

Appendix A.1

WORK PROCESS SCHEDULE Plumber

O*NET-SOC CODE: 47-2152.02 RAPIDS CODE: 0432

This schedule is attached to and a part of these Standards for the above identified occupation.

1. APPRENTICESHIP APPROACH

Time-based Competency-based Hybrid

2. TERM OF APPRENTICESHIP

The term of the apprenticeship is approximately 4 years with an OJL attainment of 8000 hours, supplemented by the minimum required 576 hours of related instruction. (Note: The competency-based training approach does not require hours.)

3. RATIO OF APPRENTICE TO JOURNEYWORKER (Trainer/Mentor/Professional)

The apprentice to journey worker (trainer/mentor/professional) ratio is: 2 Apprentice(s) to 1 Journeyworker(s) when the apprentice license is with the State of Idaho and 1 apprentice to 1 Journey worker when the apprentice license is with the State of Washington as per 29 CFR § 29.5 (b)(7).

4. APPRENTICE WAGE SCHEDULE

Apprentices shall be paid a progressively increasing schedule of wages based on either a percentage or a dollar amount of the current hourly trainer (journeyworker / mentor / professional) wage rate, which is \$25.00.

Progressive Wage Schedule is as follows:

Term	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8
Hours	1000 Hours	1000 Hours	1000 Hours	1000 Hours	1000 Hours	1000 Hours	1000 Hours	1000 Hours
Percent/Dollar Amount	50%	55%	60%	65%	70%	75%	80%	85%

5. PROBATIONARY PERIOD

Every applicant selected for apprenticeship will serve a probationary period of 1000 hours.



6. SELECTION PROCEDURES

The process for finding and selecting the best talent possible for an apprenticeship opening position includes the following:

The sponsor may post open positions on career sites or the company's internal career board to solicit applications.

Applications will be pre-screened to eliminate candidates who do not meet the basic qualifications requirements of the position.

Those applicants that meet basic qualifications will be processed through an assessment to screen out those who lack the desire and interest for the apprenticeship. Screening applicants will be performed through interviews and job simulations to select candidates with the highest potential for apprenticeship success.

The Apprentice(s) will be selected based on the most qualified candidate.

Applicants that have accepted the position will be registered within 45 days.

The apprenticeship selection process and procedures will be uniformly and consistently applied to all applicants.

Any applicant who feels that they were wrongfully denied entry into the apprenticeship program may appeal the decision using the applicant appeals procedure described in Section J of the Standards.

Maintenance of Applications and Selection Records

The sponsor and participating employer will keep adequate records according to their own internal systems, policies, and procedures. There will be no undue burden placed on the company in regarding to hiring the applicant as their apprentice. The items and records maintained, including qualifications of each applicant; the basis for evaluation for selection or rejection of each applicant; the records pertaining to interviews of applicants; the original application for each applicant; information relative to the operation of the apprenticeship program, including, but not limited to, job assignment, promotion, demotion, layoff, or termination; rates of pay or other forms of compensation or conditions of work; hours including hours of work and, separately, hours of training provided; and any other records pertinent to a determination of compliance with 29 CFR § 30, as may be required by the U.S. Department of Labor.

The records pertaining to individual applicants selected will be maintained in such manner as to permit the identification of race, gender, or ethnicity.

Records will be maintained for 5 years from the date of last action and made available upon request to the U.S. Department of Labor or other authorized representative.



WORK PROCESS SCHEDULE Plumber

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Work Process Schedule:

Total Minimum Hours Required: 8000

Period	Tasks/Competencies	Hours/Testing
	<ul style="list-style-type: none">• <i>Installation of piping for waste, soil, sewerage, and vents.</i>• <i>Installation of piping for hot and cold water</i>• <i>Assembly of fixtures and appliances</i>• <i>Solder Work and Lead Burning</i>• <i>Welding and brazing connected the trade</i>• <i>Maintenance and repair of heating, plumbing, gas fittings</i>• <i>Operation, care, and use of all tools and equipment</i>• <i>Operation and maintenance of complete repair service</i>• <i>Code, blueprint reading and sketching, and safety requirements</i>	<p>1,500 hours</p> <p>2,500 hours</p> <p>1,250 hours</p> <p>10 hours</p> <p>250 hours</p> <p>800 hours</p> <p>525 hours</p> <p>540 hours</p> <p>625 hours</p>



RELATED INSTRUCTION OUTLINE
Plumber

O*NET-SOC CODE: 47-2152.02 RAPIDS CODE: 0432

INSTRUCTION PROVIDED BY:



North Idaho College

North Idaho College
 Workforce Training Center
 Industry & Trades Department
 525 Clearwater Loop, Post Falls, ID 83854

Related Instruction Descriptions:

Total Minimum Hours Required: 576

Each of the following subjects may take more or less time than is shown, but a minimum of 144 hours per year is recommended.

Period	Tasks/Competencies	Hours/Testing
1	Plumbing Apprenticeship Year 1	144

Introduction to the Plumbing Profession - 6 hours

- *History of the Plumbing Profession*
- *Idaho State Plumbing Structure*
- *Basic Principles of Plumbing*

Objectives:

- *Describe the history of the plumbing profession*
- *Identify the state of Idaho's organizational structure*
- *Identify the basic principles on which the plumbing code is based*

Plumbing Safety - 18 hours

- *Basic Safety*
- *CPR/First Aid*
- *Lifting*
- *Ladder*
- *Fire*
- *Personal Protective Equipment*
- *Trench*
- *Lock out /tag out*
- *Confined Space*

Objectives:

- *Understand common unsafe acts and conditions that cause accidents and how to handle these situations to make them safer*



- *Identify job site hazards - work specific to plumbers*
- *Learn how to maintain your workplace safely*
- *Understand OSHA's involvement in the plumbing profession*
- *Understand how the cost of accidents and illnesses effect everyone on a job site*
- *Identify how to properly lift heavy objects to avoid injury*
- *Identify the proper procedures to safely work on and around ladders*
- *Identify the different types of fires and the proper extinguisher to use for each type*
- *Identify the types of personal protective equipment needed in the plumbing profession and when each type is required*
- *Understand how to work safely in and around a trench*
- *Understand the lock out/ tag out procedure*
- *Understand how to properly work in and around a confined space*

Introduction into Hand Tools used in the Plumbing Profession - 6 hours

- *Levels*
- *Tape Measure*
- *Screw Drivers*
- *Wrenches*
- *Plastic Pipe Cutter*
- *Saws*
- *Pliers*
- *Torch regulator assembly*

Objectives:

- *Identify the types of hand tools used in the plumbing profession*
- *Learn how to properly use and care for basic hand tools*
- *Visually inspect hand tools to determine if they are safe to use*
- *Identify the types of personal protective equipment required to be used with hand tools*

Introduction into Power Tools used in the Plumbing Profession - 6 hours

- *Power Drills*
- *Drill Bits*
- *Power Saws*
- *Air Compressor*
- *Pneumatic Tools*
- *Jack Hammers*

Objectives:

- *Identify the types of power tools used in the plumbing profession*
- *Learn how to properly use and care for basic power tools*
- *Identify which drill or saw is used relevant to the work location*
- *Identify which drill bit or saw blade is used relevant to a system installation*
- *Visually inspect power tools to determine if they are safe to use*
- *Identify the types of personal protective equipment required to be used with power tools*

Identification of All Plumbing Fittings and Types of Pipe - 6 hours

Objectives:

- *Identify and describe the various fittings used in the plumbing profession*



- *Understand that certain fitting materials and designs may only be used for specific systems*
- *Describe the relationship of fitting design selections and plumbing codes*
- *Identify and describe common types of pipes used in the plumbing profession*
- *Understand that certain types of pipes may only be used for specific systems*
- *Describe the relationship of pipe design selections and plumbing codes*

Mathematics - 30 hours

- *Review of Basic Math Fundamentals*
- *Area*
- *Volume*
- *Weight/Gallons of liquids*

Objectives:

- *Define the kinds of measurements used*
- *Demonstrate how to use a calculator to solve plumbing math*
- *Define the basic concepts to solve story problems.*
- *Demonstrate the use of a standard ruler and tape measure*
- *Recognize some of the basic shapes used in the plumbing industry and demonstrate basic geometry to measure them*
- *Solve problems for area and volume using appropriate formulas.*
- *Solve problems relating to area, volume, weights and gallons*

Introduction to the Uniform Plumbing Code - 39 hours

- *General Regulations*
- *Water System*
- *Drain, Waste and Vent System*

Objectives:

- *Apply general regulations related to water systems and drain, waste and vent systems*
- *Perform water pipe sizing exercises*
- *Describe the code requirements for the installation of water supply and distribution systems (materials, joints, connections, sizing, etc)*
- *Describe the code requirements for the installation of drain and waste systems (materials, joints, connections, sizing, etc)*
- *Perform drain and waste pipe sizing exercises*

Isometric Drawings - 15 hours

- *Plumbing Symbols and Abbreviations*
- *Three dimensional drawing*

Objectives:

- *Identify the various plumbing symbols and abbreviations used on a blueprint drawing*

Lab – Cut and Join Pipes-7

Introduction to Plumbing Fixtures – 7



Introduction to Drain, Waste, and Vent Systems - 10

Introduction to Water Distribution Systems - 10

2 Plumbing Apprenticeship Year 2

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INTRODUCTION TO THE PLUMBING PROFESSION – 60 hours

- *Introduction to the Plumbing Profession*
- *Describe Idaho Plumbing Code and Administrative Rules requirements.*
- *Identify the basic principles on which plumbing is based.*
- *Identify and maintain licensing, certification, and industry credentialing requirements.*
- *General Regulations*
- *Plumbing Fixtures and Fixture Fittings*
- *Water Supply and Distribution*
- *Sanitary Drainage*
- *Building Sewers*
- *Indirect Wastes*
- *Vents*
- *Traps*

Objectives:

- *Identify the Uniform Plumbing Code and Idaho Law administrative and enforcement rules*
- *Explain when the general regulations apply to various parts of the plumbing system (water, drainage, venting, etc.)*
- *Describe how plumbing fixtures are roughed-in and installed*
- *Perform water pipe sizing exercises*
- *Describe the code requirements for the installation of water supply and distribution systems (materials, joints, connections, sizing, etc)*
- *Describe the code requirements for the installation of drain and waste systems (materials, joints, connections, sizing, etc)*
- *Perform drain and waste pipe sizing exercises*
- *Describe the code requirements for the installation of public and private building sewers*
- *Identify and install an indirect waste system*
- *Describe the code requirements for the installation of the vent systems (materials, joints, connections, sizing, etc)*
- *Perform vent pipe sizing exercises*
- *Describe where traps are required in the plumbing system*

Construction documents/Plan Reading – 24 hours

- *Describe basic plumbing symbols, abbreviations, and specifications.*
- *Explain how the specifications relate to the plan.*
- *Identify the necessary requirements and locations to install the plumbing fixtures and plumbing appurtenances.*
- *Describe the coordination of trades on the job site.*
- *Recognize site plan, floor plans, elevations, sectional views, details, and schedules.*
- *Locate specific information on building plans.*



Objectives:

- *Identify the various plumbing symbols and abbreviations used on a blueprint drawing*

Given various residential blueprint drawings. The student will complete to minimum UPC standards the following:

- *Identify various parts of the plumbing system*
- *Isometrically draw the drain, waste and vent system*
- *Isometrically draw the water distribution system*
- *Make a material list for the drain, waste and vent system*
- *Make a material list for the water distribution system*

Knowledge of Related Industries - 10 hours

- *Explain how to use alternating-current meters and instruments in the pipe trades.*
- *Apply basic building codes.*

Fittings and Valves – 19

- *Identify the proper fittings and/or valves for specific systems.*
- *Apply the various fittings and valves by type, size, materials and application.*
- *Types of Pipe*
- *Identify the common types of pipes.*
- *Identify the proper pipes for specific systems.*

Safety - 12 hours

- *Recognizing safe and unsafe working conditions in the work place environment*
- *Complete OSHA 10 Certification.*

Objectives:

- *Given various job site situations, explain proper safety procedures*

Math Applications - 15 hours

- *Review Area and Volume*
- *Elevation and Grade*
- *Pressure*
- *Standard Weight Pipe*
- *Allowances for Threaded, Copper and Plastic Fittings*
- *Equal Spacing*
- *Various Angles in Plumbing*

Objectives:

- *Calculate area for various geometric shapes*
- *Calculate water volumes, weights, and gallons for various geometric shapes*
- *Define Elevation and Benchmark*
- *Calculate Elevations*
- *Calculate pressure from height of water*
- *Recognize different pipe weights*
- *Calculate end-to-end and center-to-center measurements for threaded, copper and plastic fittings*
- *Compare the bend or fitting angle to a circle*

Maintenance and Repair – 20 hours

- *Diagnose water heater problems (e.g. gas, electric, tankless).*
- *Identify repairs for residential fixtures.*



- *Identify repairs for commercial fixtures.*

3 Plumbing Apprenticeship Year 3

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The Uniform Plumbing Code (UPC) - 63 Hours

- *General Regulations*
- *Plumbing Fixtures and Fixture Fittings*
- *Water Heaters*
- *Water Supply and Distribution*
- *Sanitary Drainage*
- *Building Sewers*
- *Indirect Wastes*
- *Vents*
- *Traps and Interceptors*
- *Storm Drainage*
- *Fuel Piping*
- *Fire Stop Protection*

Objectives:

- *Identify proper code terminology.*
- *Identify general plumbing requirements for hanging and securing piping.*
- *Identify plumbing fixtures.*
- *Perform water heater sizing, combustion air calculations, vent sizing, and installation.*
- *Perform water pipe sizing calculations.*
- *Explain when and what type of backflow prevention devices, assemblies, and methods are required.*
- *Perform drain and waste pipe sizing calculations.*
- *Perform indirect waste installation and usage.*
- *Describe venting systems (horizontal, vertical wet venting, etc.).*
- *Identify proper use of traps and interceptors.*
- *Perform proper storm drain sizing and calculations.*
- *Perform fuel gas sizing calculations.*
- *Identify proper fire-stop installation.*
- *Identify the proper use of gray water, reclaimed water, and rainwater systems.*
- *Utilize appendices and reference standards.*
- *Apply IDAPA Plumbing rules and statutes (Title 54).*

Commercial Blueprint Reading - 42 hours

- *Introduction to Commercial Blueprints*
- *Basic Plumbing Symbols and Abbreviations*
- *Spec Book relationship to the plan*
- *Plumbing Rough-in*
- *Plumbing Fixtures*
- *Coordinate with other construction trades on the job*

Objectives:

- *Understand the Different Illustrated Views of a building*
- *Understand Basic Plumbing Symbols and Abbreviations*
- *Describe how the Spec Book relates to the plan*
- *Identify the requirements necessary for the rough in of the drain, waste, and vent system, water supply and distribution system, gas piping system, etc.*



- *Identify the necessary requirements and locations to properly install the plumbing fixtures and plumbing appurtenances*
- *Identify the reasons for coordination of trades on the job site*

ADA Guidelines - 8 hours

- *ADA Guidelines related to plumbing*

Objectives:

- *Identify and describe the necessary requirements to plumb according to ADA standards*

Applied Mathematics - 17 Hours

- *Jumper Offsets*
- *Offsets in Parallel*
- *Rolling Offsets*
- *Cast Iron Assemblies with Various Bends*
- *Review of Area and Volume*

Objectives:

- *Determine center-to-center and end-to-end lengths for parallel offsets.*
- *Calculate the travel for a rolling offset. 4.1.3 Solve for end-to-end lengths of pipe.*
- *Calculate area, water volumes, weights, and gallons for various geometric shapes.*
- *Explain pressure measurement in terms of Pounds per Square Inch (PSI) and inches of mercury. Perform angular, length, and converted temperature measure calculations.*
- *Calculate material expansion and/or volume related to heat.*

Service Plumbing – 30 hours

- *Troubleshooting*
- *Repair Fixtures, Valves, and Faucets*
- *Diagnose and Repair Water Supply and Drainage Piping, water Heaters and Appliances*

Objectives:

- *Diagnose water heater problems (e.g. gas, electric, tankless).*
- *Identify repairs for residential fixtures.*
- *Identify repairs for commercial fixtures.*

4 Plumbing Apprenticeship Year 4

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Interpretation and Application of the Uniform Plumbing Code and Idaho Statutes Title 54, Chapter 26: Plumbing and Plumbers - 120 hours

- *Administration and Idaho Title 54*
- *General Regulations*
- *Plumbing Fixtures and Fixture Fittings*
- *Water Heaters*
- *Water Supply and Distribution*
- *Sanitary Drainage*
- *Building Sewers*
- *Indirect Wastes*



- *Vents*
- *Traps and Interceptors*
- *Storm Drainage*
- *Fuel Piping*
- *Fire Stop Protection*

Objectives:

- *Identify the codes pertaining to the above list from the Uniform Plumbing Code*
- *Describe Idaho Law administrative and enforcement rules*
- *Explain when the general regulations apply to various parts of the plumbing system (water, drainage, venting, etc.)*
- *Describe how plumbing fixtures are roughed-in and installed*
- *Explain the rules governing installation of water heaters*
- *Perform water pipe sizing exercises*
- *Describe the code requirements for the installation of water supply and distribution systems (materials, joints, connections, sizing, etc)*
- *Explain when and what type of backflow prevention devices, assemblies, and methods are required*
- *Describe the code requirements for the installation of drain and waste systems (materials, joints, connections, sizing, etc)*
- *Perform drain and waste pipe sizing exercises*
- *Describe the code requirements for the installation of public and private building sewers*
- *Identify and install an indirect waste system in a lab.*
- *Describe the code requirements for the installation of the vent systems (materials, joints, connections, sizing, etc)*
- *Perform vent pipe sizing exercises*
- *Describe where traps are required in the plumbing system*

Identify and install an interceptor in a lab.

- *Describe the code requirements for the installation of storm drainage systems (materials, joints, connections, sizing, etc)*
- *Perform storm drainage pipe sizing exercises*
- *Describe the code requirements for the installation of fuel pipe systems (materials, joints, connections, sizing, etc)*
- *Perform fuel pipe sizing exercises*
- *Explain the general requirements for fire stop protection*

Isometric Drawings and Material Lists - 15 hours

- *Drain, Waste and Vent System Drawing*
- *Water Distribution System Drawing*
- *Drain, Waste and Vent System Material List*
- *Water Distribution System Material List*
- *Trim Material List*

Objectives:

- *Given a set of residential blueprint drawings (example: residence on plumbing street). The student will complete to minimum UPC standards the following:*
- *Isometrically draw the drain, waste and vent system*
- *Isometrically draw the water distribution system*
- *Create a material list for the drain, waste and vent system*
- *Create a material list for the water distribution system*



- *Create a material list of the plumbing fixtures and trim*

Safety - 6 hours

- *Recognizing safe and unsafe working conditions in the work place environment*

Objectives:

- *Give examples of direct and indirect costs of workplace accidents*
- *Identify safety hazards of the construction industry*

Math Applications - 10 hours

- *Area*
- *Volume*
- *Pressures*

Objectives:

- *Calculate area for various geometric shapes*
- *Calculate water volumes, weights, and gallons for various geometric shapes*
- *Calculate pressure from height of water*

Review – 9 hours

TOTAL MINIMUM HOURS 576