groups which could benefit most from such a program would be residents of suburbs. The outward pressure of persons seeking to leave the central city would tend to be overcome over a sufficient period of time if conditions in the cities were made attractive. The suburbs would thus be permitted to retain their suburban character, which would otherwise be lost. And it should not be forgotten that blight anywhere—like hatred, fear and despair—is not confined by boundary lines and will spread to us wherever we are unless its causes are overcome.

An effort to overcome these causes must of course include concern with such problems as both fairness and effectiveness in law enforcement, better education, and expanding opportunity for all citizens in every field of life regardless of background. It must also include a concentrated attack on the twin needs of decent housing for the cities at reasonable rents and job security in the building industry. These tasks are vital not for ourselves alone, but also for the future of the children of all of us and as an example to the entire world of the energy of a free society.

[The End]

[35] Compare Thomas C. Schelling, *The Strategy of Conflict*, part II, 1963.

[36] See footnote 28.

[37] Compare Givens, "Deliberative Processes of the Committee on Labor and Social Security Legislation," 21 *Record of NYCBA* 482 (1966).

[38] This would help to alleviate such problems as those outlined in Gould, "Employment Security, Seniority and Race: The Role of Title VII of the Civil Rights Act of 1964," 13 *Howard Law Journal* 1, Winter 1967. See also Roberts, "Johnson to Call Parley on Slums," *New York Times*, June 4, 1967, Sec. 1, p. 42; Johnson, "March Planned to 'Build, Baby,'" *New York Times*, June 4, 1967, p. 43.

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BUILDING AND CONSTRUCTION TRADES COUNCIL
OF GREATER NEW YORK,
New York, N.Y., January 11, 1968.

Mr. RICHARD A. GIVENS,
Assistant U.S. Attorney,
U.S. Court House, New York, N.Y.

DEAR MR. GIVENS: Enclosed please find copy of letter I received from the Building Trades Employers' Association which is self explanatory.

I regret that I didn't send this letter to you sooner. As you can see, it is dated November 14, 1967. The delay was due to my extremely heavy schedule at the end of the year with out of town meetings, Conventions, etc.

As you can see from this letter, the Employers' are in accord with our thinking. I hope this will be helpful to you in pushing this program for better housing.

With kind regards.

Sincerely,

PETER J. BRENNAN, *President.*

BUILDING TRADES EMPLOYERS' ASSOCIATION,
New York, N.Y., November 14, 1967.

Mr. PETER J. BRENNAN,
President, Building and Construction Trades Council of Greater New York,
New York, N.Y.

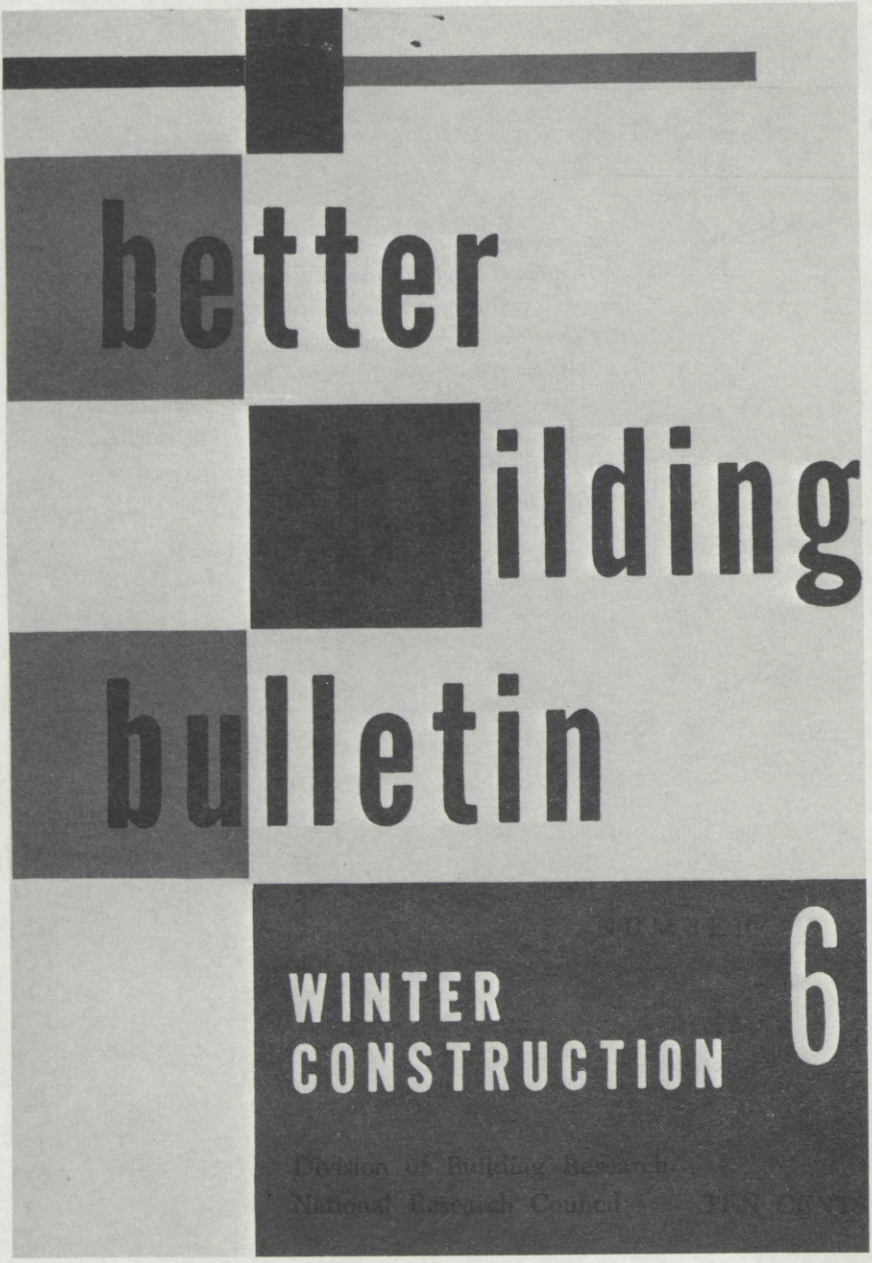
DEAR PETE: This is to acknowledge receipt of your letter of November 9th and advise that Jerry Burns and I have discussed the material accompanying it which was provided by the "Community-Wide Panel For A Better City".

Arising from this discussion we wish to advise you that the Building Trades Employers' Association is pleased to join with you in endorsing this plan as it is our traditional position to favor any program which will lead to better housing for all and provide enhanced job opportunities to the construction trades craftsmen which we employ, as well as, to our member firms.

Sincerely,

Earl
H. EARL FULLILOVE,
Chairman, Board of Governors.

(Mr. Bone submitted the following publication:)


better
building
bulletin
WINTER
CONSTRUCTION
6

December 1960.
Supersedes Bulletin issued December 1955.

This is one of the series of bulletins on better building practice prepared by the Division of Building Research, National Research Council, as part of its service to the construction industry of Canada; it deals with

WINTER CONSTRUCTION

and has been prepared by C. R. Crocker and D. C. Tibbetts of the Construction Section of D.B.R., with the valued assistance of many members of the construction industry experienced in winter work.

TABLE OF CONTENTS

	Page
Purpose of Booklet	5
Planning	6
Site Organization	
Water supply for construction purposes	8
Storage and protection of materials on the site	9
The fire problem	9
Excavations and Foundations	
Excavating	10
Foundations	11
Concrete	13
Heating the mix	14
Placing the concrete	15
Curing	15
Accelerators	19
Storage of materials	20
Preparation of mortar	20
Mortar mixes	21
Heating of masonry units	21
Laying precautions	21
Masonry protection	22
Plaster	22
Stucco	23
Roofing	23
Painting and Decorating	24
Protection of Winter Work	24
Heating Equipment for Winter Work	26
Electric Lighting	28
Conclusion	28

PURPOSE OF THIS BOOKLET

Winter construction has come to be a well-accepted feature of the construction industry in Canada. Many great engineering projects such as the St. Lawrence River power scheme have been carried out with much of the work upon them performed during severe winter periods. The success of Canadian constructors in carrying out major building operations throughout Canadian winters has won for them an enviable reputation.

Despite this, it is not generally appreciated that even the smallest construction projects, including house building, can be carried out during winter periods, with little extra cost involved but with some advantages over summer construction — provided that all winter work is properly planned.

So much is to be gained by an increase in the volume of winter construction in Canada, particularly in the reduction of seasonal unemployment which will result, that the Government of Canada has officially endorsed efforts toward the extension of winter building work. This booklet is a contribution from the National Research Council Division of Building Research towards this goal.

It is intended to show how proper management can be applied to all normal building operations with a view to making them easier to perform during winter weather. The booklet deals with each major building operation. For convenience, many common features are repeated under the respective headings in order to make each section complete in itself.

This booklet is merely an introduction to a vast subject, but it is hoped that it will make clear that Canada's reputation for good building during the winter can apply just as well to the small job as to the major construction enterprise, provided that proper advance planning is done. The booklet starts with a brief section on planning, since planning alone holds the key to real success in winter construction.

PLANNING

Construction men agree that the additional costs of winter construction are negligible when the job is closed in before severe weather arrives. In fact, there are many cases where lower costs result owing to such factors as availability of labour, building materials, and equipment; easy access to the building site; uninterrupted work, and quality control.

A study of such cases shows, however, that very careful and detailed planning came first. The object of this planning is to schedule and time each phase of the job so that the least possible inconvenience is suffered due to the weather. The ideal situation results when the building is closed in before winter comes. When this is not possible then proper planning will ensure that provision has been made to overcome the problems associated with winter construction. It must be pointed out that many of these problems are no more severe than those to be found on construction jobs at other times of the year.

Planning winter building operations requires a knowledge of local weather conditions. Builders who have been building in the same area for a number of years can plan their winter operations on the basis of their own experience. Others lacking this local information can obtain it from the nearest meteorological office.

Before winter operations begin, and particularly before the first period of heavy frost or heavy snowfall, provision should be made for access roads, drainage, services, land clearing, lot layouts, and excavations. Some of these jobs can be difficult or impossible once winter has set in.

In addition, it is well to make pre-winter arrangements for water supply for construction purposes, temporary power, space and shelter for the storage of building materials, shelter for the workmen, and protection and maintenance of tools and equipment.

Roads and ditches should be put in early so that equipment and materials may be easily moved to and from the site. Side

clearances should be provided for snow removal. Roads are much easier to build before the ground freezes and before fall rains or early snowfalls. Good drainage is necessary to maintain a road usable and trouble-free for several months. Besides access roads from main roads to subdivisions, it is important that driveways be roughed in to carry trucking loads. Suitable culverts should be provided at ditch crossings into construction sites to ensure proper drainage during wet weather.

Availability of building materials and equipment on short notice is one of the advantages of building in winter. It is important, therefore, not only to provide roads but to keep them open and in good condition. If this is done materials can be delivered as required reducing the amount of space and shelter that would otherwise be required. Well maintained roads also ensure easy access to the site by fire-fighting equipment in the event of an emergency.

Municipal services such as electric power, water, and sewers should be arranged for well in advance of the construction starting time so that there will be no holdups due to bad weather or trenching in frozen ground. Where storm sewers are to be provided, the site should be drained before cold weather sets in. It is best to install septic tanks at the time of excavating for the foundation. A septic tank can be put in place in winter provided the ground is first covered by snow, brush or straw to prevent frost penetration and to make cold weather excavation possible.

Disposal beds should be backfilled and covered with straw or snow to prevent freezing and heaving of the tile. Workmen and vehicles should be kept away from the disposal bed area as compacted snow cover will increase frost penetration. If cold weather is expected before there is snow on the ground, the disposal area should be covered with a foot or two of straw until after the septic tank system has been in operation for several weeks.

Lot layout, surveying, excavation, staking and the establishment

of elevations can best be done before the ground freezes or before much snow has fallen. Land clearing and rough grading can normally best be done before snow has covered the site.

The items cited above fall into the category of planning the winter job. They are dealt with more easily before freeze-up or snowfall. This does not mean that they cannot be done in winter — they can, but with difficulty.

SITE ORGANIZATION

Water Supply for Construction Purposes

In winter, precautions must be taken against freezing of water pipes to ensure an adequate water supply for on-site concrete, masonry, and plaster work. In addition, water should be available for fire-fighting purposes. Water pipes can be protected against freezing by insulating or heating.

Where water under pressure is available, a frost well can be put down to the depth of the water main. The bottom of the well must be equipped to drain to a sewer or porous ground so that the service pipe can be readily emptied at night. Where necessary the valves and couplings can be protected by a layer of straw. The well should be covered to exclude snow. Rubber or plastic hoses are often used as temporary service lines. These hoses should be emptied when not in use and stored under cover. Pipes should be supported in such a way that no water can remain in them when they are drained.

Insulation for temporary service pipes can be provided by placing the pipe in a trench and backfilling before freeze-up. If trenching is not practicable then pipes can be laid in boxes filled with shavings or sawdust. Four to 6 inches of dry insulation will prevent freezing of still water in pipes for 24 hours on most construction sites. A small amount of insulation may be enough if water is being run continually through the pipe but the pipe must be drained after working hours if the water is shut off.

Electrical heating of pipes is effected by passing a low-tension current, supplied from the power lines through a transformer, through the pipe proper, or through an insulated cable passing through the pipe. There are "wrap-around" cables available that operate on normal supply voltages and these, together with some insulation, will provide enough protection for most winter jobs.

Storage and Protection of Materials on the Site

Millwork, finish flooring, asphalt shingles and cement should be stored in a warm, dry location. Lumber, plywood, insulating sheathing, gypsum board, masonry units and masonry materials must be kept dry. Certain materials such as reinforcing steel and cast-iron pipes suffer no direct damage through exposure for a few months; nevertheless, work will be slowed down if they are encrusted with snow and ice. Materials not requiring coverings should at least be stored off the ground on platforms or skids to prevent their freezing to the ground.

The Fire Problem

Make sure that salamanders and other temporary heating equipment do not set fire to formwork and tarpaulins. Fires may occur from welding and cutting operations but most of the fires in formwork have started in tarpaulins from portable heaters.

A flameproofing liquid for treating tarpaulins in the field was developed during the war for the armed forces. A specification for the liquid and its application is available (Canadian Government Specifications Board Specification 4-GP-56).

Salamanders should be placed on the ground or other incombustible base. If placed on wooden floors, salamanders must be insulated by at least 3 inches of incombustible material covered by sheet metal and extending 2 feet beyond all sides. There should be a clear distance of at least 30 inches in a horizontal direction from all wood construction and a clear distance of 6 feet above all salamanders.

Do not throw chunks of asphalt that are covered with ice or snow into a heating kettle. The conversion of the ice and snow into steam in the hot asphalt will cause spattering and may also cause the kettle to overflow and start a fire. Never heat asphalt cement directly over a fire; put unopened cans in hot water to warm.

Fire hoses should be kept close to all formwork and buildings when heaters are being used on the job. If there is danger of freezing, the fire main should be kept drained and controlled by a valve protected from freezing but easily accessible. Hand extinguishers are a valuable supplement to a supply of water. These should be checked periodically to determine if they are fully charged and in good working order.

EXCAVATIONS AND FOUNDATIONS

Excavating

Modern excavating machinery can readily operate in ground frozen to a depth of 1 foot. Earthwork will usually cost less, however, when it is done before or between frost periods. For a well-planned winter job it is possible that all excavating and trenching can be done before cold weather.

Earth that is to be excavated after winter sets in can be covered with brush or straw to reduce frost penetration. If heavy snows precede periods of very low temperatures, then this snow cover should be left undisturbed to provide a blanket of insulation over the area to be excavated later. Rock excavations present no particularly difficult problems at temperatures above 0°F.

Excavating is sometimes easier in winter. Drainage and well-point work is often reduced or eliminated during cold weather. Shoring, cribbing, and piling may also be reduced if the ground is frozen so as to maintain a certain stability with slopes and vertical cuts.

Frost protection inside the excavation is usually necessary. Straw should be placed in the bottom of the excavation and up the

sides for a few feet. This will reduce frost penetration and make it possible to place footings on an unfrozen base. The straw is removed immediately before placing the concrete for the footings and replaced as soon as the concrete is placed to ensure proper curing of the concrete. On a rock base, heating with steam before the footing concrete is placed will provide better curing conditions for the concrete.

Sides of excavations and embankments having a south or southwest exposure are subject to cycles of freezing and thawing with consequent sloughing and caving in. Straw placed against these sides and covered with tarpaulins will usually stop this action, and make work on the footings and foundation walls easier.

Thawing operations may be necessary where excavations must be made at the height of the cold weather.

Where frost has penetrated deep into the soil, fires can be used to thaw the ground. For sewers and water-mains this may be done by spreading approximately 1 foot of hay or straw covered with 3 inches of slack coal. When a good tight job of spreading the coal over the straw is accomplished, the ground will be thawed to a depth of as much as 3 feet by one burn. Wood scraps and petroleum products can also be set afire. Flame throwers are beginning to make an appearance for thawing small sections at a time.

Steam is sometimes used by one of the following methods:

(1) thin coils laid on the frozen surface;

(2) steam jets keeping water warm in a pit;

(3) steam points melting their way into the frost crust.

The last-mentioned method has proved to be the most effective means of thawing with steam.

Foundations

Concreting against frozen ground is poor practice. Excavations should be made just before placing concrete, or so protected that the bottom and sides do not freeze. The same applies for trenches for sewers and drains.

One of the most common and serious types of frost damage is by frost heaving of foundations. It is absolutely essential to prevent freezing of the ground below the foundation when frost susceptible soils are encountered. If a basement is left open or unheated, insulation must be provided over the entire foundation, and on concrete floors. A twenty-inch layer of straw or hay will usually provide the required amount of protection for short periods.

Forms for foundations should not be placed on ice or snow. All ice or snow on the inside surfaces of forms and between forms must be removed before concrete is placed. This can readily be done by steaming. The base must be thawed before footings are placed and kept that way thereafter. Steel reinforcement and construction joints must be free of snow and ice and preferably warm.

Masonry units for foundations should be thoroughly cured. Those having a moisture content greater than 20 per cent should not be used. Blocks that have ice on them should not be used. Dry blocks permit mortar to set faster. Blocks should be warmed when temperatures fall below 40°F. These precautionary measures lessen the chances of damage by frost.

Mortar for block foundations should be prepared from warm aggregate and the mixing water must be heated when the temperature is below 40°F. Mortar should be prepared in small batches and kept warm until it is used. Mortar and masonry materials should be maintained at a temperature of not less than 40°F. during laying. The masonry should not be subjected to below freezing temperatures during the first 48 hours after laying.

Drain tile may be placed around the footings and covered with crushed rock or other granular material. Straw or hay should then be placed on top of this material to prevent frost heaving and freezing of the tile and footings. Proper outlets for the tile must be provided to take care of early spring runoff. No backfilling should be done until spring unless unfrozen material is used.

This should be placed in layers of 6 inches to one foot and compacted to prevent future settlement and subsequent ponding of water near the foundation wall.

CONCRETE

Protection for concrete is essential during placing and curing in any region where temperatures below freezing are expected. Good practice requires that the concrete be warm when placed and that it be kept above freezing until it has gained sufficient strength to prevent damage when frozen. Concrete which has attained a strength of 500 psi is considered past the danger stage, although it is still not capable of withstanding repeated cycles of freezing and thawing. Further gain in strength will depend on temperature and humidity conditions, but care must be taken to see that temperatures do not rise to a high level. It is not generally realized that concrete which is not allowed to freeze and which is placed and cured at low temperatures above freezing develops higher ultimate strength and greater durability than concrete placed and cured at higher temperatures. It is only in winter that the contractor can provide the low temperatures required for top quality concrete.

While low temperatures are desirable, fresh concrete must not be allowed to freeze. When this happens the hydration of the cement ceases and ice crystals form within the concrete. While hydration will resume with a rise in temperature, the disruption caused by the expanding ice crystals will have so damaged the concrete that it will never attain the strength of unfrozen concrete and may, in severe cases, be completely destroyed.

All necessary equipment and materials for the protection of the concrete should be on the site well in advance of freezing weather. With the concrete in place and the temperature dropping below freezing it is often too late to begin collecting protective equipment and materials.

The next step in winter concreting is to select suitable aggregate.

Soft, shaly stones are dangerous since they absorb water and may cause rupture after the concrete has hardened particularly when the concrete is subjected to cycles of freezing and thawing. Further information on the making of concrete is contained in Better Building Bulletin No. 3, "Concrete" published by the Division of Building Research.

Heating the Mix

The table below indicates, for various outside temperatures, the requirements for heating of aggregate and water and also the recommended temperature of the concrete in the mixer.

Air Temperatures	Water	Aggregates		Concrete Temp. at mixer
		Sand	Coarse	
Above 30°F.	Heated	—	—	60 to 80°F.
30 to 0°F.	"	Heated	—	65 to 90°F.
Below 0°F.	"	"	Heated	70 to 90°F.

When the air temperature is just below freezing, the required temperature for the concrete mix can be obtained by heating the water only. This assumes, however, that the aggregate is not frozen and no ice is contained in the aggregate. Later as the weather becomes colder and stockpiles freeze, heat is also applied to the sand. In severe winter weather coarse aggregate is also heated.

The temperature of the mixing water should be controlled to avoid variations from batch to batch. If either the water or the aggregate is heated to a temperature above 100°F., water and aggregate should come together first in the mixer in such a way that the temperature of the combination is reduced to below 100°F. before the cement is added. This will prevent flash set.

If water is heated to a maximum temperature of 140°F. then it should not be necessary to heat the aggregates to a temperature in excess of 60°F. even during the coldest weather.

Placing the Concrete

The temperature of the concrete when placed should be between 60°F. and 80°F. This applies winter or summer. There is nothing to be gained and damage can result if concrete is placed at too high a temperature.

Before concrete is placed, all ice, snow and frost must be removed from forms, reinforcement and other contact surfaces. The temperature of surfaces in contact with the concrete should be above 40°F. No concrete should be placed on a frozen subgrade or on one that contains frozen materials.

Curing

As soon as the concrete is placed, steps must be taken to ensure that the temperature of the concrete at all surfaces does not drop below 50°F. for a period of 5 days or below 70°F. for 3 days. In either case, the concrete after the initial curing period should be kept at a temperature above freezing until it has reached an age of 7 days. When high early strength cement is used or an additional 20 per cent of cement is added to the mix, the protection period may be reduced to 3 days at 50°F. or 2 days at 70°F.

Higher curing temperatures than those indicated may result in reduced strength and durability of the concrete. Rapid changes in temperature are also undesirable. At the end of the protection period, the temperature of the concrete should be gradually reduced at a rate of 20°F. per day until the outside air temperature has been reached.

During the initial curing period, the concrete must be kept damp as well as warm. At the lower wintertime temperatures, the forms will usually retain sufficient moisture to ensure adequate curing. They may, therefore, be left in place for as long a period

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as possible. This is contrary to good practice during hot weather, when the forms are stripped as soon as possible to permit proper curing of the concrete. Large exposed surfaces of concrete such as floor slabs must, however, be kept damp if dry heat is used. Often heaters blow hot dry air directly over a freshly placed concrete surface. Concrete cured under these conditions will not be durable and will often have a weak chalky surface with little resistance to abrasion.

During the hardening of the concrete and especially in the first few days, considerable heat is developed. If this heat is conserved, no heat from outside sources will be necessary to ensure good curing conditions. This heat may be conserved by covering the concrete surface with insulating blankets or insulated forms. The amount of insulation for various kinds of concrete work at different outside temperatures is given in the following tables which have been taken from ACI Standard 604-56, "Recommended Practice for Winter Concreting."

INSULATION REQUIREMENTS FOR CONCRETE WALLS AND FLOOR SLABS ABOVE GROUND

Concrete placed at 50°F.

Wall thickness, ft.	Minimum air temperature allowable for these thicknesses of commercial blanket or batt insulation, deg. F.			
	0.5 in.	1.0 in.	1.5 in.	2.0 in.
Cement content — 300 lb. per cu. yd.				
0.5	47	41	33	28
1.0	41	29	17	5
1.5	35	19	0	−17
2.0	34	14	−9	−29
3.0	31	8	−15	−35
4.0	30	6	−18	−39
5.0	30	5	−21	−43
Cement content — 400 lb. per cu. yd.				
0.5	46	38	28	21
1.0	38	22	6	−11
1.5	31	8	−16	−39
2.0	28	2	−26	−53
3.0	25	−6	−36	—
4.0	23	−8	−41	—
5.0	23	−10	−45	—
Cement content — 500 lb. per cu. yd.				
0.5	45	35	22	14
1.0	35	15	−5	−26
1.5	27	−3	−33	−65
2.0	23	−10	−50	—
3.0	18	−20	—	—
4.0	17	− 23	—	—
5.0	16	− 25	—	—
Cement content — 600 lb. per cu. yd.				
0.5	44	32	16	6
1.0	32	8	−16	−41
1.5	21	−14	−50	−89
2.0	18	− 22	—	—
3.0	12	−34	—	—
4.0	11	−38	—	—
5.0	10	−40	—	—

INSULATION REQUIREMENTS FOR CONCRETE SLABS PLACED ON THE GROUND

Concrete at 50°F. placed on ground at 40°F. No ground temperature gradient assumed

Slab thickness, ft.	Minimum air temperature allowable for these thicknesses of commercial blanket or batt insulation, deg. F.			
	0.5 in.	1.0 in.	1.5 in.	2.0 in.
Cement content — 300 lb. per cu. yd.				
0.333	—	—	—	—
0.667	49	47	44	42
1.0	43	33	22	12
1.5	33	12	−10	−33
2.0	24	−9	−43	−77
2.5	14	−31	−76	—
3.0	5	−52	—	—
Cement content — 400 lb. per cu. yd.				
0.333	—	—	—	—
0.667	46	40	32	26
1.0	37	22	5	−12
1.5	25	−5	−37	−68
2.0	13	−32	−78	—
2.5	1	−59	—	—
3.0	−11	—	—	—
Cement content — 500 lb. per cu. yd.				
0.333	—	—	—	—
0.667	42	32	21	10
1.0	32	10	−13	−35
1.5	17	−23	−63	−103
2.0	3	−55	—	—
2.5	−12	—	—	—
3.0	−27	—	—	—
Cement content — 600 lb. per cu. yd.				
0.333	50	50	48	48
0.667	39	24	9	−5
1.0	27	−1	−31	−59
1.5	10	−40	−90	−139
2.0	−8	−78	—	—
2.5	−25	—	—	—
3.0	−43	—	—	—

INSULATION EQUIVALENTS*

Insulating material	Equivalent thickness, in.
1 in. of commercial blanket or batt insulation	1.000
1 in. of loose fill insulation of fibrous type	1.000
1 in. of insulating board	0.758
1 in. of sawdust	0.610
1 in. (nominal) of lumber	0.333
1 in. of dead-air space (vertical)	0.234
1 in. of damp sand	0.023

*The tables are calculated for the stated thicknesses of blanket-type insulation with an assumed conductivity of 0.25 Btu. per hr. per sq. ft. for a thermal gradient of 1 deg. F. per in. The values given are for still air conditions and will not be realized where air infiltration due to wind occurs. Close-packed straw under canvas may be considered a loose-fill type if wind is kept out of the straw. The insulating value of a dead-air space greater than about ½ in. thick does not change greatly with increasing thickness. Textbooks or manufacturers' test data should be consulted for more detailed data on insulations.

Accelerators

The hardening of concrete will be accelerated if small amounts of additional cement are added to the mix. Use of 1 per cent of calcium chloride by weight of the cement is often recommended in cold weather for the same purpose. An exception to this is when sulphate-resisting concrete is required; in this case, an extra bag of cement per cubic yard should be used rather than calcium chloride. The calcium chloride, when it is used, should be dissolved in a portion of the mixing water.

Salts or other chemicals must not be used as antifreeze agents. In the quantity that is safe to use, calcium chloride will only lower the freezing point by 2 or 3 degrees. Too much salt may reduce the durability of concrete, intensify the destructive reaction between the alkalis in portland cement and certain susceptible aggregates, and promote the corrosion of metal reinforcement

and ducts imbedded in the concrete. It is generally agreed that calcium chloride must not be used in amounts in excess of 2 per cent by weight of the cement.

MASONRY

While much is known about winter concreting, little study has been devoted to cold weather masonry construction. Regulations which have been in use are based on the results of work done about thirty years ago on concrete since it was considered that the mortar would react to cold weather in much the same way as does concrete. Many masonry buildings have been constructed, however, without protection and, even under severe winter conditions, these structures have shown remarkable durability. This has led to some relaxation of the regulations regarding winter masonry construction, but this does not mean that masonry can take care of itself in cold weather. Failures are still reported and are no doubt due to inadequate supervision on the site.

Storage of Materials

The first step in preparing for winter masonry construction is to provide a storage space where masonry units and mortar materials can be kept on a platform raised to prevent wetting from ground moisture. The materials must be covered with tarpaulins, building paper or plastic film to keep them dry and free of ice or snow. Space located in an area where the temperature is above freezing is desirable but not essential.

Preparation of Mortar

When the temperature falls below 40°F., the water for the mortar should be heated to provide a mortar with a temperature between 60°F. and 80°F. The water must not be heated to a temperature higher than 150°F. In very cold weather, the sand also may require to be heated, but again care must be taken to avoid overheating. All that is required is that the temperature

of the sand be above freezing and that it is free of snow or ice. Sand can be heated by piling it around a metal pipe in which a slow fire is built.

Mortar Mixes

In mild weather, a suitable mix is one part portland cement, two parts lime putty and eight or nine parts of sand (1:2:8 or 9) all by volume.

In cold weather, more cement is used to accelerate the hardening of the mortar. A 1:1:5 or 6 mix is suggested.

Mixes stronger than 1:1:5 such as 1:3 (cement:sand) are only recommended where a dense, strong mortar is required in engineering construction or for masonry construction below grade. These strong mortars should not be used, however, with masonry units which have a high drying-shrinkage, since the brick or block may be cracked during the drying out period.

A weaker mortar will accommodate the movement of those concrete blocks and concrete or sand-lime bricks which have higher shrinkage values.

Heating of Masonry Units

Bricks must be heated when the temperature falls below 32°F. Not only will this ensure that the temperature of the masonry is above freezing but will also permit the establishment of a good bond between the mortar and the brick. When the suction of the brick must be controlled, this can only be done when the brick is at a temperature above freezing. The brick must not be overheated, a temperature of 40 to 50°F. being quite adequate.

Laying Precautions

Block and brick must never be laid on a snow- or ice-covered base. The tops of unfinished walls must be covered at the end of the day's work to keep the masonry dry and free from ice or snow. Bricks must be supplied in a dry condition.

Bricks with initial rates of absorption above 20 grams per minute should be sprinkled with warm water just before laying. The brick must not be saturated since they may disintegrate on freezing.

Masonry Protection

After the masonry walls are laid up, they should be kept at a temperature above freezing for at least 48 hours. Tarpaulins are usually sufficient for this purpose for temperatures down to 25°F. At lower temperatures artificial heat inside temporary enclosures is required. Care must be taken to prevent heating of one side of a wall only.

PLASTER

Fresh plaster must not be allowed to freeze since this will result in damp, dark-coloured walls with inadequate strength. During the first twenty-four hours the plaster should be kept warm and moist. After plaster has hydrated, which will be within the 24 hours, ventilation must be provided to permit drying of the plaster. High humidity conditions, particularly at temperatures of 40°F. to 50°F., may prevent drying of the plaster; this greatly weakens the bond of the plaster to the base. If outside temperatures are below 40°F., heat must be introduced to supplement ventilation. The temperature should be controlled, however, to prevent too rapid drying of the plaster which often results in the formation of shrinkage cracks. A temperature of 65°F. could be considered a desirable maximum level. Ventilation should be so arranged that air currents do not impinge on a freshly plastered surface. In very cold weather air for ventilation should be introduced at some point away from the area to be dried.

Since in most cases the permanent heating system is in operation when the plastering is started, no trouble is found in maintaining proper temperatures. Warm air heating systems also permit the introduction of fresh air directly to the furnace. When temporary

heaters are used, care must be taken to provide careful supervision since smoke or fumes may stain the plaster.

Condensation on windows is a problem during the first 24 hours on a winter plastering job. Water dripping from windows may cause permanent damage to the plaster or to woodwork. If condensation cannot be controlled during this period, then ventilation must be provided.

STUCCO

Stucco is usually a cement plaster and requires curing conditions similar to those for concrete. Stucco should not therefore be applied at below-freezing temperatures unless adequate protection in the form of heated enclosures is available.

ROOFING

Water trapped under or between the plies of built-up roofing will invariably give trouble. It is important, therefore, that the roof deck is dry when the roofing is applied and that no water gets between the layers of roofing felt.

Asphalt and tar are often heated to higher temperatures than normal to compensate for the lower winter air temperatures. This is not good practice since overheating changes the physical properties of these materials and will reduce roof life. The temperature recommended by the manufacturer must not, therefore, be exceeded.

Roofing felts and asphalt shingles during cold weather should be kept at a temperature of 70°F. until they are ready to be used. Gravel or slag used to surface built-up roofs must be dry and should be heated when the air temperature is below 40°F. to ensure proper penetration into the bitumen.

Every effort should be made to construct a built-up roof in warm dry weather. When this is not possible, then precautions must be taken to keep water, snow and ice off the roof deck and the roofing.

PAINTING AND DECORATING

Do not apply exterior paint at temperatures below 50°F. Paint applied in cold weather will not dry properly and will lose its durability and resistance to weathering. For winter work it is best to pre-prime outside trim and millwork in a heated and ventilated building and finish the painting in warm weather.

Control of temperature for interior painting presents no problem if the heating system is operating. Ventilation is desirable not only to assist in the drying of the paint, but also to remove the solvents which are sometimes toxic.

Fresh plaster should not be painted. This retards the drying of the plaster and may result in fading of the pigments in the paint. Taping of joints in dry wall construction should not be done at temperatures below 50°F.

Wallpaper should not be applied at low temperatures. If heat is not provided freezing and souring of paste can readily occur. If the paste sours it will spoil the paper. Wet conditions inside the house or papering over fresh plaster will also cause paste souring. A tablespoon of carbolic acid to a bucket of paste reportedly will keep paste good for three or four days. If paper will not dry in this time, increase the heat in the building or use a dehumidifier.

PROTECTION OF WINTER WORK

Winter in most of Canada is severe and the majority of building operations can carry on only when protection in the form of insulation or shelters is provided. In house building many builders find that the use of insulated forms to protect concrete foundations and steam to prevent the entry of frost into the ground is all the protection that is required. As soon as the foundation is in place, the wood frame and exterior cladding can be put in place in all but the most severe weather. Quality of such work is often better in winter since the frame is not subjected to

wetting by rain as so often occurs in summer. Temporary shelters do provide good working conditions for house builders, but so far a light, portable shelter designed for repeated re-use has not been developed. Shelters which can only be used once or which must be dismantled and then re-erected have been found too expensive for general use.

On other projects including larger residential units, shelters are widely used. The great advantage of using a shelter to enclose all or a portion of the work is that it permits the contractor to carry on without interruption under conditions selected to ensure maximum quality and productivity.

Most enclosures make use of transparent plastic films. Sometimes the plastic is used only as temporary hoarding for door and window openings or as window strips, but often the whole enclosure is covered with polyethylene. Other enclosures use panels of plywood or building board which are later recovered and used in construction. Tarpaulins are still widely used. Recently, plastic tarpaulins have been introduced which have the great advantage of remaining flexible at low temperatures. The transparent plastics also have the great advantage of trapping solar heat so that the temperature inside enclosures covered with polyethylene may be as much as 45 degrees above outside air temperatures during sunny weather. This often provides all the heat that is required during the daytime. In very cold areas, additional insulation may be obtained with two layers of plastic to provide an air space to reduce heat loss during cloudy, windy weather and at night.

Shelters can be grouped in two general classifications. There are those which are self-supporting such as the laminated-arch plastic-covered enclosures. The second type of shelter uses the existing frame of the building for support. The most common type is the enclosed scaffold suspended from outriggers on the roof. This external working platform is raised from one story to the next as work progresses. Another method of enclosing the

skeleton makes use of standard sections of tubular scaffolding and is generally most economical for buildings under four or five stories in height. The scaffold is braced against the frame and covered with plywood, tarpaulins or plastic attached to a light frame wired to the outer members of the scaffold.

HEATING EQUIPMENT FOR WINTER WORK

Steam boilers are recognized as an economical source of heat for winter jobs. On the average job, the capacity of a boiler should be from 2 to 2½ boiler horse power per yard of concrete per hour of maximum demand. Steam from the boilers may be used to:

(1) heat the various buildings used;
(2) heat the concrete aggregates and mixing water;
(3) thaw out forms;
(4) protect the concrete after placement.

For the use of boilers for heating the materials used in making concrete, the following data may be useful:

(1) One boiler h.p. (33.5 thousand B.t.u.'s per hour) will raise the temperature of 30 gallons of water about 100°F. in one hour;
(2) One boiler h.p. will raise the temperature of 1 ton of moist unfrozen aggregate about 60 to 65°F. in one hour;
(3) One boiler h.p. will raise the temperature of about 1 ton of the frozen aggregate about 30 to 40°F. in one hour;
(4) When steam is used for heating aggregates and water, the required boiler capacity per yard of concrete per hour will range from about 1 h.p. for mild winter weather to about 2½ h.p. for fairly severe winter weather. For boilers of the type and capacity discussed here, about 140 sq. ft. of steam radiation is equal to 1 boiler h.p.

Steam unit heaters, portable warm-air units equipped with blowers, coal-, coke-, and oil-fired salamanders and gas-burning units are all commonly used in present-day cold-weather work.

It is important to note that extreme care should be exercised in the handling and locating of this equipment.

Coke-burning equipment should not be left unattended and enough ventilation of enclosures should be provided to take care of harmful gases that are sometimes given off by such units. Portable coke ovens produce sulphurous acid which produces rust on hardware. Hardware should be coated therefore when these units are used.

Infra-red rays are being used on some winter concrete jobs. Banks of five 250-watt infra-red lights are used to keep fresh concrete from freezing. These are the ordinary bulbs for therapeutic heat lamps and can be bought in drug, hardware or appliance stores. Job-made troughs fitted with light sockets contain the lamp banks. The troughs are deep enough to protect the lamps and are about 20 feet long. The trough is set horizontally on the working platform and the lamps are directed at the form surfaces. These units have been used successfully for protecting concrete placed at -15°F. It is suggested that the lamps be not placed too close to wood forms or tarpaulins because of the fire hazard involved.

Natural gas, where available, is often used to supply heat for winter construction jobs. Where there is no fire hazard, it is common practice to use open flares; otherwise gas-fired unit heaters are used.

The most widely used heater is the oil-fired space heater which comes in a number of sizes up to 800,000 B.t.u. per hour. These heaters are usually located inside the enclosure and are not vented.

All heaters burning coal, coke, oil or gas which discharge the products of combustion into the heated space must be operated with care to prevent a build-up of harmful gases. While there is little danger from carbon monoxide with properly adjusted heating units, ventilation should be provided when workmen are in the enclosure. Ventilation must also be provided during the first 24 hours after placing concrete. During this period, floor slabs

or other exposed surfaces will be damaged when the carbon dioxide content reaches a high level. When carbonation has taken place, the only way to correct the damage is to grind down the soft surface of the concrete until a firm surface is reached. This is an expensive operation.

ELECTRIC LIGHTING

Because of the shorter days and cloudy weather associated with the winter months in Canada, artificial illumination must be provided on most construction jobs. It is generally considered that for construction work, a light intensity of 10 foot-candles must be provided for the ordinary construction operations. On small construction jobs this usually involves between 5 and 10 100-watt bulbs per 1000 square feet of area. Where power lines are already installed, no difficulty is experienced in obtaining a temporary power line to the job for the operation of electrical equipment as well as lighting equipment. Portable generators, of which there are a large number on the market, can be used where power lines are not available.

CONCLUSION

This bulletin has attempted to indicate some of the techniques used in Canada by contractors working throughout the winter months. There is little to be found in these pages which will be new to those familiar with winter construction but it is hoped that many contractors who in the past have stopped construction in the late fall, will be encouraged to so plan their construction that it will be possible for them to continue throughout the winter months. It should be pointed out that while many protective measures must be taken during the winter, good control can be maintained of the various jobs associated with construction work. This often results in a superior structure over one built, for example, during extremely hot summer weather when it is very difficult to provide protective measures for concrete and masonry.

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