

British Columbia Construction Association

# Integrating Newcomers

A comparison of select British Columbian and California  
apprenticeships

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## Preface

We conducted a comparison of apprenticeship essential, health and safety, and legislated skills requirements, training contents, and certification processes between British Columbia and California for 5 trades: Carpenter, Construction Electrician, Construction Craft Worker, Plumber, and Roofer.

The goal of the comparison is to provide a reasoned tool for newcomers - and their advisors - when they are trying to determine what BC trade best matches their trade credential and experience.

The report is in 4 parts:

1. A quick summary equivalency reference tool with upgrade recommendations;
2. A methodology section outlining how we arrived at the conclusions;
3. A results section containing full details of the analysis undergirding the reference tool; and,
4. A discussion section that addresses briefly what the results might mean and how these considerations might be used for make-up training and the job-aids.

The first section (“An applied glimpse at differences”) can be used as a stand-alone. Newcomers and their advisors will find all the key comparisons and upgrade recommendations there. The section is the summary of the other three sections which, together, provide a level of detail more appropriate to policy-driven endeavors.

Due to scope constraints, we have focussed the comparisons using the BC apprenticeship program and BC legislated requirements as bases for technical, safety, and compliance skills. But we used Employment and Social Development Canada’s Essential Skills profiles for our analysis of literacy and numeracy skills requirements.

## An applied glimpse at differences

In this summary tool, we outline trade credential equivalency processes and “high-level” comparisons of the skills, programs, and certification mechanisms for the 5 trades. Three sections follow this “glimpse”: methodology, results, and discussion. The methodology section lists the data sources we used and how we conducted the analysis. The results section makes thorough use of tables and color-coding to provide fine-grained analysis and summative results. And the discussion section contains practical, reasoned recommendations. All of these elements are summarized in this “glimpse” section.

### Credential equivalency

There is no formal recognition of trade credentials in Canada; there is no assured exchange of a foreign trade credential for an equivalent Canadian credential.

In British Columbia (BC), no credential is required to work in any of the trades. Some specific trade activities, however, require a relevant base trade credential – for example to “pull” electrical permits or connect a gas furnace. Mandatory credential requirements vary from Canadian jurisdiction to jurisdiction; consult the provincial Apprenticeship website or the Federal Ellis Chart<sup>1</sup>.

Trade credentials in BC are awarded by the Industry Training Authority (ITA). Similar entities – provincial government departments or crown-enabled institutions – award trade credentials in the other Canadian provinces and territories.

In BC<sup>2</sup>, the ITA issues 2 trade credentials: the Certificate of Apprenticeship (CofA) and the Certificate of Qualification (CofQ). These credentials bear the federal Red Seal endorsement for Red Seal trades<sup>3</sup>. CofA credentials are issued upon successful completion of the relevant apprenticeship program. CofQ credentials are issued upon successful completion of the relevant Red Seal or Interprovincial Standards examination (IP). CofQs without Red Seal endorsement are awarded for non-Red Seal trades upon successful completion of the relevant ITA CofQ examination.

Access to these examinations is by one of two routes: apprenticeship program completion or challenge based on time-in-trade. Apprenticeship programs vary in length and in the number of weeks of in-school training over the duration of the program – apprentices are registered with the ITA; in-school training is through ITA-approved public and private training providers. Time-in-trade challengers are required to prove they have practiced the trade for at least 1.5 times the stipulated length of the apprenticeship on-the-job hours (See Table below).

Table 1. Trade certification requirements in BC

Trade	Apprenticeship		Challenge	
	In-school (weeks)	On-the-job (hours)	On-the-job (hours)	Fee
Carpenter	28	6480	9720	C\$120
Construction Electrician	40	6000	9000	C\$120
Construction Craft Worker	8	4000	6000	C\$120
Plumber	32	6420	9630	C\$120
Roofer	12	3600	5400	C\$120

<sup>1</sup> <http://www.ellischart.ca/search/s.2.1rch-eng.html> last accessed 29 September 2016

<sup>2</sup> The same general process holds in the other Canadian jurisdictions.

<sup>3</sup> <http://www.itabc.ca/discover-apprenticeship-programs/search-programs> accessed 23 September 2016

### Essential skills equivalency

In all of the 5 trades, workers are expected to read, consult, and fill a range of documents, from simple forms requiring dates, times, or measurements to detailed reports to engineers, inspectors, or customers. The “California – All trades” scores reflect our assumption that newcomers have met the lowest academic requirement of GED, hence have the literacy and numeracy skills to handle moderately elaborate documents – these often provide or require numerical information such as readings or measurements. We also assumed that newcomers would be able to understand trade-specific common instructions (written or spoken) but might not have the technical language skills required to write complex reports, direct teams, or lead group discussions such as pre-job conferences or tailboards.

California offers a single pathway to (most) trade credentials: apprenticeship. But there are many different places to attend training.

Table 2. Summative select Essential Skills complexity scores (Carp. means Carpenter; C.E. means Construction Electrician; C.C.W. means Construction Craft Worker; Plumb. means Plumber; Roof. means Roofer)

Essential Skills' Category	Trade					California
	Carp.	C.E.	C.C.W.	Plumb.	Roof.	All trades
<b>Reading</b>	2.56	2.11	1.67	2.44	1.67	2.56
<b>Document use</b>	1.89	2.78	1.11	1.89	1.67	2.11
<b>Writing</b>	1.60	1.60	1.20	1.20	0.40	2.20
<b>Numeracy</b>	1.64	1.71	1.14	2.00	1.71	1.57
<b>Oral Communication</b>	1.50	1.90	0.80	1.00	1.50	1.40

### Health and Safety, and other legislated skills equivalencies

The “skills” listed in the table below are, at a minimum, those that trade persons are expected to have when reporting to the job site. Some of the skills required in BC are also required in California, but since most of these are highly jurisdiction-specific, newcomers would not fully have BC-equivalent skills.

In some cases, it is the employer’s responsibility to provide training or equipment, but that is not always the case. Trade persons should make sure they have the skills and qualifications required to work safely and within the legislated framework for their trade’s most common demands.

Trade persons are often expected to drive a company vehicle – most likely a pick-up truck or van. These vehicles can be operated with a Class 5 BC Driver’s License. ICBC has a reciprocal agreement in place to exchange a California driver’s license for a BC one (some conditions apply).

Table 3. Select Regulatory Requirements scores (using same complexity scores as for Essential Skills)

Regulatory requirements	Trade				
	Carp.	C.E.	C.C.W.	Plumb.	Roof.
<b>OSH Requirements</b>					
WorkSafeBC (WSBC) Rights and Responsibilities	0	0	0	0	0
WSBC Young / New Worker (Training & Orientation)	0	0	0	0	0
Personal Protective Equipment (PPE) requirements	3	3	3	3	3

Regulatory requirements	Trade				
	Carp.	C.E.	C.C.W.	Plumb.	Roof.
Duty to co-operate with internal and external OSH officials	3	3	3	3	3
<b>Other Regulatory Requirements</b>					
WHMIS	0	0	0	0	0
Fall arrest / restraint / protection	3	3	3	N/A	3
Confined space	N/A	0	N/A	0	N/A
Building Code	0	N/A	0	0	0
Gas Code (B 149.1)	N/A	N/A	N/A	0	N/A
Canadian Electrical Code	N/A	0	N/A	0	N/A
Driver's License (Class 5)	5	5	5	5	5

## Training contents equivalency

### Major differences all trades

Table 4. Major differences between the BC and California apprenticeship programs for 5 trades, by trade.

Trade	Major differences
Carpenter	<ul style="list-style-type: none"> <li>The California program does not include oxy-fuel cutting, and roofing finishing materials.</li> <li>California building codes are different.</li> <li>The California program has a “green” element not in the BC program.</li> <li>California entry requirement is high school graduation or GED but varies locally.</li> <li>The BC program has 4 levels of block release in-school training over 4 years; the California is based on minima of 4 years of work totalling at least 4800 hrs and 576 hrs of school training.</li> </ul>
Construction Craft Worker	<ul style="list-style-type: none"> <li>The trade in California has no masonry component.</li> <li>The trade in California has a large asphalt roadwork component.</li> <li>There are no educational requirements to enter the trade in California but there may be English language proficiency tests.</li> <li>The BC program has 2 levels of block-release in-school training over 2 years; the California is based on minima of 2 years of work totalling at least 3000 hrs and 216 hrs of school training.</li> </ul>
Construction Electrician	<ul style="list-style-type: none"> <li>The California program does not include high voltage, entertainment systems, and nurse call system competencies.</li> <li>The California codes are different than those in BC.</li> <li>The California program has a “green” element not in the BC program.</li> <li>The BC program has 4 levels of block-release in-school training over 4 years; the California is based on minima of 4 years of work totalling at least 8000 hrs and 640 hrs of school training.</li> </ul>
Plumber	<ul style="list-style-type: none"> <li>The California program does not include irrigation systems.</li> <li>The California program has heat pump components not in the BC program.</li> <li>The California program has a “green” element (especially used water treatment, water conservation and reclamation) not in the BC program.</li> <li>The BC program has 4 levels of block release in-school training; the California is based on minima of 4 years of work totalling at least 7200 hrs and 800 hrs of school training.</li> </ul>



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Trade	Major differences
Roofer	<ul style="list-style-type: none"> <li>California roofers do not appear to be expected to organize and run roofing jobs; they are mainly installers and fixers.</li> <li>The California program has a “green” element not emphasized in BC (e.g., roofing around photovoltaic systems).</li> <li>There are no educational requirements to enter the trade in California but there may be English language proficiency tests.</li> <li>The BC program has 3 levels of block release in-school training; the California is based on minima of 3.5 years of work totalling at least 4000 hrs and 576 hrs of school training.</li> </ul>

### Most important trade areas equivalencies

The table below contains a rated summary of the 5 most important trade areas for each trade, where importance is based on in-school and on-the-job training effort expressed in percentage of the apprenticeship duration.

Table 5. Top 5 trade areas for all trades (ratings; 0=not mentioned; 1=some overlap with BC program; 2=substantial overlap with BC program)

Top 5 General Areas of Competence by trade				
Trade and GACs	BC program			California
	School	On-job	Total %	
	Hours	Hours		Rating
<b>Carpenter</b>				
Wood Frame Construction	191.1	1474	23%	2
Concrete Formwork	161.7	1247	19%	2
Documentation and Organizational Skills	157.5	1215	19%	2
Finishing Materials	96.6	745.2	12%	2
Tools and Equipment	67.2	518.4	8%	2
<b>Construction Electrician</b>				
Apply Circuit Concepts	441	2205	37%	2
Install Electrical Equipment	210	1050	18%	2
Install Low Voltage Distribution Systems	168	840	14%	2
Install Control Circuits and Devices	168	840	14%	2
Read and Interpret Drawings and Manuals	75	375	6%	2
<b>Plumber</b>				
Install Natural Gas and Propane Systems	192	1580	25%	2
Organize Work	122.5	1009	16%	2
Install Sanitary and Storm Drainage Systems	113.8	936.3	15%	2
Install Water Service and Distribution	96	790.1	12%	2
Install Hydronic Heating and Cooling	77.04	634.1	10%	2
<b>Construction Craft Worker</b>				

Top 5 General Areas of Competence by trade				
Trade and GACs	BC program			California
	School	On-job	Total %	
	Hours	Hours		Rating
Perform Concrete Work	45.6	19%	760	1
Perform Site Work	43.2	18%	720	2
Use Scaffolding and Access Equipment	27.6	12%	460	1
Perform Utilities and Pipeline Tasks	26.4	11%	440	1
Organize Work	24	10%	400	1
<b>Roofer (Damp- and Waterproofer)</b>				
Install Low Slope and Flat Roofing	138.0	1380	38%	2
Install Steep Roofing	55.2	552	15%	2
Organize Work	45.6	456	13%	0
Use Safe Work Practices	44.4	444	12%	1
Use Documentation	32.4	324	9%	1

### Certification process equivalency

BC apprentices are required to pass each of 2-4 levels (blocks) of in-school training. Pending the implementation of centrally-imposed tests, practical and theory tests were training institution-specific, but coordinated through a BC Articulation Committee for some of the trades. Successful completion of the final Level in-school final exam gives access to the Red Seal examination, the only certification mechanism for trade persons in BC (all the trades we looked at are “Red Seal” trades).

This is somewhat more systematic than the California credentialing system as it is wholly “owned” by the Apprenticeship Sponsor and the training institution (if these are separate entities which is not always the case). Moreover, the California system is based on minimum standards which can be supplemented locally: there is no strict equivalency within the state between the “Proof of Completion” awarded for any trade. However, the “cultural” and work environment in California are similar enough to allow a California trade worker holding a California “Certificate of Completion” to be taken as qualified as a BC one - after having addressed the skills gaps as indicated in “Recommendations” below.

The table below summarizes the major differences.

Table 6. Comparison of BC and California examination and credentialing

Examination and certification		
Element	BC	California
Exam	Single	Multiple
	Pencil & paper	Pencil & paper
		Hands-on
Domains tested	Multiple unspecified	Multiple unspecified
	Proxy	Proxy and direct
Domain inclusion	Negotiated norm	Local norm
Item type	Selected response	Unknown
Scoring	Machine	Unknown for theory

Examination and certification		
Element	BC	California
		Employer evaluation
Scores	One correct	Local norms
Results	Unique fixed cut score	Compounded
Validity	Medium	Weak
Reliability	Unknown	Weak
Credential	Endorsement	State proof of completion

## Recommendations

### Essential Skills recommendations

Assuming one is dealing with California trade workers holding a state “Certificate of Completion”, English language skills, including trade technical terms should not be an issue. There might be some essential skills issues for the Construction Craft Labourer and Roofer and waterproofer trades workers, since they have no educational prerequisites – the same reasoning might apply for those workers having a GED. Directing these newcomers to the TOWES<sup>4</sup> assessment tools might be the quickest way for them to find out if they lack essential skills required to progress in their trade.

### Health and Safety, and other legislated skills recommendations

There are many online training opportunities for all the OSH requirements that are appropriate and recognized. These can be purchased for approximately \$200.

Code books (or relevant appropriate section) can be purchased for \$150-250 online or at specialized bookstores – knowing the code will be important for those workers wanting to challenge the Red Seal examination, especially for Plumbers and Electricians.

Plumbers wishing to install and connect gas-fired appliances will have to take a course and pass the relevant Safety Authority examination.

### Carpenter recommendations

Providing California carpenters with an oxy-fuel component at an institution (approximately 2 weeks and \$500) as well (advanced) on-the-job experience for timber framing and site layout would bring them up to the level of BC carpenters.

And to ensure safety on the job site, a one-day rigging and hoisting course would be beneficial.

Alternatively, they could pick up these skills on the job if they were employed as a Construction Craft Worker, whether as an apprentice or a labourer, getting to Carpenter Red Seal certification in 2-3 years (their apprenticeship hours fall short of the ITA requirement).

### Construction Electrician recommendations

California electricians have the skills to be productive on a worksite on residential, commercial, or industrial jobs. But they will need to adapt to high voltage component that they do not seem to have. Likewise, codes and regulations driving work practices will be foreign to them. Providing them with an Electrical Code course (approximately 2 weeks a day/week and \$600) would bring them up to speed.

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<sup>4</sup> <http://www.towes.com/en/home/home> last accessed 03 December 2016

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Alternatively, they could pick up these skills on the job, getting to Red Seal certification in a year or so.

### [Plumber recommendations](#)

California “plumbers” have the skills to be productive on residential, commercial, or industrial worksites for installation, commissioning, and troubleshooting work. But codes and regulations driving work practices will be foreign to them, and they will not have the required gas license. Providing them with the in-school equivalent of C3 (codes and regulations) in C line in Level 1 (approximately 1 week) of the apprenticeship program and a Gas B course (approximately 3 weeks and \$1000) would bring them up to speed.

Alternatively, they could pick up code-related skills on the job and take the Gas B course – to get the Safety Authority qualification, then challenge the Red Seal examination in a year or so.

### [Construction Craft Worker recommendations](#)

California Construction Craft Labourers have the skills to be productive on a worksite. But, codes and regulations driving work practices will be foreign to them. While they have no masonry background, they bring asphalt roadwork to the table. As well they have substantial utility piping (and pipeline) experience. After a solid year and a half on the job, they should be able to challenge the Red Seal examination.

### [Roofer recommendations](#)

California Roofers have the skills to be productive on a worksite, be it flat, low slope, or steep roofing. They would also be a strong asset in the roof architectural sheet metal work. But, codes, regulations, and industry standards driving work practices will be foreign to them – as will be managing a job on their own. Within a year or so on the job they should be able to challenge the Red Seal examination.

## Methodology

We obtained data from 8 major US and California sources of information, and one main source for British Columbia. The US and California sources were:

- United States Department of Labor<sup>5</sup>
- DIR – DAS (Department of Industrial Relations – Division of Apprenticeship Standards)<sup>6</sup>
- Southwest Carpenters Training Fund<sup>7</sup>
- Carpenters Training Committee for Northern California<sup>8</sup>
- United Union of Roofers, Waterproofers and Allied Workers<sup>9</sup>
- California Electrical Training<sup>10</sup>
- Electrical Training Institute<sup>11</sup>
- Plumbing School Training<sup>12</sup>

The latter concerned with providing access to employment through continuing education and training for adults.

On these sites, we collected data from the following documents or web pages:

- <http://www.dir.ca.gov/das/MITC/MITC/Carpenter/Carpenterindustry.pdf>
- <http://www.dir.ca.gov/das/MITC/MITC/Electrical/Electrical.pdf>
- <http://www.dir.ca.gov/das/MITC/MITC/Electrical/ElectricalResidential.pdf>
- <http://www.dir.ca.gov/das/MITC/MITC/Construction/Construction.pdf>
- <http://www.dir.ca.gov/das/MITC/MITC/Plumbing/Plumbing.pdf>
- <http://www.dir.ca.gov/das/MITC/MITC/Roofer/Rooferwaterproofing.pdf>

The British Columbian source were:

- ITA (Industry Training Authority).
- WorkSafeBC<sup>13</sup>
- ICBC<sup>14</sup>

On these sites, we collected data from the following documents or web pages:

- ITA Program Profile
- ITA Program Outline
- WorkSafeBC Employee Roles, Rights and Responsibilities web pages
- WorkSafeBC Young or New Workers Training Guide pdf
- ICBC “Moving to BC” web pages

In the report, we use the BC trade name, requisites, and content as the reference.

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<sup>5</sup> <https://www.dol.gov/featured/apprenticeship> last accessed 30 November 2016

<sup>6</sup> <http://www.dir.ca.gov/das/mitc.htm> Last accessed 29 November 2016

<sup>7</sup> <http://www.swctf.org/home/index.html> last accessed 29 November 2016

<sup>8</sup> <http://www.ctcnc.org/> last accessed 29 November 2016

<sup>9</sup> <http://www.unionroofers.com/> last accessed 29 November 2016

<sup>10</sup> <https://www.californiaelectricaltraining.com/> last accessed 30 November 2016

<sup>11</sup> <http://www.laett.com/> last accessed 30 November 2016

<sup>12</sup> <http://www.plumbingschool.training/guide-to-plumbing-certification/> last accessed 30 November 2016

<sup>13</sup> <https://www.worksafebc.com/en> last accessed 2 October 2016

<sup>14</sup> <http://www.icbc.com/driver-licensing/moving-bc/Pages/default.aspx> last accessed 2 October 2016

## Essential skills

Employment and Social Development Canada (ESDC)<sup>15</sup> has published essential skills profiles for over 350 occupations. Essential skills fall under a number of categories. To make things simpler, we have retained those shown in Table 8 below. We did not retain the “Thinking”, “Digital Technology”, “Working with Others”, or “Continuous Learning” as these categories address either the newcomer or her culture or his opportunities rather than portable skills amenable to improvement through training.

As a reference, we used the Essential Skills profile for Construction Trades Helpers and Labourers (NOC 7611, 7612) assuming it was similar to the BC Construction Craft Worker (C.C.W.) trade. And we aligned the Essential Skills for the other 4 trades to those for C.C.W. retaining the complexity score as published. Skills in each of the categories are accompanied by a “complexity rating” ranging from 1-5, where “1” means “basic” and “5” means “advanced”.

We married the Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR)<sup>16</sup> to the Canadian complexity rating in order to assign a complexity score to an average California trade person, i.e., a non-native speaker of English who might have had some basic training in English.

To assign complexity scores, we stipulated that the CEFR language proficiency were arranged on this continuum: reception (listening and reading – A1/A2) < production (spoken and written – B1) < interaction (spoken and written – B2) < mediation (translating and interpreting – C1/C2). We have assumed that these ratings are interval-based in order to calculate averages. We used 0 to indicate absence.

In effect, we boosted the complexity scale from an ordinal to an interval scale to legitimately calculate average scores. We used Bond and Fox, 2007<sup>17</sup> scale explanation as a rationale:

- Nominal scales – separate the data of interest in defined, recognizable classes, for example, there is an “A”, a “B”, a “C”, ... a “n”
- Ordinal scales – separate nominal data along a quantitative axis, for example  $A > B > C > \dots n$ , therefore, e.g.  $A > n$
- Interval scales – separate ordinal data along a regular quantitative axis, for example  $A > B > C > \dots n$ , such that  $(A-z)=B$ ,  $(B-z)=C$ ,  $(C-z)=D$ , ...,  $(m-z)=n$ , and  $z$  is invariant or constant but specific to the data (and scale) at hand (e.g. millimeters, cents, seconds, etc.)
- Ratio scales – separate interval data along a quantitative axis, for example  $A > B > C > \dots n$ , such that  $(A-z)=B$ ,  $(B-z)=C$ ,  $(C-z)=D$ , ...,  $(m-z)=n$ , and  $z$  is invariant or constant across all possible scales

In the 5 trades, workers are expected to read, consult, and fill a range of documents, from simple forms requiring dates, times, or measurements to detailed reports to engineers, inspectors, or customers. The “California – All trades” scores reflect our assumption that newcomers who have had basic English language training have the skills to handle simple documents – these often provide or require numerical information such as readings or measurements. We also assumed that newcomers would be able to understand simple instructions (written or spoken) but would not have the technical language skills

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<sup>15</sup> [http://www.esdc.gc.ca/en/essential\\_skills/profiles/index.page](http://www.esdc.gc.ca/en/essential_skills/profiles/index.page) accessed 20 September 2016

<sup>16</sup> [http://www.coe.int/t/dg4/linguistic/Cadre1\\_en.asp](http://www.coe.int/t/dg4/linguistic/Cadre1_en.asp) accessed 24 September 2016

<sup>17</sup> Bond, T. & Fox, C. (2007). *Applying the Rasch model: Fundamental measurement in the human sciences* (2nd). Mahwah, NJ

required to direct small teams or take an active part in group discussions such as pre-job conferences or tailboards.

We used the classification and color scheme listed in Table 7 below.

Table 7. Complexity level<sup>18</sup> for essential skills cross-referenced to CEFR

Essential Skill complexity rating descriptor	CEFR	Complexity Level
<ul style="list-style-type: none"> <li>• Not present</li> </ul>	-	0
<ul style="list-style-type: none"> <li>• Read relatively short texts to locate a single piece of information.</li> <li>• Follow simple written directions.</li> </ul>	A1 / A2	1
<ul style="list-style-type: none"> <li>• Read more complex texts to locate a single piece of information or read simpler texts to locate multiple pieces of information.</li> <li>• Make low-level inferences.</li> </ul>	B1	2
<ul style="list-style-type: none"> <li>• Choose and integrate information from various sources or from several parts of a single text.</li> <li>• Make low-level inferences from multiple sources.</li> <li>• Identify relevant and irrelevant information.</li> </ul>	B2	3
<ul style="list-style-type: none"> <li>• Integrate and synthesize information from multiple sources or from complex and lengthy texts.</li> <li>• Make complex inferences and use general background knowledge.</li> <li>• Evaluate quality of text.</li> </ul>	C1	4
<ul style="list-style-type: none"> <li>• Interpret dense and complex texts.</li> <li>• Make high-level inferences and use specialized knowledge.</li> </ul>	C2	5

## Training Contents: GACs, Competencies, and Rating Scale

### Rank-ordering GACs

We assumed that the in-school training hours assigned to any given GAC reflect the relative importance of that aspect of the trade. Further, we assumed that proportion of total training hours dedicated to any aspect of the trade reflect the frequency with which that aspect of the trade is practiced in the field.

We used the BC program outline posted on the ITA website as the reference document. We first listed all the General Areas of Competence (“Lines” or GACs) with the respective percentage of instructional time by level of apprenticeship. We calculated the number of hours devoted to each of these GACs by multiplying the training time allotment - over 4 levels - in percent by the number of training hours for each level and then summed these values.

$$\sum_{i=1}^4 (\%_{instructional\ time})(instructional\ time_{level}) \quad (1)$$

We divided this sum into the total program instructional time and expressed the quotient in percentage, then used this percentage and multiplied it by the on-the-job program hours.

<sup>18</sup> [http://www.esdc.gc.ca/en/essential\\_skills/profiles/readersguide.page](http://www.esdc.gc.ca/en/essential_skills/profiles/readersguide.page) accessed 24 September 2016

$$\left( \frac{\sum_{i=1}^4 (\% \text{instructional time}) (\text{instructional time}_{\text{level}})}{\text{Total}_{\text{instructional time}}} \right) (\text{Hours}_{\text{OJT}}) \quad (2)$$

Then we rank-ordered the GACs from largest number of program hours to smallest number of program hours.

Due to scope constraints, we did not perform the same analysis at the competency level.

#### Competency rating scale

Unlike the ITA documents, California documents are less prescriptive when it comes to training hours, focussing instead on competence attainment (based on local tests cross-referenced to “end state” competences’ completion).

Given the lack of time markers in California trade training, we decided to limit our competency ratings on a three-point basis, using the following protocol:

- **0 (zero)** for BC competencies that are not mentioned in the California documents.
- **1 (one)** for BC competencies that are partially covered by those described in the California documents.
- **2 (two)** for BC competencies that are completely covered by with those described in the California documents.

The GAC rating is the rounded mean of the constituent competency ratings.



## Results

### Essential Skills

Refer to the Methodology session, Table 7 for complexity rating explanation and color code.

Most California Trade workers master English – some of the “training organizations” have language proficiency tests to screen out non-speakers of English - and the ratings reflect this. We have assumed that California newcomers have mastered English trade technical terms, the imperial system, and business practices, but that they would not have mastered the SI system, BC construction standards, codes (fire, building, plumbing, etc.), and regulations.

Table 8. Detailed Essential Skills requirements by trade cross-referenced to "Most California Trade Newcomers" skills

Essential Skills (by profile)	Trade					
	Carp.	C.E.	C.C.W.	Plumb.	Roof.	Cali.
<b>Reading</b>						
Read instructions and warnings written on signs, labels and packaging.	1	1	1	0	1	3
Read short text entries on forms and technical drawings.	1	1	1	1	1	3
Read notices and bulletins.	2	2	2	2	2	3
Read a variety of instructions, procedures, and workplace safety materials.	2	2	2	2	1	3
Read safety-related information, and equipment use instructions.	3	3	3	3	2	3
May read trade journals, brochures and website articles to learn about new products and technologies.	3	3	3	3	2	2
May read manuals, and instructions and procedures contained in manuals.	3	3	3	3	3	2
May read technical reports and trade textbooks.	4	0	0	4	0	2
Read and interpret building codes, regulations, bylaws and standards.	4	4	0	4	3	2
"Average"	2.56	2.11	1.67	2.44	1.67	2.56
<b>Document use</b>						
Scan labels on product packaging and equipment to locate specifications, times, safety information and identification numbers.	1	1	1	1	1	2
View digital readouts, and readings on equipment.	0	1	1	0	0	3
Refer to lists to identify identification numbers and quantities.	0	2	1	2	2	3
Locate and enter data on labels.	1	3	0	1	2	3
Complete a variety of forms and check boxes; enter dates, times, and identification numbers.	2	3	2	2	2	2
Locate data, such as dates, times and dimensions, in tables and conversion charts.	3	3	2	3	2	2
May interpret technical drawings including floor plans, schematics, and assembly drawings.	3	4	3	4	3	2

*A Comparison of Select British Columbia and California Apprenticeships*

Essential Skills (by profile)	Trade					
	Carp.	C.E.	C.C.W.	Plumb.	Roof.	Cali.
Complete complex entry forms and building permits.	3	4	0	0	0	0
Study a variety of plan, elevation, detail, elevation and section drawings.	4	4	0	4	3	2
"Average"	1.89	2.78	1.11	1.89	1.67	2.11
<b>Writing</b>						
Write short comments in log books to, e.g., record the outcome of safety inspections.	1	1	1	1	1	3
Write short notes to co-workers to, e.g., inform them about defective equipment.	1	0	1	1	0	3
May write text entries in forms.	2	2	2	2	0	2
May write short reports to describe events leading up to workplace accidents.	2	2	2	2	1	1
Write comments in forms, schedules, job hazard assessment forms.	2	3	0	0	0	2
"Average"	1.60	1.60	1.20	1.20	0.40	2.20
<b>Numeracy</b>						
May purchase supplies using petty cash and receive change.	1	0	1	1	1	1
Take a variety of measurements using basic tools.	1	1	1	1	2	2
Measure the dimensions and angles using basic tools.	0	1	1	1	2	2
Compare measurements to specifications.	1	1	1	1	2	2
May estimate distances.	0	1	1	0	0	1
Calculate material requirements.	2	2	2	2	3	2
May calculate averages.	2	2	2	2	1	1
May estimate quantities.	2	2	2	2	2	1
Estimate the length of time that it will take to complete projects.	2	1	0	2	3	1
May estimate weights.	0	2	2	3	2	1
May schedule the completion of construction.	2	2	0	3	3	1
Calculate amounts for estimates and invoices.	3	2	0	3	3	1
May take precise measurements using specialized measuring instruments.	3	3	3	3	0	3
Calculate runs, rises and offsets.	4	4	0	4	0	3
"Average"	1.64	1.71	1.14	2.00	1.71	1.57
<b>Oral Communication</b>						
Speak to suppliers.	1	1	1	1	1	1

*A Comparison of Select British Columbia and California Apprenticeships*

Essential Skills (by profile)	Trade					
	Carp.	C.E.	C.C.W.	Plumb.	Roof.	Cali.
Exchange information with co-workers and other tradespeople.	2	2	2	2	2	2
Participate in group discussions.	2	2	2	0	2	2
Talk to safety and building inspectors.	2	2	0	2	2	2
Speak with manufacturer representatives.	2	0	0	0	1	1
Listen to instructions.	0	0	3	0	0	2
Speak with customers.	3	3	0	2	3	1
May provide detailed instructions to co-workers.	3	3	0	3	1	1
Interact with co-workers regarding critical safety issues.	0	3	0	0	3	2
Exchange information with engineers, owners, architects, inspectors and other trades.	0	3	0	0	0	0
"Average"	1.50	1.90	0.80	1.00	1.50	1.40

**Health and Safety, and other legislated skills**

We have assessed the skill level of newcomers with Canadian and BC OSH, as well as code requirements as non-existent or partial. There are some forms of requirement in California but it is most likely different from those in BC.

We have applied that reasoning to WorkSafeBC (WSBC) rights and responsibilities for workers – and “new” workers, Fall Protection, and Confined Space requirement.

We have applied that reasoning to Federal legislation that covers Workplace Hazardous Materials Information System (WHMIS) as a requirement for all types of work and workplace.

And we have applied that reasoning to the codes relevant to their occupation as necessary. We have included a special consideration for plumbers who, in BC, are expected to have a “Gas B License”.

We have assumed that trade persons are often expected to drive a company vehicle – most likely a pick-up truck or van. These vehicles can be operated with a Class 5 BC Driver’s License. ICBC has an agreement in place to exchange a California driver’s license for a BC one.

Table 9. Regulatory requirements for 5 trades - training (and certification) may be undertaken by the employer (refer to Table 7 for complexity rating explanation and color code)

Regulatory requirements	Trade				
	Carp.	C.E.	C.C.W.	Plumb.	Roof.
<b>WSBC Rights</b>					
Right to a healthy and safe workplace	0	0	0	0	0
Right to safety training and orientation	0	0	0	0	0
Right to refuse unsafe work	0	0	0	0	0
<b>WSBC Responsibilities</b>					
Young / New Worker (Training & Orientation)	0	0	0	0	0

## A Comparison of Select British Columbia and California Apprenticeships

Regulatory requirements	Trade				
Follow safe work procedures and act safely in the workplace at all times.	0	0	0	0	0
Use the protective clothing, devices, and equipment provided. Be sure to wear them properly.	3	3	3	3	3
Co-operate with joint occupational health and safety committees, worker health and safety representatives, WorkSafeBC prevention officers, and anybody with health and safety duties.	3	3	3	3	3
Miscellaneous Requirements					
WHMIS	0	0	0	0	0
Fall arrest / restraint / protection	3	3	3	N/A	3
Confined space	N/A	1	N/A	1	N/A
Building Code	0	N/A	0	0	0
Gas Code (B 149.1)	N/A	N/A	N/A	0	N/A
Canadian Electrical Code	N/A	0	N/A	0	N/A
Driver's License (Class 5)	5	5	5	5	5

### Training programs comparisons

In the table below, we compare key structural and procedural elements of the apprenticeship programs in BC and in California. Note that we have only considered the California certification based on apprenticeship. This, in part because access to mandatory state licensure in California for trades such as Electrician and Plumber is made easier, but not exclusively, when holding a locally issued trade qualification obtained through an apprenticeship.

Table 10. Comparison of BC and California apprenticeship program elements across 5 trades

Program element		British Columbia	California
Entry requirements	Type	Recommended	Required
	Special requirements	None	Locally: <ul style="list-style-type: none"> <li>18 years old (17 with special dispensation)</li> <li>Recommended or mandatory physical abilities</li> <li>Mandatory drug testing</li> <li>English and scholastic proficiency tests</li> <li>Drug test</li> </ul>
	Lowest scholastic	Grade 9 (Roofer)	None (Roofer, Waterproofer)
	Preferred scholastic	Grade 10 (Carpenter, Construction Craft Worker, Roofer)	All trades 12 years of schooling; or GED
	Highest scholastic	Grade 12 (Plumber) Grade 12 (Electrician)	All trades 12 years of schooling; or GED

[A Comparison of Select British Columbia and California Apprenticeships](#)

Program element		British Columbia	California
	Topics scholastic	English, math, science	Arithmetic, English, science, and shop preferred
In-school training	Total length	Varies (0 - 1200 hours total)	216 - 800 hours total
	Number of periods	Varies (3-4)	Fixed hours per year (2-4)
	Additional studies		Varies depending on local requirements; may be more than minimum.
On-the-job training	Total length	Fixed for each trade, but varies by trade (3600 –6480 hours)	Fixed minimum for each trade but varies (3000 – 8000 hours)
	Number of periods	Fixed but varies by trade	Fixed minimum hours for each trade but “period” varies locally based on work availability and training schedule
Assessment	School-based exams	Institution-specific (moving to standardized tests)	Program-sponsor specific
	On-the-job	Employer hours sign-off	Program-sponsor competence evaluation
	Certification	“Paper-and-pencil” single test	<ul style="list-style-type: none"> <li>• State-issued “Certificate of Completion” – no test</li> <li>• State licensure required for some trades and work (Electrician, Plumber)</li> </ul>

[Training Contents Comparison](#)

[Carpenter programs comparison at-a-glance](#)

Table 11. BC and California Carpenter apprenticeships (2 streams); duration and prerequisites

British Columbia - Carpenter	California - Carpenter
Level 1 In-school training: 210 hours	Year 1 in-school training: min. 144 hrs.
Level 2 In-school training: 210 hours	Year 2 in-school training: min. 144 hrs.
Level 3 In-school training: 210 hours	Year 3 in-school training: min. 144 hrs.
Level 4 In-school training: 210 hours	Year 4 in-school training: min. 144 hrs.
Total in-school: 840 hours	Total in-school: min. 576 hours
Total work based: 6480 accumulated work based hours	Total work base: min. 4800 hours over min. 4 years
Recommended entry: Grade 10 English, Math, and Science	High school graduation or GED or 6 months’ work experience in carpentry or carpentry pre-apprenticeship graduation; mandatory placement exam prior to apprenticeship (for union apprenticeships; varies locally)

[Carpenter GACs and Competencies comparison \(details\)](#)

In the table below we list all the GACs and attendant competencies rated as described above. The ratings are indicative of the differences between trade practices in BC and California.

Table 12. Rank-ordered BC Carpenter GACs and competencies (0=not present in California program; 1=partial overlap; 2=substantial or complete overlap with BC program) – Note Hours & percentages are for the BC program

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
<b>Wood Frame Construction</b>	191.1	23%	1474	<b>2</b>
Describe Wood Frame Construction				1
Select Framing Materials				1
Build Floor Systems				2
Build Wall Systems				2
Build Stair Systems				2
Build Roof Systems				2
Build Specialized Framing Systems				1
Perform Renovations and Additions				0
Build Timber and Engineered Wood Construction				1
Build Decks and Exterior Structures				1
<b>Concrete Formwork</b>	161.7	19%	1247	<b>2</b>
Use Concrete Types, Materials, Additives and Treatments				1
Select Concrete Forming Systems				2
Build Footing and Vertical Formwork				2
Build Slab-On-Grade Forms and Suspended Slab Forms				2
Install Reinforcement and Embedded Items				2
Build Concrete Stair Forms				1
Place and Finish Concrete				1
Install Specialized Formwork				2
<b>Documentation and Organizational Skills</b>	157.5	19%	1215	<b>2</b>
Describe Carpentry Trade				1
Use Construction Drawings and Specifications				2
Interpret Building Codes and Bylaws				0
Plan and Organize Work				2
Perform Trade Math				2
<b>Finishing Materials</b>	96.6	12%	745.2	<b>2</b>
Describe Roofing Materials				0
Install Doors and Hardware				2
Install Windows and Hardware				2
Install Exterior Finishes				2

*A Comparison of Select British Columbia and California Apprenticeships*

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				<b>California</b>
Install Interior Finishes				2
Install Cabinets				2
Install Interior Floor, Ceiling and Wall Systems				2
<b>Tools and Equipment</b>	67.2	8%	518.4	<b>2</b>
Use Hand Tools				2
Use Portable Power Tools				2
Use Stationary Power Tools				2
Use Oxy-Fuel Equipment				0
<b>Survey Instruments and Equipment</b>	50.4	6%	388.8	<b>2</b>
Use Levelling Instruments and Equipment				2
Use Site Layout Equipment				2
<b>Building Science</b>	35.7	4%	275.4	2
Control the Forces Acting on a Building				2
Control Heat and Sound Transmission				2
Control Air and Moisture Movement in Buildings				2
<b>Site Layout</b>	33.6	4%	259.2	<b>1</b>
Lay Out Building Locations				1
Prepare Building Site				1
Apply Excavation and Shoring Practices				1
<b>Access, Rigging and Hoisting Equipment</b>	25.2	3%	194.4	1
Use Ladders, Scaffolds and Access Equipment				2
Use Rigging and Hoisting Equipment				0
<b>Safe Work Practices</b>	21	3%	162	<b>2</b>
Apply Shop and Site Safety Practices				2
Apply Personal Safety Practices				2

Construction Electrician programs comparison at-a-glance

Table 13. Construction electrician and Electrical duration and prerequisites

British Columbia – Construction Electrician	California - Electrician
Level 1 In-school training: 300 hours	Year 1 in-school training: minimum 160 hours
Level 2 In-school training: 300 hours	Year 2 in-school training: minimum 160 hours
Level 3 In-school training: 300 hours	Year 3 in-school training: minimum 160 hours
Level 4 In-school training: 300 hours	Year 4 In-school training: minimum 160 hours
Approximate in-school: 1200 hours	Total in-school: 640 hours
Total work based: 6000 accumulated work based hours	Total work base: 8000 hours

[A Comparison of Select British Columbia and California Apprenticeships](#)

British Columbia – Construction Electrician	California - Electrician
Recommended but not required: recent Grade 12 graduation (within 5 yrs.) with demonstrated mechanical aptitude; Math and Physics 11; English or Communications 12; or successful completion of an electrical industry assessment exam; or recent (with 5 yrs.) Electrical Foundation Program graduate.	High school graduation or GED Must have completed one full year (2 semesters) of high school algebra with a minimum grade of "C," or the equivalent or one semester of college algebra with a minimum grade of "C" or the equivalent. Valid California Driver's License.

[Construction Electrician GACs and Competencies comparison \(details\)](#)

In the table below we list all the GACs and attendant competencies rated as described above. The ratings are indicative of the differences between trade practices in BC and California. Note that the reference is the California trade “Electrician” rather than “Electrical Inside Wireman” which is limited to residential electrical work.

Table 14. Rank-ordered Construction Electrician GACs and competencies (0=not present in California program; 1=partial overlap; 2=substantial or complete overlap with BC program)

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				California
<b>Apply Circuit Concepts</b>	441	2205	37%	<b>2</b>
Use Electrical Circuit Concepts				2
Analyze DC Circuits				2
Solve Problems Using the Principles of Electromagnetism				2
Analyze Single-phase AC Circuits				2
Analyze Three-phase Circuits				2
Analyze Electronic Circuits				2
<b>Install Electrical Equipment</b>	210	1050	18%	<b>2</b>
Install Lighting and Lighting Controls				2
Install Transformers				2
Install Protective Devices				2
Install DC Motors and Generators				2
Install AC Motors and Alternators				2
Install HVAC				2
Install Emergency Power Systems				2
Install Alternative Power Systems				2
<b>Install Low Voltage Distribution Systems</b>	168	840	14%	<b>2</b>
Apply Codes, Regulations and Standards				1
Install Service Equipment				2
Install Grounding and Bonding				2
Install Distribution Centres				2
Install Raceways, Boxes and Fittings				2
Install Conductors and Cables				2



*A Comparison of Select British Columbia and California Apprenticeships*

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
Install Utilization Equipment and Devices				2
<b>Install Control Circuits and Devices</b>	168	840	14%	2
Install Manual Motor Controls				2
Install Magnetic Motor Controls				2
Install Electronic Motor Controls				2
Install PLCs				1
Install Automated Controls				2
<b>Read and Interpret Drawings and Manuals</b>	75	375	6%	2
Use Circuit Drawings				2
Use Construction Drawings and Specifications				2
Use Manuals and Manufacturers' Instructions				1
Plan Time and Materials				0
<b>Install Signal and Communications Systems</b>	42	210	4%	2
Install Fire Alarm and Suppression Systems				2
Install Structured Cabling Systems				2
Install Nurse Call Systems				0
Install Building Integrated Control Systems				2
Install Sound Systems				0
Install Entertainment Systems				0
Install CATV Systems				2
Install Security Alarm Systems				2
<b>Use Test Equipment</b>	42	210	4%	2
Use Analog Meters				2
Use Digital Meters				2
Use Scopes				2
Use Power Quality Analyzers				2
Perform Structured Cable Testing and Reporting				2
<b>Install High Voltage Systems</b>	24	120	2%	0
Apply High Voltage Safety Procedures				0
Install High Voltage Cable				0
Install High Voltage Switch Gear				0
Use High Voltage Test Equipment				0
<b>Use Safe Work Practices</b>	18	90	2%	2
Perform Lockout Procedures				2
Apply WCB Standards and Regulations				0

[A Comparison of Select British Columbia and California Apprenticeships](#)

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				<b>California</b>
Apply Safe Work Practices				2
Apply WHMIS				0
Use a Daily Safety Plan				2
Use Safe Rigging Techniques				2
<b>Use Essential Skills</b>	12	60	1%	<b>1</b>
<b>Use Tools and Equipment</b>	0	0	0%	<b>2</b>
Use Hand Tools				2
Use Power Tools				2
Use Fastening Systems				2
Use Powder Actuated Tools				0
Use Access Equipment				2

[Plumbers programs comparison at-a-glance](#)

Table 15. BC and California Plumber duration and prerequisites

British Columbia – Plumber	California - Plumber
Level 1 In-school training: 180 hours	Year 1 in-school training: minimum 200 hours
Level 2 In-school training: 180 hours	Year 2 in-school training: minimum 200 hours
Level 3 In-school training: 180 hours	Year 3 in-school training: minimum 200 hours
Level 4 In-school training: 240 hours	Year 4 in-school training: minimum 200 hours
Total in-school: 780 hours	Total in-school: 800 hours
Total work based: 6420 accumulated work based hours	Total work base: 7200 hours
Recommended but not required: Grade 12 English, Grade 11 Algebra or Trade Math 11, Grade 11 Physics or Science and Technology 11	High school diploma or GED; must be able to read, write and speak the English language. Attend two nights per week in related training classes (school) during school terms. Valid California driver’s license. Present verification of legal right to work in the United States.

[Plumbers GACs and Competencies comparison \(details\)](#)

In the table below we list all the GACs and attendant competencies rated as described above. The ratings are indicative of the differences between trade practices in BC and California.

Table 16. Rank-ordered Plumber GACs and competencies (0=not present in California program; 1=partial overlap; 2=substantial or complete overlap with BC program)

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				<b>California</b>
<b>Install Natural Gas and Propane Systems</b>	192	1580	25%	<b>2</b>
Install and service fuel systems				2
Install and service gas equipment				2

*A Comparison of Select British Columbia and California Apprenticeships*

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
Install venting and air supply				2
Install and service controls and safeguards				2
Use gas codes, regulations and standards				0
<b>Organize Work</b>	122.5	1009	16%	<b>2</b>
Use mathematics and science				2
Read drawings and specifications				2
Use codes, regulations and standards				0
Use manufacturer and supplier documentation				2
Plan a project				2
<b>Install Sanitary and Storm Drainage Systems</b>	113.8	936.3	15%	<b>2</b>
Install sanitary drain, waste and vent systems				2
Install storm drainage systems				2
Install sanitary sewer systems				2
Test and commission sanitary and storm drainage systems				2
Maintain and repair sanitary and storm drainage systems				2
<b>Install Water Service and Distribution</b>	96	790.1	12%	<b>2</b>
Install water services				2
Install potable distribution systems				2
Install private potable water supply systems				2
Install water treatment systems				2
Test and commission potable water systems				2
Maintain and repair potable water systems				2
<b>Install Hydronic Heating and Cooling</b>	77.04	634.1	10%	<b>2</b>
Describe the operation of hydronic heating and cooling systems				2
Install hydronic heating and cooling systems				2
Test and commission hydronic systems				2
Maintain and repair hydronic systems				2
<b>Use Tools and Equipment</b>	55.28	455	7%	<b>2</b>
Use hand tools				2
Use portable power tools				2
Use stationary power tools				2
Use measuring and leveling tools				2
Use cutting, brazing, and soldering equipment				2

*A Comparison of Select British Columbia and California Apprenticeships*

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
Use ladders and platforms				2
Use rigging and hoisting equipment				2
<b>Prepare and Assemble Plumbing Components</b>	35.1	288.9	4%	<b>2</b>
Install pipes				2
Install valves				2
Install fittings				2
Penetrate structures				2
<b>Apply Plumbing Principles</b>	23.32	191.9	3%	<b>2</b>
<b>Install Fixtures and Appliances</b>	22.4	184.4	3%	<b>2</b>
Install fixtures and trims				2
Install appliances				2
Test and commission fixtures and appliances				2
Maintain and repair fixtures and appliances				2
<b>Install Specialized Systems</b>	18.42	151.6	2%	<b>2</b>
Install medical gas systems				2
Install irrigation systems				0
Install compressed air systems				2
Install fire protection systems				2
Test and commission specialized systems				2
Maintain and repair specialized systems				2
<b>Use Safe Work Practices</b>	12.42	102.2	2%	<b>2</b>
Control workplace hazards				2
Use information in the OSH Regulation and WCB standards				0
Use WHMIS				0
Use Personal Protective Equipment				2
Practice fire prevention				2
<b>Install Private Sewage Systems</b>	11.76	96.79	2%	<b>2</b>
Install private sewage disposal systems				2
Repair and maintain private sewage disposal systems				2

Construction Craft Workers programs comparison at-a-glance

Table 17.BC Construction Craft Worker and California Construction Craft Worker (concrete) duration and prerequisites

<b>British Columbia – Construction Craft Worker</b>	<b>California - Construction Craft Laborer</b>
Level 1 In-school training: 120 hours	Year 1 In-school training: 108 hours

[A Comparison of Select British Columbia and California Apprenticeships](#)

British Columbia – Construction Craft Worker	California - Construction Craft Laborer
Level 2 In-school training: 120 hours	Year 2 In-school training: 108 hours
Total in-school: 780 hours	Total in-school: 216 hours
Total work based: 4000 accumulated work based hours	Total work based: 3000 over 2 years minimum
Recommended but not required: Grade 12 English, Grade 11 Algebra or Trade Math 11, Grade 11 Physics or Science and Technology 11	No educational requirement. English language (speaking, reading, writing) required.

[Construction Craft Workers GACs and Competencies comparison \(details\)](#)

In the table below we list all the GACs and attendant competencies rated as described above. The ratings are indicative of the differences between trade practices in BC and California – they also stem from the type of work in which the California laborers are involved routinely.

Table 18. Rank-ordered Construction Craft Worker GACs and competencies (0=not present in California program; 1=partial overlap; 2=substantial or complete overlap with BC program; Note: we used the “Concrete” specialization as a reference)

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				California
<b>Perform Concrete Work</b>	45.6	19%	760	<b>1</b>
Form Concrete				1
Place and Finish Concrete				1
Modify Concrete				0
Install Grout, Epoxies and Caulking				1
<b>Perform Site Work</b>	43.2	18%	720	<b>2</b>
Prepare Site				2
Perform Ground Work				2
Perform Demolition				2
Apply Excavation and Shoring Practices				2
Service Site				1
<b>Use Scaffolding and Access Equipment</b>	27.6	12%	460	<b>1</b>
Use Scaffolding and Access Equipment				1
Use access equipment				0
<b>Perform Utilities and Pipeline Tasks</b>	26.4	11%	440	<b>2</b>
Install utility piping				2
Perform pipeline activities				2
Perform pipeline maintenance				0
<b>Organize Work</b>	24	10%	400	<b>1</b>
Use Documentation, Blueprints and Specifications				1
Communicate with Others				1
Use Basic Trade Math				0
<b>Perform Routine Trade Activities</b>	24	10%	400	<b>1</b>

*A Comparison of Select British Columbia and California Apprenticeships*

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
Install Permanent and Temporary Fencing				1
Erect and Dismantle Hoarding / Enclosures				0
Perform Traffic Control				2
Establish Grades and Elevations				0
Handle Materials				2
Install Membranes				1
Install Insulating Materials				1
<b>Use Safe Work Practices</b>	18	8%	300	<b>1</b>
Manage Workplace Hazards				2
Apply OHS Regulations and WorkSafeBC Standards				0
Use Fall Protection Systems and Equipment				1
Use Personal Protective Equipment				1
Use Fire Safety Procedures				1
Use Safety Committees				0
Perform Safety Watch				0
<b>Use Tools and Equipment</b>	12	5%	200	<b>2</b>
Use hand tools				2
Use power tools				2
Use powder-actuated tools				0
Use Rigging and Hoisting Equipment				1
Use portable equipment				2
Use mobile equipment				2
Use sandblasters				0
Use packers				2
<b>Perform Masonry Work</b>	12	5%	200	<b>0</b>
Prepare masonry work				0
Tend to bricklayers				0
<b>Perform Roadwork</b>	7.2	3%	120	<b>2</b>
Install paving materials				2
Install roadwork components				2

Roofer (Damp- and Waterproof) programs comparison at-a-glance

Table 19. BC and California Roofer apprenticeships; duration and prerequisites (Note: California reference is the Dual Stream)

British Columbia - Roofer	California – Roofer and waterproofer
Level 1 In-school training: 120 hours	Year 1 in-school training: minimum 144 hours

[A Comparison of Select British Columbia and California Apprenticeships](#)

British Columbia - Roofer	California – Roofer and waterproofer
Level 2 In-school training: 120 hours	Year 2 in-school training: minimum 144 hours
Level 3 In-school training: 120 hours	Year 3 in-school training: minimum 144 hours
	Year 4 in-school training: minimum 144 hours
Total in-school: 360 hours	Total in-school: 576 hours
Total work based: 6480 accumulated work based hours	Total work base: 4000 hours over 42 months minimum
Recommended entry: Grade 10 English, Math, and Science	No educational requirement. English language (speaking, reading, writing) required. Provide own tools and equipment.

[Roofer \(Damp- and Waterproofing GACs and Competencies comparison \(details\)\)](#)

In the table below we list all the GACs and attendant competencies rated as described above. The ratings are indicative of the differences between trade practices in BC and California.

Table 20. Rank-ordered Construction Roofer GACs and competencies (0=not present in California program; 1=partial overlap; 2=substantial or complete overlap with BC program; Note: we used the “Roof, wall and waterproofing technology” specialization as a reference)

General Area of Competence (GAC)	In-school hours	%/GAC	On-the-job hours	Rating
Competencies				California
<b>Install Low Slope and Flat Roofing</b>	138.0	1380	38%	<b>2</b>
Install Gypsum Board and Insulation				2
Install Overlay Board				2
Install Vapour Retarders and Air Barriers				2
Install Flashing Materials				2
Install Built-Up Roofing Systems				2
Install Flexible Membrane Roof Systems				2
<b>Install Steep Roofing</b>	55.2	552	15%	<b>2</b>
Install Asphalt Shingles				2
Install Wood Shingles and Shakes				2
Install Concrete and Composite Materials				2
Install Metallic Materials				2
<b>Organize Work</b>	45.6	456	13%	<b>0</b>
Describe Roof Types				0
Communicate with others				0
Prepare the worksite				0
Estimate quantities of materials				0
<b>Use Safe Work Practices</b>	44.4	444	12%	<b>1</b>
Describe Workplace Hazards				2
Interpret the Occupational Health and Safety Regulation and WCB Standards				0
Use WHMIS				0
Use Personal Protective Equipment				2

*A Comparison of Select British Columbia and California Apprenticeships*

<b>General Area of Competence (GAC)</b>	In-school hours	%/GAC	On-the-job hours	<b>Rating</b>
Competencies				<b>California</b>
Use fire safety procedures				2
<b>Use Documentation</b>	32.4	324	9%	<b>1</b>
Read Drawings and Specifications				1
Use Building Codes and RCABC Standards				0
Read Manufacturers' Information				0
<b>Use Tools and Equipment</b>	21.6	216	6%	<b>2</b>
Use hand tools				2
Use portable power tools				2
Use propane-fuelled equipment				2
Use hot process equipment				2
Use Hoisting, Lifting and Rigging Equipment				2
Use Motorized Equipment				2
Use Ladders and Platforms				2
<b>Assess and Maintain Roof, Damp and Waterproofing</b>	12.0	120	3%	<b>2</b>
Assess Roof Conditions				2
Maintain and Repair Roofs, Damp and Waterproofing				2
<b>Apply Waterproofing and Damp-Proofing</b>	7.2	72	2%	<b>2</b>
Waterproof surfaces				2
Damp-proof surfaces				2
<b>Prepare Roofs</b>	3.6	36	1%	<b>2</b>
Prepare Roofs For Replacement				2
Prepare Roofs For New Installation				2



## Discussion

In this section, we consider the meaning of the results.

### Essential Skills

#### Reading

The “overall score of 2.56” reflects our assumption that many California trade persons have English as mother tongue, and have completed high school or obtained a GED where the language of instruction and examinations is English. Regardless of English fluency, it is also safe to assume that California newcomers would lack familiarity with exact BC-specific safety, trade or legislation technical terms, or codes and regulations, but would master those in a general sense as they would trade processes language (including trade jargon).

In addition, reception (listening and reading – A1/A2), reading tending to be a more complex literacy skill than listening (and understanding), this even more so in a specialized field and for newcomers with just the GED or from a trade with no educational requirements such as Construction Craft Laborer or Roofer and waterproofer.

#### Document Use

The “overall score of 2.11” reflects the language assumption we mentioned above. We can expect a California newcomer whose mother tongue and education are English to be able to handle most common documents, especially plans, schematics, blueprints etc. The California trade person’s limitations would be linked to differing protocols embedded in the plans rather than the language skills. The only skill we thought might be out of a California trade person is that of completing complex forms and building permits (score of 0). Here we have assumed that unfamiliarity with exact terms and process, even though in English, worked synergistically “against” a newcomer.

The most complex literacy skill required here is that of mediation (translating and interpreting - C1/C2). But California trade persons have had to practice that skill in their day-to-day practice in their home state/country. In BC their only impediment is that of having to apply the skill in a new environment.

#### Writing

The “overall score of 2.20” reflects both the language assumption we mentioned above and the fact that both written production (written – B1) and document “interaction” (B2) are directly proportional to educational achievement – here we have assumed that GED achievement was common and weighted that with the fact that 2 of the 5 trades have no educational requirements.

#### Numeracy

The “overall score of 1.57” reflects the language assumption even though its importance is not as great here as it is in the other essential skills categories. However, the trade educational requirements - and there are none for 2 of the 5 trades we considered – are light on mathematics, with the algebra requirement for electrician apprentices, and the training, most often does not mention “trade math”. Still, we can expect a California newcomer to be able to handle tasks requiring numbers like taking measurements and conducting rough estimates as these skills are part of everyday trade practices – but we might make an exception for Roofers and waterproofer and Construction Craft Laborers, where the emphasis appears to be more on “doing” than “planning”.

## [A Comparison of Select British Columbia and California Apprenticeships](#)

In addition of these two trades, the other 3 trades workers might also not be fluent in scheduling and estimating costs and time-to-completion because (i) the minimum educational achievement required is quite low, and (ii) these skills are not emphasized (or mentioned in the training minima). In addition, we can assume that, despite commonalities, California business trade practices are different in BC.

### [Oral communications](#)

The “overall score of 1.40” reflects the language assumption and the complexity level: interaction (spoken – B2) < mediation (translating and interpreting – C1/C2). Language demands such as understanding simple requests, what is said at crew meetings, or what a customer might want is certainly within the grasp of a California newcomer. But talking to building and safety inspectors, engineers, manufacturers, or acting as a crew leader might be beyond a California trade person’s abilities less because of language barriers than because of a lack of familiarity with the industry in BC.

### [Essential Skills recommendations](#)

It is unlikely that essential skills training is required for California newcomers, at least for them to be able to join and function as part of a (small) team. Doubtless some of them, especially those newcomers whose mother tongue is not English, would benefit from a brief educational intervention made up of 2 parts: (i) trade and legalistic English and (ii) worksite protocols and business processes, both making use of documents, such as regulations or codes, pertinent to the newcomers’ trade.

### [Health and Safety, and other legislated skills](#)

Here we have assumed that Personal Protective Equipment (PPE), Fall protection and arrest, and participation/cooperation with OSH practices and people are similar – and just as compulsory - in California. But to be compliant in BC, a trade worker needs to be holding the BC (or Canadian) proof of training.

WorkSafeBC (WSBC) lists rights and responsibilities for workers – and additional training for “new” workers. While compliance is commonly taken care of by the employer, it is up to the trade person to know what they can and cannot do safely, as well as how to be in compliance with WSBC regulation. WSBC requirements with respect to PPE varies from trade to trade but usually includes regulation-approved footwear, clothing (including high visibility clothing), ear/eye/hand protection, and hard hat. In addition, for some types of work, respirator proficiency is required.

Workplace Hazardous Materials Information System (WHMIS) is a requirement for all types of work and workplace. WHMIS certification is often a pre-requisite for jobs – it may be offered through the employer.

Proof of training and a certificate in Fall Prevention (covered under Part 11 of the WSBC Regulation) is a requirement for all workers who work at heights exceeding 3 meters. And while it is possible to work without fall restraint (for example if guardrails have been installed), roofers and carpenters will often be required to have and know how to use fall restraint equipment.

Electricians and plumbers often work in confined spaces (covered under Part 9 of the WSBC Regulation). Proof of training and a certificate is required for those workers who might come across such environments.

## [A Comparison of Select British Columbia and California Apprenticeships](#)

For all construction trades a familiarity with the codes relevant to their occupation is necessary. In addition, plumbers in BC are expected to have a “Gas B License” in order to install and connect gas-fired appliances.

Trade persons are often expected to drive a company vehicle – most likely a pick-up truck or van. These vehicles can be operated with a Class 5 BC Driver’s License. ICBC has an agreement in place to exchange a California driver’s license for a BC one provided a copy of the document is submitted alongside proof of at least 2 years’ driving experience either in the form of a formal letter or as attested by the issuance date on the driver’s license itself. Operating commercial vehicles with more than 2 axles, especially those equipped with air brakes requires a special license and an air brake endorsement.

### [Health and Safety, and other legislated skills recommendations](#)

There are many online training opportunities for all the OSH requirements that are appropriate and recognized. These can be purchased for approximately \$200.

Code books (or relevant appropriate section) can be purchased for \$150-250 online or at specialized bookstores – knowing the code will be important for those workers wanting to challenge the Red Seal examination, especially for Plumbers and Electricians.

Plumbers wishing to install and connect gas-fired appliances will have to take a course and pass the relevant Safety Authority examination.

## [Training Contents Comparisons](#)

### [Carpenter](#)

The differences between trade practices in BC and California are minimal. Briefly, in California carpenters do not routinely

- Build structures using timber-frame techniques.
- Install roofing materials.
- Use oxy-fuel equipment.
- Perform rigging and hoisting tasks.

Curiously, the apprenticeship program does not mention the performance of:

- Perform renovations and additions.

### [Carpenter recommendations](#)

California carpenters have the skills to be productive on a worksite. But they miss some minor skills required to be fully autonomous – say on a small residential job where roofing is required, or to work on residential tower, industrial, or commercial projects that make heavy use of reinforcing steel in concrete. Providing California carpenters with an oxy-fuel component at an institution (approximately 2 weeks and \$500) as well (advanced) on-the-job experience for timber framing and site layout would bring them up to the level of BC carpenters.

And to ensure safety on the job site, a one-day rigging and hoisting course would be beneficial<sup>19</sup>.

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<sup>19</sup> See, e.g., <http://www.safetycheck.ca/course-training.asp?name=introduction-to-rigging-and-hoisting&id=38>

## [A Comparison of Select British Columbia and California Apprenticeships](#)

Alternatively, they could pick up these skills on the job if they were employed as a Construction Craft Worker, whether as an apprentice or a laborer, getting to Carpenter Red Seal certification in 2-3 years (their apprenticeship hours fall short of the ITA requirement).

### [Construction Electrician](#)

The differences between trade practices in BC and California stem from codes and regulations, and high voltage electrical distribution systems. But California electricians have advanced skills in photovoltaic and other green technologies. Briefly, in California electricians do not

- Install sound and entertainment systems.
- Install nurse call systems.
- Install high voltage systems.
- Plan and estimate jobs (generally).

### [Construction Electrician recommendations](#)

California electricians have the skills to be productive on a worksite on residential, commercial, or industrial jobs. But they will need to adapt to high voltage component that they do not seem to have. Likewise, codes and regulations driving work practices will be foreign to them. Providing them with an Electrical Code course (approximately 2 weeks a day/week and \$600) would bring them up to speed.

Alternatively, they could pick up these skills on the job, getting to Red Seal certification in a year or so.

### [Plumber](#)

The differences between trade practices in BC and California stem from codes and regulations. But California plumbers have advanced skills in water conservation and other green technologies. Briefly, in California “Plumbers” do not

- Irrigation systems.

### [Plumber recommendations](#)

California “plumbers” have the skills to be productive on residential, commercial, or industrial worksites for installation, commissioning, and troubleshooting work. But codes and regulations driving work practices will be foreign to them, and they will not have the required gas license. Providing them with the in-school equivalent of C3 (codes and regulations) in C line in Level 1 (approximately 1 week) of the apprenticeship program and a Gas B course (approximately 3 weeks and \$1000) would bring them up to speed.

Alternatively, they could pick up code-related skills on the job and take the Gas B course – to get the Safety Authority qualification, then challenge the Red Seal examination in a year or so.

### [Construction Craft Worker](#)

The ratings are indicative of the differences between trade practices in BC and California. Clearly, California Construction Craft Laborers work more often on road, utility, and pipeline crews than they do on large construction projects.

Briefly, in California Construction Craft Laborers do not

- Help masons.
- Modify concrete structures.
- Maintain pipelines.
- Establish elevations.

## [A Comparison of Select British Columbia and California Apprenticeships](#)

- Erect/dismantle enclosures.
- Use access equipment.

### [Construction Craft Worker recommendations](#)

California Construction Craft Laborers have the skills to be productive on a worksite. But, codes and regulations driving work practices will be foreign to them. While they have no masonry background, they bring asphalt roadwork to the table. As well they have substantial utility piping (and pipeline) experience. After a solid year and a half on the job, they should be able to challenge the Red Seal examination.

### [Roofer](#)

The ratings are indicative of the differences between trade practices in BC and California.

Briefly, in California Roofers and waterproofers do not

- Organize and “run” jobs.
- Know local industry standards (in this case Roofing Contractors Association of BC – RCABC).

And while they waterproof structures, it is unclear to determine, from the documents, what proportion of this work is conducted below grade.

But they have advanced skills in treating (sometimes maintaining) green technologies that are installed on roofs such as photovoltaic cells. In addition, they also have advanced training in handling polluting waste in a “green manner”.

### [Roofer recommendations](#)

California Roofers have the skills to be productive on a worksite, be it flat, low slope, or steep roofing. They would also be a strong asset in the roof architectural sheet metal work. But, codes, regulations, and industry standards driving work practices will be foreign to them – as will be managing a job on their own. Within a year or so on the job they should be able to challenge the Red Seal examination.

## [Credentialing comparisons](#)

### [British Columbia](#)

Apprentices are required to pass each of 4 levels (blocks) of in-school training. At the time of this writing, the practical and theory tests were institution-specific, but coordinated through a BC Articulation Committee for the trade. The Industry Training Authority (ITA) intends to impose standardized level theory tests starting in 2016. There is no standardized practical test: instructors assign cumulative marks for in-school projects (similar but not standardized).

Successful completion of the Level 4 in-school final exam gives access to the Red Seal examination, the only certification mechanism for carpenters in BC.

### [The Red Seal - Apprentices and challengers](#)

#### [Introduction](#)

Apprentices and approved challengers are required to write the Red Seal examination to get a BC carpenter credential. There is no partial credit, no part credential.

The Red Seal examination is a timed “paper and pencil” test. All questions on the examination are machine-scorable multiple choice.

The Red Seal Certification examination is based on the National Occupational Analysis (NOA). The NOA is broken down into a number of blocks, tasks, and sub-tasks. Examination questions are based on the sub-tasks, the number of questions on each sub-task is based on a national mathematical average of estimated time spent on task by the carpenters in each jurisdiction, curved to the total number of question on the examination.

There is no weighting of any section of the Red Seal examination based on either heightened safety implications or criticality of task. There is no jurisdictional examination overlay for the Red Seal examination.

Red Seal examinations are prepared cooperatively between all Canadian jurisdictions but are hosted by a designated jurisdiction (designate status for any Red Seal examination is assigned through the CCDA<sup>20</sup>'s Product Committee's ISEC<sup>21</sup>). Red Seal examinations are item bank-generated; that is for each examinable sub-task of the NOA, a number of items are developed and then randomly assigned to an instrument based on a ToS<sup>22</sup> that mirrors the NOA percentages.

Bank-generated examinations are more comprehensive and more "difficult<sup>23</sup>" than many of the "before-bank" examinations: items address more areas of the trade at more varied/complex levels than in one-off, instructor-developed examinations.

### Problems

It is generally assumed that the ability to pass the examination<sup>24</sup> can be directly attributed to a candidate's work experience: that there is a direct proportional relationship between the level, scope, and quality of on-the-job training (OJT) and experience, and performance on the examination. It is also assumed that the instructional content (and activities) delivered by the institutions reflect the National Occupational Analysis (NOA) - our analysis shows this to be a dubious assumption, at best.

There are several problems with these assumptions. First, it is questionable if a pencil and paper test can stand as a proxy for practical ability. Second, it is unclear whether the candidates are able, for the purpose of the test only, to conceptualize what they do to answer a "word" problem. Third, domain hierarchy is neither considered nor established. And fourth, the NOA sub-tasks are not worded clearly enough to permit domain definition (e.g. "G21.01 Removes existing materials").

The third and fourth problems are of interest to the carpenter Red Seal examination because they are borne out of examination development design and practice. As a pencil and paper test, the carpenter IP assumes that all candidates can read, thus making the examination a test of literacy. As well, many items require candidates to apply mathematical concepts to identify (not necessarily generate as they would on the job) the correct answer, as such, the Red Seal is a test of numeracy. These two domains are listed in the Essential Skills, but these are not tested for, nor are they part of the requirement for challengers,

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<sup>20</sup> Canadian Council of Directors of Apprenticeship

<sup>21</sup> The *Interprovincial Standards Examination Committee* is made up of provincial/territorial government representatives

<sup>22</sup> A *Table of Specifications* is developed by the host jurisdiction and assigns weights and taxonomic item levels to sub-tasks

<sup>23</sup> Where "difficulty" is a perceptual measure from the candidates' perspective rather than statistically derived through Item Response or Classical theories

<sup>24</sup> 70% aggregate cut score for all Red Seal examinations

## [A Comparison of Select British Columbia and California Apprenticeships](#)

but they are tested in conjunction with the job skills. All Red Seal examinations are made up of items that test an indeterminate number of domains in an indeterminate fashion.

Success on the Red Seal examination means the candidate scored >70%. All Red Seal examinations have this unique cut score. The cut score is not adjusted to the compounded psychometric profile of the items used for the examination – items are not differentially weighted. And, while results are available at the task level, the score obtained is the unweighted ratio of correct answers over number of questions at the sub-task level.

### *Validity*

Validity is a measure of confidence in the inferences made based on a test score. With high stakes tests (like the Red Seal), it is crucial that test developers and administrators ensure inferences drawn from test scores are accurate. In the case of carpenters, a score <70% means that the candidate is not a competent carpenter, a serious professional issue.

Validation studies are recommended prior to the introduction of any test and should be mandatory for high stakes tests like the carpenter Red Seal. Usually three types of validation studies are conducted: content, criterion-related, and construct. With Red Seal examinations in general, only a cursory content validation is conducted when local experts review items.

Some may argue that the use of subject matter experts (SMEs) during item development is a validation exercise. This is a spurious argument, as content validation exercises ought to be conducted by independent judges, not the people who developed the items. Moreover, there is no indication that the SMEs are fully cognizant of all domains tested, are representative of the population of carpenters, or can precisely determine what is being tested.

### *Reliability*

If a test is an accurate measure of an individual's ability<sup>25</sup>, then any candidate's observed scores should be consistent over repeated tries on the same test or parallel, equated tests. Reliability indices are numerical values that provide a statistical measure of the consistency of test scores; one would expect z-scores of a given individual to remain relatively consistent over repeated tries.

Score consistency is affected both by random and systematic errors. Random errors are chance happening and cannot be controlled (but they can be accounted for). Systematic errors are due to either examination flaws or candidates' characteristic (e.g. visual impairment). Red Seal examinations are developed, produced, and implemented without any reliability studies. In fact, some jurisdictions do not track reliability indices, even rudimentary  $\alpha$ s or z-scores distributions in or for test-re-test situations.

### *California*

The State of California issues a "Certificate of Completion" only to those apprentices who have completed the minimum requirements as stated in the Minimum Industry Training Criteria (MITC) developed by "The Electrical Industry Training Committee" which is appointed by the California Apprenticeship Council (CAC). These MITC are "managed" by the Division of Apprenticeship Standards (DAS) of the California Department of Industrial Relations. For trades like Electrician and Plumber, a

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<sup>25</sup> i.e. that  $E$  (the error unrelated to the domain(s) being tested – see footnote 2) is minimized in  $T=X+E$  so that the test score ( $X$ ) is a stable, true reflection of the true score ( $T$ ),

trade license is available to all, regardless of background, provided they can pass the examinations – there are schools specializing in exam preparation courses.

For apprentices, there are no paper-and-pencil summative tests like the Red Seal. There are institution-specific examinations for in-school training, the scheduling, sequencing, content, and testing of which must match the MITC but can (and do) vary locally – local industry and unions (not obligately) establish and “enforce” these requirements.

For apprentices, there are no standard hands-on tests. Rather, “All apprentices must prove a satisfactory competency of prior skills and knowledge at the time of their advancement to the next higher level. The tests shall be based on all Related and Supplemental Instruction and hands-on manipulative skills. Periodic testing shall be done during each level of coursework and apprentices shall not advance to the next level unless they have achieved an average total score of 70% or higher.”<sup>26</sup>

In addition, some employers are also the “training institution” of record. For them, as for, say Joint Apprenticeship Training Committees of various unions, or community colleges, or private institutions, the main obligation to the state is to account for funds received from the US Federal Government under one of the following programs:

- U.S. Department of Education: Federal Student Aid Funds, Title IV Student Aid including Pell Grants and Federal Work Study
- U.S. Department of Labor: Federal Workforce Funds for Registered Apprenticeship
- U.S. Department of Veterans Affairs: GI Bill® and Veterans Programs in Registered Apprenticeship
- U.S. Department of Agriculture: Supplemental Nutrition Assistance Program – Employment and Training Programs
- U.S. Department of Transportation: Federal Highway Administration On-the-Job Training and Supportive Services Program
- U.S. Department of Housing and Urban Development; Section Covered: Housing and Urban Development Financial Assistance Programs

California maintains a parallel (and sometimes collaborative), albeit less extensive, funding system. California also “audits”, and in collaboration with the advisory bodies mentioned above, sets graduation minima for apprenticeship provider to achieve as a condition for on-going funding.

There is no state oversight or testing of achievement.

None of the tests that are used are cross-referenced to “end state” competences. Rather, they are based on statements (for electricians) such as “Methods for selecting proper size and type of conductors”, or “Sizing, layout and installation of grounding systems” for school-based training, and for on-the-job-training, “Establishing a Grounding System” or “Installing New Wiring and Repairing Old Wiring”. The embodiment of these competences is left to the entity delivering the program.

The trade credentials are issued by the California Department of Industrial Relations upon documented completion of the program minimum requirements.

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<sup>26</sup> California Electrical Industry MITC



*Validity*

The state requires that California apprentices demonstrate both cognitive and hands-on abilities. But the modes and instruments for testing are non-standard. And since apprenticeship completions are a key indicator for continued funding, and since the examiners are also the people delivering the program, a potential conflict of interest is possible and may be a threat to the tests validity, even at a local level.

The terminal competences are those the training program and the trade require as minimum proof of competence but the vagueness and generality of the terms, phrases, and descriptors, not to mention lack of performance outcomes or indicators (at least with Bloom-aligned action verbs), leave a lot of room for stated rather than demonstrated achievement.

Assuming validity is unwarranted by the evidence.

*Reliability*

Having many tests increase challenges to reliability if we added a reliability index for each test and summed those. But in California, the tests are not standardized and do not appear to have been tested for consistency, either on their own or from test to test.

While we could argue that the California performance picture of an apprentice is a composite one spread over the duration of the apprenticeship, it is unknown that a candidate in a test-re-test situation would “do” roughly the same overall.

Assuming reliability is unwarranted by the evidence.

*BC vs. California*

Table 21 compares the major elements of the testing and credentialing systems for apprentices and trade persons in BC and in California. Both systems reflect general beliefs and philosophy about education and training.

Briefly, BC, consistent with a greater reliance on technology and quantitative, large scale standardized testing uses a machine scorable test. The Red Seal examinations are designed and produced by a broad-based Canadian consensus, and are managed by a local arms-length government agency, ITA, an institution removed from the training institutions and the field. The Red Seal endorsement is meant to qualify the worker to the worker’s benefit.

By contrast, the California approach is non-standard, reflects local ideas of competence, and is reliant on non-expert testers and tests. But, as is the case in BC, the credential is meant to qualify the worker to the employers’ benefit.

Table 21. Comparison of BC and California examination and credentialing

Examination and certification		
Element	BC	California
Exam	Single	Multiple
	Pencil & paper	Pencil & paper
		Hands-on
Domains tested	Multiple unspecified	Multiple specified (somewhat)
	Proxy	Direct and proxy
Domain inclusion	Negotiated norm	Local norm
Item type	Selected response	Unknown

*A Comparison of Select British Columbia and California Apprenticeships*

Examination and certification		
Element	BC	California
Scoring	Machine	Rubric-based
		Examiner teams
Scores	One correct	Unknown
Results	Unique fixed cut score	Locally averred minimum
Validity	Medium	Weak
Reliability	Unknown	Weak
Credential	Endorsement	State (completion only)