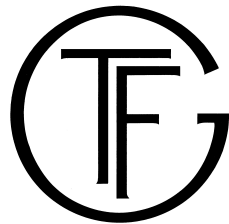


# TFG Apprenticeship Manual

Timber Framers Guild

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# History and Development of the Program

The Timber Framers Guild Apprenticeship Program was developed to train skilled and knowledgeable timber frame carpenters. Registered with the Department of Labor (DoL) in August 2009, a nationally recognized training program was sought out as a tool for recruiting top quality apprentices to careers in heavy timber construction. The apprenticeship program aims to broaden the skill set and focus the training of future Journeyworkers in the industry.

A primary motivation for creating the program was the preservation of a great wealth of knowledge in danger of being confined to buildings, as the American rebirth generation of timber framers found in the 1970s. Classically, the apprenticeship model addresses a potential future deficit of skills and knowledge by pairing less skilled workers with more competent ones who mentor and pass along their experience. By creating, maintaining and supporting its own program, the Timber Framers Guild hopes to secure the future of the industry.

The program is a combination of on-the-job training, classroom study(related training), and testing. The curriculum begins in the forest and continues through conversion methods, joinery, installation, and final structure. Continuing education is critical to long-term success, and the program provides funding to Journeyworkers to continue their journey through the curriculum and beyond.

An average of three years of shop and site work, classroom study, and testing is required before the apprentice earns the title of journeyworker. This model is based on the example of other trades within the construction industry. Our Apprenticeship Standards prescribe a 1:1 ratio of apprentices to journeyworkers, so every apprentice is under the sponsorship and supervision of one journeyworker. The Guild certifies two levels of competency in the craft: Apprentice and Journeyworker. The DoL certification applies only to Apprenticeship.

The Apprenticeship Program is based on partnerships between employers and employees, apprentice and journeyworker, the Guild and the U.S. government. As the sponsor, the Guild registers the apprentices, certifies journeyworkers, and provides both educational opportunities and the required technical instruction.

## The ATC

The Apprenticeship Training Committee (ATC) is comprised of volunteer journeyworkers and other qualified Guild members who supervise the administration of the program and

monitor an apprentice's progress. They carry out the responsibilities and duties required of the sponsor (the Guild) as described in the Standards of Apprenticeship, a document registered with the DoL. The committee can be reached at [atc@tfguild.org](mailto:atc@tfguild.org)

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## Program Requirements

The apprenticeship program is a hybrid, 3-year training program with an estimated minimum of 5000 hours and a suggested maximum of 7000 hours of work experience, with 144 related training hours required each year. If an apprentice has credit for previous experience, it is recorded when the apprentice is registered with the DoL. Topics for on-the-job training can be distributed throughout any term of the apprenticeship and are listed in Appendix A. Related Training topics, as outlined in Appendix B, are recommended to certain years in order to help apprentices prioritize self-study opportunities.

All apprentices submitting a curriculum self-review as part of their application are subject to testing for competency in the future if the ATC deems it necessary. Apprentices found deficient in certain areas will be assisted in achieving competency through additional training.

Teaching experience is an important part of becoming a Journeyworker. Near the end of the Apprenticeship, an apprentice is **required** to develop a minimum one hour lesson plan for teaching a skill or concept, and an opportunity to deliver this lesson will be found.

## On-the-Job Learning

On-the-Job Learning hours are counted for work performed under the supervision of a registered Journeyworker. The hours allotted to these various processes are estimated times that the average Apprentice will require to learn each phase of the program. If the training required is not part of the expertise of the journeyworker, the Apprentice is allowed to obtain that training under another journeyworker, provided that journeyworker is recognized by the ATC. Apprentices working or being trained at Guild projects may receive credit for that experience either as OJL or related training, depending on the scope of the event.

The OJL and related training schedule for any apprentice may be modified with approval of the ATC. An apprentice who can demonstrate competency may also test out of those areas without credit for previous experience. Once an apprentice is admitted to the program, however, with or without advanced placement, they are required to log the minimum total hours required to complete the program from that stage.

Note that each apprentice must be supervised during OJL by a registered Journeyworker at all times, whether on-site or in the shop. The nature of this supervision is described in Section XVI of the *National Standards of Apprenticeship*

Please review Appendix A for a detailed description of on the job work processes. Full curriculum outlines and testing requirements for each section of the Apprenticeship curriculum can be found in the document *Guild Training Curriculum*. The hours required in each of the OJL sections are outlined in the following table.

Section	Work Process	Hours(min-max)
2	Drawings and Specifications	300-500
4	Timber Conversion	50-100
7	Trade Practices	50-100
9	Timber Framing Techniques	1200-1600
10	Tools and Equipment	1000-1400
11	Related Materials	150-200
12	Related Trades	50-100
13	Related Skills	200-400
14	Finishing Timbers	500-600
15	Raising and Rigging	1000-1400
16	Conservation Techniques	500-600
	Total	5000-7000

## Related Training

Every year, an apprentice is **required** to participate in coursework related to the job as outlined in Appendix B. The recommended term of apprenticeship will include no less than 144 hours of related instruction for each year of the apprenticeship. Such related and supplemental instruction may be given by classroom instruction, correspondence course, home study, or other form of ATC approved self-study. The Guild may provide the venues, media, instructional aids and equipment as possible, and the apprentice may fulfill hours through a third party approved by the Guild (first aid from the American Red Cross, for example).

Related training does not need to be provided or supervised by registered journeymen, but must be *pre-approved for credit by the ATC*. When possible, tuition and expenses will be supplemented by the apprenticeship budget, with prior approval.

Please review Appendix B for more details. The table below lists the yearly breakout of related training requirements.

	Section	Related Training	Hours	
<b>Year One</b>	1	Safe Work Practices	24	} 144
	3	Historic Timber Framing	12	
	5	Timber Management	12	
	6	Timber Grading	16	
	8G-K,N	Trade Sciences	40	
	15	Traditional Raising and Rigging	40	
<b>Year Two</b>	7	Trade Practices	48	} 144
	9E,H,K	Timber Framing Techniques	80	
	13	Related Skills	16	
<b>Year Three</b>	8A-F,L,M	Trade Sciences	124	} 144
	16	Conservation Techniques	20	



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## Program Policies

### Logbook

Apprentices are **required** to log their hours. Failure to do so can result in being placed on inactive status, and no OJL hours will be credited nor reimbursements issued until placed on active status. Logbooks shall be reviewed by the supervising Journeyworker monthly, and sign off on the hours recorded. Quarterly review by the ATC will happen independently with the supervising Journeyworker and Apprentice.

When an apprentice has logged the required hours and related training, a written request for graduation, accompanied by a current curriculum self-review form signed by the supervising Journeyworker should be sent to the ATC.

### Dues, Reimbursements, Benefits

Annual dues for the program are \$1000.00, payable either monthly or annually. When payment is 30 days past due, an email reminder is sent and any pending reimbursements are suspended. At 60 days past due final notice is given by mail. At 90 days past due, the apprentice or journeyworker is placed on inactive status.

Funds from the program account are *distributed on a pre-approval, reimbursement basis only*. A copy of the reimbursement form is included at the end of the manual, and a digital version is available upon request. During an Apprentice's enrollment, fees and travel expense for one conference and all annual ATP assessments are eligible for reimbursement. All reimbursed costs for Journeyworkers are currently (2015) capped at \$350.00 annually for fees related to their continuing education. Reimbursements are subject to availability of funds and at the discretion of the ATC.

Active members are those who are up to date on payments and their logbook (apprentices only), but become inactive when they have not fulfilled either responsibility. Inactive members will not receive credit for hours logged or reimbursed for any program related expenses. When current payment or an up to date logbook is received by the ATC, active status is reinstated.

## Wage Progression

Apprentices are paid on a progressive schedule of wages, expressed as a percentage of the journeyworker rate in the shop in which they are employed. For example:

### 2½ Year Term Example:

0-6 months - 0-1000 hours = 50% of journeyworker wage  
 6 months - 1000 - 2000 hours = 55% of journeyworker wage  
 2nd year, 2000 - 4000 hours = 65% of journeyworker wage  
 3rd year, 4000 hours - completion, (5000 hours minimum) = 75% of journeyworker wage

### 3½ Year Term Example:

0-6 months - 0-1000 hours = 50% of journeyworker wage  
 6 months - 1000 - 2000 hours = 55% of journeyworker wage  
 2nd year, 2000 - 4000 hours = 65% of journeyworker wage  
 3rd year, 4000 hours - 6000 hours (5000 hours minimum) = 75% of journeyworker wage  
 4th year, 6000 hours - completion, (7000 hours maximum) = 85% of journeyworker wage

For 2015, the base journeyworker wage set by the Guild as a national average is \$20/hour. An entry-level apprentice starting at 50% of the journeyworker rate would begin at \$10/hour. Both the journeyworker and apprentice wage rates are stipulated in the Apprentice Agreement. In no case will an apprentice be paid less than the schedule basis of a \$20/hour journeyworker rate, although the company can opt to pay more.

## Curriculum Goals and Testing

All of the learning tasks in the Curriculum are in either the OJL Work Process Schedule or the Related Training outline. For each skill and area of study, there are Goals, both theoretical and practical, that the apprentice must be able to meet to successfully complete the program (see *Guild Curriculum Outlines*). It is the employer's and journeyworker's responsibility to provide opportunities for the apprentice to meet those goals.

The *Related Training Endorsement* records attendance at courses and similar events to meet required hours, but does not record successful achievement of Goals. If there is a test to measure that achievement associated with the course, then those results should be recorded under the appropriate topic(s) in the logbook with the endorsement of the assessor who administered the test.

In general, the supervising journeyworker will administer tests to their own apprentice, or testing may be given online, at Guild events, or at the Annual Training and Assessment. Until tests are written and reviewed for all subjects, assessment may be accompanied by interviews and or other alternative methods to further evaluate an apprentice's progress.

In summary, the apprentice may not be tested in all areas of the curriculum before they graduate, but they need to be prepared to achieve any of the Goals for which they have logged the required OJL hours and related training. Any apprentice or journeyworker may test out of any section of the curriculum at any time such an assessment is being offered, regardless of their status or hours worked. Competency for both individual modules and the curriculum as a whole is defined as 70% of the whole.

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## Work Process Schedule - OJL Outline

### DRAWINGS AND SPECIFICATIONS 300-500

- Identify, read and interpret essential information provided in construction documents.
- Identify, read and interpret essential information provided in construction documents.
- Make technical drawings and details for timber-framed buildings.
- Identify and describe the information required for building codes, estimating, planning, permits, engineering and sub trades.
- Identify and describe various methods for assigning locations of timbers within frames.
- Identify common frame components.

### TIMBER CONVERSION 50-100

- Identify and demonstrate techniques for safely and accurately hewing logs and timbers
- Identify and describe timber milling equipment and procedures
- Identify and describe special considerations for the milling of salvaged timber.
- Demonstrate milling with portable sawmill.

### TRADE PRACTICES 50-100

- Identify and describe the general processes and practices necessary to manage a small timber frame project effectively.
- Demonstrate effective communication with colleagues and co-workers.
- Identify, describe and demonstrate the good work habits necessary to being a responsible and productive member of a timber framing crew.
- Identify and describe effective techniques for yard management.
- Demonstrate the effective care and management of stock, tools and inventory.

- Demonstrate basic instructional techniques for the teaching of hard and soft skills to timber framers.
- Document all timber framing projects that Apprentice has been involved in throughout the period of their apprenticeship.

#### TIMBER FRAMING TECHNIQUES 1200-1600

- Select timbers for framing.
- Describe how to safely and effectively store and protect timbers during all timber framing operations from initial delivery to site assembly.
- Demonstrate safe timber handling.
- Describe common work sequences and processes for timber framing shops.
- Describe efficient shop layout.
- Describe the tools and equipment necessary to perform common work sequences for timber framing shops.
- Demonstrate the use of Square Rule Layout, Mill Rule Layout and Mapping for joinery and frame sections.
- Demonstrate the safe and accurate layout and cutting of common joinery.
- Describe, construct and use jigs and templates for timber framing.

#### TOOLS & EQUIPMENT 1000-1400

- Demonstrate the safe care, use and storage of hand and power tools used for timber framing.
- Demonstrate the sharpening of edge tools.
- Identify historic hand tools used for timber framing.
- Identify and describe appropriate PPE for use with hand and power tools.
- Demonstrate the safe care, use and storage of chainsaws for timber framing.
- Identify and describe Computer Numeric Control (CNC) and other machines that are used for timber framing.
- Demonstrate the safe care and use of lifting and hoisting equipment for timber framing.
- Identify, describe and demonstrate the use of survey instruments.
- Demonstrate the safe care and use of forklifts for timber framing.
- Demonstrate the safe care and use of access equipment, including Mobile Elevated Work Platforms (MEWP) for timber framing.

#### RELATED MATERIALS 150-200

- Identify and describe the glues and fasteners and related tools that are commonly used in timber frame construction.
- Identify and describe the general properties and appropriate applications of glues and fasteners that are commonly used in timber frame construction.
- Identify and describe the types of enclosure systems that are commonly used in timber frame construction.

## RELATED TRADES

50-100

- Identify and describe common general carpentry, finish carpentry and sub-trade (plumbing, electrical, mechanical) processes and practices.
- Identify and describe constructive measures for ensuring an effective interface between general carpenters, finish carpenters, sub-trades and timber framers.
- Identify and describe constructive measures for ensuring a smooth handover between timber frame contractors and general carpenters, finish carpenters and sub-trades.
- Identify and describe common sub-trade (plumbing, electrical, mechanical) processes and practices.

## RELATED SKILLS

200-400

- Identify and define stair building and handrailing terms.
- Identify and describe common stair building and handrailing details.
- Calculate the angles and dimensions necessary to construct basic straight and winding stairs to satisfy building code requirements.
- Make straight stairs and handrails for timber framed buildings.

## FINISHING TIMBERS

500-600

- Identify and describe various chamfering tools, techniques and profiles.
- Demonstrate the safe and effective cutting of common chamfers and stops with hand and power tools.
- Identify and describe various planing tools and techniques used in timber framing.
- Demonstrate the safe and effective planing of timbers with hand and power tools.
- Identify and describe the general properties and appropriate applications of finishes that are commonly used in timber frame construction.
- Describe common work sequences, tools, equipment and processes for applying surface finishes to timbers.
- Describe common work sequences, tools, equipment and processes for applying surface protection to timbers.

## RAISING &amp; RIGGING

1000-1400

- Identify and describe procedures for preparing a job site for the erection of a timber-framed building.
- Identify and describe procedures for checking foundations and floors in preparation for the erection of a timber-framed building.
- Identify and describe procedures for the safe and efficient loading / unloading of timber frames on trucks.
- Identify the various types of vehicles commonly used for frame deliveries, and describe appropriate and economical uses for each.
- Calculate the weights and centers of gravity of timbers and frame assemblies.
- Determine appropriate rigging points for frame assemblies.
- Identify and describe hazards associated with using cranes to raise timber buildings.
- Identify and describe common crane types and their applications for timber framing.
- Demonstrate correct hand signals for communicating with crane operators.
- Determine appropriate sling angles for lifting with cranes.
- Demonstrate safe and correct inspection of lifting tackle.
- Demonstrate safe slinging / rigging of loads for cranes.
- Demonstrate how to plan, organize and run a safe and efficient frame raising.
- Demonstrate pre-work planning and perform raising briefings.
- Demonstrate the correct tying of common knots and hitches and describe their uses for timber framing.
- Identify and describe hazards associated with installing structural insulated panels (SIPs).
- Demonstrate safe and correct installation of SIPs.
- Identify and describe tools for cutting and modifying SIPs.
- Identify and describe safe and correct methods for cutting and modifying SIPs.

## CONSERVATION TECHNIQUES

500-600

- Demonstrate how to plan and organize a safe frame dismantling.
- Demonstrate pre-work planning and perform dismantling briefings.
- Demonstrate how to safely and effectively dismantle a timber-framed building.
- Identify and describe common types of repairs for timber structures.
- Demonstrate simple timber repairs.

- Demonstrate simple metalwork repairs.
- Demonstrate simple chemical repairs.
- Describe the effects of shrinkage on various repair types.
- Describe the effects of water / moisture on various repair types.

TOTAL

5000-7000



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## Related Training Outline

### Year One

#### SAFE WORK PRACTICES

24

- Identify pertinent legislation and regulations
- Identify and describe common shop and site hazards
- Identify and describe shop and site safety equipment and practices
- Identify and describe safety committees
- Identify and describe procedures for reporting an injury at the shop and at the site
- Identify and describe safe shoring and bracing of timber frames
- Demonstrate inspection and safe use of ladders, scaffolds and access equipment
- Identify and describe Personal Protective Equipment (PPE)
- Describe and demonstrate safe lifting and manual handling
- Identify and describe basic first aid requirements for timber framing.
- Complete basic first aid training and demonstrate basic first aid techniques.
- Identify and describe common controlled products used and stored at a commercial timber framing operation.
- Use Material Safety Data Sheets (MSDS) to identify and describe safety precautions for storage and handling of hazardous materials.
- Use MSDS to identify appropriate PPE for use of common hazardous materials.

#### HISTORIC TIMBER FRAMING

12

- Identify and describe the history and evolutionary progress of timber framing and joinery techniques.
- Identify and describe the key historic periods of development in timber framing style and form.

- Identify the general types and forms of timber buildings.
- Determine the age of a building by examining details of its construction.
- Identify and describe historic timber framing tools and the markings that they make.

## TIMBER MANAGEMENT

12

- Identify and describe the environmental and economic impacts of non-sustainable forestry.
- Identify and describe the environmental and economic benefits of sustainable forestry.
- Identify and describe the value added concept.
- Identify and describe the principals behind sustainable-yield forest management for timber production.
- Identify and describe standards and certification for sustainable forest management and timber production.
- Describe the process of timber harvesting, shipping and seasoning.
- Identify common tree species used by timber framers.
- Identify general characteristics and properties of common tree species used by timber framers.
- Demonstrate the correct method of determining the timber volume and quality of living trees.

## TIMBER GRADING

16

- Identify natural-growth, manufacturing and seasoning defects in timbers
- Demonstrate the correct use of visual grading rules to grade timbers.
- Identify design values for timbers.

## TRADE SCIENCES

40

- Demonstrate the use of common mathematical formulas and measurement systems used for construction.
- Demonstrate the use of geometry to solve problems that are commonly found in construction.
- Demonstrate the use of developed drawing to illustrate roof planes and joinery.
- Demonstrate the use of trigonometry for solving common construction problems.
- Use ratio and proportion to solve common construction problems.
- Identify and describe the full range of terms that are commonly used by timber framers to describe their frames, frame components and joinery.

## TRADITIONAL RAISING AND RIGGING 40

- Identify and describe hazards associated with using traditional rigging and raising equipment to erect timber buildings.
- Identify and describe common types of traditional raising and rigging equipment and their applications for timber framing.
- Identify and describe design and specification issues for traditional lifting systems.
- Demonstrate safe and correct communication with lifting crew.
- Determine appropriate sling angles for lifting.
- Demonstrate safe and correct inspection of lifting tackle.
- Demonstrate safe and effective raising and down-rigging of Gin Poles, A-Frames and Derricks.
- Demonstrate safe slinging / rigging of loads with traditional raising and rigging equipment.
- Demonstrate the correct method for reeving blocks and tackle.
- Identify and describe hazards associated with hand-raising timber frames without lifting tackle.
- Demonstrate safe and correct communication with hand-raising lifting crew.

## Year Two

## TRADE PRACTICES 48

## · PROJECT MANAGEMENT

Identify and describe the general processes and practices necessary to manage a small timber frame project effectively.

Identify and describe record keeping, and the use of site journals for project management.

Identify and describe protocols and procedures for effectively managing and issuing drawings, details and specifications.

Identify and describe protocols and procedures for effectively managing and issuing correspondence relating to the construction of timber frames.

Identify and describe protocols and procedures for effectively tracking costs and quantities.

## · SMALL BUSINESS BASICS

Identify and describe employer and employee obligations.

Identify and describe basic client agreements.

Identify and describe basic contracts of employment.

Identify and describe the general processes and practices necessary to promote and operate a small, successful, timber frame business.

Identify and describe the principals of good business practice for timber framing companies.

· ESTIMATING

Identify and quantify the materials, labor and equipment necessary to construct timber-framed buildings.

Demonstrate the calculation of board measurements and timber volume for estimating.

Compile and organize estimates of material, labor and equipment quantities.

Calculate the costs and times associated with material, labor and equipment quantities.

Identify and describe the various common factors that have an effect on the cost of timber frame construction.

· OFFICE SYSTEMS

Identify and describe the basic office systems that are necessary to operate an effective timber framing businesses.

Identify and describe commonly available computer hardware and software for timber frame offices.

Demonstrate the effective use of computers to perform basic tasks.

TIMBER FRAMING TECHNIQUES

80

- Demonstrate the use of Scribe Rule for joinery and frame sections.
- Demonstrate the layout and cutting of joinery in round log work.
- Demonstrate the use of various tools for the development of compound joinery layout and member angles.

RELATED SKILLS

16

- Demonstrate the safe and effective making of riven pegs with hand tools.
- Demonstrate the safe and effective making of handles for common woodworking tools.
- Identify and describe the hazards that are commonly associated with falling trees and bucking logs.
- Correctly identify tension and compression wood in trees and logs.
- Identify and describe the principles of best practice for the safe and effective falling of trees and bucking of logs under a variety of common woodland conditions.

- Demonstrate the safe and effective felling of small diameter trees and bucking of logs.
- Demonstrate the correct layout and chip carving of letters and numerals.

## Year Three

### TRADE SCIENCES

124

- MECHANICAL PROPERTIES OF TIMBER FRAMES

Identify and describe the various loads that effect timber framed structures and the causes of these loads.

Identify and describe the various load conditions of timber posts and beams.

Identify and describe how and why timber framed structures fail.

- FORCES & STRESSES IN TIMBER FRAMES

Identify and describe the various forces and stresses that act upon a timber framed building and its individual timber components.

Identify tension joinery.

- PROPERTIES & REACTIONS OF WOOD

Identify and describe the parts and properties of hardwood and softwood.

Describe the various types of shrinkage that effect timbers.

Describe the effects of timber shrinkage on timber shapes and dimensions.

Identify and describe the processes of rot, decay and insect attack in timber.

- FORCES & STRESSES IN FASTENERS

Describe how loads are transmitted through connections and how various fasteners resist these loads.

Identify and describe the various properties and issues of common timber fasteners. I

Identify connection types that require specialized and expert design.

- CALCULATE LOADS

Demonstrate how to calculate simple loads for timbers and frames.

Demonstrate how to calculate simple loads for timber connections.

Identify and describe when a professional engineer is required.

- DESIGN TIMBER FRAMES

Identify and describe the general principals of frame design.

Identify and describe the various processes that are necessary for generating frame designs.

Identify cost-effective frame designs.

Identify and select appropriate frame and truss types for specific applications.

Identify and describe when a professional engineer is required.

Identify and describe when a professional architect is required.

- COMPUTER AIDED DESIGN (CAD)

Identify and describe commonly available CAD packages and their uses for timber frame design.

Compare and distinguish between commonly available CAD packages and their applications and limitations for timber frame design.

Demonstrate the use of CAD for the production of simple frame drawings.

- COMPUTER AIDED ENGINEERING (CAE)

Identify and describe commonly available CAE packages and their uses for timber frame design.

Compare and distinguish between commonly available CAE packages and their applications and limitations for timber frame design.

## CONSERVATION TECHNIQUES

20

- Identify and describe the national and international bodies that govern the conservation of historic timber buildings.
- Identify and describe current standards and guidelines for the conservation of historic timber buildings.
- Identify and describe preservation ethics as they pertain to the conservation of historic timber buildings.
- Identify, describe and discuss issues of timber supply related to the conservation of historic timber buildings.
- Identify, describe and discuss the significance of preserving historic craft techniques and how this relates to the conservation of historic timber buildings.
- Identify and describe common practices used to conserve and preserve historic timber buildings.
- Identify and describe the tools and techniques that are commonly used for investigating, quantifying and documenting historic timber buildings.
- Demonstrate how to document, measure and label a historic timber building in accordance with the recommendations of the Traditional Timberframe Research and Advisory Group (TTRAG).
- Create a survey report for an historic timber building.

- Identify and quantify the materials, labor and equipment necessary to repair timber-framed buildings.
- Compile and organize estimates of material, labor and equipment quantities for repairs of timber buildings.
- Calculate the costs and times associated with material, labor and equipment quantities for repairs of timber buildings.
- Identify and describe the various common factors that have an effect on the cost of timber frame restoration and repair work.