



HARLOW

canadian wood frame houses

This brochure has an important role in explaining the nature of the project but it is not part of the Contract Documents. No attempt has been made to make this into a manual on Canadian house construction methods; it is solely a means of trying to provide the Contractor with an understanding of the Canadian principle of wood frame construction used in this Harlow project.

Prepared by Central Mortgage and Housing Corporation
Ottawa, Canada

February 1966

HARLOW DEVELOPMENT CORPORATION

Gate House, The High, Harlow, Essex, England.

General Manager:	B. Hyde Harvey F.I.M.T.A., F.S.A.A., D.P.A.
Architect Planner:	F. Gibberd C.B.E., F.R.I.B.A., M.T.P.I.
Executive Architect:	V. Hamnett B.Sc., A.R.I.B.A., Dip. T.P., A.M.T.P.I.
Chief Engineer:	O.W. Gilmour M.A., M.A.I., M.I.C.E.

CENTRAL MORTGAGE AND HOUSING CORPORATION

Head Office Ottawa, Canada

This Corporation is the Canadian Government's housing agency and operates in Canada as a Crown Corporation.

Chief Architect and Planner:	D. Crinion M.R.A.I.C., A.M.T.P.I.C., A.R.I.B.A.
Chief Engineer:	A.J.E. Smith P.Eng., M.E.I.C.
Senior Architect in Charge:	M. Clayton M.R.A.I.C., A.R.I.B.A.

CANADIAN DEPARTMENT OF TRADE AND COMMERCE

This is a Department of the Canadian Government with offices throughout the world and is represented in the United Kingdom by the Minister (Commercial) and his staff at the Office of the High Commissioner for Canada, No. 1 Grosvenor Square, London W.1, England.

QUANTITY SURVEYORS

Langdon and Every, 19, The Rows, Harlow, Essex, England.

THE PROJECT

Following a visit to Canada in 1963, members of a British Housing Mission issued a report outlining their findings on the practices and techniques used in Canadian house building. The report included a recommendation that three pairs of demonstration houses be built in different parts of the United Kingdom to illustrate Canadian building techniques, and these to be followed by a medium density housing project for about 200 dwellings. The latter scheme would be to test the viability of Canadian methods of timber frame construction in Britain in terms of cost, efficiency of construction, and value for money.

The demonstration houses were built by the Canadian Government in 1964 and this present project is the implementation of the second part of the Mission's recommendations.

A site made available by the Harlow Development Corporation was selected for the project following consultations between Canadian authorities, the Ministry of Housing and Local Government and local authorities in Britain. The overall coordination of this project is the responsibility of the Canadian Department of Trade and Commerce. Central Mortgage and Housing Corporation, as agent for the Canadian Government has responsibility for the design and supervision of construction. A Clerk of the Works will be appointed to the project by the owner, the Harlow Development Corporation.

It can be fairly said that the key to the success of this project, in the terms proposed by the British Housing Mission, does not lie in the use of the timber itself. Rather it is in the way that the Contractor takes every possible advantage inherent in the construction technique: it is imperative that this be fully understood.

The sequence of operations in the construction of a house using Canadian methods is not the same as that for a conventional British house constructed of masonry. Neither the time allowed for each trade, nor the method of overlapping of trades is the same. The techniques are different and a correct appreciation of this difference is essential to realize the fullest potential in savings of time and money.

Enthusiasm is often expressed over the short time required to close in the house from the weather by using Canadian methods. This is both understandable and correct, however it should be remembered that this is but one phase in the building of the house. The fact is that similar savings in time are possible throughout all phases of the construction and this should be thoroughly recognised. Comment is made later on the possible sequence of operations for this project.

SITE AREA

Total Acres	14.65	
Less Police Houses (not in contract)	.20	
		<hr/> 14.45

NUMBER OF DWELLINGS

5.8% Four Person	10	
65.9% Five Person	114	
28.3% Six Person	49	
		<hr/> 173

NUMBER OF PERSONS

5.23 Per Unit	904
---------------	-----

DENSITY

Units Per Acre	12.00
Persons Per Acre	63.00

NUMBER OF GARAGES

Attached	82	
Grouped	93	
		<hr/> 175

PARKING

Visitors	25	
Individual Off-Street	82	
		<hr/> 107

Construction of the Roads and Main Sewers are under separate contract and it is anticipated that they will be substantially complete prior to the start of the construction of the housing.

CONSTRUCTION OF
ROADS ETC.

The construction of footpaths and street lighting will be done under a later, separate contract.

The project consists of 173 houses with the following bedroom breakdown:

PROJECT DRAWINGS

2-Bedroom Units	10
3-Bedroom Units	114
4-Bedroom Units	49

The basic design of the three and four-bedroom units is identical; an extra single-storey room component being added to the three-bedroom unit to create the four-bedroom unit. This means that throughout the project there are 163 repeats of the basic unit, with components added as required.

The working drawings are divided into two sections:

Site Working Drawings
Architectural Working Drawings

The Site drawings are prefixed with the letter "S" and are prepared on larger sheets than the Architectural drawings which are prefixed with the letter "A". Though the division of the work will be clear, cross reference between the two are essential. For example, the Block Key Plans and Elevations of the site working drawings indicate how the house and its components, shown on the architectural drawings, are related on site. Other prefixes used are "H" for Heating and "P" for Plumbing drawings. Three Design drawings prefixed with the letter "D" are included purely for the convenience of the Contractor.

The Architectural drawings have been prepared on a project basis; this means that in principle, a construction detail occurring on all three types

of house is only shown once. For example, all details of windows for each house type are shown on one sheet. There are not separate window drawings for each house.

There are two house plans shown, an interior basic unit (which is the same for the 3-bedroom and 4-bedroom house) and the 2-bedroom unit. All variations and components to be added to the basic unit are shown separately and are to be used as called for on the Block Key Plan Site drawings.

Because of the number of details required for this special project a system of Roman numerals has been used to assist in easy reference. Where a detail is shown on the same sheet as the reference point, it is indicated by a Roman numeral in a circle. Where a detail is shown on a different sheet from the reference point, a circle is used with the upper half showing the Roman numeral for the detail and the sheet number in the lower half.

NUMBERING OF DETAILS

Wood Frame Platform Construction is the typical and traditional method for building houses in Canada. The details used have been evolved over the years by a process of practical experience and field testing until the system has been refined into a technique that has generally been set down and governed by the requirements of the National Building Code of Canada.

WOOD FRAME PLATFORM CONSTRUCTION

There are variations in detail that can be used to suit local conditions or even individual preferences. It is possible, for example, for one or two men in a remote area to build a house by assembling components, stud by stud, on the site; on the other hand, a highly organized construction firm can pre-cut, pre-assemble, or prefabricate frame components to whatever degree of sophistication desired. The essential point in this is that the basic principles of construction remain exactly the same.

A set of working drawings prepared for use in Canada will not show conventional framing information since the builder will be completely conversant with the requirements. Further, he will have evolved procedures for his own use that will give him the maximum advantage of economy and efficiency. Because we cannot assume that the Contractor for this project will be familiar with Canadian technique the drawings show in detail how the framing is laid out and how it may be broken down to manageable sections or panels for pre-assembly.

A comment is needed on the system of wall framing illustrated. All large house building contractors in Canada use some method of pre-assembly for wall panels, it has therefore been assumed that this procedure will also prove the most efficient method to be used in the United Kingdom and particularly for this project of 173 houses. There are, of course, many aspects concerned in the choice of panel breakdown but by and large the two most obvious considerations are: size and weight, the first for reason of transportation and the second for handling without the use of mechanical equipment. Indicated on the working drawings and described in the Bills of Quantities is the method that is considered will prove to be both practical and economical for construction of these houses. No variations to the methods of construction shown and described will be accepted in the tenders.

As already stated, the drawings show how the framing for the walls are to be broken down for purposes of pre-assembly. This applies only to the exterior and central bearing walls of the Basic and 2-bedroom houses, it being thought that the Contractor may wish to use his own methods for construction of the remaining walls, however advice will be given, if required, on making these walls into panels.

WALL PANELS

It will be seen that at the junction of one panel with the other, blocking pieces are called for. Sometimes they are needed because of a wall coming in at right angles at this point, but the blocking is only to be lightly fixed to the stud before locating the panels in position on the job: any slight adjustment for tolerance can therefore be made by amending the size of the blocking before final fixing.

All wall panels for the project shown on the drawings are numbered consecutively, for example the panels for the Basic 3 and 4-bedroom interior house are numbered from 1 to 10 with all other panels to the 2-bedroom house, components, etc. following in number, whatever the location may be.

The gable end walls for the 2-bedroom house appear more complicated than any other wall condition, they have been shown in panel form mainly to be consistent. Considering that there are only a total of four walls with the two variations shown, it may be more economical to frame portions of each storey on the platform and raise them into position. This well illustrates the versatility of the framing system since separate jigs need not necessarily be made for a small number of special components. The final decision on the method to be used is left to the Contractor.

All plywood exterior sheathing is to be laid out on the stud panels from left to right on looking at the drawing. There is to be an overlap of an end stud to cover possibilities of a "through joint" at the junction of panels.

It should be noted that the top wall plate of the "double top plates" must in no circumstance form part of a pre-assembled panel. This top plate MUST be a site operation, this is to ensure continuity of structure. The jointing of this plate must not occur within 3'-0" of the junction of pre-assembled panels, this does not apply of course to corner conditions.

It should be pointed out that although every effort has been made to ensure the accuracy of the setting-out of the wall panels the responsibility for the correct work on site must remain with the Contractor.

All party walls are to be 9" common brickwork. The method to be used for their erection in relationship to the wood framing is to be chosen by the Contractor with the approval, and advice if required, of CMHC.

PARTY WALLS

In addition to timber frame party walls there is extensive use of masonry party walls for wood frame row housing in Canada. The choice on the method of erection insofar as whether they are built before, with, or after the wood framing, is dependent on many factors. Probably the point having most influence is the climatic condition existing at the time of construction. This factor plus the Contractor's own preference, the design of the housing unit, etc. all influence a final decision. Due to the versatility of the wood framing technique it has not been necessary in Canada to determine one single method for the construction of this element and this is why the exact procedure is left to the Contractor.

There are four basic procedures that could be used:

- 1) Construction when wall framing, including roof, is complete;
- 2) Construction of complete wall prior to erection of framing;
- 3) Construction of the party wall in two sections, by building the first portion when the first floor bearing wood walls are in position, and the second portion in the same way, using the first floor as a working platform;
- 4) Construction of the party wall in two sections, by building the ground floor portion first, then erection of ground floor wall framing, the floor system, followed by the first floor wall framing. The party wall is then completed using the first floor as the working platform.

The first method is not often used in Canada, though it may be more practical for use in the United Kingdom. Since there is no wood framing parallel to and adjoining the brick party wall, extensive temporary cross bracing of the house is required before the party wall is built.

The second method requires exact workmanship in construction of the party wall and again, extensive cross bracing before the wood framing is erected.

The third method has the advantage of using the wood framing as a guide for the building of the party wall; but it is in some ways complicated by the temporary bracing needed.

The fourth method has many advantages even although on first appearance, it may appear to be more complex than the previous methods. This is due to the necessity to break the continuity of trades for erection. It is often found that if the phasing of the trades can be worked out simply, the advantages of using the framing both as bracing and a working platform often proves this an efficient system to use.

The following sequence of operations is given only as a guide to try and illustrate the time when sub-trades are required and to show the possibilities for the overlapping of their respective work. Such a list itself cannot show the earliest time every operation may start, this could only be done by a system of bar charts. However it is assumed that the Contractor will be aware of this aspect. Further, unforeseen conditions such as weather, etc. will require flexibility in any ideal sequence.

SEQUENCE OF OPERATIONS

1. Excavation.
2. Foundation walls.
3. Floor slab including service runs, etc.
4. Dampproofing exterior walls.
5. Backfill as required.
6. First lift of Party Wall.
7. Ground floor wall framing.
8. First floor platform.
9. First floor wall framing.
10. First floor party wall.
11. Roof complete.
12. Furnace, water tank, etc. in place.
13. Windows and Exterior Door Frames.
14. Plumbing roughed in and Bath in place.
15. Electric service installed to Main Panel.
16. Gas service installed.
17. Furnace hooked up to Electric Panel.
18. House wiring roughed in.
19. Exterior finish applied.
20. Exterior trim applied.
21. Exterior painting.
22. Caulking.
23. Insulation applied.

24. Interior door trim applied.
25. Gypsum wall board applied and taped.
26. Stairs installed.
27. Kitchen cabinets installed.
28. Ceramic tile applied.
29. Hardwood flooring laid.
30. Hardware installed.
31. Interior trim applied
32. Interior painting.
33. Hardwood flooring finished.
34. Tile flooring laid.
35. Plumbing fixtures installed.
36. Construction clean-up.
37. Grading.
38. House walks, etc.
39. Exterior siteworks, etc.

It should be noted that Items 6,7,8,9, and 10 will depend upon the choice made for the construction of the party wall (see previous reference to this).

It is normal Canadian practice to have heating in the house as soon as possible after the house is closed in from the weather. The practice will also be required on this project.

HEATING

The reason for this procedure is to ensure that excess moisture is removed before such operations as the taping of gypsum board is done, wood finish flooring applied, etc. It is accomplished by heating the whole house to a temperature slightly below normal occupancy, and having all the operating portion of the windows partially open. This drying period will last for approximately two weeks depending on the prevailing climate, but will in no way prevent such trades as plumbing, electrical, etc. from continuing with their work.

It should be appreciated that two indirect advantages ensue from the requirement for heat. The first is that the interior temperatures can be

approximately regulated to the ideal for such finishing trades as painting, tiling, etc. The second is that by ensuring reasonable temperatures, a good rate of productivity can be expected from and maintained by the building tradesmen.

It will be necessary to ensure that adequate means of heating are available at the correct time. This is done by using the house furnace (see Sequence of Operations). The Gas Board have already expressed their willingness to cooperate on early installation of their service and the necessary metering. They have also pointed out the need for early storage facilities of heating equipment. Temporary forms of heating in the way of unit heaters will be acceptable only in case of an emergency.

One of the characteristics of a Canadian housing project is the use of hand power tools. This is so taken for granted that it has now become part of the construction technique insofar as speed of erection and work of subsequent sub-trades are concerned. It should be noted that even with a great amount of the pre-assembling of components there is still the need for hand power equipment. If full economy is to be achieved it is essential that sufficient tools of this nature be available and the necessary power for their use.

ELECTRICITY

Bye-law approval of the Harlow Urban District Council has been received for the project.

BUILDING REGULATIONS

The project will be supervised by the Architects (Central Mortgage and Housing Corporation) following British practice of having a full time representative on the site. This representative will in fact be a Canadian

SITE SUPERVISION

Site Engineer. His general experience will be such that not only will he act in a supervisory capacity but will be able to assist the Contractor, if required, in becoming familiar with the Canadian wood framing technique. It is anticipated that he will be available in the United Kingdom for a period before site construction starts, again, to advise the Contractor, if desired, on the organization of the building programme.

The Contract arrangements and administrative procedures for this project will follow all normal British practice as required by the client and owner, The Harlow Development Corporation.

OPERATION
OF CONTRACT