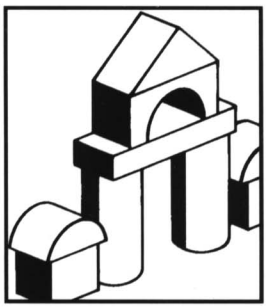
Heritage Notes

Architectural Preservation | General



Number 4

The Architectural Preservation Process

Gary Duguay

Figure 1. This historical photograph of H.A. Day's store in Lacombe, Alberta, circa 1901 is a record of the building as well as the people. Photo: Provincial Archives of Alberta A.11,264

This Heritage Note is intended to help individuals understand the complex nature of the architectural preservation process. Individuals interested in a particular aspect of the process are encouraged to read further. Please check the "Keys to Further Information" on page 16.

What follows is a brief overview of a typical public architectural preservation process and the role of the architect within it. The process was developed in the public sector to meet public demands for a responsible approach to the preservation of significant heritage resources and reflects the need for a clearly defined system which permits regular review and approval at various stages. In many respects it is not unlike the project development process, or the facility acquisition process, used for new construction (see Table 1). However,

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where the project development process results in a new facility for modern use, the goal of the preservation process is to adapt an existing historic structure for modern use while retaining as much of the original building material as possible. The following is a description of some of the differences between the two processes. Particular attention is given to the preliminary assessment and research stages of the preservation process because they differ significantly from the inception and feasibility stages of the project development process.

The fundamental difference between these two processes takes place in the planning phase. In the preservation process, a great deal more investigation and analysis of existing conditions take place before design can begin. The processes are virtually identical through the implementation phase except that the demands on the architect are usually greater throughout the preservation process.

1. THE PLANNING PHASE

The planning or pre-design phase of a project identifies a project's goals and objectives as well as its feasibility.

1.1 Inception/Preliminary Assessment

In new construction, the term *inception* refers to the identification of the facility requirements and/or investment opportunities, the general description of major objectives, the scope of work, and the preliminary investigation of possible solutions by the owner or client. At this stage, the architect is not yet involved.

In a preservation project, the process of researching and evaluating existing buildings in order to identify those which may be of national, provincial, regional or community significance is known as the *preliminary assessment*. Identification and protection of particularly significant buildings is usually dealt with by government agencies through enacted policies or legislation. These may establish the preservation strategies which are considered to be appropriate and in the public interest. In Canada, buildings of national significance are recognized through commemoration in the form of a plaque. In Alberta, buildings of provincial significance are offered legislated protection through designation and incentives for preservation through a granting structure. At the municipal level, the city of Edmonton provides tax incentives to preserve buildings which are deemed significant. In some jurisdictions, the

	For New Construction	For Historic Buildings
PHASE A. Planning Pre-design	STAGE 1. Inception 2. Feasibility 3. Programme Definition	STAGE 1. Preliminary Assessment 2. Research 3. Programme Definition
B. IMPLEMENTATION: DESIGN	4. Schematic Design 5. Design Development 6. Construction Documents	4. Schematic Design 5. Design Development 6. Construction Documents
C. EXECUTION	7. Bid and Negotiations 8. Construction and Contract Administration 9. Commissioning	7. Bid and Negotiations 8. Construction and Contract Administration 9. Commissioning

Table 1:
Project Development

preservation architect is usually consulted at the outset of the process, regarding the integrity, condition and usability of the buildings and may also play a role in the evaluation of a heritage resource's significance. Should the building be designated as a result of the evaluation, the architect must be aware of the legislated controls and of any incentives which may be offered to promote preservation.

1.2 Feasibility/Research

In new construction, the term *feasibility* refers to the establishment of project objectives. These objectives are usually based on content, quality, time and cost, identification and analysis of constraints. They should also include formulation and evaluation of potential solutions and identification of the preferred option.

In a public preservation project, the term *research* refers to an extensive investigation and analysis of the character, condition and limitations of the existing building and its site. It includes an evaluation of any proposed preservation strategies and possible uses and recommendations for the most appropriate preservation treatment.

To conduct this broad range of research, a number of professionals and specialists may be employed. This team may include architects, planners, engineers, historians, archaeologists, curators, conservators, landscape architects and experts in historic resource interpretation.

Often the same team is retained throughout the design and execution phases of the project. This differs from the typical practice in new construction of changing team members as the project moves through the project development process.

The following is a detailed description of the research stage of the architectural preservation process. In most instances, the preliminary assessment establishes the significance of the heritage resource and proposes a preservation strategy, either implicitly or explicitly. For example, a building which has been identified as outstanding may either be preserved or restored. Research is the first step in testing the validity, possibilities and limitations of any proposed preservation strategies, based on an investigation of physical and documentary evidence. The investigation involves data collection and analysis to obtain as much information as possible about the heritage resource, its history and its cultural significance. This important step ensures that the selection and development of a preservation strategy respects the site's historic and architectural character.

1.2.1 Historical Research

The main objectives of historical research are to obtain and document information about the history of the building and about the persons and events associated with it. Historical research may be presented in a single report but often takes the form of a series of reports which are outlined below.

A *theme and resource assessment* analyzes the heritage resource in terms of important national, provincial, regional, or local themes. This is useful in master planning and interpretation of the site.

A *narrative or social history* describes the people and events associated with the development and use of the building, which often forms the basis for the interpretive programme, the story which is to be related to the visitors.

A *materials history*, which describes the furnishings and equipment associated with the building and its occupants.

A *structural history or building history* focuses exclusively on the understanding of the building and its development. Of all the types of reports, it is the most influential in the selection and development of a preservation strategy. Its purpose is to document the design, construction and development of a building. In particular, the researcher looks for information on the architect and/or builder, the dates and appearance of the original building and

a) PRIMARY SOURCES	i) Physical Evidence	Architectural Analysis Archaeological Analysis
	ii) Written Materials	Legal Records Publications Municipal Business Records
b) SECONDARY SOURCES	i) Written Materials	Local Histories Bibliographies Genealogies
	ii) Oral Histories	

Table 2:
Structural History

Taken from the article "Documentation of Historic Structures" by Paula Stoner Reed, *APT Bulletin*, Vol XIV, No. 4, 1982.

subsequent alterations, the building materials and construction techniques, and the use of the structure throughout its history. The researcher is also interested in the people and events associated with the building as they have a significant impact on its use and development.

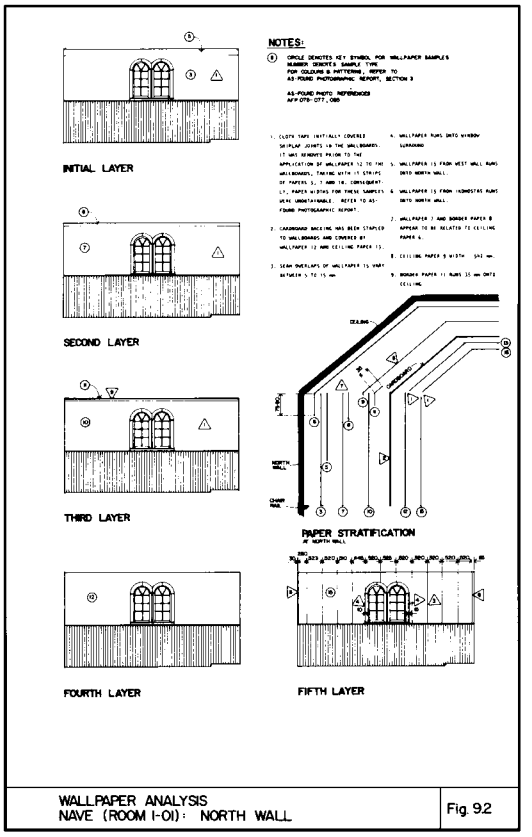


Figure 2. Stratigraphy plays an important role in the architectural analysis of buildings. Layers of wall-coverings, such as the wallpaper shown here, are an important primary source of information on the finishes of a historic building.

Obtaining information about a building is a particularly difficult task because often there are no written records. Where records do exist, there is usually little specific information about the building. It is rare that a single source will provide sufficient information to fully understand a building. To obtain the necessary facts, every possible source of information should be thoroughly examined. In addition to written records, other sources of information include physical evidence, visual materials and oral histories. These are usually categorized as either primary or secondary sources.

Table 2 classifies various sources of information for a structural history, in order of probable accuracy.

1.2.1.1 Primary Sources

Primary sources are contemporary with the period being studied. Included among them are physical evidence, written evidence and visual materials.

Physical Evidence

Researchers with a purely historical background can sometimes overlook the most important source of information, evidence derived from physical remains. Whether located above or below grade, physical remains can reveal a great deal about a building and its occupants to those trained to interpret them. Below grade, an archaeologist and above grade,

Figure 3. By removing layers of soil, archaeologists can locate and identify hidden objects. Here, a wooden sidewalk was uncovered beneath the Factor's House at Historic Dunvegan, during the archaeological research process.

a preservation architect, use their specialized training to locate, analyze and record the physical remains. Their investigation and analysis may reveal information which fills a void in the documentary record. For example, the preservation architect may discover wear patterns on the floor which may indicate the placement of furnishings. On the other hand, documentary evidence obtained by the historian may aid the archaeologist and the preservation architect in their interpretation of incomplete physical remains (see Figures 2 and 3). The mutual benefit of exchanging information suggests that physical and documentary evidence be examined simultaneously and analyzed comparatively. Such an exchange of information may serve to substantiate the findings of each. As well, the investigation of differences in each other's findings may indicate when and where further investigation is required.

Written Records

Legal records may not mention the structure specifically, however, they provide a starting point for the researcher. Because they record the sequence of ownership or "chain of title", establishing who owned the property and when, deeds are the most important of the legal records. This list of owners is essential before the search can proceed to other sources. Although probate records, which include wills and inventories of the estate, rarely describe the building, they can provide an indication of the contents at a particular point in time, which may suggest room use. Tax assessment records usually provide little direct information about the building, but can be useful as an indication of a significant change in the relative value of the property. Such a change may indicate a substantial improvement to the structure. If the property was ever involved in litigation, court records may provide a description of the building.

Publications are a potentially valuable source of information. Local papers may contain a photograph and detailed description of a recently completed building, particularly if it was the work of a noted architect or was owned

by a leading community figure. Coverage of a special event may also include photographs of the property. If the property was offered at public sale, a newspaper advertisement may provide a complete description of the building and its condition. If the building was damaged in a natural disaster or fire, there may be a report on the event, which may help to explain repairs and subsequent alterations to the building. Although not as common as newspaper accounts, magazine articles may contain a written and graphic description of the building.

Municipal records contain a wide variety of materials which may prove useful. These include council minutes, business licences, residential and business directories, fire reports, building permits and tax assessment records.

Business records, although rare, may provide clues to the nature and extent of alterations to the building. An example would be a bill of sale, listing the type and quantity of building materials delivered to the property.

Visual Materials

Photographs are an excellent source of information. A photograph of family members in front of their house during a special event provides an invaluable record of both building and the people associated with it on a specific date. (See figure 1). Photographs are particularly useful to the architect in both the investigation and analysis of the building as well as in the preparation of design drawings. For example, the photograph may reveal earlier configurations and missing building elements. Unfortunately, photographs are rare before the late 19th century, when the simple box camera and roll film were invented. Also, most early photographs are of building exteriors only, until the beginning of the 20th century when technology was sufficiently advanced to enable interior exposures to be made.

Architectural drawings are extremely rare and when they are located, they should be carefully checked against the existing building, bearing in mind that it was not unusual for an architect or builder to make changes during construction.

Artwork may occasionally depict a building, perhaps in the background of a drawing or painting of people or an event. However, artistic license must be taken into account when examining this source.

Maps may be found in various forms, including local town plans, engineering plans and insurance plans, all of which contain specific information about the building or its use. Bird's eye view maps often show buildings in detail.

1.2.1.2 Secondary Sources

Secondary sources are distinguished from primary sources in that they are separated from the object of study by time. This separation must be taken into consideration when evaluating the accuracy of secondary sources.

Written records

Written records include local histories, biographies and genealogies. Generally, these are not as helpful as primary sources because their main purpose was not to record information about buildings. Of these sources, local histories are likely to be the most useful because they may contain visual materials, such as photographs and artists' renderings not found elsewhere.

Oral history

Oral history is perhaps the least reliable source of information about the building because accuracy varies with the telling and with time. Skilled interviewing techniques are required to obtain and record the recollections of previous owners or occupants of the structure. The researcher may use information supplied by the architect or archaeologist from their analysis of the physical remains as a basis for questioning the informants. Showing them conceptual drawings of what the building may have looked like at a specific date may prove particularly useful in confirming its earlier appearance. Previous owners and their descendants may also be a source of primary evidence, such as photographs of the building or written

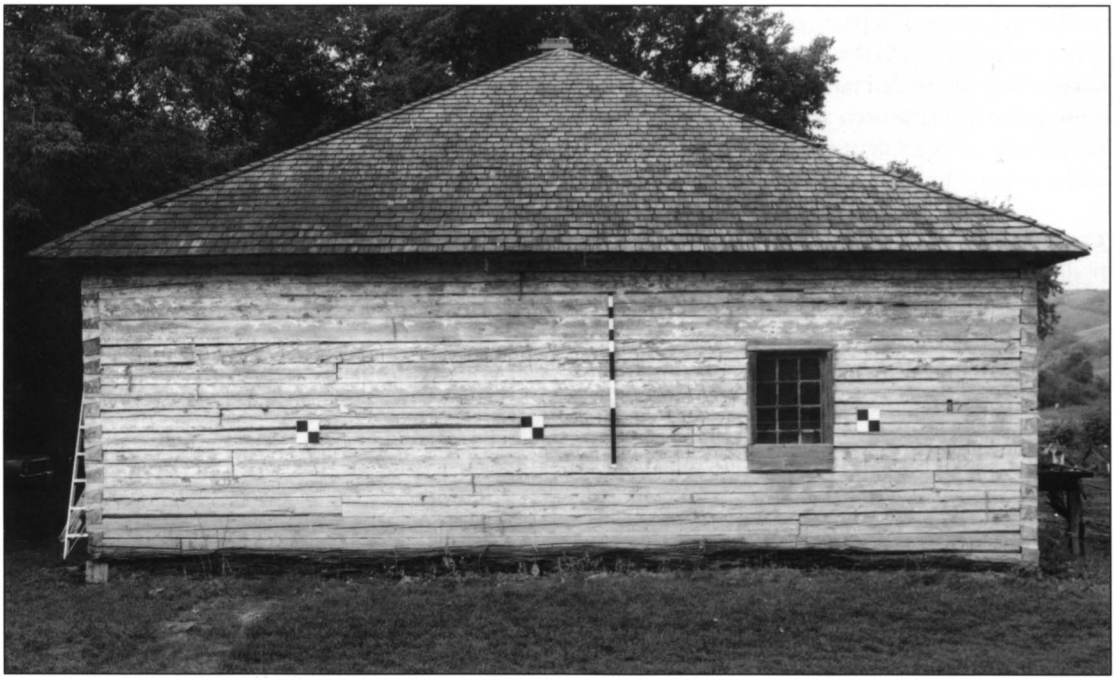


Figure 4. It is not always necessary to produce measured drawings, particularly of simple buildings. Using common equipment and simple techniques, a single photograph can be used in place of a drawing. Dimensions can be taken from the plane on which the scale bar has been positioned. Targets placed on a level line at known distances can also be used to obtain accurate dimensions from photographs.

documents such as diaries and letters which describe it. They may also be a source of artifacts found in the building itself or on the grounds.

1.2.2 Architectural Research

As is the case with structural history, the purpose of architectural research is to obtain a thorough understanding of the building. The difference is that where structural history tends to focus on documentation, architectural research is based on detailed study of the building itself. A detailed on-site investigation and analysis of the building is undertaken to provide a description of its present state, to identify evidence of its development, and to evaluate the integrity of its building materials and systems. The information obtained through this investigation will be particularly useful in the selection and development of an appropriate preservation strategy. It may also contribute to the evaluation of the building's significance as a heritage resource.

The investigation of the structure is usually done in two phases. The first, a documentation phase, records its present *as-found* or extant configuration and condition. The second phase, analysis, involves probing beneath the building's surface to reveal evidence of the original building and subsequent alterations as well as evaluating the condition of building materials and systems. The information obtained during the analysis is often incorporated into *measured drawings*, which are detailed graphic descriptions of the building (see figures 4 and 6). An overview of all aspects of architectural research is provided in Table 3.

Table 3: Architectural Research

ARCHITECTURAL RESEARCH	
a) DOCUMENTATION:	i) Field Notes ii) Measured Drawings
b) ANALYSIS:	i) Non-Destructive ii) Destructive
c) WRITTEN REPORT	

1.2.2.1 Documentation

The preparation of measured drawings is usually done in two stages, a field stage, in which the building is measured and recorded in

field note form and in photographs and an office stage, in which the notes are then transcribed into scaled measured drawings. The reasons for this approach are that the condition, occupancy or location of the building may not allow precise drawings to be made on the spot.

Field Stage

Field notes are usually prepared when the building is in poor condition, is occupied or is at some distance away. Because they can be produced relatively quickly, the preparation of field notes reduces the amount of time spent on site. A reduction in travel time and thus expenses can significantly reduce the total cost of producing measured drawings.

A sequential approach is usually taken to the preparation of field notes to avoid duplication of effort and to ensure that all the necessary data is collected. The sequence for recording a building usually begins with floor plans and elevations, proceeds to building systems and ends with building details. The recording process used to measure the building can be an aid to observing irregularities. For example, the accurate measuring of floor levels using a surveyor's level may reveal a sudden rise or fall at a particular point along the floor. This irregularity may prove to be a clue to the connection between the original structure and a subsequent alteration. Further investigation of such irregularities takes place during the analysis of the building. Throughout the recording sequence, photographs are taken to supplement the field notes and written descriptions of observed conditions.

Photographs can be of great assistance as reference material when preparing the measured drawings. They may also be useful in the working drawing stage. Considerable drafting time can be saved by enlarging and printing a photograph on drafting paper and annotating it with instructions for repairs. This technique also reduces the amount of measuring time required on site.

The most frequently used photographic equipment is a 35 mm single lens reflex camera with a wide angle lens for interiors and a perspective-correcting lens for exterior shots. A large format camera is useful because the photographic image is of better quality and can

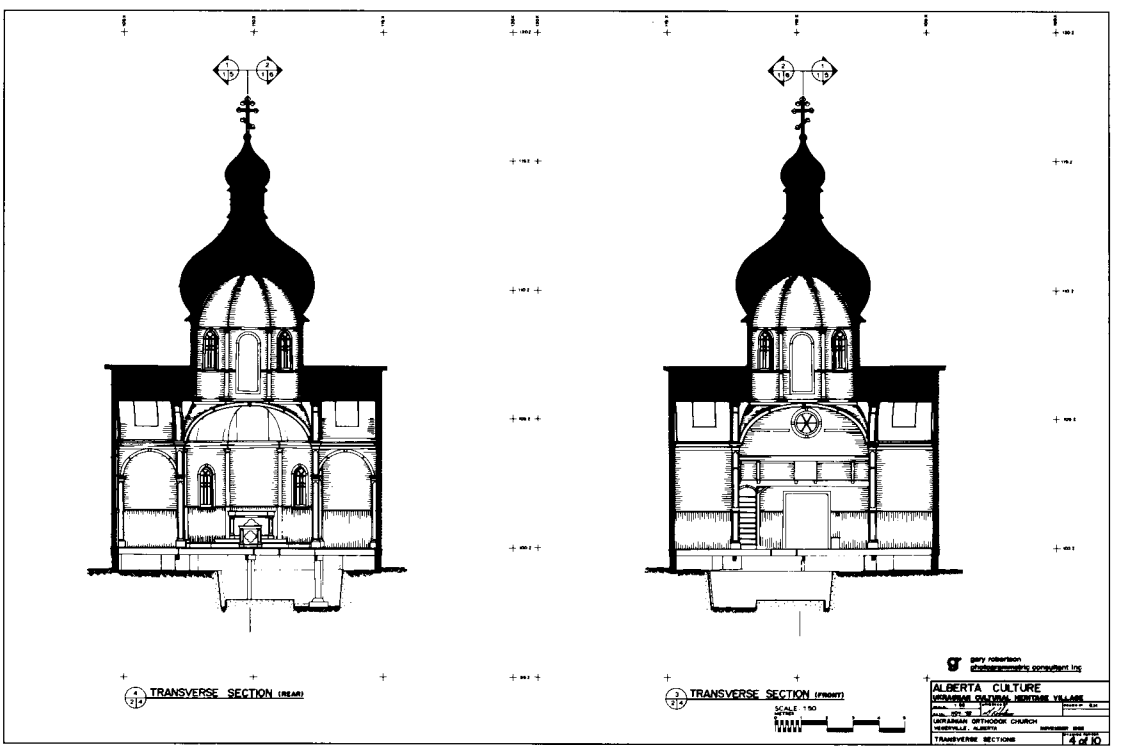


Figure 5.
Stereophotogrammetry is the quickest, most accurate and often the most practical method of making accurate drawings of complex buildings. This method uses pairs of photographic images to make drawings such as these transverse sections of St. Volodymyr's Ukrainian Orthodox Church at the Ukrainian Cultural Heritage Village.

Figure 6. This measured drawing of the Convent of the Immaculate Conception in Edmonton was produced for record purposes before the building was demolished.

also be rectified in the field. A rectified photograph is one in which the image is to scale, permitting direct measurements from the photograph. (See figure 4.)

Stereophotogrammetry is a recent photographic technique in which a pair of photographs are taken by two high precision cameras set at a certain distance apart. These images are then placed in a stereo plotter which re-creates a single, 3-D image. As the operator traces this image, the stereo plotter mechanically reproduces a precise line drawing of the image. The result is an accurate measured drawing. Since this technique requires both skilled technicians and specialized equipment, it is expensive. For this reason, stereophotogrammetry is usually reserved for complex building elevations or areas which are not easily accessible (See figure 5).

Office Stage

Measured drawings can be divided into two broad categories based on their intended use. They can be done for record purposes only or as an essential part of the preservation process.

Measured drawings are usually done for record purposes as part of an inventory of a nation's most significant heritage resources, such as the Canadian Inventory of Historic Building or the Building Reports published by the Federal Buildings Review Office. When done for this purpose only, measured drawings are often comparatively superficial. They usually consist of basic floor plans, principal elevations and a general section as well as details of the structural and decorative elements which make the structure unique. These drawings are often prepared in a presentation style with a limited number of dimensions and annotations. While useful for illustrating the pictorial and historical character of the heritage resource, they are insufficiently detailed to provide the essential information required when preservation work is planned. (See figure 6). They may, however, serve as the basis for the preparation of a more detailed record.

When preservation work is planned, measured drawings are an essential part of the preservation practice of recording every stage of a project. Although these drawings will

eventually become an important archival reference, they are initially a basis for analysis and later for the preparation of design and working drawings. They differ from those done for record purposes primarily in their accuracy, completeness and in the level of detail presented.

1.2.2.2 Analysis

While measured drawings may be prepared by architectural technologists or draftsmen familiar with survey, graphic and photographic techniques for recording buildings, analysis requires the skills and training of a preservation architect or technologist. Its purpose is to identify and assess the condition of all materials and systems and to reveal any evidence of the original building and subsequent alterations. The preservation architect must therefore have a knowledge of both current and period building materials and construction techniques as well as being familiar with destructive and non-destructive methods of probing beneath the surface of the original building. Clues on where to begin are provided by irregularities found during preparation of field notes and the measured drawings or from information obtained through historical research.

Non-destructive probing

Non-destructive probing is the preferred method of building analysis, when the building surfaces are unlikely to be affected by the proposed preservation strategy. The most common method is thermography (infra-red radiation). Other methods include radiography (X-rays) and simple visual inspection.

Destructive probing

Destructive probing is a method of building analysis which involves the systematic removal of outer layers of building materials and finishes to reveal the layers beneath. This will necessarily result in the destruction of some of the layers which cannot be salvaged as samples. For this reason, written and photographic recording is done before, during

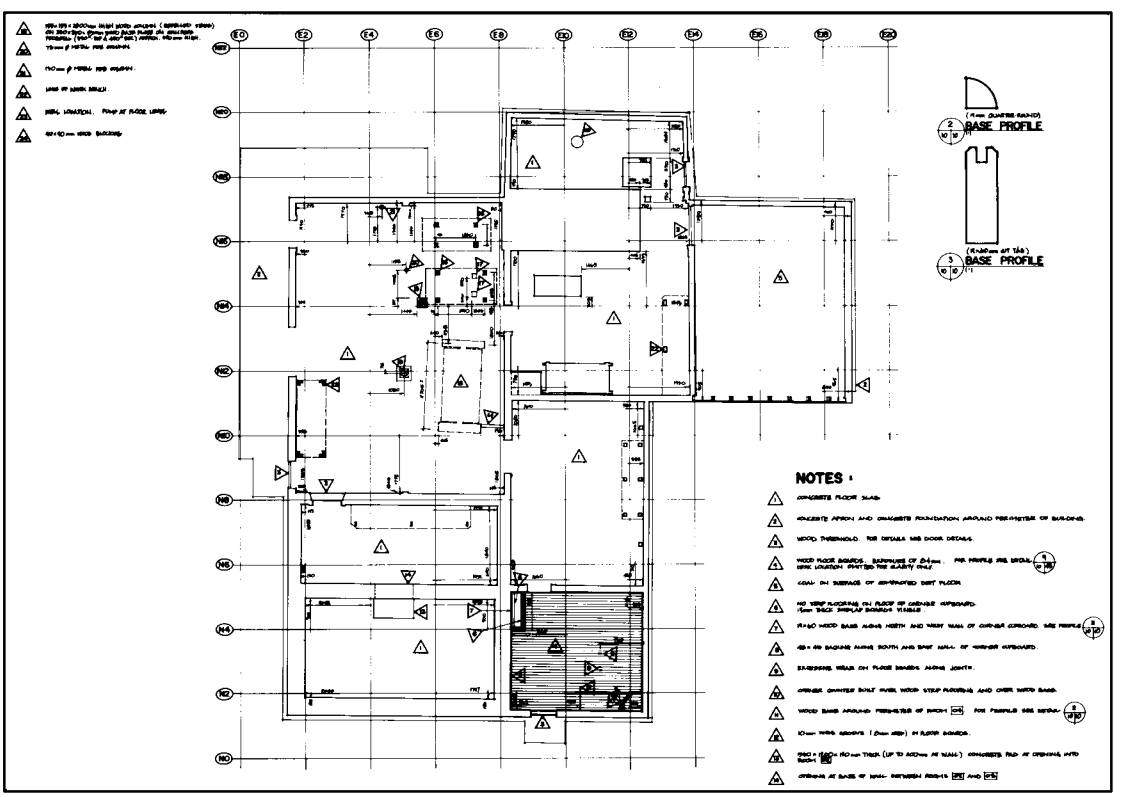


Figure 7. This measured drawing of the Markerville Creamery was made (using a Computer Assisted Drafting system) before any restoration work was carried out. The drawing is fully dimensioned and annotated as part of the as found record, which is necessary for accurate restoration.

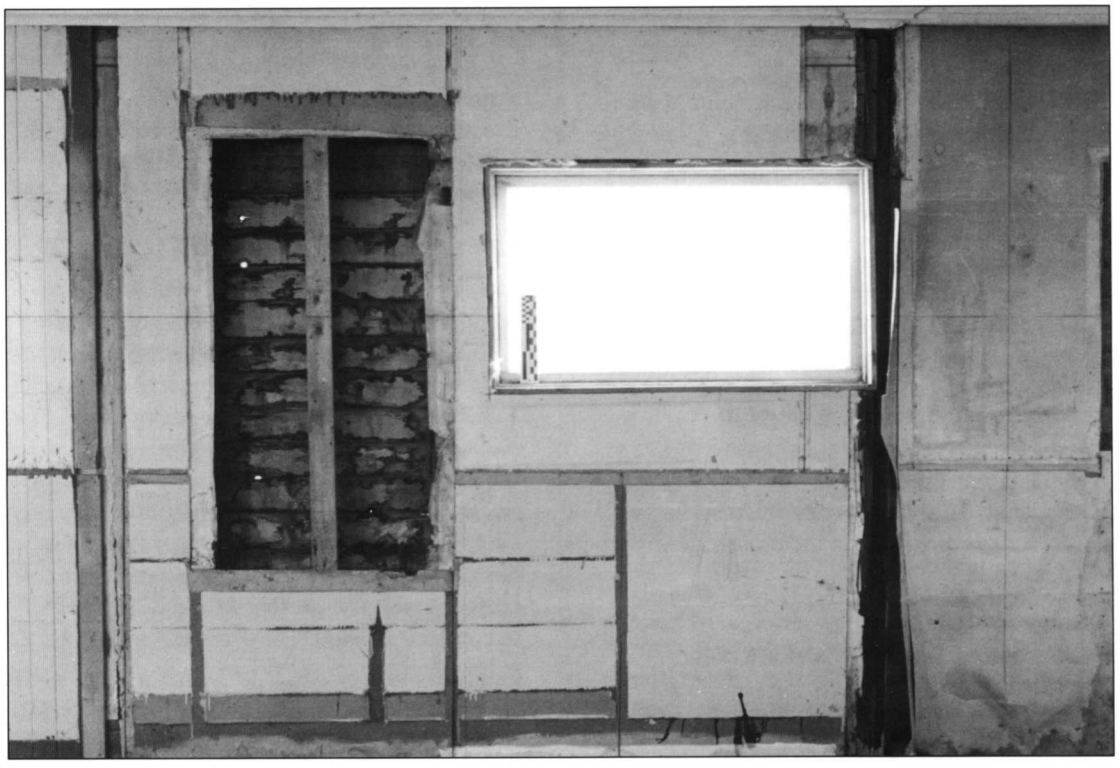


Figure 8. "Destructive probing" involves the removal of the outer layers of material in order to examine what lies below. Removing the most recent wall coverings from the Alberta Lumber Co. building at the Ukrainian Cultural Heritage Village revealed an earlier window opening.

and after each removal as an essential part of the process. (See figure 8). Samples which can be salvaged are carefully labelled and stored for future reference. Destructive probing is justified in those cases where the building surface will be affected as a result of the proposed intervention, so it is important to obtain as much information about the building as possible beforehand. Destructive probing will reveal paint and wallpaper chronology, and is necessary to obtain samples either for further testing the strength of materials or for a permanent reference collection of building materials and finishes.

The Written Report

The written report usually contains a description of the procedures used to document and analyze the building, a summary of the findings of the architectural investigation and a discussion of the reasoning used to draw conclusions about the building's chronological development. The conclusions should be co-ordinated with and related to the historical research.

Although research has traditionally been undertaken as a series of individual studies by a number of different professionals and specialists, the complexity of the research and the benefits of sharing information between the various disciplines has resulted in research being conducted by a multidisciplinary team. The production of individual reports co-ordinated by either a historian or preservation architect has recently given way to an integrated research report.

The preparation of the *research report* or *historic structure report* follows the established preservation practice of conducting a detailed study of the heritage resource as the first step in the preservation process. It is particularly important if the preservation strategy being considered is restoration. The report is usually placed in a public archives, along with documentation of all the other aspects of the preservation project, to provide future researchers with a complete record of all the work carried out on the building throughout its lifetime.

The research report recommends a preservation strategy, whether it be preservation, restoration or reconstruction. It analyzes and records all periods of construction, modifications, materials, building techniques, evidence of use, cultural and social setting, and history. Depending on the results of the investigation, alternative preservation strategies may be proposed.

Although the format of research reports vary, they usually contain the following information:

- a statement of the anthropological/ archaeological, historical or architectural/ engineering significance of the building and its setting. This is a more detailed statement than the one provided in the preliminary assessment.
- a narrative and graphic description of the appearance, occupation, and use of the building and its setting during significant periods or over time. This is based on documentary and oral historical evidence, physical evidence from architectural fabric investigation, and any archaeological investigation. All sources of information must be cited.
- a description and record of existing conditions, using measured drawings, photography or other appropriate means.
- an evaluation of the impact of the proposed use on the integrity of the structure, including the effect of compliance with building codes and regulations for human safety, energy conservation and handicapped access.
- an engineering report on safety and load bearing limits of the structure in view of the apparent conditions or proposed use.
- an identification and analysis of significant material, structural, natural, environmental and human factors affecting preservation of the building and recommended measures to deal with them, including any constraints on proposed use.
- the recommended steps for preservation, restoration, renovation or reconstruction; a discussion of the basis for such recommendations; as well as preliminary drawings and engineering designs.
- an analysis of the impact of the proposed action on the structure and its contents, with recommendations to avoid or mitigate any potential adverse effects.
- a rough estimate of the cost of carrying out the recommendations.
- a recommendation for further study in support of the proposed treatment.

1.3 Programme Definition

In new construction, the terms *programme definition* or *programming* refer to the preparation of a project brief. This document describes the functional requirements, performance criteria, schedule and budget of the project in detail. The programme may be prepared either by the owner or an architect or programming specialist hired by the owner.

In a public preservation project, the term *programme definition* refers to the preparation of a *preservation brief*, which synthesizes the research data, assesses the interpretive potential, establishes a tentative use and recommends a preservation strategy, including a proposed schedule and budget. The preservation brief is usually prepared by the preservation architect in consultation with the interdisciplinary team assigned to the project.

2. THE IMPLEMENTATION PHASE

2.1 Design

2.1.1 Schematic Design

The implementation phase of a project can be sub-divided into two components; the production of a design and its execution. In new construction, a *schematic or conceptual design* is produced, which will comply with the criteria defined in the project brief. It is at this stage that design consultants, such as architects and engineers, are usually hired by the owner. Depending on the project, these consultants may in turn hire other consultants. In a

preservation project, schematic designs focus on the particular preservation strategy recommended in the preservation brief and illustrate the impact of the proposed *intervention*. This is the term used for the work carried out on the historic structure.

2.1.2 Design Development

In new construction, *design development* refers to the detailed analysis of the selected design solution and the formulation of the final execution strategy, the way in which the work will be organized and carried out. In a public preservation project, design development deals with refining the schematic design to show the extent of changes to be made and indicate which methologies would be most appropriate to carry them out.

2.1.3 Construction Documents

In new construction, the terms *construction documents* or *documentation*, refer to the production of working drawings and specifications. These documents are used to obtain contract prices and form the basis for construction in accordance with the execution strategy.

In a preservation project, the objectives are the same. The working drawings and specifications, however, must allow for unanticipated variations in existing conditions. The organization of the construction documents will rely upon the implementation strategy and the type of contract.

In a public preservation project, the implementation strategy is often *sequential/linear*, also referred to as a *design/bid/build, traditional* or *conventional* strategy, in which each stage of the project development process must be completed before the next stage can begin. This particular implementation strategy is usually associated with a *stipulated-sum* contract, also referred to as a *lump-sum, fixed-price* or *basic construction* contract. In this form of contract, a single contract is usually awarded on the basis of the lowest bid and a firm price to a general contractor, who sub-contracts specialized portions of the work to various trades. The advantages to this execution strategy and contract format are:

- the bidding process is open to public scrutiny, a necessity for public projects;
- the bid price is likely to be competitive in the open market; and
- the stipulated-sum contract results in a firm price being obtained from the general contractor who also assumes the financial risk for completion of the project at the specified price.

However, there are a number of disadvantages:

- the process is lengthy because of the time it takes to prepare the elaborate drawings and specifications and the legal documents which are necessary to protect each party;
- there is a distinct separation between the design and the construction processes which does not permit an exchange of expertise. This can result in uneconomical designs;
- because the ultimate selection factor is usually the lowest bid price, there is often little or no control over the choice of general contractor and particularly the sub-trades, who are not known until the bids are opened. This can be a problem if there is a concern about their ability to carry out the quality of work usually required in a preservation project;
- because there is little or no room to adjust the contract price during construction, the contractors are likely to bid higher to minimize their financial risk, particularly if they are unfamiliar with the nature of the work; and
- if unexpected field conditions are found, it is generally difficult to hold the contractor to the agreement. When adjustments to the scope of work are negotiated after the contract is awarded, there is little or no control over the value and cost of the change orders.

The stipulated-sum contract is effective for projects with quantifiable tasks. It is not well suited to preservation projects where

unexpected field conditions are likely to be encountered. To allow for adjustment for unanticipated work without sacrificing cost control, the following alternative contract formats may be considered.

The *modified stipulated sum* type of contract involves obtaining a lump-sum bid for known work and a unit price for additional work of a known condition but unknown quantity. Although a desirable format, under this contract, the contractor cannot be held responsible if unexpected conditions are encountered.

In the *cost-plus* type of contract, also known as a *time and materials* or *straight cost* contract, the contractor undertakes whatever work is required to complete the project and is reimbursed for the cost of his time and materials plus a percentage for overhead and profit. Because this is an open contract, control is established through close monitoring of the work and by setting a ceiling or upset price. The primary disadvantage of such a contract is not knowing what the total cost of the project is likely to be.

In a *negotiated contract*, a select list of bidders with proven track records are invited to submit bids, usually on a modified lump sum basis. After the contract is awarded, the contract price may be modified by unit cost for additional or deleted work of known condition but unknown quantity. If there are unknown conditions, there are no unit prices.

2.2 Execution

2.2.1 Bid and Negotiations

In new construction, *bid and negotiations*, also referred to as *tendering/procurement*, involves issuing a call for tenders, briefing bidders, issuing addenda, analyzing tenders received and selecting the most advantageous, carrying out negotiations and finally, awarding the contract.

In a preservation project, the same tasks are involved, however, the architect can expect to spend a great deal more time briefing bidders, particularly if they are unfamiliar with preservation projects. Bidders must be made aware of the significance of the heritage resource and the necessity of protecting it from damage, because of the irreplaceability of the original material. They must also be made aware of the need for frequent inspections to ensure quality control and for frequent communication between the contractor and the architect during the construction process. This is particularly important because discrepancies between the drawings and existing conditions are inevitable, increasing the likelihood of re-design and further negotiations.

2.2.2 Construction and Contract Administration

In new construction, construction and contract administration involves reviewing both shop drawings and proposed methods and materials, obtaining cost breakdowns and schedules from the contractor, organizing regular project meetings, conducting regular inspections, negotiating change orders, expediting approvals, and conducting final acceptance and releasing of holdbacks. These tasks ensure that construction is carried out on time, on budget and in accordance with the drawings and specifications. This is usually the longest stage of the project development process.

In a preservation project, the tasks are the same, but there are a number of differences in the demands made on the architect. Frequent site inspections are required for quality control, particularly when the construction workers are not familiar with the methods and procedures of repairing or replacing existing materials. If a unit price contract is used, site inspections are required in order to take time-consuming measurements for cost control.

The preservation architect may also be involved in the extensive testing of original or replacement material, assessing the quality and condition of the remaining materials, verifying the effectiveness of proposed methods and procedures, checking compatibility between replacement and original materials and ensuring quality control.

The scheduling and co-ordination of construction activities is particularly demanding for the preservation architect because the scope of work is often not fully known until removals permit examination of the subsurface. Frequently, materials required for repair or replacement must be specially ordered and delivery delays are not uncommon.

2.2.3 Commissioning

In new construction, *commissioning* refers to the handing-over of the building from the contractor to the operator. Some of the tasks involved include: arranging for start up and testing of systems and correction of any deficiencies, obtaining the as-built documentation and maintenance manual from the contractor, developing a facility management programme, arranging for the briefing and training of operating staff, and finalizing the acceptance and handover.

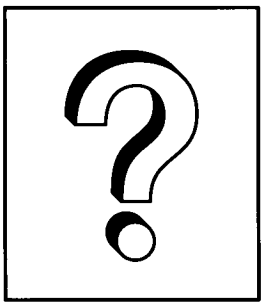
In a preservation project, the architect should be made responsible for preparing both the *as-built documentation* and the *maintenance manual*. The as-built documentation will become part of the archival record of the intervention and is the basis for the development of the maintenance manual.

The as-built documentation consists of a written and illustrated report describing in detail where and how the existing conditions varied from the measured drawings. This information will permit the architect to make revisions to the measured drawings before they are placed in an archival collection. The report also describes how and why modifications to the working drawings were required during the actual construction. Photographs taken during the site visits, copies of the revised working drawings, field sketches and change orders supplement the written portion of the report.

The operating and maintenance manual will set out the building's maintenance programme, based on its occupancy and use. For example, a hospital's maintenance programme has cleanliness as its primary objective, and for that reason, no thought is given to the harm that the maintenance procedures may be doing to the building materials. While modern building maintenance strategies are usually based on the premise that buildings have a finite life span, historic building maintenance has preservation as its goal. The objective is to make the historic building materials and equipment last as long as possible. For this reason, the maintenance manual developed by the preservation architect must convey the difference between the two approaches to those who will have the historic building in their care.

The development of such a manual for a preservation project can be very time-consuming because the architect cannot assume that caretakers will be familiar with either the maintenance techniques and procedures required for historic building materials and finishes or with the replacement materials and the specialized or sophisticated systems incorporated into the building. For example, maintenance personnel may not be aware that modern cleaning procedures will ruin a historic shellac finish. Many historic buildings have an almost invisible protective film applied to windows to reduce the damage done to the interior by ultra-violet rays. Cleaners must be informed that this fragile film requires specialized cleaning treatment to prevent its being scratched.

The maintenance manual for a historic building can become complex because of the way in which maintenance is performed. At some historic sites, maintenance is an interpretive activity in which guides use period techniques. However, it may also be carried out either by specially trained in-house maintenance staff or contract maintenance personnel with training in modern maintenance practices. Often it is some combination of these resources. The maintenance manual must be tailored in format and language to address this broad range of available skills and experience. The preservation architect should be required to provide extensive briefing and training to those responsible for maintaining the historic buildings.



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