

CCDA Final Approval of Harmonization Recommendations

Version: June 30, 2022

Overview

The goal of the Harmonization Initiative is to *substantively align* apprenticeship systems across Canada by making apprenticeship training more consistent in the Red Seal trades¹. Harmonization of apprenticeship training is a key priority for industry, the Canadian Council of Directors of Apprenticeship (CCDA) and the Forum of Labour Market Ministers (FLMM)². The implementation target is to have apprentices accepted in level 1 (minimum requirement) as of September 2016 in most jurisdictions.

Name	Total Training Hours	Training Levels	Sequencing	Variations	CCDA Approval
1. Metal Fabricator (Fitter)	5400	3	1.2. Snapshot and Topic Detail 1.3. Sub-Task 1.4 Metal Fabricator Fitter Phase 7 Review	Sequencing: Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW) and Metal Core Arc Welding (MCAW) will be covered in levels 1 and 2, with the exception of Alberta where they will be covered in levels 2 and 3. Hours: Ontario 6000 hours	June 3, 2015
2. Welder	5400	3	2.2. Snapshot and Topic Detail 2.3. Sub-Task 2.4 Welder Phase 9 Review	Sequencing: Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW) and Metal Core Arc Welding (MCAW) will be taught progressively across all levels in most of Canada, but Alberta will offer them only in levels 2 and 3. Northwest Territories and Nunavut follow Alberta's training program. Hours: Ontario 6000 hours	June 3, 2015
3. Carpenter Phase 1	7200	4	3.2. Snapshot and Topic Detail 3.3. Sub-Task by NOA Block 3.3.A Carpenter Phase 7 Review	Training Levels: Ontario will stay at three levels. Hours: Ontario's industry recommended 7200 hours however in regulation this is what it states: An apprentice training program in the trade is established and shall consist of a minimum of 3,844 hours of related training and work experience training or such greater number of hours as the Director may determine of related training and work experience training to a maximum of 7,200 hours. R.R.O. 1990, Reg. 1056, s. 3.	July 7, 2015 Review approved March 30, 2021
4. Ironworker (Generalist)	5400	3	4.2. Snapshot 4.3. Topic Detail 4.4. Sub-Task by NOA	General: Alberta is in the process of considering de-designating Ironworker (Generalist) so will not be harmonizing this trade at this time. Name: Ontario's name is Ironworker-Generalist	Sept. 17, 2015

¹ Québec is an observer on this initiative.

² **Ontario's Harmonization Project Terms of Engagement:**

The College is not able to independently implement the recommendations without its Ministry of Labour, Training and Skills Development (MLTSD) partner who administer and fund ON's apprenticeship programs.

More specifically, Ontario has adopted the following guiding principles:

Trade Name: Ontario has taken the position that variances in trade names will be noted as exceptions, but are 'close enough' in terms of not inhibiting apprentice mobility (as per the agreed definition of 'substantive alignment').

Total Hours: Where Ontario meet and exceeds the hours recommendation in many trades, Ontario will maintain its current hours structure and not lower the allotment of training time. Where Ontario is lower, we will meet with industry and apprenticeship partners to confirm the viability/possibility of adding training hours.

Levels: Where the number of levels differs, Ontario will 'stand aside' and not obstruct the recommendation from moving forward.

Sequencing: Ontario is 'standing aside' on all proposed sequencing until the RSOS workshop is held and Ontario stakeholders have had the opportunity to validate that document and decide what jurisdictional specific content is necessary to include – the jurisdictional specific content may impact Ontario's ability to align with the proposed sequencing. From a development perspective, Ontario will make best efforts to align sequencing.

				<p>Hours: Ontario 8000 hours</p> <p>Sequencing: Jurisdictions may meet the benchmark by covering content that was not covered in level 1 and 2 or exceed the benchmark by reinforcing content taught in level 1 and 2 in level 3 Pre-Stressed/Post-Tensioning Systems.</p>	
5. Ironworker (Structural/Ornamental)	5400	3	<p>5.2. Snapshot</p> <p>5.3. Topic Detail</p> <p>5.4. Sub-Task by NOA</p>	<p>Sequencing: Alberta will be abstaining from approving the harmonized course sequencing for Ironworker (Structural/Ornamental) due to concerns about how the sequencing will affect a provincially designated trade – Metal Building Systems Erector. Alberta’s abstention should not prevent the CCDA from harmonizing this trade. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the Red Seal standard.</p> <p>Ontario: Sequencing is not aligned yet.</p> <p>Name: Ontario’s name is Ironworker-Structural and Ornamental</p>	Sept. 17, 2015
6. Ironworker (Reinforcing)	3600	2	<p>6.2. Snapshot</p> <p>6.3. Topic Detail</p> <p>6.4. Sub-Task by NOA</p>	<p>Sequencing: Alberta will be abstaining from approving the harmonized course sequencing for Ironworker (Reinforcing) due to concerns about how the sequencing will affect a provincially designated trade – Metal Building Systems Erector. Alberta’s abstention should not prevent the CCDA from harmonizing this trade. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the Red Seal standard.</p> <p>Name: Ontario’s name is Reinforcing Rodworker</p>	Sept. 17, 2015
7. Mobile Crane Operator and 8. Mobile Crane Operator (Hydraulic)	5400	3	<p>7.2. Snapshot</p> <p>7.3. Topic Detail</p> <p>7.4. Sub-Task by NOA</p> <p>7.4.A Mobile Crane Operator Review Phase 7</p>	<p>Name: Alberta’s provincial legislation will reflect the trade name ‘Crane and Hoisting Equipment Operator - Mobile Crane Operator’. Ontario provincial legislation will reflect the trade name 'Hoisting Engineer - Tower Crane Operator'.</p> <p>Ontario’s provincial legislation will reflect the trade name “Hoisting Engineer - Mobile Crane Operator 1”.</p> <p>Hours: Ontario total training hours (in-class and on –the-job) will be 6000 hours. Northwest Territories and Nunavut follow Alberta’s training program.</p> <p>Sequencing: Alberta will maintain their current in-class training structure. While Alberta will be abstaining from approving the harmonized course sequencing for Mobile Crane Operator, Alberta’s abstention should not prevent the CCDA from harmonizing these trades. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the CCDA standard wherever possible. Ontario sequencing will be under review but will not be ready for the September 2016 deadline.</p> <p>Weight Restriction: <i>An apprentice wishing to receive Red Seal endorsement as a Mobile Crane Operator must have work experience on a mobile crane greater than 15 tons (imperial) or 13.6 tonnes (metric). * Individuals with work experience on a combination of equipment must demonstrate the majority of their work experience on a mobile crane greater than 15 tons (imperial) or 13.6 tonnes (metric).</i></p> <p><i>*(Note) New Brunswick will continue to require work experience on a mobile crane greater than 25 tons (imperial); however, Mobile Crane apprentices transferring to New Brunswick from another province/territory, who have not achieved the required hours in the trade, will have their documented work experience recognized.</i></p> <p>Mobile Crane Hydraulic: Industry recommended that the CCDA support only one Red Seal Mobile Crane Operator trade which incorporates hydraulic telescopic, hydraulically driven lattice boom and friction driven lattice boom cranes.</p>	November 20, 2015
9. Tower Crane Operator	3000	2	<p>9.2. Snapshot</p> <p>9.3. Topic Detail</p> <p>9.4. Sub-Task by NOA</p> <p>9.5 Tower Crane Operator Review Phase 9</p>	<p>Name: Ontario provincial legislation will reflect the trade name 'Hoisting Engineer - Tower Crane Operator'; Alberta provincial legislation will reflect the trade name ‘Crane and Hoisting Equipment Operator - Tower Crane Operator’.</p> <p>Sequencing: Alberta will maintain their current in-class training structure. While Alberta will be abstaining from approving the harmonized course sequencing for Tower Crane Operator, Alberta’s abstention should not prevent the CCDA from harmonizing this trade. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the CCDA standard wherever possible. Ontario sequencing will be under review but will not be ready for the September 2016 deadline.</p>	November 20, 2015
10. Heavy Duty Equipment Technician (HDET)	7200	4	<p>10.2. Snapshot</p> <p>10.3 Topic Detail with sub-tasks</p> <p>10.4 HDET Review Phase 8</p>	<p>Name: Alberta provincial legislation will reflect the trade name Heavy Equipment Technician-Heavy Duty Equipment Mechanic (Off Road)</p> <p>Hours: Ontario 7000 hours</p> <p>Training Levels: Alberta will have three (3) levels of training. Ontario will have three levels of training.</p> <p>Sequencing:</p> <ol style="list-style-type: none"> 1. <i>Tools and Equipment</i> - in Ontario, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3 2. <i>Hydraulic Systems - Advanced</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for Ontario (exception) covered across all levels, and Alberta (exception) covered in Level 3. 	July 8, 2016

				<ol style="list-style-type: none"> 3. <i>Hydraulics, Hydrostatics and Pneumatics</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. Ontario (exception), covered across all levels and for HDET and AET, in Ontario, specialized pneumatic training is an employer responsibility, Saskatchewan (exception) covered in Level 3. 4. <i>Electrical</i> - L4 British Columbia (exceed) Electrical Drive Systems, Hybrid Systems; L3 Alberta (exceed) Off Road Electrical Circuit Fundamentals and Service. 5. <i>Frames, Steering and Suspension</i> - Exception for Ontario HD trade where it will be delivered in level 3. Exception for Alberta, where it will be delivered in Level 3. 6. <i>Brakes - Advanced</i> - Ontario will deliver advanced brakes across level 2 and 3. 7. <i>Structural Components</i> - In Alberta, this content may be delivered in context at later levels. 8. <i>Heating, Ventilation and Air Conditioning/ Environmental Controls</i>: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues. 9. <i>Trailer</i> - Alberta delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics <u>may</u> occur where a jurisdiction has a separate trade designated for Transport Trailer Technician. 10. <i>Engines and Engine Support Systems</i> - Alberta and British Columbia delivery in level 2. 11. <i>Drivetrain (Powertrain)</i> - Alberta and British Columbia delivery in level 3 12. Ontario will consider alignment upon new RSOS publication. <p><i>*Note: NT, NU and YT follow Alberta's training program.</i></p>	
11. Truck and Transport Mechanic	7200	4	11.2. Snapshot 11.3 Topic Detail with subtasks 11.4 Truck and Transport Mechanic Phase 8 Review	<p>Training Levels: Alberta will have three (3) levels of training. Ontario will consider alignment upon new RSOS publication.</p> <p>Hours: Ontario 6720 hours</p> <p>Sequencing:</p> <ol style="list-style-type: none"> 1. <i>Tools and Equipment</i> - in Ontario, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3 2. <i>Hydraulic Systems - Advanced</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for Ontario (exception) covered across all levels, and Alberta (exception) covered in Level 3. 3. <i>Hydraulics, Hydrostatics and Pneumatics</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. Ontario (exception), covered across all levels and for HDET and AET, in Ontario, specialized pneumatic training is an employer responsibility, Saskatchewan (exception) covered in Level 3. 4. <i>Electrical</i> - L4 British Columbia (exceed) Electrical Drive Systems, Hybrid Systems; L3 Alberta (exceed) Off Road Electrical Circuit Fundamentals and Service. 5. <i>Frames, Steering and Suspension</i> - Exception for Ontario HD trade where it will be delivered in level 3. Exception for Alberta, where it will be delivered in Level 3. 6. <i>Brakes - Advanced</i> - Ontario will deliver advanced brakes across level 2 and 3. 7. <i>Structural Components</i> - In Alberta, this content may be delivered in context at later levels. 8. <i>Heating, Ventilation and Air Conditioning/ Environmental Controls</i>: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues. 9. <i>Trailer</i> - Alberta delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics <u>may</u> occur where a jurisdiction has a separate trade designated for Transport Trailer Technician. 10. <i>Engines and Engine Support Systems</i> - Alberta and British Columbia delivery in level 2. 11. <i>Drivetrain (Powertrain)</i> - Alberta and British Columbia delivery in level 3 12. Ontario, Curriculum Standard is not currently aligned with recommended sequence. <p><i>*Note: NT, NU and YT follow Alberta's training program.</i></p>	July 8, 2016
12. Agricultural Equipment Technician	7200	4	12.2. Snapshot 12.3 Topic Detail with sub-tasks 12.4 Agricultural Equipment Technician – Phase 7 Review	<p>Sequencing:</p> <ol style="list-style-type: none"> 1. <i>Tools and Equipment</i> - in Ontario, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3 2. <i>Hydraulic Systems - Advanced</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for Ontario (exception) covered across all levels, and Alberta (exception) covered in Level 3. 	July 8, 2016

				<ol style="list-style-type: none"> 3. <i>Hydraulics, Hydrostatics and Pneumatics</i> - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. Ontario (exception), covered across all levels and for HDET and AET, in Ontario, specialized pneumatic training is an employer responsibility, Saskatchewan (exception) covered in Level 3. 4. <i>Electrical</i> - L4 British Columbia (exceed) Electrical Drive Systems, Hybrid Systems; L3 Alberta (exceed) Off Road Electrical Circuit Fundamentals and Service. 5. <i>Frames, Steering and Suspension</i> - Exception for Ontario HD trade where it will be delivered in level 3. Exception for Alberta, where it will be delivered in Level 3. 6. <i>Brakes - Advanced</i> - Ontario will deliver advanced brakes across level 2 and 3. 7. <i>Structural Components</i> - In Alberta, this content may be delivered in context at later levels. 8. <i>Heating, Ventilation and Air Conditioning/ Environmental Controls</i>: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues. 9. <i>Trailer</i> - Alberta delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics <u>may</u> occur where a jurisdiction has a separate trade designated for Transport Trailer Technician. 10. <i>Agriculture Equipment and Accessories</i> – Alberta delivery in level1 and 4. 11. <i>Engines and Engine Support Systems</i> - Alberta and British Columbia delivery in level 2. 12. <i>Drivetrain (Powertrain)</i> - Alberta and British Columbia delivery in level 3 <p><i>*Note: NT follow Alberta’s training program.</i></p>	
13. Automotive Service Technician	7200	4	13.2. Snapshot 13.3 (Topic) Sub-Task by RSOS 13.4 Automotive Service Technician Phase 9 Review	<p>Name: Slight variations include; Nunavut – Motor Vehicle Mechanic (French) New Brunswick - Technicien d’entretien Automobile; Ontario - Technicien ou technicienne d’entretien automobile; Nunavut – Mécanicien d’automobiles</p> <p>Hours: Ontario will remain at 7200 hours.</p> <p>Training Levels: Ontario will remain at three levels of training but will mirror harmonized sequencing.</p>	April 15, 2016
14. Industrial Mechanic (Millwright)	7200	4	14.2. Snapshot 14.3 (Topic) Sub-Task by RSOS	<p>Name: Slight variations include; Ontario – Industrial Mechanic Millwright; British Columbia – Millwright; Northwest Territories - Millwright-Industrial Mechanic (French) New Brunswick - Mécanicien-monteur industriel (de chantier); Ontario – Mécanicien industriel/mécanicienne industrielle de chantier; Manitoba – Mécanicien Industriel (de chantier); Northwest Territories – Mécanicien-monteur industriel</p> <p>Sequencing: Alberta will have partial alignment.</p> <p>Hours: All jurisdictions agree to 7200 hours with the exception of Manitoba, 6400 hours and Ontario 8000.</p>	First three recommendations: April 15, 2016 CCDA approved: July 8, 2016
15. Construction Electrician	7200	4	15.2. Snapshot 15.3 (Topic) Sub-Task by RSOS 15.4 Construction Electrician Phase 7 Review	<p>Name: Alberta provincial legislation will reflect the trade name “Electrician” Ontario’s trade name will remain “Electrician-Construction and Maintenance.”</p> <p>Sequencing:</p> <ol style="list-style-type: none"> 1. <i>Consumer/Supply Services and Metering Equipment</i> - Ontario will cover three-phase in Level 2 2. <i>Signaling Systems</i> – (Variations) Saskatchewan and Alberta will deliver in Level 1 as well. Ontario will deliver in Levels 1 and 2. 3. <i>Signaling Systems</i> – In Alberta, Journeyperson Certification is required to install, maintain, test and verify fire alarm systems. 4. <i>HVAC</i> - (Variations) New Brunswick, Prince Edward Island, Manitoba and Newfoundland and Labrador will deliver HVAC controls in Level 3 5. <i>(Motor) Drives</i> – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4. <p><i>*Note: NT, NU and YT follow Alberta’s training program.</i></p>	July 8, 2016
16. Industrial Electrician	7200	4	16.2. Snapshot 16.3 (Topic) Sub-task by RSOS 16.4 Industrial Electrician Phase 7 Review	<p>Sequencing:</p> <ol style="list-style-type: none"> 1. <i>Consumer/Supply Services and Metering Equipment</i> - Ontario will cover three-phase in Level 2 2. <i>Signaling Systems</i> – Ontario will deliver in Levels 1 and 2. 3. <i>HVAC</i> - (Variations) New Brunswick, Prince Edward Island, Manitoba and Newfoundland and Labrador will deliver HVAC controls in Level 3 4. <i>(Motor) Drives</i> – (Variations) Manitoba will deliver additional content in VFD Electronics in Level 4. 	July 8, 2016

				5. <i>Predictive and Preventative Maintenance</i> – Maintenance within the Industrial Electrician Trade may be described differently than within the Construction Electrician Trade. A card for “Predictive and Preventative Maintenance” is not based on a task, but rather a performance indicator, and is illustrated to verify the content.	
17. Steamfitter/Pipefitter	7200	4	17.2. Snapshot 17.3 (Topic) Sub-Task by RSOS 17.4 Steamfitter/Pipefitter Phase 8 Review	Name: Slight variations include; Ontario – Steamfitter; Manitoba - Steamfitter-Pipefitter; Saskatchewan – Steamfitter-Pipefitter; Alberta – Steamfitter-Pipefitter; Northwest Territories – Steamfitter and Pipefitter (French) New Brunswick – Tuyauteur-monteur de tuyaux à vapeur; Ontario – Monteur de tuyaux de vapeurs; Manitoba – Monteur d’appareils de chauffage; Northwest Territories – Tuyauteur-monteur d’appareils à vapeur. Hours: All jurisdictions agree to 7200 hours with the exception of Ontario, 9000 hours. Training Levels: Alberta agrees to four (4) training levels but may require additional time to implement. Ontario will remain at three levels of training but will mirror harmonized sequencing.	First three recommendations April 15, 2016 CCDA approved: June 8, 2016
18. Plumber	7200	4	18.2. Snapshot 18.3 (Topic) Sub-Task by RSOS 18.4 Plumber Phase 8 Review	Hours: All jurisdictions agree to 7200 hours with the exception of Ontario, 9000 hours. Name: Slight variations include (French) New Brunswick and Manitoba – Plombier Sequencing: Variations: Low Pressure Steam Systems; Process Piping – BC and AB do not deliver this training in the Plumber program (see SFPP) Training Levels: Ontario will remain at three levels of training but will mirror harmonized sequencing.	First three recommendations April 15, 2016 CCDA approved: June 8, 2016
19. Boilermaker	5400	3	19.2 Snapshot 19.3 (Topic) Sub-Task by RSOS	Name: Slight variations include; Ontario –Construction Boilermaker (French) New Brunswick – Chaudronnier-monteur; Ontario – Chaudronnier/chaudronnière de construction; Manitoba – Chaudronnier Hours: All jurisdictions agree to 5400 hours with the exception of Ontario, 6600 hours. Sequencing: British Columbia will deliver dismantling and removal of vessels and components in Levels 1 and 2. Note: Industry in Nova Scotia and New Brunswick has requested to align with Alberta’s curriculum sequencing. Pending change (or transition) from four (4) levels to three (3) levels.	First three recommendations April 15, 2016 CCDA approved: November 15, 2016
20. Sprinkler Fitter	7200	3 (over 4 years)	20.2 Snapshot 20.3 (Topic) Sub-Task Detail	Name: Ontario: The change to Sprinkler Fitter still requires on further consultation and a regulation change. New Brunswick’s name is consistent in English, but different in French (Monteur de Réseaux de Gicleurs).	First three recommendations November 15, 2016. CCDA approved: March 6, 2017 December 5, 2017 – NCC notations added
21. Concrete Finisher	3600	2	21.2 Snapshot 21.3 (Topic) Sub-Task Detail	Hours: Ontario, 4500 hours.	First three recommendations December 14, 2017. CCDA approved: March 31, 2017
22. Landscape Horticulturist	6000	4	22.2 Snapshot 22.3 (Topic) Sub-Task Detail	Hours: Update- On March 14, 2017, Industry concluded their discussion regarding total training hours and came to the consensus of 6000 hours. The rationale included the accommodation of all provinces’ growing season. Hours: Ontario, 6120 hours Sequencing: Ontario proposes to align with the proposed four levels to harmonize the in-school program by having an option of running the current 2 levels (24 weeks in total) as 2 x 6 week increments per level (each year) allowing the apprentice to complete the 12 weeks in succession, or by only taking one 6 week increment (Levels 1A and 1B and 2A and 2B). The Ministry of Advanced Education and Skills Development will have to agree and implement.	Name: January 18, 2017 Levels: January 18, 2017 Hours: (Industry) March 14, 2017 CCDA Final Sequencing: April 20, 2017 (Update October 23, 2017 – MWA E) December 5, 2017 – NCC notations added
23. Sheet Metal Worker	7200	4	23.2 Snapshot 23.3 (Topic) Sub-Task Detail	Name: Slight variations include Ontario and New Brunswick (French). (ON-Tôlier ou Tôlière, NB-Tôlier) Hours: Ontario 9000 hours	Name: February 17, 2017

				<p>Levels: Ontario three (3) training levels Sequencing: Alberta variations – Pattern Development – L1 5.01, L2 5.02, L3 5.04, 5.05, L4 5.03. Scheduled Maintenance and Repair will be delivered in L2 and L4 (residential/commercial)</p>	<p>Levels: February 17, 2017 Hours: February 17, 2017 CCDA Final Sequencing: July 28, 2017</p>
24. Machinist	7200	4	<p>24.2 Snapshot 24.3 (Topic) Sub-Task Detail</p>	<p>Name: Ontario – General Machinist (Régleur-conducteur de machines-outils) Hours: Ontario 8000 hours Levels: Ontario three (3) training levels</p>	<p>Name: April 10, 2017 Levels: April 10, 2017 Hours: April 10, 2017 CCDA Final Sequencing: November 1, 2017</p>
25. Rig Technician	4860	3	<p>25.2 Snapshot 25.3 (Topic) Sub-Task Detail</p>		<p>Name: May 1, 2017 Levels: May 1, 2017 Hours: May 1, 2017 CCDA Final Sequencing: November 17, 2017</p>
26. Insulator (Heat and Frost)	7200	4	<p>26.2 Snapshot 26.3 (Topic) Sub-task Detail</p>	<p>Name: Ontario (name very similar) Heat and Frost Insulator Training Levels: Saskatchewan 3 Levels Yukon will remain at three (3) technical training levels. Hours: Yukon 5400</p>	<p>Name: September 21, 2017 Levels: September 21, 2017 Hours: September 21, 2017 CCDA Final Sequencing: January 31, 2018</p>
27. Refrigeration and Air Conditioning Mechanic.	7200	4	<p>27.2 Snapshot 27.3 (Topic) Sub-task Detail</p>	<p>Name: New Brunswick – Refrigeration and Air Conditioning Technician Training Levels: Manitoba 5 Levels (4 Levels RACM + 1 Level of Gasfitter B (Domestic) training) (Additional notes: the RACM training is only 4 levels; however, there is a requirement to have the Red Seal of Gas in order to attain the licence to work in MB. The first level of Gas-Domestic is embedded into the RACM 4 levels, the “5th level” is the level 2 of Gas – Domestic.) Hours: Ontario 9000 hours, Manitoba 9000 hours (please see note above)</p>	<p>Name: November 6, 2017 Levels: November 6, 2017 Hours: November 6, 2017 Sequencing: March 21, 2018</p>
28. Tool and Die Maker	7200	3	<p>28.2 Snapshot 28.3 (Topic) Sub-task Detail</p>	<p>Name: Ontario – (FR Outilleur-ajusteur) Training Levels: Manitoba – 4 Levels Hours: Ontario 8000 hours</p>	<p>Name: January 15, 2018 Levels: January 15, 2018 Hours: January 15, 2018 CCDA Final Sequencing: May 15, 2018</p>
29. Automotive Refinishing Technician	3600	2	<p>29.2 Snapshot 29.3 (Topic) Sub-task Detail</p>	<p>Name: - Training Levels: - Hours: -</p>	<p>Name: October 23, 2018</p>

(Formerly: Automotive Painter)					Levels: March 28, 2018 Hours: March 28, 2018 CCDA Final Sequencing: July 31, 2018
30. Auto Body and Collision Technician (Formerly: Motor Vehicle Body Repairer (Metal and Paint))	7200	4	30.2 Snapshot 30.3 (Topic) Sub-task Detail	Name: Training Levels: Hours:	Name: October 23, 2018 Levels: April 10, 2018 Hours: April 10, 2018 CCDA Final Sequencing: October 31, 2018
31. Powerline Technician	7200	4	31.2 Snapshot 31.3 (Topic) Sub-task Detail	Name: - Training Levels: - Hours: -	Name: July 17, 2018 Levels: July 17, 2018 Hours: July 17, 2018 CCDA Final Sequencing: February 13, 2019
32. Hairstylist (Traditional Apprenticeship)	3600	2	32.2 Snapshot 32.3 (Topic) Sub-task Detail	Name: - Training Levels: Manitoba (1 Level) Hours: - Sequencing: Alberta Colouring and Lightening (L2); Ontario Front Desk (meet and exceed L1, L2)	Name: October 16, 2018 Levels: October 16, 2018 Hours: October 16, 2018 CCDA Final Sequencing: February 13, 2019
33. Cook	5400	3	33.2 Snapshot 33.3 (Topic) Sub-task Detail	Name: - Training Levels: Ontario (2 Levels) Hours: - Sequencing:	Name: December 10, 2018 Levels: December 10, 2018 Hours: December 10, 2018 CCDA Final Sequencing: July 16, 2019
34. Instrumentation and Control Technician	7200	4	34.2 Snapshot 34.3 (Topic) Sub-task Detail	Name: - Training Levels: - Hours: Ontario 8000 hours Sequencing: -	Name: April 9, 2019 Levels: April 9, 2019 Hours: April 9, 2019 CCDA Final Sequencing: September 23, 2019
35. Glazier	7200	3	35.2 Snapshot 35.3 (Topic) Sub-task Detail	Name: - Ontario, Architectural Glass and Metal Technician / Technicien/Technicienne du verre et du métal architecturaux Training Levels: - Ontario 3 Levels Hours: The increase in hours is a request by industry. Feedback indicates that there is a need for a larger portion of on-the-job training.	Name: September 23, 2019 Name Change Survey did not create a name change.

				Ontario 8000, British Columbia 6940 Sequencing:	Levels: September 23, 2019 Hours: September 23, 2019 CCDA Final Sequencing: January 15, 2020
Commencing with Bricklayer, sequencing charts will include both topic and sub-tasks to prevent duplication.					
36. Bricklayer	5400	3	36.2 (Topic) Sub-task Detail	Name: Ontario, Brick and Stone Mason Training Levels: Ontario, 5600 hours Hours: Sequencing:	Name: September 9, 2019 Levels: September 9, 2019 Hours: September 9, 2019 CCDA Final Sequencing: October 15, 2020
37. Motorcycle Technician (Formerly Motorcycle Mechanic)	6400	4	37.2 (Topic) Sub-task Detail	Hours: <i>As a general rule, the CCDA has recommended a total of 1800 hours of training per level as a starting point for harmonization. Jurisdictions may organize the ratio of in-class and on-the-job training requirement as appropriate. Due to the seasonal nature of the trade, 1600 hours per year (6400) has been recommended.</i> Ontario 6000, British Columbia – 7260*including Power Equipment Technician Training Levels: Ontario – 2 over 3.5 years Sequencing:	Name: September 9, 2019 (Revised May 27, 2020) Levels: September 9, 2019 Hours: September 9, 2019 CCDA Final Sequencing: February 21, 2020
38. Parts Technician	5400	3	38.2 (Topic) Sub-task Detail	Name: Training Levels: Hours: Sequencing:	Name: November 20, 2019 Alternate development. Levels, Hours, CCDA Sequencing: Consultation and approvals closed June 24, 2020
39. Roofer	5400	3	39.2 Topics with Details	Name: Training Levels: Hours: Sequencing:	Name: September 9, 2019 Levels: September 9, 2019 Hours: September 9, 2019 CCDA Final Sequencing: October 30, 2020
40. Cabinetmaker	7200	4	40.2 Topics with Details	Name: Training Levels: Hours:	Name: March 10, 2020

				Sequencing:	Levels: March 10, 2020 Hours: March 2020 CCDA Final Sequencing: October 15, 2020
41. Lather (Interior Systems Mechanic)	5400	3	41.2 Topics with Details	Name: Training Levels: Hours: Sequencing:	Name: September 25, 2020 Levels: September 25, 2020 Hours: September 25, 2020 CCDA Final Sequencing: June 30, 2021
42. Recreation Vehicle Service Technician	5400	3	42.2 Topics with Details	Name: Training Levels: Hours: Sequencing:	Name: July 29, 2020 Levels: July 29, 2020 Hours: July 29, 2020 CCDA Final Sequencing: June 16, 2021
43. Painter and Decorator	5400	3	43.2 Topics with Details	Name: Training Levels: Hours: Sequencing:	
44. Transport Trailer			44.02 Topics with Details	Name: Training Levels: Hours: Sequencing:	
45. Baker				Name: Training Levels: Hours: Sequencing:	
46. Floorcovering Installer				Name: Training Levels: Hours: Sequencing:	
47. Tilesetter				Name: Training Levels: Hours: Sequencing:	

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1. Metal Fabricator (Fitter)

1.1. Metal Fabricator (Fitter) Recommendations

That provinces and territories adopt the **Red Seal trade name** 'Metal Fabricator (Fitter) / Monteur-ajusteur / Monteuse-ajusteuse de charpentes métalliques'.

- That the total number of training hours be **5400** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents with the following variations:
 - Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW) and Metal Core Arc Welding (MCAW) will be covered in levels 1 and 2, with the exception of Alberta where they will be covered in levels 2 and 3.

1.2. Metal Fabricator (Fitter) Sequencing – Snapshot and Topic Detail

Level One	Level Two	Level Three
Quality Assurance	Quality Assurance	Quality Assurance
Safety		
Tools and Equipment		
Stationary Machinery		
Access Equipment		
Hoisting, Lifting and Rigging		
Layout and Pattern Development – A1	Layout and Pattern Development – A2	Layout and Pattern Development – A3
	Layout – Simple and Complex Components and Templates - B1	Layout – Simple and Complex Components and Templates – B2
Cutting – Oxy-fuel Cutting		
Cutting – Plasma Arc Cutting - C1 (Introduction)	Cutting – Plasma Arc Cutting - C2 (Core learning)	
Welding – Shielded Metal Arc Welding (SMAW) – D1 (Set-up, strike and maintain an arc)	Welding – Shielded Metal Arc Welding (SMAW) – D2 (Tack weld all positions)	
Welding – Gas Metal Arc Welding (GMAW) – E1 (Set-up and maintain an arc) ³	Welding – Gas Metal Arc Welding (GMAW) – E2 (Tack weld all positions)	
Welding – Flux Core Arc Welding (FCAW) – F1 (Set-up and deposit a weld) ⁴	Welding – Flux Core Arc Welding (FCAW) – F2 (Tack weld all positions)	
Welding – Metal Core Arc Welding (MCAW) – G1 (Set-up and deposit a weld) ⁵	Welding – Metal Core Arc Welding (MCAW) – G2 (Tack weld, flat and horizontal positions)	
	Form Materials using Equipment (Plate rolling, press brake and bending)	
	Metallurgy	
	Heat Forming	
		Communication and Trade Documentation
		Work Planning
		Automated Shape Cutting Machines and Shape Rolling Equipment
	Fabrication (Simple)	Fabrication (Complex)
	Fit and Assemble (Simple)	Fit and Assemble (Complex)
		Finish Preparation

³ Variation: Alberta will feature GMAW in level 2 and 3 rather than level 1 and 2

⁴ Variation: Alberta will feature FCAW in level 2 and 3 rather than level 1 and 2

1.3. Metal Fabricator (Fitter) Sequencing - Sub-task		
Level One	Level Two	Level Three
Quality Assurance 4.01 – performs visual inspections	Quality Assurance 4.02 – verifies measurements, welds and layout 4.03 – tracks material and parts for traceability	Quality Assurance 4.02 – verifies measurements, welds and layout 4.03 – tracks material and parts for traceability
Safety 1.01 – maintains safe work environment 1.02 – uses personal protective equipment (PPE) and safety equipment 3.02 – communicates with others		
Tools and Equipment 2.01 – maintains hand, power, layout and measuring tools and equipment 7.03 – cuts material using shears 7.04 – cuts material using saws		
Stationary Machinery 2.02 – maintains stationary machinery 7.03 – cuts material using shears 7.04 – cuts material using saws 7.05 – cuts material using ironworkers 7.06 – cuts material using computer numerical controlled (CNC) equipment 7.07 – drills holes 7.08 – cuts threads		
Access Equipment 2.04 – uses access equipment		
Hoisting, Lifting and Rigging 5.02 – determines weights 5.03 – applies rigging practices 5.04 – operates material handling equipment		
Layout and Pattern Development – A1 3.01 – interprets plans, drawings and specifications 6.01 – performs pattern development 6.02 – calculates material allowances for various processes 6.03 – determines dimensions 9.01 – assembles jigs	Layout and Pattern Development – A2 3.01 – interprets plans, drawings and specifications 6.01 – performs pattern development 6.02 – calculates material allowances for various processes 6.03 – determines dimensions	Layout and Pattern Development – A3 3.01 – interprets plans, drawings and specifications 6.01 – performs pattern development 6.02 – calculates material allowances for various processes 6.03 – determines dimensions

⁵ Variation: Alberta will feature MCAW in level 2 and 3 rather than level 1 and 2

1.3. Metal Fabricator (Fitter) Sequencing - Sub-task		
Level One	Level Two	Level Three
	Layout – Simple and Complex Components and Templates - B1 6.04 – transfers dimensions 6.05 – makes templates 9.01 – assembles jigs	Layout – Simple and Complex Components and Templates – B2 6.04 – transfers dimensions 6.05 – makes templates 9.01 – assembles jigs
Cutting – Oxy-fuel Cutting 2.03 – maintains cutting and welding equipment 7.02 – cuts material using manual oxy-fuel cutting equipment 8.05 – applies heat for forming		
Cutting – Plasma Arc Cutting - C1 (Introduction) 2.03 – maintains cutting and welding equipment 7.01 – cuts materials using plasma cutting equipment	Cutting – Plasma Arc Cutting - C2 (Core learning) 7.01 – cuts materials using plasma cutting equipment	
Welding – Shielded Metal Arc Welding (SMAW) – D1 (Set-up, strike and maintain an arc) 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.02 – performs tack welding 10.03 – minimizes welding distortions	Welding – Shielded Metal Arc Welding (SMAW) – D2 (Tack weld all positions) 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.03 – minimizes welding distortions 10.04 – applies welding processes 10.05 – corrects welding distortions	
Welding – Gas Metal Arc Welding (GMAW) – E1 (Set-up and maintain an arc) ⁶ 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.02 – performs tack welding 10.03 – minimizes welding distortions	Welding – Gas Metal Arc Welding (GMAW) – E2 (Tack weld all positions) 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.03 – minimizes welding distortions 10.04 – applies welding processes 10.05 – corrects welding distortions	
Welding – Flux Core Arc Welding (FCAW) – F1 (Set-up and deposit a weld)⁷ 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.02 – performs tack welding 10.03 – minimizes welding distortions	Welding – Flux Core Arc Welding (FCAW) – F2 (Tack weld all positions) 2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.03 – minimizes welding distortions 10.04 – applies welding processes 10.05 – corrects welding distortions	
Welding – Metal Core Arc Welding (MCAW) – G1 (Set-up and deposit a weld)⁸	Welding – Metal Core Arc Welding (MCAW) – G2 (Tack weld, flat and horizontal positions)	

⁶ Variation: Alberta will feature GMAW in level 2 and 3 rather than level 1 and 2

⁷ Variation: Alberta will feature FCAW in level 2 and 3 rather than level 1 and 2

⁸ Variation: Alberta will feature MCAW in level 2 and 3 rather than level 1 and 2

1.3. Metal Fabricator (Fitter) Sequencing - Sub-task		
Level One	Level Two	Level Three
2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.02 – performs tack welding 10.03 – minimizes welding distortions	2.03 – maintains cutting and welding equipment 7.09 – prepares joints 10.01 – applies heat prior to tack welding 10.03 – minimizes welding distortions 10.04 – applies welding processes 10.05 – corrects welding distortions	
	Form Materials using Equipment (Plate rolling, press brake and bending) 6.04 – transfers dimensions 8.01 – forms materials using plates rollers 8.02 – forms materials using shape rollers 8.04 – forms materials using benders	
	Metallurgy 8.05 – applies heat for forming 10.01 - applies heat prior to tack welding 10.03 - minimizes welding distortions 10.05 - corrects welding distortions	
	Heat Forming 8.05 – applies heat for forming	
		Communication and Trade Documentation 3.02 – communicates with others
		Work Planning 3.03 – organizes project tasks 5.01 – organizes materials
		Automated Shape Cutting Machines and Shape Rolling Equipment 7.06 – cuts material using computer numerical controlled (CNC) equipment 8.03 – forms materials using conventional and computer numerical controlled (CNC) press brake
	Fabrication (Simple) 6.04 - transfers dimensions 7.01 - cuts material using manual plasma arc cutting equipment 7.02 - cuts material using manual oxy-fuel cutting equipment 7.03 - cuts material using shears 7.04 - cuts materials using saws 7.05 - cuts materials using ironworkers 7.07 - drills holes 7.08 - cuts threads 7.09 - prepares joints 8.01 – forms materials using plates rollers 8.02 – forms materials using shape rollers	Fabrication (Complex) 6.04 - transfers dimensions 7.01 - cuts material using manual plasma arc cutting equipment 7.02 - cuts material using manual oxy-fuel cutting equipment 7.03 - cuts material using shears 7.04 - cuts materials using saws 7.05 - cuts materials using ironworkers 7.07 - drills holes 7.08 - cuts threads 7.09 - prepares joints 8.01 – forms materials using plates rollers 8.02 – forms materials using shape rollers

1.3. Metal Fabricator (Fitter) Sequencing - Sub-task		
Level One	Level Two	Level Three
	8.03 - forms materials using conventional and Computer Numerical Controlled (CNC) press brakes 8.04 – forms materials using benders	8.03 - forms materials using conventional and Computer Numerical Controlled (CNC) press brakes 8.04 – forms materials using benders
	Fit and Assemble (Simple) 9.02 – determines proper sequence of assembly 9.03 – assembles sub-components and components 9.04 – sets fabricated component in place 9.05 – fastens components on-site	Fit and Assemble (Complex) 9.02 – determines proper sequence of assembly 9.03 – assembles sub-components and components 9.04 – sets fabricated component in place 9.05 – fastens components on-site
		Finish Preparation 11.01 Determines finishing process. 11.02 Prepares material for finishing.

NOTE – Sequencing based on the most recent national occupational analysis.

NOTE – Sub-tasks found in the NOA, which *directly* relate to the Unit or Topic title, are listed in this table. Other sub-tasks related to the unit or topic, not listed in this table, may be added to achieve a logical template for instruction. The sub-tasks may be repeated in multiple Units or Topics due to similar knowledge and competencies for Sub-tasks.

1.4. Metal Fabricator (Fitter) Sequencing – Details with Sub-tasks (Phase 7 Review)

Yellow highlighting is new development. Red font (un-bolded) is an edit.

Level One	Level Two	Level Three
	In Context	In Context
		Welding Activities
	Handles Materials	
<p style="text-align: center;">Safety-Related Functions</p> <p>1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment</p>		
<p style="text-align: center;">Tools and Equipment</p> <p>2.01 Maintains hand, power, layout and measuring tools and equipment 2.02 Maintains stationary machinery 2.03 Maintains cutting and welding equipment 2.04 Uses access equipment</p>	<p style="text-align: center;">Tools and Equipment</p> <p>2.03 Maintains cutting and welding equipment</p>	
<p style="text-align: center;">Organizes Work</p> <p>3.01 Interprets plans, drawings and specifications</p>	<p style="text-align: center;">Organizes Work</p> <p>3.01 Interprets plans, drawings and specifications</p>	<p style="text-align: center;">Organizes Work</p> <p>3.01 Interprets plans, drawings and specifications 3.02 Organizes project tasks</p>
<p style="text-align: center;">Quality Assurance Throughout Fabrication and Assembly Process</p> <p>4.01 Performs visual inspections</p>	<p style="text-align: center;">Quality Assurance Throughout Fabrication and Assembly Process</p> <p>4.02 Verifies measurements, welds and layout 4.03 Tracks material and parts for traceability</p>	<p style="text-align: center;">Quality Assurance Throughout Fabrication and Assembly Process</p> <p>4.02 Verifies measurements, welds and layout 4.03 Tracks material and parts for traceability</p>
<p style="text-align: center;">Handles Materials</p> <p>5.02 Determines weights 5.03 Applies rigging practices 5.04 Operates material handling equipment</p>		<p style="text-align: center;">Handles Materials</p> <p>5.01 Organizes material</p>
<p style="text-align: center;">Communication Techniques</p> <p>6.01 Uses communication techniques</p>		<p style="text-align: center;">Mentoring Techniques</p> <p>6.02 Uses mentoring techniques</p>
<p style="text-align: center;">Layout</p> <p>7.01 Performs pattern development 7.02 Calculates material allowances for various processes 7.03 Determines dimensions</p>	<p style="text-align: center;">Layout</p> <p>7.01 Performs pattern development 7.02 Calculates material allowances for various processes 7.03 Determines dimensions 7.04 Transfers dimensions 7.05 Makes templates</p>	<p style="text-align: center;">Layout</p> <p>7.01 Performs pattern development 7.02 Calculates material allowances for various processes 7.03 Determines dimensions 7.04 Transfers dimensions 7.05 Makes templates</p>
<p style="text-align: center;">Material Cutting</p> <p>8.01 Cuts material using manual plasma cutting equipment. 8.02 Cuts material using manual oxy-fuel cutting equipment. 8.03 Cuts material using shears. 8.04 Cuts material using saws. 8.05 Cuts material using ironworkers.</p>	<p style="text-align: center;">Material Cutting</p> <p>8.01 Cuts material using manual plasma cutting equipment 8.02 Cuts material using manual oxy-fuel cutting equipment 8.03 Cuts material using shears 8.04 Cuts material using saws 8.05 Cuts material using ironworkers 8.07 Drills holes</p>	<p style="text-align: center;">Material Cutting</p> <p>8.01 Cuts material using manual plasma cutting equipment 8.02 Cuts material using manual oxy-fuel cutting equipment 8.03 Cuts material using shears 8.04 Cuts material using saws 8.05 Cuts material using ironworkers 8.06 Cuts material using computer numerical controlled (CNC) equipment</p>

1.4. Metal Fabricator (Fitter) Sequencing – Details with Sub-tasks (Phase 7 Review)

Yellow highlighting is new development. Red font (un-bolded) is an edit.

Level One	Level Two	Level Three
8.06 Cuts material using computer numerical controlled (CNC) equipment. 8.07 Drills holes. 8.08 Cuts threads. 8.09 Prepares joints.	8.08 Cuts threads 8.09 Prepares joints	8.07 Drills holes 8.08 Cuts threads 8.09 Prepares joints
<p style="text-align: center;">Forms Material</p> 9.05 Applies heat for forming	<p style="text-align: center;">Forms Material</p> 9.01 Forms materials using plate rollers 9.02 Forms materials using shape rollers 9.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes 9.04 Forms material using benders 9.05 Applies heat for forming	<p style="text-align: center;">Forms Material</p> 9.01 Forms materials using plate rollers 9.02 Forms materials using shape rollers 9.03 Forms materials using conventional and computer numerical controlled (CNC) press brakes 9.04 Forms material using benders
<p style="text-align: center;">Sub-Components and Components</p> 10.01 Assembles jigs 10.02 Determines proper sequence for assembly 10.03 Assembles sub-components and components 10.04 Sets fabricated component in place 10.05 Joins components on-site	<p style="text-align: center;">Sub-Components and Components</p> 10.02 Determines proper sequence for assembly 10.03 Assembles sub-components and components. 10.04 Sets fabricated component in place 10.05 Joins components on-site	<p style="text-align: center;">Sub-Components and Components</p> 10.02 Determines proper sequence for assembly 10.03 Assembles sub-components and components 10.04 Sets fabricated component in place 10.05 Joins components on-site
<p style="text-align: center;">Welding Activities</p> 11.01 Applies heat prior to tack welding 11.02 Performs tack welding 11.03 Minimizes welding distortions	<p style="text-align: center;">Welding Activities</p> 11.01 Applies heat prior to tack welding 11.03 Minimizes welding distortions 11.04 Applies welding processes 11.05 Corrects welding distortions	
		<p style="text-align: center;">Project Completion</p> 12.01 Identifies type of finish 12.02 Prepares material for finishing

2. Welder

2.1. Welder Recommendations

That provinces and territories adopt the **Red Seal trade name** Welder / Soudeur / Soudeuse

- That the total number of training hours be **5400** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the trade technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents with the following variations:
 - Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Core Arc Welding (FCAW) and Metal Core Arc Welding (MCAW) will be taught progressively across all levels in most of Canada, but Alberta will offer them only in levels 2 and 3.

2.2. Welder Sequencing – Snapshot and Topic Detail

Level One	Level Two	Level Three
Safety		
Tools and Equipment		
Stationary Machinery		
Access Equipment		
Hoisting, Lifting and Rigging		
Communication and Trade Documentation		
Fabrication - A1	Fabrication - A2	
Cutting – Oxy-fuel Cutting		
Cutting – Plasma Arc Cutting		
Cutting – Electric Arc Cutting and Gouging		
Welding – Shielded Metal Arc Welding (SMAW) – C1⁹ (Simple positions: flat, horizontal, vertical; and/or Set-up, strike, maintain an arc; Fillet weld, all positions)	Welding – Shielded Metal Arc Welding (SMAW) – C2 (More difficult positions: 45 degree/overhead; and/or Groove weld plate, all positions; Fillet and groove weld, medium carbon steel)	Welding – Shielded Metal Arc Welding (SMAW) – C3 (Most Difficult: Pipe and tubing, all positions; Alloy steels)
Welding – Gas Metal Arc Welding (GMAW) – D1¹⁰ (Set up arc and maintain an arc; Fillet and groove weld, all positions)	Welding – Gas Metal Arc Welding (GMAW) – D2 (Fillet and groove weld, all positions; Fillet and groove weld, medium carbon steel)	Welding – Gas Metal Arc Welding (GMAW) – D3 (Pipe and Tubing, all positions; Aluminum alloys; Stainless steel alloys)
Welding – Flux Core Arc Welding (FCAW) – E1¹¹ (Set-up and deposit a weld)	Welding – Flux Core Arc Welding (FCAW) – E2 (Fillet and groove weld plate, all positions)	Welding – Flux Core Arc Welding (FCAW) – E3 (Pipe and tubing, all positions)
Welding – Metal Core Arc Welding (MCAW) – F1¹² (Set-up and deposit a weld)	Welding – Metal Core Arc Welding (MCAW) – F2 (Fillet weld, all positions)	Welding – Metal Core Arc Welding (MCAW) – F3 (Groove weld, all positions)
	Welding – Gas Tungsten Arc Welding (GTAW) – G1 (Fillet and groove weld, all positions; Fillet and groove weld, medium carbon steel)	Welding – Gas Tungsten Arc Welding (GTAW) – G2 (Pipe and tubing, all positions; Ferrous and non-ferrous alloys)
	Welding – Submerged Arc Welding - H1	Welding – Submerged Arc Welding - H2
	Work Planning	
Quality Control - I1	Quality Control - I2	Quality Control - level I3
	Layout and Pattern Development	

⁹ Variation: Alberta will feature SMAW in level 2 and 3 rather than across 3 levels

¹⁰ Variation: Alberta will feature GMAW in level 2 and 3 rather than across 3 levels

¹¹ Variation: Alberta will feature FCAW in level 2 and 3 rather than across 3 levels

¹² Variation: Alberta will feature MCAW in level 2 and 3 rather than across 3 levels

2.3. Welder Sequencing - Sub-task		
Level One	Level Two	Level Three
Safety 3.01 – performs hazard assessments 3.02 – maintains safe work environment 3.03 – uses personal protective equipment (PPE) and safety equipment		
Tools and Equipment 1.01 – maintains hand, power, layout and measuring tools 8.01 – selects cutting and grinding tools 8.03 – cuts using shears and ironworkers 8.04 – cuts using hand tools 8.05 – cuts using handheld power tools		
Stationary Machinery 1.02 – maintains stationary machinery 8.01 – selects cutting and grinding tools 8.02 – cuts using stationary band saws and power hacksaws		
Access Equipment 2.01 – uses access equipment		
Hoisting, Lifting and Rigging 2.02 – uses rigging, hoisting and lifting equipment		
Communication and Trade Documentation 4.01 – uses documentation and reference material 4.03 – organizes materials		
Fabrication - A1 5.07 – finishes final product 6.01 – develops templates 6.02 – transfers dimensions from drawings to materials? 7.01 – prepares materials? 7.02 – fits components for welding 7.03 – assembles components	Fabrication - A2 5.07 – finishes final product 6.01 – develops templates 6.02 – transfers dimensions from drawings to materials 7.01 – prepares materials 7.02 – fits components for welding 7.03 – assembles components	
Cutting – Oxy-fuel Cutting 1.03 – maintains thermal cutting equipment 1.04 – maintains welding equipment 9.01 – selects OFC gas and equipment 9.02 – sets up OFC equipment 9.03 – sets operating parameters for OFC equipment 9.04 – performs cut and gouge using OFC equipment		
Cutting – Plasma Arc Cutting 1.03 – maintains thermal cutting equipment 10.01 – selects PAC equipment and consumables 10.02 – sets up PAC equipment		

2.3. Welder Sequencing - Sub-task		
Level One	Level Two	Level Three
10.03 - sets operating parameters for PAC equipment 10.04 - performs cut or gouge using PAC equipment		
Cutting – Electric Arc Cutting and Gouging 11.01 – selects CAC-A equipment and consumables 11.02 – sets up CAC-A equipment 11.03 – sets operating parameters for CAC-A equipment 11.04 – performs cut or gouge using CAC-A equipment		
Welding – Shielded Metal Arc Welding (SMAW) – C1 (Simple positions: flat, horizontal, vertical; and/or Set-up, strike, maintain and arc; Fillet weld, all positions)¹³ 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 12.01 – selects SMAW equipment and consumables 12.02 – sets up SMAW equipment 12.03 – sets operating parameters for SMAW 12.04 – performs weld with SMAW equipment Variation: Alberta will feature SMAW in level 2 and 3 rather than across 3 levels	Welding – Shielded Metal Arc Welding (SMAW) – C2 (More difficult positions: 45 degree/overhead; and/or Groove weld plate, all positions; Fillet and groove weld, medium carbon steel) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 12.01 – selects SMAW equipment and consumables 12.02 – sets up SMAW equipment 12.03 – sets operating parameters for SMAW 12.04 – performs weld with SMAW equipment Variation: Alberta will feature SMAW in level 2 and 3 rather than across 3 levels	Welding – Shielded Metal Arc Welding (SMAW) – C3 (Most Difficult: Pipe and tubing, all positions; Alloy steels) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 12.01 – selects SMAW equipment and consumables 12.02 – sets up SMAW equipment 12.03 – sets operating parameters for SMAW 12.04 – performs weld with SMAW equipment Variation: Alberta will feature SMAW in level 2 and 3 rather than across 3 levels
Welding – Gas Metal Arc Welding (GMAW) – D1 (Set up arc and maintain an arc; Fillet and groove weld, all positions)¹⁴ 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment	Welding – Gas Metal Arc Welding (GMAW) – D2 (Fillet and groove weld, all positions; Fillet and groove weld, medium carbon steel) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment	Welding – Gas Metal Arc Welding (GMAW) – D3 (Pipe and Tubing, all positions; Aluminum alloys; Stainless steel alloys) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment

¹³ Variation: Alberta will feature SMAW in level 2 and 3 rather than across 3 levels

¹⁴ Variation: Alberta will feature GMAW in level 2 and 3 rather than across 3 levels

2.3. Welder Sequencing - Sub-task		
Level One	Level Two	Level Three
<p>Variation: Alberta will feature GMAW in level 2 and 3 rather than across 3 levels</p> <p>Welding – Flux Core Arc Welding (FCAW) – E1 (Set-up and deposit a weld)¹⁵ 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature FCAW in level 2 and 3 rather than across 3</p>	<p>Variation: Alberta will feature GMAW in level 2 and 3 rather than across 3 levels</p> <p>Welding – Flux Core Arc Welding (FCAW) – E2 (Fillet and groove weld plate, all positions) 5.03 – controls temperature of weldments? 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature FCAW in level 2 and 3 rather than across 3</p>	<p>Variation: Alberta will feature GMAW in level 2 and 3 rather than across 3 levels</p> <p>Welding – Flux Core Arc Welding (FCAW) – E3 (Pipe and tubing, all positions) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature FCAW in level 2 and 3 rather than across 3</p>
<p>Welding – Metal Core Arc Welding (MCAW) – F1 (Set-up and deposit a weld)¹⁶ 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature MCAW in level 2 and 3 rather than across 3 levels</p>	<p>Welding – Metal Core Arc Welding (MCAW) – F2 (Fillet weld, all positions) 5.03 – controls temperature of weldments? 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature MCAW in level 2 and 3 rather than cross 3 levels</p>	<p>Welding – Metal Core Arc Welding (MCAW) – F3 (Groove weld, all positions) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source? 5.06 – performs equipment start-up and shut-down 13.01 – selects FCAW, MCAW and GMAW gas, equipment and consumables 13.02 – sets up FCAW, MCAW and GMAW equipment 13.03 – sets operating parameters for FCAW, MCAW and GMAW 13.04 – performs weld using FCAW, MCAW and GMAW equipment</p> <p>Variation: Alberta will feature MCAW in level 2 and 3 rather than across 3 levels</p>
	<p>Welding – Gas Tungsten Arc Welding (GTAW) – G1 (Fillet and groove weld, all positions; Fillet and groove weld, medium carbon steel) 1.04 – maintains welding equipment</p>	<p>Welding – Gas Tungsten Arc Welding (GTAW) – G2 (Pipe and tubing, all positions; Ferrous and non-ferrous alloys) 5.03 – controls temperature of weldments 5.05 – selects welding process and power source?</p>

¹⁵ Variation: Alberta will feature FCAW in level 2 and 3 rather than across 3 levels

¹⁶ Variation: Alberta will feature MCAW in level 2 and 3 rather than across 3 levels

2.3. Welder Sequencing - Sub-task		
Level One	Level Two	Level Three
	5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 14.01 – selects GTAW gas, equipment and consumables 14.02 – sets up GTAW equipment 14.03 – sets operating parameters for GTAW 14.04 – performs weld using GTAW equipment	5.06 – performs equipment start-up and shut-down 14.01 – selects GTAW gas, equipment and consumables 14.02 – sets up GTAW equipment 14.03 – sets operating parameters for GTAW 14.04 – performs weld using GTAW equipment
	Welding – Submerged Arc Welding – H1 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 15.01 – selects SAW equipment and consumables 15.02 – sets up SAW equipment 15.03 – sets operating parameters for SAW 15.04 – performs weld using SAW equipment	Welding – Submerged Arc Welding – H2 1.04 – maintains welding equipment 5.03 – controls temperature of weldments 5.04 – stores welding consumables 5.05 – selects welding process and power source 5.06 – performs equipment start-up and shut-down 15.01 – selects SAW equipment and consumables 15.02 – sets up SAW equipment 15.03 – sets operating parameters for SAW 15.04 – performs weld using SAW equipment
	Work Planning 4.02 – plans job tasks 4.03 – organizes materials	
Quality Control - I1 Visual Inspections	Quality Control - I2 5.01 – performs quality inspection 5.02 – marks welds, materials and parts	Quality Control - I3 5.01 – performs quality inspection 5.02 – marks welds, materials and parts
	Layout and Pattern Development 6.01 – develops templates 6.02 – transfers dimensions from drawings to materials	

NOTE – Sequencing based on the most recent national occupational analysis.

NOTE – Sub-tasks found in the NOA, which *directly* relate to the Unit or Topic title, are listed in this table. Other Sub-tasks related to the Unit or Topic, not listed in this table, may be added to achieve a logical template for instruction. The sub-tasks may be repeated in multiple Units or Topics due to similar knowledge and competencies for Sub-tasks.

3. Carpenter

3.1. Carpenter Recommendations

That provinces and territories adopt the **Red Seal trade name Carpenter / Charpentier / charpentière**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

3.2. Carpenter Sequencing – Snapshot and Topic Detail ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Project drawings	Project drawings	Project drawings
	Specifications	Specifications	Specifications
	Materials/fasteners, adhesives and connectors	Materials/fasteners, adhesives and connectors	Materials/fasteners, adhesives and connectors
Safety			
Tools and Equipment			
Temporary Access Equipment and Structures			
Lifting, Rigging and Hoisting			
Documentation safety documentation workplace documentation			Project Planning scheduling (sequence) site preparation organize materials
Site Layout hand tools layout instruments up to builders level	Site Layout layout instruments total station		
Constructs Formwork concrete formwork slab on grade embedded steel (dismantle) formwork placement of concrete curing of concrete basic finishing of concrete footing forms wall and grade beam		Constructs Formwork concrete formwork concrete falsework column formwork pre-cast components grout embedded steel excavation shoring and underpinning	
Floor Systems (Engineered and Lumber Framing) floor systems engineered floor systems dimensional lumber floor framing point load			Flooring (Floor Covering) underlayment floor covering access flooring
Wall Systems (Engineered and Lumber Framing) Introduction	Wall Systems (Engineered and Lumber Framing) wall systems engineered wall systems dimensional lumber wall framing	Wall Systems (Demountable) , Wallboard and Finish demountable wall systems wall board wall compound panels, tiles and solid wood finishes	
	Ceiling Framing roof and ceiling framing	Ceiling Systems ceiling systems suspended ceilings	

3.2. Carpenter Sequencing – Snapshot and Topic Detail ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

Level One	Level Two	Level Three	Level Four
		lays out ceiling systems	
	Roof Systems/Trusses roof and ceiling framing roof gables lays out ceiling systems lays out roof systems	Roof Systems/Trusses hip roof equal slope lays out roof systems	Roof Systems/Trusses special Roof unequal Slope lays out roof systems
	Roof Covering and Components components coverings		
	Jambs/Frames, Doors, Windows and Hardware (Exterior) exterior jambs/frames exterior doors specialty exterior doors exterior windows exterior door and window hardware	Jambs/Frames, Doors, Windows and Hardware (Interior) wood steel	Panels, Tiles and Solid Wood Finishes install panels, tiles and solid wood finishes
	Finish Components and Accessories (Exterior) wall components wall coverings	Finish Components and Accessories (Interior) (fabricate) components (install) components and accessories cabinets	
	Stairs straight	Stairs concrete	Stairs geometric
Deck Systems deck systems constructing components			Renovation remove existing materials protect structure join new to existing change existing structure

3.3. Carpenter Sequencing - Sub-task by NOA Block **ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES**

Universal Topics taught in context with applicable tasks.

	Context	Context	Context
	3.01 Installs fasteners, adhesives and connectors 5.01 Interprets project drawings 5.02 Interprets specifications	3.01 Installs fasteners, adhesives and connectors 5 5.01 Interprets project drawings 5.02 Interprets specifications	3.01 Installs fasteners, adhesives and connectors 5.01 Interprets project drawings 5.02 Interprets specifications

Block A - Common Occupational Skills

TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
Safety 2.01 Uses personal protective equipment and safety equipment 2.02 Maintains safe work environment 5.03 Interprets safety documentation			
What is taught progressively? • N/A			
What is taught in context? • with applicable task(s)			
Tools and Equipment 1.01 Maintains hand, power and pneumatic tools 1.02 Maintains stationary tools 1.03 Uses powder actuated tools 1.05 Uses layout instruments			
What is taught progressively? • N/A			
What is taught in context? • with applicable task(s)			
Temporary Access Equipment and Structures 4.01 Uses stationary access equipment 4.02 Uses mobile access equipment 4.03 Erects/dismantles scaffolding 4.04 Modifies specialized scaffolding			
What is taught progressively? • N/A			
What is taught in context? • with applicable task(s)			
Lifting, Rigging and Hoisting 1.04 Uses lifting, rigging and hoisting equipment			

3.3. Carpenter Sequencing - Sub-task by NOA Block **ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES**

Universal Topics taught in context with applicable tasks.

	Context	Context	Context
	3.01 Installs fasteners, adhesives and connectors 5.01 Interprets project drawings 5.02 Interprets specifications	3.01 Installs fasteners, adhesives and connectors 5 5.01 Interprets project drawings 5.02 Interprets specifications	3.01 Installs fasteners, adhesives and connectors 5.01 Interprets project drawings 5.02 Interprets specifications

Block B - Planning and Layout

TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
Documentation 5.03 Interprets safety documentation 5.04 Interprets workplace documentation			Project Planning 6.01 Schedules work sequence 6.02 Performs site preparation 6.04 Organizes materials
Site Layout 1.05 Uses layout instruments (hand tools, layout instruments up to builder's level) 7.01 Performs site layout	Site Layout 1.05 Uses layout instruments (total station)		
What is taught progressively? <ul style="list-style-type: none"> complexity of layout 			
What is taught in context? <ul style="list-style-type: none"> Tools/instruments 			

3.3. Carpenter Sequencing - Sub-task continued ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

Block C - Concrete			
TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
Constructs Formwork 7.02 Lays out concrete framework 8.03 Constructs footing forms 8.04 Constructs wall and grade beam framework 8.05 Constructs slab on grade framework 8.08 Installs embedded steel 8.09 Dismantles formwork 9.01 Places concrete 9.02 Facilitates the curing of concrete 9.03 Performs basic concrete finishing		Constructs Formwork 7.02 Lays out concrete formwork 8.01 Erects excavation shoring and underpinning 8.02 Erects concrete falsework 8.06 Constructs column formwork 8.07 Constructs stair formwork 8.08 Installs embedded steel 9.04 Installs pre-cast components 9.05 Installs grout	
What is taught progressively? <ul style="list-style-type: none"> N/A 		What is taught progressively? <ul style="list-style-type: none"> N/A 	
What is taught in context? <ul style="list-style-type: none"> characteristics and applications layout 		What is taught in context? <ul style="list-style-type: none"> characteristics and applications layout 	
Block D - Framing			
TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
Floor Systems (Engineered and Lumber Framing) (includes point load) 7.03 Lays out floor systems 10.01 Installs engineered floor systems 10.02 Constructs dimensional lumber floor framing			
Wall Systems (Engineered and Lumber Framing) Introduction <i>Note: MB and BC to exceed baseline</i>	Wall Systems (Engineered and Lumber Framing) 7.05 Lays out wall systems 12.01 Installs engineered wall systems 12.02 Constructs dimensional lumber wall framing 10.02 Constructs dimensional lumber floor framing		
Deck Systems 7.04 Lays out deck systems 11.01 Constructs deck 11.02 Installs deck components			
	Ceiling Framing 13.02 Constructs roof and ceiling framing		
	Roof Systems/Trusses (roof and ceiling framing, roof gables) 7.06 Lays out ceiling systems	Roof Systems/Trusses (hip roof, equal slope) 7.07 Lays out roof systems 13.01 Installs engineered trusses	Roof Systems/Trusses (special roof, unequal slope) 7.07 Lays out roof systems

3.3. Carpenter Sequencing - Sub-task continued ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

	7.07 Lays out roof systems 13.01 Installs engineered trusses 13.02 Constructs roof and ceiling framing	13.02 Constructs roof and ceiling framing	13.01 Installs engineered trusses 13.02 Constructs roof and ceiling framing
		What is taught progressively? <ul style="list-style-type: none"> • roof systems • engineered trusses 	
		What is taught in context? <ul style="list-style-type: none"> • layout • install • construct 	
Block E - Exterior Finish			
TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
	Roof Covering and Components 15.01 Installs roofing components 15.02 Installs roofing coverings		
	Jambs/Frames, Doors, Windows and Hardware (Exterior) 14.01 Installs exterior jambs/frames 14.02 Installs exterior doors 14.03 Installs specialty exterior doors 14.04 Installs exterior windows 14.05 Installs exterior door and window hardware		
	Finish Components and Accessories (Exterior) 16.01 Installs exterior wall components 16.02 Installs exterior wall coverings		
	What is taught progressively? <ul style="list-style-type: none"> • N/A 		
	What is taught in context? <ul style="list-style-type: none"> • with applicable task(s) 		
Block F - Interior Finish			
TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
	Stairs (Straight) 7.03 Lays out stairs 20.03 Constructs stairs	Stairs (Concrete) 7.03 Lays out stairs 8.07 Constructs stair formwork 20.03 Constructs stairs	Stairs (Geometric) 7.03 Lays out stairs 20.03 Constructs stairs

3.3. Carpenter Sequencing - Sub-task continued ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

	<p>What is taught progressively?</p> <ul style="list-style-type: none"> • type of stair(s) <p>What is taught in context?</p> <ul style="list-style-type: none"> • layout • construct 		
		<p>Ceilings Systems</p> <p>7.06 Lays out ceiling systems</p> <p>17.04 Installs suspended ceilings</p>	
		<p>Wall Systems (Demountable), Wallboard and Finish</p> <p>17.05 Installs demountable wall systems</p> <p>17.01 Installs wallboard</p> <p>17.02 Installs wall compound</p> <p>17.03 Installs panels, tiles and solid wood finishes</p>	
			<p>Panels, Tiles and Solid Wood Finishes</p> <p>17.03 Install panels, tiles and solid wood finishes</p>
		<p>Finish Components and Accessories (Interior) (includes cabinets)</p> <p>20.01 Fabricates finish components</p> <p>20.02 Installs finish components and accessories</p>	
		<p>Jambs/Frames, Doors, Windows and Hardware (Interior) (wood and steel)</p> <p>19.01 - installs interior jambs/frames</p> <p>19.02 - installs interior doors</p> <p>19.03 - installs interior windows</p> <p>19.04 - installs interior door and window hardware</p>	
			<p>Flooring (Floor Covering)</p> <p>18.01 Installs underlayment</p> <p>18.02 Installs floor covering</p> <p>18.03 Installs access flooring</p>
		<p>What is taught progressively?</p> <p>N/A</p>	
		<p>What is taught in context?</p> <ul style="list-style-type: none"> • interior jambs/frames • interior doors • interior windows • interior door and window hardware 	

3.3. Carpenter Sequencing - Sub-task continued ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

Block G - Renovation			
TOPIC by BLOCK			
Level One	Level Two	Level Three	Level Four
			Renovation 21.01 Removes existing material 21.02 Protects structure during renovations 22.01 Joins new to existing construction 22.02 Changes existing structure during renovations Note: Jurisdictions can choose to exceed baseline and teach speciality cabinetry here.

NOTE – Sequencing based on the most recent national occupational analysis.

NOTE – Sub-tasks found in the NOA, which *directly* relate to the Unit or Topic title, are listed in this table. Other Sub-tasks related to the Unit or Topic, not listed in this table, may be added to achieve a logical template for instruction. The sub-tasks may be repeated in multiple Units or Topics due to similar knowledge and competencies for Sub-tasks.

CARPENTER - ORIGINAL DEVELOPMENT, PLEASE SEE BELOW FOR UPDATES

3.3.A Carpenter Sequencing – Phase 7 UPDATES (2021)

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Tools and Equipment	Tools and Equipment	Tools and Equipment
	Documentation	Documentation	Documentation
Tools and Equipment 1.01 Uses hand, power and pneumatic tools 1.02 Uses stationary tools 1.03 Uses powder-actuated tools 1.04 Uses lifting, rigging and hoisting equipment 1.05 Uses layout instruments and equipment (1.06, 1.07 NCC)	Tools and Equipment 1.05 Uses layout instruments and equipment		
Safety-Related Activities 2.01 Uses personal protective equipment (PPE) and safety equipment 2.02 Maintains safe work environment			
Temporary Access Structures 3.01 Uses stationary access equipment 3.02 Uses mobile access equipment 3.03 Erects/dismantles scaffolding 3.04 Modifies scaffolding			
Uses Communication Techniques 4.01 Uses communication techniques			Uses Mentoring Techniques 4.02 Uses mentoring techniques
Documentation 5.01 Interprets project drawings. 5.02 Interprets specifications. 5.03 Interprets			

3.3.A Carpenter Sequencing – Phase 7 UPDATES (2021)

Level One	Level Two	Level Three	Level Four
safety documentation. 5.04 Interprets workplace documentation.			
			Organizes Work 6.01 Schedules work sequence 6.02 Performs site preparation 6.03 Performs quantity take off 6.04 Organizes material
Layout 7.01 Performs site layout. 7.02 Lays out concrete formwork 7.03 Lays out floors 7.04 Lays out decks 7.05 Lays out walls 7.06 Lays out ceilings 7.07 Lays out roofs	Layout 7.01 Performs site layout 7.03 Lays out floors 7.05 Lays out walls 7.06 Lays out ceilings 7.07 Lays out roofs 7.08 Lays out stairs	Layout 7.02 Lays out concrete formwork 7.03 Lays out floors 7.06 Lays out ceilings 7.07 Lays out roofs 7.08 Lays out stairs 7.09 Lays out balustrades	Layout 7.03 Lays out floors 7.07 Lays out roofs 7.08 Lays out stairs 7.09 Lays out balustrades
Formwork 8.03 Constructs footing forms. 8.04 Constructs wall form systems and grade beam formwork 8.05 Constructs slab formwork 8.08 Installs embedded reinforcements 8.09 Dismantles formwork		Formwork 8.01 Erects excavation shoring and underpinning 8.02 Erects concrete falsework 8.06 Constructs column formwork 8.07 Constructs stair formwork 8.08 Installs embedded reinforcements	
Concrete, Cement-Based and Epoxy Products		Concrete, Cement-Based and Epoxy Products	

3.3.A Carpenter Sequencing – Phase 7 UPDATES (2021)

Level One	Level Two	Level Three	Level Four
9.01 Places concrete. 9.02 Facilitates curing of concrete. 9.03 Performs basic concrete finishing.		9.04 Installs pre-cast components. 9.05 Installs grout.	
Floor Systems 10.01 Installs engineered floor systems. 10.02 Constructs dimensional lumber floor framing	Floor Systems 10.02 Constructs dimensional lumber floor framing		
Deck Systems 11.01 Constructs decks 11.02 Installs deck components			
Wall Systems 12.01 Installs engineered wall systems 12.02 Constructs dimensional lumber wall framing	Wall Systems 12.01 Installs engineered wall systems 12.02 Constructs dimensional lumber wall framing		
	Roof and Ceiling Systems 13.01 Installs engineered trusses. 13.02 Constructs roof and ceiling framing.	Roof and Ceiling Systems 13.01 Installs engineered trusses. 13.02 Constructs roof and ceiling framing.	Roof and Ceiling Systems 13.01 Installs engineered trusses. 13.02 Constructs roof and ceiling framing.
	Exterior Doors and Windows 14.01 Installs exterior jambs/frames. 14.02 Installs exterior doors. 14.03 Installs		

3.3.A Carpenter Sequencing – Phase 7 UPDATES (2021)

Level One	Level Two	Level Three	Level Four
	exterior windows. 14.04 Installs exterior door and window hardware.		
	Roofing 15.01 Installs roofing components. 15.02 Installs roofing coverings.		
	Exterior Finishes 16.01 Installs exterior wall components. 16.02 Installs exterior wall coverings.		
		Wall and Ceiling Finishes 17.01 Installs wallboard 17.02 Applies compound to walls and ceilings 17.03 Installs panels, tiles and solid wood finishes 17.04 Installs suspended ceilings 17.05 Installs demountable wall systems	
			Flooring 18.01 Installs underlayment. 18.02 Installs floor coverings. 18.03 Installs access flooring.
		Interior Doors and Windows 19.01 Installs interior	

3.3.A Carpenter Sequencing – Phase 7 UPDATES (2021)

Level One	Level Two	Level Three	Level Four
		jambs/frames. 19.02 Installs interior doors. 19.03 Installs interior windows. 19.04 Installs interior door and window hardware.	
	Finish Components and Stairs 20.03 Constructs stairs ¹⁷	Finish Components and Stairs 20.01 Fabricates finish components 20.02 Installs finish components and accessories 20.03 Constructs stairs	Finish Components and Stairs 20.03 Constructs stairs
			Renovation Support Activities 21.01 Removes existing material. 21.02 Protects structure during renovations.
			Renovation Construction Activities 22.01 Joins new to existing construction. 22.02 Changes existing structure during renovations

¹⁷ Some basic overview of stair construction concepts could be introduced by trainers as a meet and exceed in level one (e.g. in combination with decks), but note that industry would be introducing the experience on the job when possible.

4. Ironworker (Generalist)

4.1. Ironworker (Generalist)¹⁸ Recommendations

That provinces and territories adopt the **Red Seal trade name Ironworker (Generalist) / Monteur/monteuse de charpentes en acier (généraliste)**

- That the total number of training hours be **5400 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and subtask mapping in the sequencing documents with the following variation:
 - Jurisdictions may meet the benchmark by covering content that was not covered in level 1 and 2 or exceed the benchmark by reinforcing content taught in level 1 and 2 in level 3 Pre-Stressed/Post-Tensioning Systems.

¹⁸ Alberta is in the process of considering de-designating Ironworker (Generalist) so will not be harmonizing this trade at this time.

4.2. Ironworker (Generalist) Sequencing - Snapshot

Level One	Level Two	Level Three
Safety Awareness		
Tools and Equipment		
Access Equipment		
Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging
Communication and Trade Documentation		
Welding I		Welding II
Oxy-fuel Cutting		
	Work Planning	Work Planning
Drawings	Drawings	Drawings
Introduction to Cranes	Cranes	Cranes
Structural Components	Structural Components	Structural Components
Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling
	Pre-engineered Structures	Pre-engineered Structures
	Pre-cast Concrete Erection and Dismantling	Pre-cast Concrete Erection and Dismantling
	Machinery and Equipment	Machinery and Equipment
	Miscellaneous Ironwork	Miscellaneous Ironwork
		Ornamental Ironwork
Reinforcing	Reinforcing	
Pre-Stressed/Post-Tensioning Systems	Pre-Stressed/Post-Tensioning Systems	Pre-Stressed/Post-Tensioning Systems ¹⁹

¹⁹ Variation: Jurisdictions may meet the benchmark by covering content that was not covered in level 1 and 2 or exceed the benchmark by reinforcing content taught in level 1 and 2, in level 3 Pre-Stressed/Post-Tensioning Systems

4.3 Ironworker (Generalist) Sequencing – Topic Detail

Level One	Level Two	Level Three
Safety Awareness <ul style="list-style-type: none"> personal protective equipment (PPE) safe work environment site hazards 		
Tools and Equipment <ul style="list-style-type: none"> hand tools power tools bending tools and equipment powder-actuated tools welding equipment 		
Access Equipment <ul style="list-style-type: none"> aerial work platforms ladders scaffolding 		
Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals. communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load <p>Taught progressively in context with the level of training</p>	Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals. communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load <p>Taught progressively in context with the level of training</p>	Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals. communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load <p>Taught progressively in context with the level of training</p>
Communication and Trade Documentation <ul style="list-style-type: none"> standards, regulations and procedures communication hand signals introduction to work planning 		
Welding I <ul style="list-style-type: none"> welding equipment <p>Taught progressively in context with the level of training.</p>		Welding II <ul style="list-style-type: none"> welding equipment <p>Taught progressively in context with the level of training.</p>
Oxy-fuel Cutting <ul style="list-style-type: none"> thermal and oxy-fuel cutting equipment 		
	Work Planning <ul style="list-style-type: none"> materials and supplies work tasks 	Work Planning <ul style="list-style-type: none"> materials and supplies work tasks

4.3 Ironworker (Generalist) Sequencing – Topic Detail

Level One	Level Two	Level Three
	Taught progressively in context with the level of training	Taught progressively in context with the level of training
Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training	Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training	Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training
Introduction to Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training	Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training	Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training
Structural Components <ul style="list-style-type: none"> layout falsework structural members 	Structural Components <ul style="list-style-type: none"> layout falsework structural members 	Structural Components <ul style="list-style-type: none"> layout falsework structural members
Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly 	Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly 	Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly
	Pre-engineered Structures <ul style="list-style-type: none"> surveying equipment layout structural members (leveling, plumbing and aligning) structural members (completing installing) 	Pre-engineered Structures <ul style="list-style-type: none"> surveying equipment layout structural members (leveling, plumbing and aligning) structural members (completing installing)

4.3 Ironworker (Generalist) Sequencing – Topic Detail

Level One	Level Two	Level Three
	<ul style="list-style-type: none"> • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly 	<ul style="list-style-type: none"> • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly
	<p>Pre-cast Concrete Erection and Dismantling</p> <ul style="list-style-type: none"> • surveying equipment • layout • structural members (leveling, plumbing and aligning) • structural members (completing installing) • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly 	<p>Pre-cast Concrete Erection and Dismantling</p> <ul style="list-style-type: none"> • surveying equipment • layout • structural members (leveling, plumbing and aligning) • structural members (completing installing) • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly
	<p>Machinery and Equipment</p> <ul style="list-style-type: none"> • surveying equipment • layout • material handling systems (installation, aligning and placing). • preventative maintenance. • structure or components (decommissioning) • disassembly • component (removing) 	<p>Machinery and Equipment</p> <ul style="list-style-type: none"> • surveying equipment • layout • material handling systems (installation, aligning and placing). • preventative maintenance. • structure or components (decommissioning) • disassembly • component (removing)
	<p>Miscellaneous Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls • preventative maintenance • structure or components (decommissioning) • disassembly • component (removing) 	<p>Miscellaneous Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls • preventative maintenance • structure or components (decommissioning) • disassembly • component (removing)
		<p>Ornamental Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls

4.3 Ironworker (Generalist) Sequencing – Topic Detail

Level One	Level Two	Level Three
		<ul style="list-style-type: none"> • preventative maintenance • structure or components (decommissioning) • disassembly • component (removing)
Reinforcing <ul style="list-style-type: none"> • bending tools and equipment • materials (cutting and bending) • places reinforcing material (placing, tying and joining) 	Reinforcing <ul style="list-style-type: none"> • bending tools and equipment • materials (cutting and bending) • places reinforcing material (placing, tying and joining) 	
Pre-Stressed/Post-Tensioning Systems <ul style="list-style-type: none"> • layout • tendons and accessories • bursting steel and anchorages • tendons to anchors • exposed tendons • stressing equipment (setting up and removing) • tendons (cutting, capping and tensioning and de-stressing) • grouting equipment • grouts 	Pre-Stressed/Post-Tensioning Systems <ul style="list-style-type: none"> • layout • tendons and accessories • bursting steel and anchorages • tendons to anchors • exposed tendons • stressing equipment (setting up and removing) • tendons (cutting, capping and tensioning and de-stressing) • grouting equipment • grouts 	Pre-Stressed/Post-Tensioning Systems²⁰ <ul style="list-style-type: none"> • layout • tendons and accessories • bursting steel and anchorages • tendons to anchors • exposed tendons • stressing equipment (setting up and removing) • tendons (cutting, capping and tensioning and de-stressing) • grouting equipment • grouts

²⁰ Variation: Jurisdictions may meet the benchmark by covering content that was not covered in level 1 and 2 or exceed the benchmark by reinforcing content taught in level 1 and 2, in level 3 Pre-Stressed/Post-Tensioning Systems.

4.4 Ironworker (Generalist) Sequencing – Subtask by 2015 NOA

Level One	Level Two	Level Three
<p>Safety Awareness</p> <p>3.08 Uses personal protective equipment (PPE). 4.03 Maintains safe work environment. 4.04 Assesses site hazards.</p>		
<p>Tools and Equipment</p> <p>3.01 Uses hand tools and measuring equipment. 3.02 Uses power tools. 3.03 Uses bending tools and equipment. 3.04 Uses powder-actuated tools. 3.10 Uses welding equipment.</p>		
<p>Access Equipment</p> <p>3.05 Uses aerial work platforms. 3.06 Uses ladders. 3.07 Uses scaffolding.</p>		
<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>	<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>	<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>
<p>Communication and Trade Documentation</p> <p>1.02 Interprets standards, regulations and procedures. 2.01 Communicates with co-workers. 2.02 Communicates with others. 2.03 Communicates with apprentices. 2.04 Uses hand signals. 2.05 Communicates electronically. 4.01 Organizes materials and supplies. (Introduction) 4.05 Plans work tasks. (Introduction)</p>		
<p>Welding I</p> <p>3.10 Uses welding equipment.</p>		<p>Welding II</p> <p>3.10 Uses welding equipment.</p>

4.4 Ironworker (Generalist) Sequencing – Subtask by 2015 NOA

Level One	Level Two	Level Three
Taught progressively in context with the level of training.		Taught progressively in context with the level of training.
Oxy-fuel Cutting 3.11 Uses thermal and oxy-fuel cutting equipment.		
	Work Planning 4.01 Organizes materials and supplies. 4.05 Plans work tasks. Taught progressively in context with the level of training.	Work Planning 4.01 Organizes materials and supplies. 4.05 Plans work tasks. Taught progressively in context with the level of training.
Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training.	Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training.	Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training.
Introduction to Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane and components for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.	Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane and components for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.	Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane and components for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.
Structural Components 4.02 Marks layouts. 14.01 Erects falsework. 14.02 Attaches structural members.	Structural Components 4.02 Marks layouts. 14.01 Erects falsework. 14.02 Attaches structural members.	Structural Components 4.02 Marks layouts. 14.01 Erects falsework. 14.02 Attaches structural members.
Structural Steel Erection and Dismantling 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components.	Structural Steel Erection and Dismantling 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components.	Structural Steel Erection and Dismantling 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components.

4.4 Ironworker (Generalist) Sequencing – Subtask by 2015 NOA

Level One	Level Two	Level Three
<p>18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>18.02 Plans sequence of disassembly. 18.03 Removes components.</p>
	<p>Pre-engineered Structures 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>Pre-engineered Structures 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>
	<p>Pre-cast Concrete Erection and Dismantling 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>Pre-cast Concrete Erection and Dismantling 3.09 Uses surveying equipment. 4.02 Marks layouts. 14.02 Attaches structural members. 14.03 Levels, plumbs and aligns structural members. 14.04 Completes installation of structural members. 17.01 Assesses current condition of components. 17.02 Field-fabricates components. 17.03 Replaces components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>
	<p>Machinery and Equipment 3.09 Uses surveying equipment. 4.02 Marks layouts. 16.01 Installs material handling systems. 16.02 Aligns material handling systems. 16.03 Places machinery and equipment. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>Machinery and Equipment 3.09 Uses surveying equipment. 4.02 Marks layouts. 16.01 Installs material handling systems. 16.02 Aligns material handling systems. 16.03 Places machinery and equipment. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components..</p>

Level One	Level Two	Level Three
	<p>Miscellaneous Ironwork</p> <p>3.09 Uses surveying equipment. 4.02 Marks layouts. 15.01 Installs curtain walls and window walls. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>	<p>Miscellaneous Ironwork</p> <p>3.09 Uses surveying equipment. 4.02 Marks layouts. 15.01 Installs curtain walls and window walls. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>
		<p>Ornamental Ironwork</p> <p>3.09 Uses surveying equipment. 4.02 Marks layouts. 15.02 Installs miscellaneous components. 17.04 Performs preventative maintenance. 18.01 Ensures decommissioning of structure or components. 18.02 Plans sequence of disassembly. 18.03 Removes components.</p>
<p>Reinforcing</p> <p>3.03 Uses bending tools and equipment 9.01 Cuts materials 9.02 Bends materials 10.01 Places reinforcing material 10.02 Ties material 10.03 Joins material</p>	<p>Reinforcing</p> <p>3.03 Uses bending tools and equipment 9.01 Cuts materials 9.02 Bends materials 10.01 Places reinforcing material 10.02 Ties material 10.03 Joins material</p>	
<p>Pre-Stressed/Post-Tensioning Systems</p> <p>10.01 Lays out profile 11.02 Places tendons and accessories 11.03 Installs bursting steel and anchorages 11.04 Connects tendons to anchors 11.05 Protects exposed tendons 12.01 Sets up stressing equipment 12.02 Tensions tendons 12.03 Cuts and caps tendons 12.04 Removes stressing equipment 12.05 De-stresses tendons 13.01 Sets up grouting equipment 13.02 Installs grouts</p> <p>Taught progressively in context with the level of training.</p>	<p>Pre-Stressed/Post-Tensioning Systems</p> <p>10.01 Lays out profile 11.02 Places tendons and accessories 11.03 Installs bursting steel and anchorages 11.04 Connects tendons to anchors 11.05 Protects exposed tendons 12.01 Sets up stressing equipment 12.02 Tensions tendons 12.03 Cuts and caps tendons 12.04 Removes stressing equipment 12.05 De-stresses tendons 13.01 Sets up grouting equipment 13.02 Installs grouts</p> <p>Taught progressively in context with the level of training.</p>	<p>Pre-Stressed/Post-Tensioning Systems²¹</p> <p>10.01 Lays out profile 11.02 Places tendons and accessories 11.03 Installs bursting steel and anchorages 11.04 Connects tendons to anchors 11.05 Protects exposed tendons 12.01 Sets up stressing equipment 12.02 Tensions tendons 12.03 Cuts and caps tendons 12.04 Removes stressing equipment 12.05 De-stresses tendons 13.01 Sets up grouting equipment 13.02 Installs grouts</p> <p>Taught progressively in context with the level of training.</p>

²¹ Variation: Jurisdictions may meet the benchmark by covering content that was not covered in level 1 and 2 or exceed the benchmark by reinforcing content taught in level 1 and 2, in level 3 Pre-Stressed/Post-Tensioning Systems.

5. Ironworker (Structural/Ornamental)

5.1. Ironworker (Structural/Ornamental) Recommendations

That provinces and territories adopt the **Red Seal trade name Ironworker (Structural/Ornamental)²² / Monteur/monteuse de charpentes en acier (structural et ornemental)**

- That the total number of training hours be **5400** (jurisdictions will determine the ratio of in-class vs. on the job training).
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and subtask mapping in the sequencing documents.

²² Alberta will be abstaining from approving the harmonized course sequencing for Ironworker (Structural/Ornamental) due to concerns about how the sequencing will affect a provincially designated trade – Metal Building Systems Erector. Alberta's abstention should not prevent the CCDA from harmonizing this trade. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the Red Seal standard.

5.2 Ironworker (Structural/Ornamental) Sequencing - Snapshot

Level One	Level Two	Level Three
Safety Awareness		
Tools and Equipment		
Access Equipment		
Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging
Communication and Trade Documentation		
Welding I		Welding II
Oxy-fuel Cutting		
	Work Planning	Work Planning
Drawings	Drawings	Drawings
Introduction to Cranes	Cranes	Cranes
Structural Components	Structural Components	Structural Components
Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling	Structural Steel Erection and Dismantling
	Pre-engineered Structures	Pre-engineered Structures
	Pre-cast Concrete Erection and Dismantling	Pre-cast Concrete Erection and Dismantling
	Machinery and Equipment	Machinery and Equipment
	Miscellaneous Ironwork	Miscellaneous Ironwork
		Ornamental Ironwork

5.3 Ironworker (Structural/Ornamental) Sequencing – Topic Detail		
Level One	Level Two	Level Three
Safety Awareness <ul style="list-style-type: none"> personal protective equipment (PPE) safe work environment site hazards 		
Tools and Equipment <ul style="list-style-type: none"> hand tools power tools powder-actuated tools welding equipment 		
Access Equipment <ul style="list-style-type: none"> aerial work platforms ladders scaffolding 		
Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load 	Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load 	Hoisting, Lifting and Rigging <ul style="list-style-type: none"> hand signals communication load to lift capability rigging equipment hoisting equipment lifting equipment rigging to load
Taught progressively in context with the level of training	Taught progressively in context with the level of training	Taught progressively in context with the level of training
Communication and Trade Documentation <ul style="list-style-type: none"> standards, regulations and procedures communication hand signals. introduction to work planning 		
Welding I <ul style="list-style-type: none"> welding equipment 		Welding II <ul style="list-style-type: none"> welding equipment
Taught progressively in context with the level of training		Taught progressively in context with the level of training
Oxy-fuel Cutting <ul style="list-style-type: none"> thermal and oxy-fuel cutting equipment 		
	Work Planning <ul style="list-style-type: none"> materials and supplies work tasks 	Work Planning <ul style="list-style-type: none"> materials and supplies work tasks
	Taught progressively in context with the level of training	

5.3 Ironworker (Structural/Ornamental) Sequencing – Topic Detail

Level One	Level Two	Level Three
		Taught progressively in context with the level of training
Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training	Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training	Drawings <ul style="list-style-type: none"> drawings and specifications Taught progressively in context with the level of training
Introduction to Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training	Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training	Cranes <ul style="list-style-type: none"> site hazards crane position base preparation crane assembly crane components (disassembly) transport hydraulic and conventional cranes tower cranes electric overhead travelling cranes Taught progressively in context with the level of training
Structural Components <ul style="list-style-type: none"> layout falsework structural members 	Structural Components <ul style="list-style-type: none"> layout falsework structural members 	Structural Components <ul style="list-style-type: none"> layout falsework structural members
Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly 	Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly 	Structural Steel Erection and Dismantling <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components field-fabricating components components (replacing and removing) preventative maintenance structure or components (decommissioning) disassembly
	Pre-engineered Structures <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components 	Pre-engineered Structures <ul style="list-style-type: none"> surveying equipment layout structural members (attaching, leveling, plumbing and aligning) structural members (completing installing) current condition of components

5.3 Ironworker (Structural/Ornamental) Sequencing – Topic Detail

Level One	Level Two	Level Three
	<ul style="list-style-type: none"> • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly 	<ul style="list-style-type: none"> • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly
	<p>Pre-cast Concrete Erection and Dismantling</p> <ul style="list-style-type: none"> • surveying equipment • layout • structural members (attaching, leveling, plumbing and aligning) • structural members (completing installing) • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly 	<p>Pre-cast Concrete Erection and Dismantling</p> <ul style="list-style-type: none"> • surveying equipment • layout • structural members (attaching, leveling, plumbing and aligning) • structural members (completing installing) • current condition of components • field-fabricating components • components (replacing and removing) • preventative maintenance • structure or components (decommissioning) • disassembly
	<p>Machinery and Equipment</p> <ul style="list-style-type: none"> • surveying equipment • layout • material handling systems (installation, aligning and placing). • preventative maintenance. • structure or components (decommissioning) • disassembly • component (removing) 	<p>Machinery and Equipment</p> <ul style="list-style-type: none"> • surveying equipment • layout • material handling systems (installation, aligning and placing). • preventative maintenance. • structure or components (decommissioning) • disassembly • component (removing)
	<p>Miscellaneous Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls • preventative maintenance • structure or components (decommissioning) • disassembly • component (removing) 	<p>Miscellaneous Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls • preventative maintenance • structure or components (decommissioning) • disassembly • component (removing)
		<p>Ornamental Ironwork</p> <ul style="list-style-type: none"> • surveying equipment • layout • curtain walls • preventative maintenance

5.3 Ironworker (Structural/Ornamental) Sequencing – Topic Detail		
Level One	Level Two	Level Three
		<ul style="list-style-type: none"> • structure or components (decommissioning) • disassembly • component (removing)

5.4 Ironworker (Structural/Ornamental) Sequencing – Sub-Task by 2015 NOA		
Level One	Level Two	Level Three
<p>Safety Awareness</p> <p>3.07 Uses personal protective equipment (PPE). 4.03 Maintains safe work environment. 4.04 Assesses site hazards.</p>		
<p>Tools and Equipment</p> <p>3.01 Uses hand tools and measuring equipment. 3.02 Uses power tools. 3.03 Uses powder-actuated tools. 3.09 Uses welding equipment.</p>		
<p>Access Equipment</p> <p>3.04 Uses aerial work platforms. 3.05 Uses ladders. 3.06 Uses scaffolding.</p>		
<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment. 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>	<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment. 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>	<p>Hoisting, Lifting and Rigging</p> <p>2.04 Uses hand signals. 2.05 Communicates electronically. 5.01 Matches load to lift capability. 5.02 Inspects rigging equipment. 5.03 Maintains rigging equipment. 6.01 Uses hoisting equipment. 6.02 Uses lifting equipment 6.03 Attaches rigging to load.</p> <p>Taught progressively in context with the level of training.</p>
<p>Communication and Trade Documentation</p> <p>1.02 Interprets standards, regulations and procedures. 2.01 Communicates with co-workers. 2.02 Communicates with others. 2.03 Communicates with apprentices.</p>		

5.4 Ironworker (Structural/Ornamental) Sequencing – Sub-Task by 2015 NOA

Level One	Level Two	Level Three
2.04 Uses hand signals. 2.05 Communicates electronically. 4.01 Organizes materials and supplies. 4.05 Plans work tasks.		
Welding I 3.09 Uses welding equipment. Taught progressively in context with the level of training		Welding II 3.09 Uses welding equipment. Taught progressively in context with the level of training
Oxy-fuel Cutting 3.10 Uses thermal and oxy-fuel cutting equipment.		
	Work Planning 4.01 Organizes materials and supplies. 4.05 Plans work tasks. Taught progressively in context with the level of training	Work Planning 4.01 Organizes materials and supplies. 4.05 Plans work tasks. Taught progressively in context with the level of training
Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training	Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training	Drawings 1.01 Interprets drawings and specifications Taught progressively in context with the level of training
Introduction to Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.	Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.	Cranes 7.01 Assesses crane site limitations. 7.02 Determines crane position. 7.03 Prepares bases. 7.04 Erects cranes and components. 8.01 Disassembles crane components. 8.02 Prepares crane for transport. Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training.
Structural Components 4.02 Marks layouts. 9.01 Erects falsework. 9.02 Attaches structural members.	Structural Components 4.02 Marks layouts. 9.01 Erects falsework. 9.02 Attaches structural members.	Structural Components 4.02 Marks layouts. 9.01 Erects falsework. 9.02 Attaches structural members.
Structural Steel Erection and Dismantling 3.08 Uses surveying equipment. 4.02 Marks layouts.	Structural Steel Erection and Dismantling 3.08 Uses surveying equipment. 4.02 Marks layouts.	Structural Steel Erection and Dismantling 3.08 Uses surveying equipment. 4.02 Marks layouts.

5.4 Ironworker (Structural/Ornamental) Sequencing – Sub-Task by 2015 NOA

Level One	Level Two	Level Three
<p>9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>	<p>9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>	<p>9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>
	<p>Pre-engineered Structures 3.08 Uses surveying equipment. 4.02 Marks layouts. 9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>	<p>Pre-engineered Structures 3.08 Uses surveying equipment. 4.02 Marks layouts. 9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>
	<p>Pre-cast Concrete Erection and Dismantling 3.08 Uses surveying equipment. 4.02 Marks layouts. 9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>	<p>Pre-cast Concrete Erection and Dismantling 3.08 Uses surveying equipment. 4.02 Marks layouts. 9.02 Attaches structural members. 9.03 Levels, plumbs and aligns structural members. 9.04 Completes installation of structural members. 12.01 Assesses current condition of components. 12.02 Field-fabricates components. 12.03 Replaces components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.</p>
	<p>Machinery and Equipment 3.08 Uses surveying equipment. 4.02 Marks layouts.</p>	<p>Machinery and Equipment 3.08 Uses surveying equipment. 4.02 Marks layouts.</p>

5.4 Ironworker (Structural/Ornamental) Sequencing – Sub-Task by 2015 NOA

Level One	Level Two	Level Three
	11.01 Installs material handling systems. 11.02 Aligns material handling systems. 11.03 Places machinery and equipment. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.	11.01 Installs material handling systems. 11.02 Aligns material handling systems. 11.03 Places machinery and equipment. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.
	Miscellaneous Ironwork 3.08 Uses surveying equipment. 4.02 Marks layouts. 10.01 Installs curtain walls and window walls. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.	Miscellaneous Ironwork 3.08 Uses surveying equipment. 4.02 Marks layouts. 10.01 Installs curtain walls and window walls. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.
		Ornamental Ironwork 3.08 Uses surveying equipment. 4.02 Marks layouts. 10.02 Installs miscellaneous components. 12.04 Performs preventative maintenance. 13.01 Ensures decommissioning of structure or components. 13.02 Plans sequence of disassembly. 13.03 Removes components.

6. Ironworker (Reinforcing)

6.1. Ironworker (Reinforcing) Recommendations

That provinces and territories adopt the **Red Seal trade name Ironworker (Reinforcing)²³ / Monteur/monteuse de charpentes en acier (barres d'armature)**

- That the total number of training hours be **3600** (jurisdictions will determine the ratio of in-class vs. on the job training).
- That the technical training program offers **2 training levels**.
- That the **sequencing** reflects the topic and subtask mapping in the sequencing documents.

²³ Alberta will be abstaining from approving the harmonized course sequencing for Ironworker (Reinforcing) due to concerns about how the sequencing will affect a provincially designated trade – Metal Building Systems Erector. Alberta's abstention should not prevent the CCDA from harmonizing this trade. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the Red Seal standard.

6.2 Ironworker (Reinforcing) Sequencing - Snapshot

Level One	Level Two
Safety Awareness	
Tools and Equipment	
Access Equipment	
Hoisting, Lifting and Rigging	Hoisting, Lifting and Rigging
Communication and Trade Documentation	
Welding I	
Oxy-fuel Cutting	
	Work Planning
Structural Components	
Drawings	Drawings
Reinforcing	Reinforcing
Introduction to Cranes	Cranes
Pre-Stressed/Post Tensioning Systems	Pre-Stressed/Post Tensioning Systems

6.3 Ironworker (Reinforcing) Sequencing – Topic Detail	
Level One	Level Two
Safety Awareness <ul style="list-style-type: none"> • Personal Protective Equipment (PPE) • Safe Work environment • Site Hazards 	
Tools and Equipment <ul style="list-style-type: none"> • Hand Tools • Power Tools • Bending Tools and Equipment • Welding Equipment 	
Access Equipment <ul style="list-style-type: none"> • Aerial Work Platforms • Ladders • Scaffolding 	
Hoisting, Lifting and Rigging <ul style="list-style-type: none"> • Hand Signals • Load to Lift Capacity • Rigging Equipment • Joisting Equipment • Lifting Equipment • Rigging/Load <p>Taught progressively in context with the level of training</p>	Hoisting, Lifting and Rigging <ul style="list-style-type: none"> • Hand Signals • Load to Lift Capacity • Rigging Equipment • Joisting Equipment • Lifting Equipment • Rigging/Load <p>Taught progressively in context with the level of training</p>
Communication and Trade Documentation <ul style="list-style-type: none"> • Drawings and Specifications • Standards, Regulations and Procedures • Communication • Hand Signals • Electronic Communication • Introduction to work planning 	
Welding I <ul style="list-style-type: none"> • Welding Equipment 	
Oxy-fuel Cutting <ul style="list-style-type: none"> • Oxy-fuel Cutting Equipment 	
	Work Planning <ul style="list-style-type: none"> • Materials and supplies • Work tasks
Structural Components <ul style="list-style-type: none"> • Layout 	

6.3 Ironworker (Reinforcing) Sequencing – Topic Detail	
Level One	Level Two
<p>Drawings</p> <ul style="list-style-type: none"> • Drawings (interpret) <p>Taught progressively in context with the level of training</p>	<p>Drawings</p> <ul style="list-style-type: none"> • Drawings (interpret) <p>Taught progressively in context with the level of training</p>
<p>Reinforcing</p> <ul style="list-style-type: none"> • Material (cutting and bending) 	<p>Reinforcing</p> <ul style="list-style-type: none"> • Material (cutting, bending, placing and joining)
<p>Introduction to Cranes</p> <ul style="list-style-type: none"> • Site Hazards • Crane Position • Bases • Cranes and Components • Disassembly • Transport • hydraulic and conventional cranes • tower cranes • electric overhead travelling cranes <p>Taught progressively in context with the level of training</p>	<p>Cranes</p> <ul style="list-style-type: none"> • Site Hazards • Crane Position • Bases • Cranes and Components • Disassembly • Transport • hydraulic and conventional cranes • tower cranes • electric overhead travelling cranes <p>Taught progressively in context with the level of training</p>
<p>Pre-Stressed/Post Tensioning Systems</p> <ul style="list-style-type: none"> • Profile • Tendons and Accessories • Bursting Steel and Anchorages • Stressing Point • Tendons • Stressing Equipment • De-stressing • Grouting Equipment • Grout (installs) <p>Taught progressively in context with the level of training</p>	<p>Pre-Stressed/Post Tensioning Systems</p> <ul style="list-style-type: none"> • Profile • Tendons and Accessories • Bursting Steel and Anchorages • Stressing Point • Tendons • Stressing Equipment • De-stressing • Grouting Equipment • Grout (installs) <p>Taught progressively in context with the level of training</p>

6.4 Ironworker (Reinforcing) Sequencing – Sub-Task by 2015 NOA	
Level One	Level Two
Safety Awareness 3.08 Uses personal protective equipment (PPE) 4.03 Maintains safe work environment 4.04 Assesses site hazards	
Tools and Equipment 3.01 Uses hand tools and measuring equipment 3.02 Uses surveying equipment 3.03 Uses power tools 3.04 Uses bending tools and equipment 3.09 Uses welding equipment	
Access Equipment 3.05 Uses aerial work platforms 3.06 Uses ladders 3.07 Uses scaffolding	
Hoisting, Lifting and Rigging 2.04 Uses hand signals 5.01 Matches load to lift capacity 5.02 Inspects rigging equipment 5.03 Maintains rigging equipment 6.01 Uses hoisting equipment 6.02 Uses lifting equipment 6.03 Attaches rigging to load Taught progressively in context with the level of training	Hoisting, Lifting and Rigging 2.04 Uses hand signals 5.01 Matches load to lift capacity 5.02 Inspects rigging equipment 5.03 Maintains rigging equipment 6.01 Uses hoisting equipment 6.02 Uses lifting equipment 6.03 Attaches rigging to load Taught progressively in context with the level of training
Communication and Trade Documentation Interprets drawings and specifications Interprets standards, regulations and procedures 2.01 Communicates with co-workers 2.02 Communicates with others 2.03 Communicates with apprentices. 2.04 Uses hand signals 2.05 Communicates electronically 4.01 Organizes materials and supplies. (Introduction) 4.05 Plans work tasks. (Introduction)	
Welding I 3.09 Uses welding equipment	
Oxy-fuel Cutting 3.10 Uses oxy-fuel cutting equipment	

Level One	Level Two
	Work Planning 4.01 Organizes materials and supplies. 4.05 Plans work tasks.
Structural Components 4.02 Marks layouts	
Drawings 10.01 Interprets placing drawings Taught progressively in context with the level of training	Drawings 10.01 Interprets placing drawings Taught progressively in context with the level of training
Reinforcing 9.01 Cuts material 9.02 Bends material 10.01 Places reinforcing material 10.02 Ties material 10.03 Joins material	Reinforcing 9.01 Cuts material 9.02 Bends material 10.01 Places reinforcing material 10.02 Ties material 10.03 Joins material
Introduction to Cranes 7.01 Assesses crane site limitations 7.02 Determines crane position 7.03 Erects cranes and components 8.01 Disassembles crane components 8.02 Prepares crane and components for transport Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training	Cranes 7.01 Assesses crane site limitations 7.02 Determines crane position 7.03 Erects cranes and components 8.01 Disassembles crane components 8.02 Prepares crane and components for transport Includes hydraulic, conventional, tower and electric overhead travelling cranes. Taught progressively in context with the level of training
Pre-Stressed/Post Tensioning Systems 11.01 Lays out profile 11.02 Places tendons and accessories 11.03 Installs bursting steel and anchorages 11.04 Connects tendons to anchors 11.05 Protects exposed tendons 12.01 Sets up stressing equipment 12.02 Tensions tendons 12.03 Cuts and caps tendons 12.04 Removes stressing equipment 12.05 De-stresses tendons 13.01 Sets up grouting equipment 13.02 Installs grout Taught progressively in context with the level of training	Pre-Stressed/Post Tensioning Systems 11.01 Lays out profile 11.02 Places tendons and accessories 11.03 Installs bursting steel and anchorages 11.04 Connects tendons to anchors 11.05 Protects exposed tendons 12.01 Sets up stressing equipment 12.02 Tensions tendons 12.03 Cuts and caps tendons 12.04 Removes stressing equipment 12.05 De-stresses tendons 13.01 Sets up grouting equipment 13.02 Installs grout Taught progressively in context with the level of training

7. Mobile Crane Operator and 8. Mobile Crane Operator (Hydraulic)²⁴

7.1 Mobile Crane Operator Recommendations

That the CCDA support only one Red Seal Mobile Crane Operator trade which incorporates hydraulic telescopic, hydraulically driven lattice boom and friction driven lattice boom cranes.

That provinces and territories adopt the **Red Seal trade name Mobile Crane Operator / Opérateur/opératrice de grue automotrice** with the following variations:

- ON - Provincial legislation will reflect the trade name 'Hoisting Engineer – Mobile Crane Operator 1/Technicien/technicienne de hissage - opérateur/opératrice de grue mobile 1.
- AB - Provincial legislation will reflect the trade name 'Crane and Hoisting Equipment Operator - Mobile Crane Operator'.
- That the total number of training hours be **5400** (jurisdictions will determine the ratio of in-class versus on-the-job training) with the following variation:
- ON - Total training hours (in-school and on-the-job) will be 6000 hours.
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflect the topic and sub-mapping in the sequencing documents with the following variations:
 - AB - Will maintain their current in-class training.²⁵
 - Jurisdictions may exceed benchmark by including training on commercial driving for transporting a mobile crane.
 - If a jurisdiction continues to offer training for Mobile Crane Operator (Hydraulic), the sequencing is identical, except that training on 'Friction Driven Lattice Boom' cranes is not included for Mobile Crane Operator (Hydraulic).
- That the Red Seal Mobile Crane Operator trade include three **equipment classifications**: Lattice Friction, Lattice Hydraulic and Hydraulic Telescopic. Boom trucks will be covered under jurisdictional requirements.
- That the Red Seal Mobile Crane Operator trade include the following **weight restriction**: An apprentice wishing to receive Red Seal endorsement as a Mobile Crane Operator must have work experience on a mobile crane greater than 15 tons (imperial) or 13.6 tonnes (metric).* Individuals with work experience on a combination of equipment must demonstrate the majority of their work experience on a mobile crane greater than 15 tons (imperial) or 13.6 tonnes (metric).

**(Note) New Brunswick will continue to require work experience on a mobile crane greater than 25 tons (imperial); however, Mobile Crane apprentices transferring to New Brunswick from another province/territory, who have not achieved the required hours in the trade, will have their documented work experience recognized.*

²⁴ Industry recommended that the CCDA support only one Red Seal Mobile Crane Operator trade which incorporates hydraulic telescopic, hydraulically driven lattice boom and friction driven lattice boom cranes.

²⁵ While Alberta will be abstaining from approving the harmonized course sequencing for Mobile Crane Operator and Tower Crane Operator, Alberta's abstention should not prevent the CCDA from harmonizing these trades. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the CCDA standard wherever possible.

7.2 Mobile Crane Operator Sequencing – Snapshot ²⁶

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
Safety		
Types and terminology		
Systems and components		
Wire rope and rigging		
Transporting a crane ²⁷		
Crane maintenance		
Lift planning	Lift planning – Hydraulic crane (basic)	
	Lift planning – Hydraulic crane (advanced)	
	Lift planning – Lattice boom crane (basic)	
	Lift planning – Lattice boom crane (advanced)	
Crane applications ²⁸	Hydraulic crane operations (basic)	Speciality hoisting operations
	Hydraulic crane operations (advanced)	
	Lattice boom crane operations (basic)	
	Lattice boom crane operations (advanced)	

²⁶ Variation: Alberta will maintain their current in-class training.

²⁷ Jurisdictions may exceed benchmark by including training on commercial driving for transporting a crane.

²⁸ The only difference between Mobile Crane Operator and Mobile Crane Operator (Hydraulic) is that training for Mobile Crane Operator (Hydraulic) does not include the following subtasks:

19.01 Operates friction drive crawler-mounted lattice boom cranes.

19.02 Operates friction drive truck-mounted lattice boom cranes.

7.3 Mobile Crane Operator Sequencing – Topic Detail		
Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
Safety <ul style="list-style-type: none"> • Regulations, manuals and policies • Safe working environment • Emergency safety procedures • Power line hazards • Worksite communications 		
Types and Terminology <ul style="list-style-type: none"> • Types of cranes • Crane classifications • Crane terminology 		
Systems and components <ul style="list-style-type: none"> • Carriers/undercarriage components • Outriggers and stabilizers • Turntable • Power plants • Drive systems • Pneumatic systems • Hydraulic systems • Electrical systems • Steering systems • Braking systems • Hoisting systems • Attachments • Safety components, devices and aids 		
Wire rope and rigging <ul style="list-style-type: none"> • Types of wire rope • Installation of wire rope • Inspection of wire rope • Rigging hardware • Inspection of rigging hardware • Rigging techniques • Maintenance of wire rope and rigging • Storage of wire rope and rigging 		
Transporting a crane <ul style="list-style-type: none"> • Highway traffic act • Preparing a crane for travel • Preparing a crane for transport • Assembly and disassembly 		

7.3 Mobile Crane Operator Sequencing – Topic Detail		
Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
Crane maintenance <ul style="list-style-type: none"> Tools for basic crane maintenance Basic crane maintenance 		
Lift planning <ul style="list-style-type: none"> Site assessment Determining load weight Crane lifting capacity Rigging requirements Load/capacity charts 	Lift planning - Hydraulic crane (2a - basic) <ul style="list-style-type: none"> Site assessment Crane lifting capacity Load/capacity chart 	
	Lift planning - Hydraulic crane (2b - advanced) <ul style="list-style-type: none"> Crane lifting capacity Load/capacity chart 	
	Lift planning - Lattice boom crane (2a - basic) <ul style="list-style-type: none"> Site assessment Crane lifting capacity Load/capacity chart 	
	Lift planning - Lattice boom crane (2b - advanced) <ul style="list-style-type: none"> Crane lifting capacity Load/capacity chart 	
<ul style="list-style-type: none"> Crane applications ²⁹ Interpret operating manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate 8-15 ton mobile crane Leave crane unattended 	<ul style="list-style-type: none"> Hydraulic crane operations (2a basic) Interpret operator manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate hydraulic crane Leave crane unattended 	<ul style="list-style-type: none"> Speciality hoisting operations Elevated work platform Engineered lift Precision lift Heavy lift Dragline and clam operations Foundation and shoring operations Multiple crane lift Water lift
	<ul style="list-style-type: none"> Hydraulic crane operations (2b advanced) Operate hydraulic crane 	
	<ul style="list-style-type: none"> Lattice boom crane operations (2a basic) Interpret operator manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate lattice boom crane Leave crane unattended 	

²⁹ The only difference between Mobile Crane Operator and Mobile Crane Operator (Hydraulic) is that training for Mobile Crane Operator (Hydraulic) does not include the following subtasks:

19.01 Operates friction drive crawler-mounted lattice boom cranes.

19.02 Operates friction drive truck-mounted lattice boom cranes.

7.3 Mobile Crane Operator Sequencing – Topic Detail		
Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
	Lattice boom crane operations (2b advanced) <ul style="list-style-type: none"> Operate lattice boom crane 	

7.4 Mobile Crane Operator Sequencing – Sub-Task by 2013 NOA^{30 31}

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
<p>Safety</p> <ul style="list-style-type: none"> • Regulations, manuals and policies • Safe working environment • Emergency safety procedures • Power line hazards • Worksite communications <p><i>Subtasks</i></p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>11.02 Evaluates risks and hazards</p>		
<p>Types and Terminology</p> <ul style="list-style-type: none"> • Types of cranes <ul style="list-style-type: none"> - Boom trucks - Mobile cranes - Tower cranes - Self-erecting cranes • Crane classifications <ul style="list-style-type: none"> - Carrier type - Hoist mechanisms - Lifting capacity - Boom types - Heavy lift cranes • Crane terminology <ul style="list-style-type: none"> - Wire rope - Fittings - Drums - Hooks - Sheaves - Winch - Slew - Hoist 		

³⁰ Variation: Alberta will maintain their current in-class training

³¹ NOTE – Sub-tasks found in the NOA, which **directly** relate to the Unit or General Learning Outcome title, are listed in this table. Other Sub-tasks related to the Unit or General Learning Outcome title, not listed in this table, may be added to achieve a logical template for instruction. The sub-tasks may be repeated in multiple Units due to similar knowledge and competencies for sub-tasks.

7.4 Mobile Crane Operator Sequencing – Sub-Task by 2013 NOA^{30 31}

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
<p>*Note - All this detail is listed in the course outline. The course is common, therefore some of this detail is not specific to Mobile Crane Operator.</p>		
<p>Systems and components</p> <ul style="list-style-type: none"> • Carriers/undercarriage components • Outriggers and stabilizers • Turntable • Power plants • Drive systems • Pneumatic systems • Hydraulic systems • Electrical systems • Steering systems • Braking systems • Hoisting systems • Attachments • Safety components, devices and aids <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>6.01 Inspects engine systems.</p> <p>6.02 Inspect air systems.</p> <p>6.03 Inspects electrical systems.</p> <p>6.04 Inspects hydraulic systems.</p> <p>6.05 Inspects chassis/carbody and running gear components.</p> <p>6.06 Inspects outriggers and counterweights.</p> <p>6.07 Inspects boom components and attachments.</p> <p>6.08 Inspects hoisting systems.</p> <p>7.02 Inspects monitoring and warning systems.</p> <p>18.01 Configures load moment indicator (LMI)</p>		

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
<p>Wire rope and rigging</p> <ul style="list-style-type: none"> • Types of wire rope • Installation of wire rope • Inspection of wire rope • Rigging hardware • Inspection of rigging hardware • Rigging techniques • Maintenance of wire rope and rigging • Storage of wire rope and rigging <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>6.08 Inspects hoisting systems</p> <p>8.03 Lubricates wire rope</p> <p>9.01 lubricates slings and hardware</p> <p>9.02 Identifies deficiencies in slings and hardware</p> <p>9.03 Disposes of damaged slings and hardware</p> <p>9.04 Stores slings and hardware</p> <p>10.01 Selects required rigging</p> <p>10.02 Rigs load</p> <p>15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom).</p>		

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
<p>Transporting a crane ³²</p> <ul style="list-style-type: none"> • Highway traffic act • Preparing a crane for travel • Preparing a crane for transport • Assembly and disassembly <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>13.01 Loads crane and components</p> <p>13.02 Unloads crane and components</p> <p>14.01 Performs pre-lift planning</p> <p>14.02 Prepares crane for transport</p> <p>14.03 Drives crane</p> <p>15.01 Installs tracks on car body (lattice boom).</p> <p>15.02 Installs house (lattice boom).</p> <p>15.03 Installs outrigger boxes (lattice boom).</p> <p>15.04 Installs boom base (lattice boom).</p> <p>15.05 Assembles boom and jib (lattice boom).</p> <p>15.06 Installs counterweights (lattice boom).</p> <p>15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.09 Disassembles boom and jib (lattice boom).</p> <p>15.10 Removes counterweights (lattice boom).</p> <p>15.11 Removes boom base (lattice boom).</p> <p>15.12 Removes house (lattice boom).</p> <p>15.13 Removes tracks from car body (lattice boom).</p> <p>15.14 Removes outrigger boxes (lattice boom).</p> <p>16.01 Installs outrigger boxes (telescopic boom).</p> <p>16.02 Installs main boom (telescopic boom).</p> <p>16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom).</p> <p>16.04 Installs counterweights (telescopic boom).</p> <p>16.05 Installs swingaway jibs and inserts (telescopic boom).</p> <p>16.06 Removes swing-away jibs and inserts (telescopic boom).</p> <p>16.07 Removes counterweights (telescopic boom).</p>		

³² Jurisdictions may exceed benchmark by including training on commercial driving for transporting a crane.

<p>16.08 Removes hoist lines, hook blocks and overhaul ball (telescopic boom).</p> <p>16.09 Removes main boom (telescopic boom).</p> <p>16.10 Removes outrigger boxes (telescopic boom).</p>		
<p>Level 1 (Common Level with Tower Crane Operator)</p>	<p>Level 2 Hoisting Applications</p>	<p>Level 3 Specialized Hoisting Applications</p>
<p>Crane maintenance</p> <ul style="list-style-type: none"> • Tools for basic crane maintenance • Basic crane maintenance <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>8.01 Changes oil and filters.</p> <p>8.02 Greases crane.</p> <p>8.03 Lubricates wire ropes.</p> <p>8.04 Makes minor adjustments and replacements.</p>		
<p>Lift planning</p> <ul style="list-style-type: none"> • Site assessment • Determining load weight • Crane lifting capacity • Rigging requirements • Load/capacity charts <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>3.01 Identifies the weight.</p> <p>3.02 Calculates weight.</p> <p>4.01 Determines radius and crane configuration.</p> <p>4.02 Interprets load charts.</p> <p>5.01 Performs sling angle calculations.</p> <p>5.02 Performs working load limit (WLL) calculations.</p> <p>10.01 Selects required rigging</p> <p>11.01 Participates in routine, engineered and specialty lift planning.</p> <p>11.02 Evaluates risks and hazards.</p>	<p>Lift planning – Hydraulic crane (2a - basic)</p> <ul style="list-style-type: none"> • Site assessment • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>3.01 Identifies the weight.</p> <p>3.02 Calculates weight.</p> <p>4.01 Determines radius and crane configuration.</p> <p>4.02 Interprets load charts.</p> <p>5.01 Performs sling angle calculations.</p> <p>5.02 Performs working load limit (WLL) calculations.</p> <p>11.01 Participates in routine, engineered and specialty lift planning.</p> <p>11.02 Evaluates risks and hazards</p>	

Level 1 (Common Level with Tower Crane Operator)	Level 2 Hoisting Applications	Level 3 Specialized Hoisting Applications
	<p>Lift planning – Hydraulic crane (2b - advanced)</p> <ul style="list-style-type: none"> • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>3.01 Identifies the weight.</p> <p>3.02 Calculates weight.</p> <p>4.01 Determines radius and crane configuration.</p> <p>4.02 Interprets load charts.</p> <p>5.01 Performs sling angle calculations.</p> <p>5.02 Performs working load limit (WLL) calculations.</p> <p>11.01 Participates in routine, engineered and specialty lift planning.</p> <p>11.02 Evaluates risks and hazards.</p>	
	<p>Lift planning – Lattice boom crane (2a - basic)</p> <ul style="list-style-type: none"> • Site assessment • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>3.01 Identifies the weight.</p> <p>3.02 Calculates weight.</p> <p>4.01 Determines radius and crane configuration.</p> <p>4.02 Interprets load charts.</p> <p>5.01 Performs sling angle calculations.</p> <p>5.02 Performs working load limit (WLL) calculations.</p> <p>11.01 Participates in routine, engineered and specialty lift planning.</p> <p>11.02 Evaluates risks and hazards.</p>	
	<p>Lift planning – Lattice boom crane (2b - advanced)</p> <ul style="list-style-type: none"> • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p>	

	<p>3.01 Identifies the weight. 3.02 Calculates weight. 4.01 Determines radius and crane configuration. 4.02 Interprets load charts. 5.01 Performs sling angle calculations. 5.02 Performs working load limit (WLL) calculations. 11.01 Participates in routine, engineered and specialty lift planning. 11.02 Evaluates risks and hazards.</p>	
<p>Level 1 (Common Level with Tower Crane Operator)</p>	<p>Level 2 Hoisting Applications</p>	<p>Level 3 Specialized Hoisting Applications</p>
<p>Crane applications</p> <ul style="list-style-type: none"> • Interpret operating manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate 8-15 ton mobile crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Maintains a safe work environment 1.02 Uses and maintains PPE and safety equipment 2.01 Communicates with others 2.02 Uses documentation 6.01 Inspects engine systems. 6.02 Inspect air systems. 6.03 Inspects electrical systems. 6.04 Inspects hydraulic systems. 6.05 Inspects chassis/carbody and running gear components. 6.06 Inspects outriggers and counterweights. 6.07 Inspects boom components and attachments. 6.08 Inspects hoisting systems. 7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems. 7.03 Monitors running lines, hoist lines and standing ropes. 7.04 Monitors gauges and warning systems. 8.02 Greases crane. 8.03 Lubricates wire ropes. 8.04 Makes minor adjustments and replacements. 10.01 Selects required rigging 10.02 Rigs load. 10.03 Monitors rigging.</p>	<p>Hydraulic crane operations (2a - basic)</p> <ul style="list-style-type: none"> • Interpret operator manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate hydraulic crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Maintains a safe work environment 1.02 Uses and maintains PPE and safety equipment 2.01 Communicates with others 2.02 Uses documentation 6.01 Inspects engine systems. 6.02 Inspect air systems. 6.03 Inspects electrical systems. 6.04 Inspects hydraulic systems. 6.05 Inspects chassis/carbody and running gear components. 6.06 Inspects outriggers and counterweights. 6.07 Inspects boom components and attachments. 6.08 Inspects hoisting systems. 7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems. 7.03 Monitors running lines, hoist lines and standing ropes. 7.04 Monitors gauges and warning systems. 8.02 Greases crane. 8.03 Lubricates wire ropes. 8.04 Makes minor adjustments and replacements. 9.01 lubricates slings and hardware 9.02 Identifies deficiencies in slings and hardware 9.03 Disposes of damaged slings and hardware 9.04 Stores slings and hardware 10.01 Selects required rigging</p>	<p>Speciality hoisting operations</p> <ul style="list-style-type: none"> • Elevated work platform • Engineered lift • Precision lift • Heavy lift • Dragline and clam operations • Foundation and shoring operations • Multiple crane lift • Water lift <p>Subtasks</p> <p>1.01 Maintains a safe work environment 1.02 Uses and maintains PPE and safety equipment 2.01 Communicates with others 2.02 Uses documentation 3.01 Identifies the weight. 3.02 Calculates weight. 4.01 Determines radius and crane configuration. 4.02 Interprets load charts. 5.01 Performs sling angle calculations. 5.02 Performs working load limit (WLL) calculations. 6.01 Inspects engine systems. 6.02 Inspect air systems. 6.03 Inspects electrical systems. 6.04 Inspects hydraulic systems. 6.05 Inspects chassis/carbody and running gear components. 6.06 Inspects outriggers and counterweights. 6.07 Inspects boom components and attachments. 6.08 Inspects hoisting systems. 7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems. 7.03 Monitors running lines, hoist lines and standing ropes. 7.04 Monitors gauges and warning systems.</p>

<p>12.01 Performs final site inspection. 12.02 Positions crane. 12.03 Completes Set Up. 18.01 Configures load moment indicator (LMI). 18.02 Mobilizes crane on jobsite. 19.01 Operates friction drive crawler-mounted lattice boom cranes.³³ 19.02 Operates friction drive truck-mounted lattice boom cranes. 20.01 Operates hydraulic drive crawler-mounted lattice boom cranes. 20.02 Operates hydraulic drive truck-mounted lattice boom cranes. 21.01 Operates crawler-mounted telescopic cranes. 21.02 Operates rubber-mounted telescopic cranes. 23.01 Secures crane for short term. 23.02 Secures crane for long term.</p>	<p>10.02 Rigs load 10.03 Monitors rigging 12.01 Performs final site inspection. 12.02 Positions crane. 12.03 Completes Set Up. 16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom). 16.05 Installs swingaway jibs and inserts (telescopic boom). 16.06 Removes swing-away jibs and inserts (telescopic boom). 16.08 Removes hoist lines, hook blocks and overhaul ball (telescopic boom). 18.01 Configures load moment indicator (LMI). 18.02 Mobilizes crane on jobsite. 21.01 Operates crawler-mounted telescopic cranes. 21.02 Operates rubber-mounted telescopic cranes. 22.04 Performs multi-crane lifts. 23.01 Secures crane for short term. 23.02 Secures crane for long term.</p>	<p>8.02 Greases crane. 8.03 Lubricates wire ropes. 8.04 Makes minor adjustments and replacements. 9.01 lubricates slings and hardware 9.02 Identifies deficiencies in slings and hardware 9.03 Disposes of damaged slings and hardware 9.04 Stores slings and hardware 10.01 Selects required rigging 10.02 Rigs load 10.03 Monitors rigging 11.01 Participates in routine, engineered and specialty lift planning. 11.02 Evaluates risks and hazards. 12.01 Performs final site inspection. 12.02 Positions crane. 12.03 Completes Set Up. 13.01 Loads crane and components 13.02 Unloads crane and components 15.05 Assembles boom and jib (lattice boom). 15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom). 15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom). 15.09 Disassembles boom and jib (lattice boom). 16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom). 16.05 Installs swingaway jibs and inserts (telescopic boom). 16.06 Removes swing-away jibs and inserts (telescopic boom). 16.08 Removes hoist lines, hook blocks and overhaul ball (telescopic boom). 17.01 Assembles specialty equipment and attachments. 17.02 Disassembles specialty equipment and attachments. 18.01 Configures load moment indicator (LMI). 18.02 Mobilizes crane on jobsite. 20.01 Operates hydraulic drive crawler-mounted lattice boom cranes. 20.02 Operates hydraulic drive truck-mounted lattice boom cranes. 21.01 Operates crawler-mounted telescopic cranes. 21.02 Operates rubber-mounted telescopic cranes. 22.01 Operates piledriver. 22.02 Performs duty cycle operations. 22.03 Operates cranes on barges. 22.04 Performs multi-crane lifts. 22.05 Uses personnel hoisting equipment.</p>
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³³ The only difference between Mobile Crane Operator and Mobile Crane Operator (Hydraulic) is that training for Mobile Crane Operator (Hydraulic) does not include the following subtasks:

19.01 Operates friction drive crawler-mounted lattice boom cranes.

19.02 Operates friction drive truck-mounted lattice boom cranes.

		<p>23.01 Secures crane for short term. 23.02 Secures crane for long term.</p>
<p style="text-align: center;">Level 1 (Common Level with Tower Crane Operator)</p>	<p style="text-align: center;">Level 2 Hoisting Applications</p>	<p style="text-align: center;">Level 3 Specialized Hoisting Applications</p>
	<p>Hydraulic crane operations (advanced)</p> <ul style="list-style-type: none"> • Operate hydraulic crane <p>Subtasks</p> <p>1.01 Maintains a safe work environment 1.02 Uses and maintains PPE and safety equipment 2.01 Communicates with others 2.02 Uses documentation 6.01 Inspects engine systems. 6.02 Inspect air systems. 6.03 Inspects electrical systems. 6.04 Inspects hydraulic systems. 6.05 Inspects chassis/carbody and running gear components. 6.06 Inspects outriggers and counterweights. 6.07 Inspects boom components and attachments. 6.08 Inspects hoisting systems. 7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems. 7.03 Monitors running lines, hoist lines and standing ropes. 7.04 Monitors gauges and warning systems. 8.02 Greases crane. 8.03 Lubricates wire ropes. 8.04 Makes minor adjustments and replacements. 9.01 lubricates slings and hardware 9.02 Identifies deficiencies in slings and hardware 9.03 Disposes of damaged slings and hardware 9.04 Stores slings and hardware 10.01 Selects required rigging 10.02 Rigs load 10.03 Monitors rigging 12.01 Performs final site inspection.</p>	

	<p>12.02 Positions crane. 12.03 Completes Set Up. 16.03 Installs hoist lines, hook blocks and overhaul ball (telescopic boom). 16.05 Installs swingaway jibs and inserts (telescopic boom). 16.06 Removes swing-away jibs and inserts (telescopic boom). 16.08 Removes hoist lines, hook blocks and overhaul ball (telescopic boom). 18.01 Configures load moment indicator (LMI). 18.02 Mobilizes crane on jobsite. 21.01 Operates crawler-mounted telescopic cranes. 21.02 Operates rubber-mounted telescopic cranes. 22.04 Performs multi-crane lifts. 23.01 Secures crane for short term. 23.02 Secures crane for long term.</p>	
<p>Level 1 (Common Level with Tower Crane Operator)</p>	<p>Level 2 Hoisting Applications</p>	<p>Level 3 Specialized Hoisting Applications</p>
	<p>Lattice boom crane operations (2a - basic)</p> <ul style="list-style-type: none"> • Interpret operator manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate lattice boom crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Maintains a safe work environment 1.02 Uses and maintains PPE and safety equipment 2.01 Communicates with others 2.02 Uses documentation 6.01 Inspects engine systems. 6.02 Inspect air systems. 6.03 Inspects electrical systems. 6.04 Inspects hydraulic systems. 6.05 Inspects chassis/carbody and running gear components. 6.06 Inspects outriggers and counterweights. 6.07 Inspects boom components and attachments. 6.08 Inspects hoisting systems. 7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems. 7.03 Monitors running lines, hoist lines and standing ropes. 7.04 Monitors gauges and warning systems. 8.02 Greases crane. 8.03 Lubricates wire ropes.</p>	

	<p>8.04 Makes minor adjustments and replacements.</p> <p>9.01 lubricates slings and hardware</p> <p>9.02 Identifies deficiencies in slings and hardware</p> <p>9.03 Disposes of damaged slings and hardware</p> <p>9.04 Stores slings and hardware</p> <p>10.01 Selects required rigging</p> <p>10.02 Rigs load</p> <p>10.03 Monitors rigging</p> <p>12.01 Performs final site inspection.</p> <p>12.02 Positions crane.</p> <p>12.03 Completes Set Up.</p> <p>15.05 Assembles boom and jib (lattice boom).</p> <p>15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.09 Disassembles boom and jib (lattice boom). 18.01 Configures load moment indicator (LMI).</p> <p>18.02 Mobilizes crane on jobsite.</p> <p>20.01 Operates hydraulic drive crawler-mounted lattice boom cranes.</p> <p>20.02 Operates hydraulic drive truck-mounted lattice boom cranes.</p> <p>22.04 Performs multi-crane lifts.</p> <p>23.01 Secures crane for short term.</p> <p>23.02 Secures crane for long term.</p>	
<p>Level 1 (Common Level with Tower Crane Operator)</p>	<p>Level 2 Hoisting Applications</p>	<p>Level 3 Specialized Hoisting Applications</p>
	<p>Lattice boom crane operations (2b - advanced)</p> <ul style="list-style-type: none"> • Operate lattice boom crane <p>Subtasks</p> <p>1.01 Maintains a safe work environment</p> <p>1.02 Uses and maintains PPE and safety equipment</p> <p>2.01 Communicates with others</p> <p>2.02 Uses documentation</p> <p>6.01 Inspects engine systems.</p> <p>6.02 Inspect air systems.</p> <p>6.03 Inspects electrical systems.</p> <p>6.04 Inspects hydraulic systems.</p> <p>6.05 Inspects chassis/carbody and running gear components.</p> <p>6.06 Inspects outriggers and counterweights.</p> <p>6.07 Inspects boom components and attachments.</p> <p>6.08 Inspects hoisting systems.</p> <p>7.01 Checks operating controls.</p> <p>7.02 Inspects monitoring and warning systems.</p> <p>7.03 Monitors running lines, hoist lines and standing ropes.</p> <p>7.04 Monitors gauges and warning systems.</p>	

	<p>8.02 Greases crane.</p> <p>8.03 Lubricates wire ropes.</p> <p>8.04 Makes minor adjustments and replacements.</p> <p>9.01 lubricates slings and hardware</p> <p>9.02 Identifies deficiencies in slings and hardware</p> <p>9.03 Disposes of damaged slings and hardware</p> <p>9.04 Stores slings and hardware</p> <p>10.01 Selects required rigging</p> <p>10.02 Rigs load</p> <p>10.03 Monitors rigging</p> <p>12.01 Performs final site inspection.</p> <p>12.02 Positions crane.</p> <p>12.03 Completes Set Up.</p> <p>15.05 Assembles boom and jib (lattice boom).</p> <p>15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom).</p> <p>15.09 Disassembles boom and jib (lattice boom). 18.01 Configures load moment indicator (LMI).</p> <p>18.02 Mobilizes crane on jobsite.</p> <p>20.01 Operates hydraulic drive crawler-mounted lattice boom cranes.</p> <p>20.02 Operates hydraulic drive truck-mounted lattice boom cranes.</p> <p>22.04 Performs multi-crane lifts.</p> <p>23.01 Secures crane for short term.</p> <p>23.02 Secures crane for long term.</p>	
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7.4.A Mobile Crane Operator Review – 2021

Level 1	Level 2	Level 3
	Context	Context
	Safety-Related Functions	Safety-Related Functions
<p style="text-align: center;">Safety-Related Functions</p> <p>1.01 Maintains a safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment 1.03 Uses Documentation</p>	<p>Note: 1.03 was originally under “Organizes Work” which now no longer exists. The subtask remains in L1 and in context.</p>	
<p style="text-align: center;">Communication Techniques</p> <p>2.01 Uses communication techniques</p>		<p style="text-align: center;">Mentoring Techniques</p> <p>2.02 Uses mentoring techniques</p>
<p style="text-align: center;">Load Weights</p> <p>3.01 Identifies the weight 3.02 Calculates weight</p>	<p style="text-align: center;">Load Weights</p> <p>3.01 Identifies the weight 3.02 Calculates weight</p>	<p style="text-align: center;">Load Weights</p> <p>3.01 Identifies the weight 3.02 Calculates weight</p>
<p style="text-align: center;">Crane Capacity Calculations</p> <p>4.01 Determines radius and crane configuration 4.02 Interprets load charts</p>	<p style="text-align: center;">Crane Capacity Calculations</p> <p>4.01 Determines radius and crane configuration 4.02 Interprets load charts</p>	<p style="text-align: center;">Crane Capacity Calculations</p> <p>4.01 Determines radius and crane configuration 4.02 Interprets load charts</p>
<p style="text-align: center;">Rigging Calculations</p> <p>5.01 Performs sling angle calculations 5.02 Performs working load limit (WLL) calculations</p>	<p style="text-align: center;">Rigging Calculations</p> <p>5.01 Performs sling angle calculations 5.02 Performs working load limit (WLL) calculations</p>	<p style="text-align: center;">Rigging Calculations</p> <p>5.01 Performs sling angle calculations 5.02 Performs working load limit (WLL) calculations</p>
<p style="text-align: center;">Pre-operational Checks and Regular Inspections</p> <p>6.01 Inspects engine systems 6.02 Inspects air systems 6.03 Inspects electrical systems 6.04 Inspects hydraulic systems 6.05 Inspects chassis/car body and running gear components 6.06 Inspects outriggers and counterweights 6.07 Inspects boom components and attachments 6.08 Inspects hoisting systems</p>	<p style="text-align: center;">Pre-operational Checks and Regular Inspections</p> <p>6.01 Inspects engine systems 6.02 Inspects air systems 6.03 Inspects electrical systems 6.04 Inspects hydraulic systems 6.05 Inspects chassis/car body and running gear components 6.06 Inspects outriggers and counterweights 6.07 Inspects boom components and attachments 6.08 Inspects hoisting systems</p>	<p style="text-align: center;">Pre-operational Checks and Regular Inspections</p> <p>6.01 Inspects engine systems 6.02 Inspects air systems 6.03 Inspects electrical systems 6.04 Inspects hydraulic systems 6.05 Inspects chassis/car body and running gear components 6.06 Inspects outriggers and counterweights 6.07 Inspects boom components and attachments 6.08 Inspects hoisting systems</p>
<p style="text-align: center;">Operational and Continual Checks</p> <p>7.01 Checks operating controls 7.02 Inspects monitoring and warning systems 7.03 Monitors running lines, hoist ropes and standing ropes 7.04 Monitors gauges and warning systems 7.05 Monitors support base</p>	<p style="text-align: center;">Operational and Continual Checks</p> <p>7.01 Checks operating controls 7.02 Inspects monitoring and warning systems 7.03 Monitors running lines, hoist ropes and standing ropes 7.04 Monitors gauges and warning systems 7.05 Monitors support base</p>	<p style="text-align: center;">Operational and Continual Checks</p> <p>7.01 Checks operating controls. 7.02 Inspects monitoring and warning systems 7.03 Monitors running lines, hoist ropes and standing ropes 7.04 Monitors gauges and warning systems 7.05 Monitors support base</p>

Minor Crane Maintenance
8.01 Changes oil and filters
8.02 Greases crane
8.03 Lubricates wire ropes
8.04 Makes minor adjustments and replacements

Minor Crane Maintenance
8.02 Greases crane
8.03 Lubricates wire ropes
8.04 Makes minor adjustments and replacements

Minor Crane Maintenance
8.02 Greases crane
8.03 Lubricates wire ropes
8.04 Makes minor adjustments and replacements

Slings and Hardware
9.01 Lubricates slings and hardware
9.02 Identifies deficiencies in slings and hardware
9.03 Disposes of damaged slings and hardware
9.04 Stores slings and hardware

Slings and Hardware
9.01 Lubricates slings and hardware
9.02 Identifies deficiencies in slings and hardware
9.03 Disposes of damaged slings and hardware
9.04 Stores slings and hardware

Rigging Procedures
10.01 Selects required rigging
10.02 Rigs load
10.03 Monitors rigging

Rigging Procedures
10.01 Selects required rigging
10.02 Rigs load
10.03 Monitors rigging

Rigging Procedures
10.01 Selects required rigging
10.02 Rigs load
10.03 Monitors rigging

Pre-lift Planning
11.01 Participates in routine, engineered and specialty lift planning
11.02 Evaluates risks and hazards

Pre-lift Planning
11.01 Participates in routine, engineered and specialty lift planning
11.02 Evaluates risks and hazards

Pre-lift Planning
11.01 Participates in routine, engineered and specialty lift planning
11.02 Evaluates risks and hazards

Crane Setup
12.01 Performs final site inspection
12.02 Positions crane
12.03 Completes setup

Crane Setup
12.01 Performs final site inspection
12.02 Positions crane
12.03 Completes setup

Crane Setup
12.01 Performs final site inspection
12.02 Positions crane
12.03 Completes setup

Components for Transport (Loading/Unloading)
13.01 Loads crane and components
13.02 Unloads crane and components

Components for Transport (Loading/Unloading)
13.01 Loads crane and components
13.02 Unloads crane and components

Cranes on Public Roadways
14.01 Performs pre-trip planning
14.02 Prepares crane for transport
14.03 Drives cranes

**Lattice Boom Cranes
(Assemble/Disassemble)**

- 15.01 Installs tracks on car body (lattice boom)
- 15.02 Installs superstructure/upperworks (lattice boom)
- 15.03 Installs outrigger boxes (lattice boom)
- 15.04 Installs boom base (lattice boom)
- 15.05 Assembles main boom, tip and boom attachments (lattice boom)
- 15.06 Installs counter weights (lattice boom)
- 15.07 Installs hook blocks and overhaul ball (lattice boom)
- 15.08 Removes hook blocks and overhaul ball (lattice boom)
- 15.09 Disassembles main boom, tip and boom attachments (lattice boom)
- 15.10 Removes counter weights (lattice boom)
- 15.11 Removes boom base (lattice boom)
- 15.12 Removes superstructure/upperworks (lattice boom)
- 15.13 Removes tracks from car body (lattice boom)
- 15.14 Removes outrigger boxes (lattice boom)

**Lattice Boom Cranes
(Assemble/Disassemble)**

- 15.05 Assembles main boom, tip and boom attachments (lattice boom)
- 15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom)
- 15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom)
- 15.09 Disassembles main boom, tip and boom attachments (lattice boom)

**Lattice Boom Cranes
(Assemble/Disassemble)**

- 15.05 Assembles main boom, tip and boom attachments (lattice boom)
- 15.06 Installs counter weights (lattice boom)
- 15.07 Installs hoist lines, hook blocks and overhaul ball (lattice boom)
- 15.08 Removes hoist lines, hook blocks and overhaul ball (lattice boom)
- 15.09 Disassembles main boom, tip and boom attachments (lattice boom)
- 15.10 Removes counter weights (lattice boom)

Telescopic Boom Crane (Assembles/Disassembles)

- 16.01 Installs outrigger boxes (telescopic boom)
- 16.03 Installs main boom (telescopic boom)
- 16.04 Installs hook blocks and overhaul ball (telescopic boom)
- 16.05 Installs counterweights (telescopic boom)
- 16.06 Installs jibs and inserts (telescopic boom)
- 16.07 Removes jibs and inserts (telescopic boom)
- 16.08 Removes counterweights (telescopic boom)
- 16.09 Removes hook blocks and overhaul ball (telescopic boom)
- 16.10 Removes main boom (telescopic boom)
- 16.11 Removes outrigger boxes (telescopic boom)

Telescopic Boom Crane (Assembles/Disassembles)

- 16.04 Installs hook blocks and overhaul ball (telescopic boom)
- 16.06 Installs jibs and inserts (telescopic boom)
- 16.07 Removes jibs and inserts (telescopic boom)
- 16.09 Removes hook blocks and overhaul ball (telescopic boom)

Telescopic Boom Crane (Assembles/Disassembles)

- 16.02 Installs superstructure/upperworks (telescopic boom)
- 16.04 Installs hook blocks and overhaul ball (telescopic boom)
- 16.06 Installs jibs and inserts (telescopic boom)
- 16.07 Removes jibs and inserts (telescopic boom)
- 16.09 Removes hook blocks and overhaul ball (telescopic boom)
- 16.12 Removes superstructure/upperworks (telescopic boom)

Specialty Equipment and Attachments (Assembles/Disassembles)

- 17.01 Assembles specialty equipment and attachments
- 17.02 Disassembles specialty equipment and attachments

Common Craning Operations

- 18.01 Configures electronic operational aids
- 18.02 Mobilizes crane on jobsite

Common Craning Operations

- 18.01 Configures electronic operational aids
- 18.02 Mobilizes crane on jobsite

Common Craning Operations

- 18.01 Configures electronic operational aids
- 18.02 Mobilizes crane on jobsite

Friction Drive Lattice Boom Cranes

- 19.01 Operates friction drive crawler-mounted lattice boom cranes
- 19.02 Operates friction drive truck-mounted lattice boom cranes

Friction Drive Lattice Boom Cranes

- 19.01 Operates friction drive crawler-mounted lattice boom cranes
- 19.02 Operates friction drive truck-mounted lattice boom cranes

Friction Drive Lattice Boom Cranes

- 19.01 Operates friction drive crawler-mounted lattice boom cranes
- 19.02 Operates friction drive truck-mounted lattice boom cranes

Hydraulic Drive Lattice Boom Cranes

- 20.01 Operates hydraulic drive crawler-mounted lattice boom cranes
- 20.02 Operates hydraulic drive truck-mounted lattice boom cranes

Hydraulic Drive Lattice Boom Cranes

- 20.01 Operates hydraulic drive crawler-mounted lattice boom cranes
- 20.02 Operates hydraulic drive truck-mounted lattice boom cranes

Hydraulic Drive Lattice Boom Cranes

- 20.01 Operates hydraulic drive crawler-mounted lattice boom cranes
- 20.02 Operates hydraulic drive truck-mounted lattice boom cranes

Telescopic Boom Cranes
21.01 Operates crawler-mounted telescopic cranes
21.02 Operates rubber tire-mounted telescopic cranes

Telescopic Boom Cranes
21.01 Operates crawler-mounted telescopic cranes
21.02 Operates rubber tire-mounted telescopic cranes

Telescopic Boom Cranes
21.01 Operates crawler-mounted telescopic cranes
21.02 Operates rubber tire-mounted telescopic cranes

Specialty Craning Operations
22.04 Performs multi-crane lifts

Specialty Craning Operations
22.01 Operates crane with piledriver
22.02 Performs duty cycle operations
22.03 Operates cranes on floating platforms
22.04 Performs multi-crane lifts
22.05 Uses personnel hoisting equipment

Crane (Secure)
23.01 Secures crane for short term
23.02 Secures crane for long term

Crane (Secure)
23.01 Secures crane for short term
23.02 Secures crane for long term

Crane (Secure)
23.01 Secures crane for short term
23.02 Secures crane for long term

9. Tower Crane Operator

9.1. Tower Crane Operator Recommendations

That provinces and territories adopt the **Red Seal trade name Tower Crane Operator / Opérateur/opératrice de grue à tour** with the following variations:

- ON - Provincial legislation will reflect the trade name 'Hoisting Engineer - Tower Crane Operator / Technicien/technicienne de hissage - opérateur/opératrice de grue à tour'.
- AB - Provincial legislation will reflect the trade name 'Crane and Hoisting Equipment Operator - Tower Crane Operator'.
- That the total number of training hours be **3000 hours** (jurisdictions will determine the ratio of in-class versus on-the-job training).
- That the technical training program offers **2 training levels**.
- That the **sequencing** reflects the topic and sub-mapping in the sequencing documents with the following variations:
 - Variation: AB – Will maintain their current in-class training.³⁴
 - Jurisdictions may exceed benchmark by including training on lift planning for self-erecting tower cranes and self-erecting tower crane operations.

³⁴ While Alberta will be abstaining from approving the harmonized course sequencing for Mobile Crane Operator and Tower Crane Operator, Alberta's abstention should not prevent the CCDA from harmonizing these trades. Alberta will continue to engage its industry stakeholders and seek opportunities for alignment with the CCDA standard wherever possible.

9.2. Tower Crane Operator Sequencing – Snapshot³⁵

Level One (Common Level with Mobile Crane Operator)	Level Two ³⁶
Safety	
Types and terminology	
Systems and components	
Wire rope and rigging	
Lift planning	Lift planning – Hammerhead tower crane
	Lift planning – Luffing jib tower crane
Crane applications	Hammerhead tower crane operations
	Luffing jib tower crane operations
	Speciality hoisting operations
Transporting a crane	
Crane maintenance	
	Climbing cranes

³⁵ Variation: Alberta will maintain their current in-class training

³⁶ Jurisdictions may exceed benchmark by including training on lift planning for self-erecting tower cranes and self-erecting tower crane operations.

9.3 Tower Crane Operator Sequencing – Topic Detail

<p style="text-align: center;">Level 1</p> <p style="text-align: center;">(Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<p>Safety</p> <ul style="list-style-type: none"> • Regulations, manuals and policies • Safe working environment • Emergency safety procedures • Power line hazards • Worksite communications 	
<p>Types and Terminology</p> <ul style="list-style-type: none"> • Types of cranes • Crane classifications • Crane terminology 	
<p>Systems and components</p> <ul style="list-style-type: none"> • Carriers/undercarriage components • Outriggers and stabilizers • Turntable • Power plants • Drive systems • Pneumatic systems • Hydraulic systems • Electrical systems • Steering systems • Braking systems • Hoisting systems • Attachments • Safety components, devices and aids 	
<p>Wire rope and rigging</p> <ul style="list-style-type: none"> • Types of wire rope • Installation of wire rope • Inspection of wire rope • Rigging hardware • Inspection of rigging hardware • Rigging techniques • Maintenance of wire rope and rigging • Storage of wire rope and rigging 	

9.3 Tower Crane Operator Sequencing – Topic Detail

Level 1 (Common Level with Mobile Crane Operator)	Level 2
Lift planning <ul style="list-style-type: none"> Site assessment <ul style="list-style-type: none"> Determining load weight Crane lifting capacity Rigging requirements Load/capacity charts 	Lift planning – Hammerhead tower crane (2a) <ul style="list-style-type: none"> Site assessment Crane lifting capacity Load/capacity chart
	Lift planning – Luffing jib tower crane (2a) <ul style="list-style-type: none"> Site assessment Crane lifting capacity Load/capacity chart
Crane applications <ul style="list-style-type: none"> Interpret operating manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate 8-15 ton mobile crane (<i>Common level with Mobile Crane Operator</i>) Leave crane unattended 	Hammerhead tower crane operations (2a) <ul style="list-style-type: none"> Interpret operator manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate hammerhead tower crane Leave crane unattended
	Luffing jib tower crane operations (2a) <ul style="list-style-type: none"> Interpret operator manuals Pre-operational inspections Pre-operational Set Up Hoisting techniques Operate luffing jib tower crane Leave crane unattended
	Speciality hoisting operations (2b) <ul style="list-style-type: none"> Elevated work platform Engineered lift Precision lift Multiple crane lift
Transporting a crane <ul style="list-style-type: none"> Highway traffic act Preparing a crane for travel Preparing a crane for transport Assembly and disassembly 	
Crane maintenance <ul style="list-style-type: none"> Tools for basic crane maintenance Basic crane maintenance 	

9.3 Tower Crane Operator Sequencing – Topic Detail

Level 1 (Common Level with Mobile Crane Operator)	Level 2
	Climbing cranes (2b) <ul style="list-style-type: none">• Climbing tower crane• Top climbing tower crane

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<p>Safety</p> <ul style="list-style-type: none"> • Regulations, manuals and policies • Safe working environment • Emergency safety procedures • Power line hazards • Worksite communications <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 4.01 Monitors site conditions.</p>	
<p>Types and Terminology</p> <ul style="list-style-type: none"> • Types of cranes <ul style="list-style-type: none"> - Boom trucks - Mobile cranes - Tower cranes - Self-erecting cranes • Crane classifications <ul style="list-style-type: none"> - Carrier type - Hoist mechanisms - Lifting capacity - Boom types - Heavy lift cranes • Crane terminology <ul style="list-style-type: none"> - Wire rope - Fittings - Drums - Hooks - Sheaves - Winch - Slew - Hoist <p>Subtasks</p>	

³⁷ **Variation:** Alberta will maintain their current in-class training

³⁸ Jurisdictions may exceed benchmark by including training on lift planning for self-erecting tower cranes and self-erecting tower crane operations

³⁹ **NOTE** – Sub-tasks found in the NOA, which **directly** relate to the Unit or General Learning Outcome title, are listed in this table. Other Sub-tasks related to the Unit or General Learning Outcome title, not listed in this table, may be added to achieve a logical template for instruction. The sub-tasks may be repeated in multiple Units due to similar knowledge and competencies for Sub-tasks.

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<p>(no subtasks directly related, this is knowledge of the trade) *Note - All this detail is listed in the course outline. The course is common, therefore some of this detail is not specific to Tower Crane Operator.</p>	
<p>Systems and components</p> <ul style="list-style-type: none"> • Carriers/undercarriage components • Outriggers and stabilizers • Turntable • Power plants • Drive systems • Pneumatic systems • Hydraulic systems • Electrical systems • Steering systems • Braking systems • Hoisting systems • Attachments • Safety components, devices and aids <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.01 Inspects structural components. 3.02 Inspects mechanical components. 3.03 Inspects lines and wire ropes. 3.04 Inspects hydraulic system components. 3.05 Inspects electrical system components. 3.06 Inspects support components. 3.07 Inspects track travel components. 3.08 Inspects cab components. 3.09 Inspects safety and access components. 3.10 Completes inspection documentation. 10.01 Performs function test.</p>	
<p>Wire rope and rigging</p> <ul style="list-style-type: none"> • Types of wire rope • Installation of wire rope • Inspection of wire rope • Rigging hardware 	

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<ul style="list-style-type: none"> • Inspection of rigging hardware • Rigging techniques • Maintenance of wire rope and rigging • Storage of wire rope and rigging <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment.</p> <p>1.02 Maintains a safe work environment.</p> <p>2.01 Communicates with others.</p> <p>2.02 Uses documentation.</p> <p>3.03 Inspects lines and wire ropes.</p> <p>5.02 Lubricates wire ropes and crane components.</p> <p>8.01 Identifies deficiencies in slings and hardware.</p> <p>8.02 Lubricates slings and hardware.</p> <p>8.03 Stores rigging equipment.</p> <p>9.01 Selects required rigging equipment.</p> <p>9.02 Rigs load.</p>	
<p>Lift planning</p> <ul style="list-style-type: none"> • Site assessment • Determining load weight • Crane lifting capacity • Rigging requirements • Load/capacity charts <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment.</p> <p>1.02 Maintains a safe work environment.</p> <p>2.01 Communicates with others.</p> <p>2.02 Uses documentation.</p> <p>4.01 Monitors site conditions.</p> <p>7.01 Interprets load charts.</p> <p>7.02 Plans work procedures.</p> <p>7.03 Prepares for specialty lifts.</p> <p>9.01 Selects required rigging equipment.</p>	<p>Lift planning – Hammerhead tower crane (2a)</p> <ul style="list-style-type: none"> • Site assessment • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment.</p> <p>1.02 Maintains a safe work environment.</p> <p>2.01 Communicates with others.</p> <p>2.02 Uses documentation.</p> <p>4.01 Monitors site conditions.</p> <p>7.01 Interprets load charts.</p> <p>7.02 Plans work procedures.</p> <p>7.03 Prepares for specialty lifts.</p> <p>9.01 Selects required rigging equipment</p> <hr/> <p>Lift planning – Luffing jib tower crane (2a)</p> <ul style="list-style-type: none"> • Site assessment • Crane lifting capacity • Load/capacity chart <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment.</p>

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
	<p>1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 4.01 Monitors site conditions. 7.01 Interprets load charts. 7.02 Plans work procedures. 7.03 Prepares for specialty lifts. 9.01 Selects required rigging equipment</p>
<p>Crane applications</p> <ul style="list-style-type: none"> • Interpret operating manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate 8-15 ton mobile crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.01 Inspects structural components. 3.02 Inspects mechanical components. 3.03 Inspects lines and wire ropes. 3.04 Inspects hydraulic system components. 3.05 Inspects electrical system components. 3.06 Inspects support components. 3.07 Inspects track travel components. 3.08 Inspects cab components. 3.09 Inspects safety and access components. 3.10 Completes inspection documentation. 4.01 Monitors site conditions. 4.02 Monitors lines and wire ropes. 4.03 Monitors equipment performance and conditions. 4.04 Monitors structural and support components. 5.01 Maintains mechanical components. 5.02 Lubricates wire ropes and crane components. 9.01 Selects required rigging equipment. 9.02 Rigs load.</p>	<p>Hammerhead tower crane operations (2a)</p> <ul style="list-style-type: none"> • Interpret operator manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate hammerhead tower crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.01 Inspects structural components. 3.02 Inspects mechanical components. 3.03 Inspects lines and wire ropes. 3.04 Inspects hydraulic system components. 3.05 Inspects electrical system components. 3.06 Inspects support components. 3.07 Inspects track travel components. 3.08 Inspects cab components. 3.09 Inspects safety and access components. 3.10 Completes inspection documentation. 4.01 Monitors site conditions. 4.02 Monitors lines and wire ropes. 4.03 Monitors equipment performance and conditions. 4.04 Monitors structural and support components. 5.01 Maintains mechanical components. 5.02 Lubricates wire ropes and crane components. 8.01 Identifies deficiencies in slings and hardware. 8.02 Lubricates slings and hardware.</p>

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<p>9.03 Monitors rigging. 10.01 Performs function test. 10.02 Confirms limits. 11.01 Trolleys carriage. 11.02 Booms (luffs) up and down. 11.03 Swings (slews) jib. 11.04 Hoists load. 11.05 Travels crane. 11.06 Performs functions simultaneously. 12.01 Performs bottom-climbing procedures. 12.02 Performs top-climbing procedures. 13.03 Hoists personnel. 14.01 Secures crane while leaving controls. 14.02 Secures crane while unattended. 14.03 Secures crane for extended periods</p>	<p>8.03 Stores rigging equipment. 9.01 Selects required rigging equipment. 9.02 Rigs load. 9.03 Monitors rigging. 10.01 Performs function test. 10.02 Confirms limits. 11.01 Trolleys carriage. 11.03 Swings (slews) jib. 11.04 Hoists load. 11.05 Travels crane. 11.06 Performs functions simultaneously. 14.01 Secures crane while leaving controls. 14.02 Secures crane while unattended. 14.03 Secures crane for extended periods</p>
	<p>Luffing jib tower crane operations (2a)</p> <ul style="list-style-type: none"> • Interpret operator manuals • Pre-operational inspections • Pre-operational Set Up • Hoisting techniques • Operate luffing jib tower crane • Leave crane unattended <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.01 Inspects structural components. 3.02 Inspects mechanical components. 3.03 Inspects lines and wire ropes. 3.04 Inspects hydraulic system components. 3.05 Inspects electrical system components. 3.06 Inspects support components. 3.08 Inspects cab components. 3.09 Inspects safety and access components. 3.10 Completes inspection documentation. 4.01 Monitors site conditions. 4.02 Monitors lines and wire ropes.</p>

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
	<p>4.03 Monitors equipment performance and conditions. 4.04 Monitors structural and support components. 5.01 Maintains mechanical components. 5.02 Lubricates wire ropes and crane components. 8.01 Identifies deficiencies in slings and hardware. 8.02 Lubricates slings and hardware. 8.03 Stores rigging equipment. 9.01 Selects required rigging equipment. 9.02 Rigs load. 9.03 Monitors rigging. 10.01 Performs function test. 10.02 Confirms limits. 11.02 Booms (luffs) up and down. 11.03 Swings (slews) jib. 11.04 Hoists load. 11.05 Travels crane. 11.06 Performs functions simultaneously. 14.01 Secures crane while leaving controls. 14.02 Secures crane while unattended. 14.03 Secures crane for extended periods</p> <p>Speciality hoisting operations (2b)</p> <ul style="list-style-type: none"> • Elevated work platform • Engineered lift • Precision lift • Multiple crane lift <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.01 Inspects structural components. 3.02 Inspects mechanical components. 3.03 Inspects lines and wire ropes. 3.04 Inspects hydraulic system components. 3.05 Inspects electrical system components. 3.06 Inspects support components. 3.07 Inspects track travel components. 3.08 Inspects cab components. 3.09 Inspects safety and access components.</p>

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
	<p>3.10 Completes inspection documentation.</p> <p>4.01 Monitors site conditions.</p> <p>4.02 Monitors lines and wire ropes.</p> <p>4.03 Monitors equipment performance and conditions.</p> <p>4.04 Monitors structural and support components.</p> <p>5.01 Maintains mechanical components.</p> <p>5.02 Lubricates wire ropes and crane components.</p> <p>7.01 Interprets load charts.</p> <p>7.02 Plans work procedures.</p> <p>7.03 Prepares for specialty lifts.</p> <p>8.01 Identifies deficiencies in slings and hardware.</p> <p>8.02 Lubricates slings and hardware.</p> <p>8.03 Stores rigging equipment.</p> <p>9.01 Selects required rigging equipment.</p> <p>9.02 Rigs load.</p> <p>9.03 Monitors rigging.</p> <p>10.01 Performs function test.</p> <p>10.02 Confirms limits.</p> <p>11.01 Trolleys carriage.</p> <p>11.02 Booms (luffs) up and down.</p> <p>11.03 Swings (slews) jib.</p> <p>11.04 Hoists load.</p> <p>11.05 Travels crane.</p> <p>11.06 Performs functions simultaneously.</p> <p>13.01 Participates in multi-crane lifts.</p> <p>13.02 Operates in multi-crane site.</p> <p>14.01 Secures crane while leaving controls.</p> <p>14.02 Secures crane while unattended.</p> <p>14.03 Secures crane for extended periods.</p>
<p>Transporting a crane</p> <ul style="list-style-type: none"> • Highway traffic act • Preparing a crane for travel • Preparing a crane for transport • Assembly and disassembly <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment.</p> <p>1.02 Maintains a safe work environment.</p>	

9.4 Tower Crane Operator Sequencing – Sub-Task by 2012 NOA^{37 38 39}

<p style="text-align: center;">Level 1 (Common Level with Mobile Crane Operator)</p>	<p style="text-align: center;">Level 2</p>
<p>2.01 Communicates with others. 2.02 Uses documentation. 6.01 Participates in crane assembly. 6.02 Participates in crane disassembly. 6.03 Transports self-erecting tower crane. (NOT COMMON CORE) 6.04 Participates in assembly and disassembly of self-erecting tower cranes. (NOT COMMON CORE)</p>	
<p>Crane maintenance</p> <ul style="list-style-type: none"> • Tools for basic crane maintenance • Basic crane maintenance <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 3.10 Completes inspection documentation. 5.01 Maintains mechanical components. 5.02 Lubricates wire ropes and crane components.</p>	
	<p>Climbing crane (2b)</p> <ul style="list-style-type: none"> • Climbing tower crane • Top climbing tower crane <p>Subtasks</p> <p>1.01 Uses PPE and safety equipment. 1.02 Maintains a safe work environment. 2.01 Communicates with others. 2.02 Uses documentation. 12.01 Performs bottom-climbing procedures. 12.02 Performs top-climbing procedures.</p>

10. Heavy Duty Equipment Technician

10.1. Heavy Duty Equipment Technician Recommendations

Heavy Duty Equipment Technician (HDET) has been added to the following Phase 2 family of trades: Truck and Transport Mechanic (TTM) and Agricultural Equipment Technician (AET). These three trades are being harmonized at the same time due to high levels of common training in many jurisdictions. The harmonization process for these trades will be the same process used to harmonize the first ten trades, starting with consultations with stakeholders followed by pan-Canadian webinars.

That provinces and territories adopt the **Red Seal trade name Heavy Duty Equipment Technician / Mécanicien/mécanicienne d'équipement lourd**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

10.2. Heavy Duty Equipment Technician – Snapshot

In Context	In Context	In Context	In Context
Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance
Operational Testing	Operational Testing	Operational Testing	Operational Testing
Planning and Communication	Planning and Communication	Planning and Communication	Planning and Communication
		Electrical	Electrical
Level One	Level Two	Level Three	Trade-Specific Level
Safety			
Tools and Equipment (1)			
Hoisting and Lifting			
Hydraulic Systems			Hydraulic Systems - Advanced (2)
<ul style="list-style-type: none"> Basic Service, Introduction to Diagnostics (TTM) 			<ul style="list-style-type: none"> Diagnose and Repair (TTM)
Pneumatics			Hydraulics, Hydrostatics and Pneumatics - Advanced (3)
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostic Tools 			<ul style="list-style-type: none"> Diagnose and Repair (HDET, AET)
Electrical 1	Electrical 2		Electrical (4)
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostics 	<ul style="list-style-type: none"> Diagnose and Repair Starting and charging systems 		
Frames, Steering & Suspension (5)			Frames, Steering & Suspension
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostics 			<ul style="list-style-type: none"> Diagnose and Repair
Brakes			Brakes Advanced (6)
<ul style="list-style-type: none"> Service Basic Diagnostics and Repair 			<ul style="list-style-type: none"> Diagnose and Repair (TTM)
Structural Components (7)			Structural Components and Accessories
<ul style="list-style-type: none"> Service Basic structural components 			<ul style="list-style-type: none"> Diagnose and repair working attachments
Heating, Ventilation and Air Conditioning / Environment Controls (8)		Heating, Ventilation and Air Conditioning / Environment Controls	
<ul style="list-style-type: none"> Safety and Awareness 			
			Trailer (9)
			(TTM)
			Agriculture Equipment and Accessories (10)
			(AET)
	Engines and Engine Support Systems	Engines and Engine Support Systems (11)	

10.2. Heavy Duty Equipment Technician – Snapshot

	Alternate Fuel (HDET, TTM only)		
	Drivetrain (Powertrain) (12)	Drivetrain (Powertrain)	

Notations/Variations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

10.3. Heavy Duty Equipment Technician – Topic Detail/ Sub-Task by NOA

(Displayed with the family of trades: Truck and Transport Mechanic and Agricultural Equipment Technician)

In context	HDET	TTM	AET
Scheduled Maintenance (In context with learning)	2.01 Maintains fluids. 2.02 Services fasteners, sealing devices, adhesives and gaskets. 2.03 Services hoses, tubing, piping, and fittings. 2.04 Services bearings and seals. 2.06 Performs scheduled maintenance procedures. 3.01 Uses documentation and reference materials. 3.02 Completes documentation.	3.01 Uses documentation and reference materials. 3.02 Maintains fluids, lubricants, and coolants. 3.03 Services hoses, tubing and fittings. 3.04 Services filters. 3.05 Services bearings, bushings, and seals. 3.06 Uses fasteners, adhesives and gaskets	2.02 Maintains fluids, lubricants, and coolants. 2.03 Services filters. 2.04 Maintains hoses, tubing, and fittings. 2.05 Services bearings/bushings, and seals. 2.06 Uses fasteners, sealing devices, adhesives, and gaskets.
Operational Testing (In context with learning)	2.07 Identifies operational faults. 2.08 Performs operational check-out.		2.01 Conducts operational tests. 2.10 Performs failure analysis.
Planning and Communication (In context with learning)	3.03 Communicates with others. 3.04 Prepares job action plan.		2.09 Plans daily tasks.
Electrical (In context with learning – Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)
Level One	HDET	TTM	AET
Safety	1.03 Operates access equipment. 1.04 Uses personal protective equipment (PPE) and safety equipment. 2.05 Services safety features. 3.05 Maintains safe work environment.	1.01 Maintains safe work environment. 1.02 Uses PPE and safety equipment.	1.01 Uses PPE 1.02 Maintains safe work environment.
Tools and Equipment (1)	1.01 Maintains tools and equipment. 4.01 Heats materials. 4.02 Cools materials. 4.03 Cuts materials. 4.04 Welds materials. 4.05 Cleans parts and materials.	2.01 Maintains hand, power, measuring, testing, and diagnostic tools. 2.02 Maintains shop equipment. 2.04 Uses welding and cutting equipment.	2.07 Cleans components. 2.08 Verifies equipment and components repairs. 3.01 Maintains tools and equipment.
Hoisting and Lifting	1.02 Uses hoisting and lifting equipment.	2.03 Uses hoisting and lifting equipment.	3.02 Uses hoisting, lifting, and securing equipment.

Level One	HDET	TTM	AET
Hydraulic Systems Service and Introduction to diagnosis	7.01 Diagnose hydraulic systems. 8.01 Repairs hydraulic systems.	38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Pneumatics Basic Service Introduction to Diagnostic Tools	7.03 Diagnose pneumatic systems 8.03 Repairs pneumatic systems (in the context of "service")		8.02 Diagnoses pneumatic systems. 9.02 Repairs pneumatic systems.
Electrical 1 Basic Service Introduction to Diagnostics	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories.	14.01 Performs servicing and repair of batteries. 14.02 Diagnoses batteries. 15.01 Services charging systems. 15.02 Diagnoses charging systems. 15.03 Repairs charging systems. 16.01 Performs servicing and repair of spark ignition systems. 16.02 Diagnose spark ignition systems. 17.01 Performs servicing and repairs of starting systems. 17.02 Diagnoses starting systems.	10.01 Diagnoses electrical power and control monitoring systems. 11.01 Repairs electrical power and control monitoring systems.
Frames, Steering & Suspension (5) Basic Service Introduction to Diagnostics	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 31.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes Service Basic Diagnostics and Repair	11.03 Diagnoses brake systems. 12.03 Repairs brake systems.	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	12.02 Diagnoses brake systems. 13.02 Repairs brake systems.

Level One	HDET	TTM	AET
Structural Components (7) Service Basic structural components	19.01 Diagnoses structural components. 19.02 Diagnoses operator station components. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 28.03 Repairs chassis/frames. 33.01 Services exterior cab components. 33.02 Services exterior cab components. 33.03 Services exterior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body.
Heating, Ventilation and Air Conditioning / Environment Controls (8) Safety and Awareness	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.

Level Two	HDET	TTM	AET
Electrical 2 Diagnose and Repair Starting and charging systems	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories. 15.01 Reads diagnostic trouble codes (DTCs). 15.02 Monitors parameters. 15.03 Interprets test results. 15.04 Tests system circuitry and components. 16.01 Updates component software. 16.02 Repairs component.	18.01 Performs servicing and repair of electrical components and accessories. 18.02 Diagnoses electrical components and accessories. 19.01 Services vehicle management systems and electronic components. 19.02 Diagnoses vehicle management systems and electronic components. 19.03 Repairs vehicle management systems and electronic components.	3.03 Uses computer diagnostics and programming. 10.02 Diagnoses electronic power and control monitoring systems. 11.02 Repairs electronic power and control monitoring systems.

Level Two	HDET		TTM		AET	
Engines and Engine Support Systems	5.01 5.02 5.03 5.04 5.05 5.06 5.07 6.01 6.02 6.03 6.04 6.05 6.06 6.07	Diagnoses base engine. Diagnoses lubrication systems. Diagnoses cooling systems. Diagnoses intake and exhaust systems. Diagnoses fuel systems. Diagnoses engine control systems. Diagnoses emission control systems. Repairs base engine. Repairs lubrication systems. Repairs cooling systems. Repairs intake and exhaust systems. Repairs fuel systems. Repairs engine control systems. Repairs emission control systems.	4.01 4.02 4.03 5.01 5.02 5.03 6.01 6.02 6.03 7.01 7.02 7.03 8.01 8.02 8.03 9.01 9.02 9.03 10.01 10.02 11.01 11.02 11.03	Services base engine. Diagnoses base engine. Repairs base engine. Services lubrication systems. Diagnoses lubrication systems. Repairs lubrication systems. Services intake and exhaust systems. Diagnoses intake and exhaust systems. Repairs intake and exhaust systems. Services engine management systems. Diagnoses engine management systems. Repairs engine management systems. Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system. Services emission systems for diesel engines. Diagnoses emission systems for diesel engines. Repairs emission systems for diesel engines. Services and repairs engine retarder systems. Diagnoses engine retarder systems. Services cooling system. Diagnoses cooling system. Repairs cooling system.	4.01 4.02 4.03 4.04 4.05 4.06 4.07 5.01 5.02 5.03 5.04 5.05 5.06 5.07	Diagnoses base engine. Diagnoses lubrication system. Diagnoses cooling system. Diagnoses intake and exhaust system. Diagnoses fuel delivery system. Diagnoses engine management systems. Diagnoses emission systems. Repairs base engine. Repairs lubrication system. Repairs cooling system. Repairs intake and exhaust system. Repairs fuel delivery system. Repairs engine management systems. Repairs emission systems.
Alternate Fuel (HDET, TTM)	5.05 6.05	Diagnoses fuel systems. Repairs fuel systems.	8.01 8.02 8.03	Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system.	(HDET, TTM)	

Level Two	HDET	TTM	AET
Drivetrain (Powertrain) (12)	9.01 Diagnoses clutch systems. 9.02 Diagnoses torque converters, fluid couplers and retarders. 9.03 Diagnoses driveline systems. 9.04 Diagnoses transmission and transfer case systems. 9.05 Diagnoses axle and differential systems. 9.06 Diagnoses final drive systems. 10.01 Repairs clutch systems. 10.02 Repairs torque converters, fluid couplers and retarders. 10.03 Repairs driveline systems. 10.04 Repairs transmission and transfer case systems. 10.05 Repairs axle and differential systems 10.06 Repairs final drive systems.	20.01 Services clutches. 20.02 Diagnoses clutches. 20.03 Repairs clutches. 21.01 Services manual transmission and transfer cases. 21.02 Diagnoses manual transmission and transfer cases. 21.03 Repairs manual transmission and transfer cases. 22.01 Services automatic transmissions. 22.02 Diagnoses automatic transmissions. 22.03 Repairs automatic transmissions. 23.01 Services automated transmissions. 23.02 Diagnoses automated transmissions. 23.03 Repairs automated transmissions. 24.01 Services driveline systems. 24.02 Diagnoses driveline systems. 24.03 Repairs driveline systems. 25.01 Services differentials. 25.02 Diagnoses differentials. 25.03 Repairs differentials. 26.01 Services drive train retarders. 26.02 Diagnoses drive train retarders. 26.03 Repairs drive train retarders.	6.01 Diagnoses dry clutches. 6.02 Diagnoses driveline systems and components. 6.03 Diagnoses wet clutches, transmissions and gear cases. 6.04 Diagnoses differentials and final drives. 7.01 Repairs dry clutches. 7.02 Repairs driveline systems and components. 7.03 Repairs wet clutches, transmissions and gear cases. 7.04 Repairs differentials and final drives.

Level Three	HDET	TTM	AET
Heating, Ventilation and Air Conditioning / Environment Controls	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.
Engines and Engine Support Systems (11)	5.01 Diagnoses base engine. 5.02 Diagnoses lubrication systems. 5.03 Diagnoses cooling systems. 5.04 Diagnoses intake and exhaust systems. 5.05 Diagnoses fuel systems. 5.06 Diagnoses engine control systems. 5.07 Diagnoses emission control systems. 6.01 Repairs base engine. 6.02 Repairs lubrication systems. 6.03 Repairs cooling systems. 6.04 Repairs intake and exhaust systems. 6.05 Repairs fuel systems. 6.06 Repairs engine control systems. 6.07 Repairs emission control systems.	4.01 Services base engine. 4.02 Diagnoses base engine. 4.03 Repairs base engine. 5.01 Services lubrication systems. 5.02 Diagnoses lubrication systems. 5.03 Repairs lubrication systems. 6.01 Services intake and exhaust systems. 6.02 Diagnoses intake and exhaust systems. 6.03 Repairs intake and exhaust systems. 7.01 Services engine management systems. 7.02 Diagnoses engine management systems. 7.03 Repairs engine management systems. 8.01 Services fuel delivery system. 8.02 Diagnoses fuel delivery system. 8.03 Repairs fuel delivery system. 9.01 Services emission systems for diesel engines. 9.02 Diagnoses emission systems for diesel engines 9.03 Repairs emission systems for diesel engines. 10.01 Services and repairs engine retarder systems. 10.02 Diagnoses engine retarder systems 11.01 Services cooling system. 11.02 Diagnoses cooling system. 11.03 Repairs cooling system.	4.01 Diagnoses base engine. 4.02 Diagnoses lubrication system. 4.03 Diagnoses cooling system. 4.04 Diagnoses intake and exhaust system. 4.05 Diagnoses fuel delivery system. 4.06 Diagnoses engine management systems. 4.07 Diagnoses emission systems. 5.01 Repairs base engine. 5.02 Repairs lubrication system. 5.03 Repairs cooling system. 5.04 Repairs intake and exhaust system. 5.05 Repairs fuel delivery system. 5.06 Repairs engine management systems. 5.07 Repairs emission systems.

Level Three	HDET	TTM	AET
Drivetrain (Powertrain)	9.01 Diagnoses clutch systems. 9.02 Diagnoses torque converters, fluid couplers and retarders. 9.03 Diagnoses driveline systems. 9.04 Diagnoses transmission and transfer case systems. 9.05 Diagnoses axle and differential systems. 9.06 Diagnoses final drive systems. 10.01 Repairs clutch systems. 10.02 Repairs torque converters, fluid couplers and retarders. 10.03 Repairs driveline systems. 10.04 Repairs transmission and transfer case systems. 10.05 Repairs axle and differential systems 10.06 Repairs final drive systems.	20.01 Services clutches. 20.02 Diagnoses clutches. 20.03 Repairs clutches. 21.01 Services manual transmission and transfer cases. 21.02 Diagnoses manual transmission and transfer cases. 21.03 Repairs manual transmission and transfer cases. 22.01 Services automatic transmissions. 22.02 Diagnoses automatic transmissions. 22.03 Repairs automatic transmissions. 23.01 Services automated transmissions. 23.02 Diagnoses automated transmissions. 23.03 Repairs automated transmissions. 24.01 Services driveline systems. 24.02 Diagnoses driveline systems. 24.03 Repairs driveline systems. 25.01 Services differentials. 25.02 Diagnoses differentials. 25.03 Repairs differentials. 26.01 Services drive train retarders. 26.02 Diagnoses drive train retarders. 26.03 Repairs drive train retarders.	6.01 Diagnoses dry clutches. 6.02 Diagnoses driveline systems and components. 6.03 Diagnoses wet clutches, transmissions and gear cases. 6.04 Diagnoses differentials and final drives. 7.01 Repairs dry clutches. 7.02 Repairs driveline systems and components. 7.03 Repairs wet clutches, transmissions and gear cases. 7.04 Repairs differentials and final drives.

Trade Specific Level	HDET	TTM	AET
Hydraulic Systems – Advanced (2) Diagnose and Repair		Hydraulic Systems 38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Hydraulics, Hydrostatics and Pneumatics (3) Diagnose and Repair	7.01 Diagnoses hydraulic systems. 7.02 Diagnose hydrostatic systems. 8.01 Repairs hydraulic systems. 8.02 Repairs hydrostatic systems.		8.01 Diagnoses hydraulic and hydrostatic systems. 9.01 Repairs hydraulic and hydrostatic systems.
Electrical (4)			
Frames, Steering and Suspension Diagnose and Repair	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 30.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes (Advanced) (6) Diagnose and Repair (Advanced)	(TTM)	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Structural Components and Accessories Diagnose and Repair Working Attachments	19.01 Diagnoses structural components. 19.02 Diagnoses operator station. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	32.01 Services interior cab components. 32.02 Services interior cab components. 32.03 Services interior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body. 20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.
Trailer (9) (TTM)	(TTM)	30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 30.03 Repairs hitches and couplers. 34.01 Services trailer components and accessories. 34.02 Diagnoses trailer components and accessories. 34.03 Repairs trailer components and accessories. 35.01 Services heating and refrigeration systems. 35.02 Services heating and refrigeration systems. 35.03 Services heating and refrigeration systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Agriculture Equipment and Accessories (10) (AET)	(AET)	(AET)	20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.

Notations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

11. Truck and Transport Mechanic

11.1. Truck and Transport Mechanic Recommendations

Truck and Transport Mechanic has been added to the following Phase 2 family of trades: Heavy Duty Equipment Technician (HDET) and Agricultural Equipment Technician (AET). These three trades are being harmonized at the same time due to high levels of common training in many jurisdictions. The harmonization process for these trades will be the same process used to harmonize the first ten trades, starting with consultations with stakeholders followed by pan-Canadian webinars.

That provinces and territories adopt the **Red Seal trade name Truck and Transport Mechanic / Mécanicien / mécanicienne de camions et transport**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

11.2. Truck and Transport Mechanic - Snapshot

In Context	In Context	In Context	In Context
Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance
Operational Testing	Operational Testing	Operational Testing	Operational Testing
Planning and Communication	Planning and Communication	Planning and Communication	Planning and Communication
		Electrical	Electrical
Level One	Level Two	Level Three	Trade-Specific Level
Safety			
Tools and Equipment (1)			
Hoisting and Lifting			
Hydraulic Systems • Basic Service, Introduction to Diagnostics (TTM)			Hydraulic Systems - Advanced (2) • Diagnose and Repair (TTM)
Pneumatics • Basic Service Introduction to Diagnostic Tools			Hydraulics, Hydrostatics and Pneumatics - Advanced (3) • Diagnose and Repair (HDET, AET)
Electrical 1 • Basic Service • Introduction to Diagnostics	Electrical 2 • Diagnose and Repair • Starting and charging systems		Electrical (4)
Frames, Steering & Suspension (5) • Basic Service • Introduction to Diagnostics			Frames, Steering & Suspension • Diagnose and Repair
Brakes • Service • Basic Diagnostics and Repair			Brakes Advanced (6) • Diagnose and Repair (TTM)
Structural Components (7) • Service • Basic structural components			Structural Components and Accessories • Diagnose and repair working attachments
Heating, Ventilation and Air Conditioning / Environment Controls (8) • Safety and Awareness		Heating, Ventilation and Air Conditioning / Environment Controls	
			Trailer (9) (TTM)
			Agriculture Equipment and Accessories (10) (AET)

	Engines and Engine Support Systems	Engines and Engine Support Systems (11)	
	Alternate Fuel (HDET, TTM only)		
	Drivetrain (Powertrain) (12)	Drivetrain (Powertrain)	

Notations/Variations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

11.3. Truck and Transport Mechanic – Topic Detail/ Sub-Task by NOA

(Displayed with the family of trades: Heavy Duty Equipment Technician and Agricultural Equipment Technician)

In context	HDET	TTM	AET
Scheduled Maintenance (In context with learning)	2.01 Maintains fluids. 2.02 Services fasteners, sealing devices, adhesives and gaskets. 2.03 Services hoses, tubing, piping, and fittings. 2.04 Services bearings and seals. 2.06 Performs scheduled maintenance procedures. 3.01 Uses documentation and reference materials. 3.02 Completes documentation.	3.01 Uses documentation and reference materials. 3.02 Maintains fluids, lubricants, and coolants. 3.03 Services hoses, tubing and fittings. 3.04 Services filters. 3.05 Services bearings, bushings, and seals. 3.06 Uses fasteners, adhesives and gaskets	2.02 Maintains fluids, lubricants, and coolants. 2.03 Services filters. 2.04 Maintains hoses, tubing, and fittings. 2.05 Services bearings/bushings, and seals. 2.06 Uses fasteners, sealing devices, adhesives, and gaskets.
Operational Testing (In context with learning)	2.07 Identifies operational faults. 2.08 Performs operational check-out.		2.01 Conducts operational tests. 2.10 Performs failure analysis.
Planning and Communication (In context with learning)	3.03 Communicates with others. 3.04 Prepares job action plan.		2.09 Plans daily tasks.
Electrical (In context with learning – Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)
Level One	HDET	TTM	AET
Safety	1.03 Operates access equipment. 1.04 Uses personal protective equipment (PPE) and safety equipment. 2.05 Services safety features. 3.05 Maintains safe work environment.	1.01 Maintains safe work environment. 1.02 Uses PPE and safety equipment.	1.01 Uses PPE 1.02 Maintains safe work environment.
Tools and Equipment (1)	1.01 Maintains tools and equipment. 4.01 Heats materials. 4.02 Cools materials. 4.03 Cuts materials. 4.04 Welds materials. 4.05 Cleans parts and materials.	2.01 Maintains hand, power, measuring, testing, and diagnostic tools. 2.02 Maintains shop equipment. 2.04 Uses welding and cutting equipment.	2.07 Cleans components. 2.08 Verifies equipment and components repairs. 3.01 Maintains tools and equipment.
Hoisting and Lifting	1.02 Uses hoisting and lifting equipment.	2.03 Uses hoisting and lifting equipment.	3.02 Uses hoisting, lifting, and securing equipment.

Level One	HDET	TTM	AET
Hydraulic Systems Service and Introduction to diagnosis	7.01 Diagnose hydraulic systems. 8.01 Repairs hydraulic systems.	38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Pneumatics Basic Service Introduction to Diagnostic Tools	7.03 Diagnose pneumatic systems 8.03 Repairs pneumatic systems (in the context of "service")		8.02 Diagnoses pneumatic systems. 9.02 Repairs pneumatic systems.
Electrical 1 Basic Service Introduction to Diagnostics	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories.	14.01 Performs servicing and repair of batteries. 14.02 Diagnoses batteries. 15.01 Services charging systems. 15.02 Diagnoses charging systems. 15.03 Repairs charging systems. 16.01 Performs servicing and repair of spark ignition systems. 16.02 Diagnose spark ignition systems. 17.01 Performs servicing and repairs of starting systems. 17.02 Diagnoses starting systems.	10.01 Diagnoses electrical power and control monitoring systems. 11.01 Repairs electrical power and control monitoring systems.

Level One	HDET	TTM	AET
Frames, Steering & Suspension (5) Basic Service Introduction to Diagnostics	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 31.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes Service Basic Diagnostics and Repair	11.03 Diagnoses brake systems. 12.03 Repairs brake systems.	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	12.02 Diagnoses brake systems. 13.02 Repairs brake systems.
Structural Components (7) Service Basic structural components	19.01 Diagnoses structural components. 19.02 Diagnoses operator station components. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 28.03 Repairs chassis/frames. 33.01 Services exterior cab components. 33.02 Services exterior cab components. 33.03 Services exterior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body.
Heating, Ventilation and Air Conditioning / Environment Controls (8) Safety and Awareness	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.

Level Two	HDET	TTM	AET
Electrical 2 Diagnose and Repair Starting and charging systems	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories. 15.01 Reads diagnostic trouble codes (DTCs). 15.02 Monitors parameters. 15.03 Interprets test results. 15.04 Tests system circuitry and components. 16.01 Updates component software. 16.02 Repairs component.	18.01 Performs servicing and repair of electrical components and accessories. 18.02 Diagnoses electrical components and accessories. 19.01 Services vehicle management systems and electronic components. 19.02 Diagnoses vehicle management systems and electronic components. 19.03 Repairs vehicle management systems and electronic components.	3.03 Uses computer diagnostics and programming. 10.02 Diagnoses electronic power and control monitoring systems. 11.02 Repairs electronic power and control monitoring systems.

Level Two	HDET		TTM		AET	
Engines and Engine Support Systems	5.01 5.02 5.03 5.04 5.05 5.06 5.07 6.01 6.02 6.03 6.04 6.05 6.06 6.07	Diagnoses base engine. Diagnoses lubrication systems. Diagnoses cooling systems. Diagnoses intake and exhaust systems. Diagnoses fuel systems. Diagnoses engine control systems. Diagnoses emission control systems. Repairs base engine. Repairs lubrication systems. Repairs cooling systems. Repairs intake and exhaust systems. Repairs fuel systems. Repairs engine control systems. Repairs emission control systems.	4.01 4.02 4.03 5.01 5.02 5.03 6.01 6.02 6.03 7.01 7.02 7.03 8.01 8.02 8.03 9.01 9.02 9.03 10.01 10.02 11.01 11.02 11.03	Services base engine. Diagnoses base engine. Repairs base engine. Services lubrication systems. Diagnoses lubrication systems. Repairs lubrication systems. Services intake and exhaust systems. Diagnoses intake and exhaust systems. Repairs intake and exhaust systems. Services engine management systems. Diagnoses engine management systems. Repairs engine management systems. Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system. Services emission systems for diesel engines. Diagnoses emission systems for diesel engines Repairs emission systems for diesel engines. Services and repairs engine retarder systems. Diagnoses engine retarder systems Services cooling system. Diagnoses cooling system. Repairs cooling system.	4.01 4.02 4.03 4.04 4.05 4.06 4.07 5.01 5.02 5.03 5.04 5.05 5.06 5.07	Diagnoses base engine. Diagnoses lubrication system. Diagnoses cooling system. Diagnoses intake and exhaust system. Diagnoses fuel delivery system. Diagnoses engine management systems. Diagnoses emission systems. Repairs base engine. Repairs lubrication system. Repairs cooling system. Repairs intake and exhaust system. Repairs fuel delivery system. Repairs engine management systems. Repairs emission systems.
Alternate Fuel (HDET, TTM)	5.05 6.05	Diagnoses fuel systems. Repairs fuel systems.	8.01 8.02 8.03	Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system.	(HDET, TTM)	

Level Two	HDET	TTM	AET
Drivetrain (Powertrain) (12)	9.01 Diagnoses clutch systems. 9.02 Diagnoses torque converters, fluid couplers and retarders. 9.03 Diagnoses driveline systems. 9.04 Diagnoses transmission and transfer case systems. 9.05 Diagnoses axle and differential systems. 9.06 Diagnoses final drive systems. 10.01 Repairs clutch systems. 10.02 Repairs torque converters, fluid couplers and retarders. 10.03 Repairs driveline systems. 10.04 Repairs transmission and transfer case systems. 10.05 Repairs axle and differential systems 10.06 Repairs final drive systems.	20.01 Services clutches. 20.02 Diagnoses clutches. 20.03 Repairs clutches. 21.01 Services manual transmission and transfer cases. 21.02 Diagnoses manual transmission and transfer cases. 21.03 Repairs manual transmission and transfer cases. 22.01 Services automatic transmissions. 22.02 Diagnoses automatic transmissions. 22.03 Repairs automatic transmissions. 23.01 Services automated transmissions. 23.02 Diagnoses automated transmissions. 23.03 Repairs automated transmissions. 24.01 Services driveline systems. 24.02 Diagnoses driveline systems. 24.03 Repairs driveline systems. 25.01 Services differentials. 25.02 Diagnoses differentials. 25.03 Repairs differentials. 26.01 Services drive train retarders. 26.02 Diagnoses drive train retarders. 26.03 Repairs drive train retarders.	6.01 Diagnoses dry clutches. 6.02 Diagnoses driveline systems and components. 6.03 Diagnoses wet clutches, transmissions and gear cases. 6.04 Diagnoses differentials and final drives. 7.01 Repairs dry clutches. 7.02 Repairs driveline systems and components. 7.03 Repairs wet clutches, transmissions and gear cases. 7.04 Repairs differentials and final drives.

Level Three	HDET	TTM	AET
Heating, Ventilation and Air Conditioning / Environment Controls	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.
Engines and Engine Support Systems (11)	5.01 Diagnoses base engine. 5.02 Diagnoses lubrication systems. 5.03 Diagnoses cooling systems. 5.04 Diagnoses intake and exhaust systems. 5.05 Diagnoses fuel systems. 5.06 Diagnoses engine control systems. 5.07 Diagnoses emission control systems. 6.01 Repairs base engine. 6.02 Repairs lubrication systems. 6.03 Repairs cooling systems. 6.04 Repairs intake and exhaust systems. 6.05 Repairs fuel systems. 6.06 Repairs engine control systems. 6.07 Repairs emission control systems.	4.01 Services base engine. 4.02 Diagnoses base engine. 4.03 Repairs base engine. 5.01 Services lubrication systems. 5.02 Diagnoses lubrication systems. 5.03 Repairs lubrication systems. 6.01 Services intake and exhaust systems. 6.02 Diagnoses intake and exhaust systems. 6.03 Repairs intake and exhaust systems. 7.01 Services engine management systems. 7.02 Diagnoses engine management systems. 7.03 Repairs engine management systems. 8.01 Services fuel delivery system. 8.02 Diagnoses fuel delivery system. 8.03 Repairs fuel delivery system. 9.01 Services emission systems for diesel engines. 9.02 Diagnoses emission systems for diesel engines 9.03 Repairs emission systems for diesel engines. 10.01 Services and repairs engine retarder systems. 10.02 Diagnoses engine retarder systems 11.01 Services cooling system. 11.02 Diagnoses cooling system. 11.03 Repairs cooling system.	4.01 Diagnoses base engine. 4.02 Diagnoses lubrication system. 4.03 Diagnoses cooling system. 4.04 Diagnoses intake and exhaust system. 4.05 Diagnoses fuel delivery system. 4.06 Diagnoses engine management systems. 4.07 Diagnoses emission systems. 5.01 Repairs base engine. 5.02 Repairs lubrication system. 5.03 Repairs cooling system. 5.04 Repairs intake and exhaust system. 5.05 Repairs fuel delivery system. 5.06 Repairs engine management systems. 5.07 Repairs emission systems.

Level Three	HDET	TTM	AET
Drivetrain (Powertrain)	9.01 Diagnoses clutch systems. 9.02 Diagnoses torque converters, fluid couplers and retarders. 9.03 Diagnoses driveline systems. 9.04 Diagnoses transmission and transfer case systems. 9.05 Diagnoses axle and differential systems. 9.06 Diagnoses final drive systems. 10.01 Repairs clutch systems. 10.02 Repairs torque converters, fluid couplers and retarders. 10.03 Repairs driveline systems. 10.04 Repairs transmission and transfer case systems. 10.05 Repairs axle and differential systems 10.06 Repairs final drive systems.	20.01 Services clutches. 20.02 Diagnoses clutches. 20.03 Repairs clutches. 21.01 Services manual transmission and transfer cases. 21.02 Diagnoses manual transmission and transfer cases. 21.03 Repairs manual transmission and transfer cases. 22.01 Services automatic transmissions. 22.02 Diagnoses automatic transmissions. 22.03 Repairs automatic transmissions. 23.01 Services automated transmissions. 23.02 Diagnoses automated transmissions. 23.03 Repairs automated transmissions. 24.01 Services driveline systems. 24.02 Diagnoses driveline systems. 24.03 Repairs driveline systems. 25.01 Services differentials. 25.02 Diagnoses differentials. 25.03 Repairs differentials. 26.01 Services drive train retarders. 26.02 Diagnoses drive train retarders. 26.03 Repairs drive train retarders.	6.01 Diagnoses dry clutches. 6.02 Diagnoses driveline systems and components. 6.03 Diagnoses wet clutches, transmissions and gear cases. 6.04 Diagnoses differentials and final drives. 7.01 Repairs dry clutches. 7.02 Repairs driveline systems and components. 7.03 Repairs wet clutches, transmissions and gear cases. 7.04 Repairs differentials and final drives.

Trade Specific Level	HDET	TTM	AET
Hydraulic Systems – Advanced (2) Diagnose and Repair		Hydraulic Systems 38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Hydraulics, Hydrostatics and Pneumatics (3) Diagnose and Repair	7.01 Diagnoses hydraulic systems. 8.01 Repairs hydraulic systems.		8.01 Diagnoses hydraulic and hydrostatic systems. 9.01 Repairs hydraulic and hydrostatic systems.
Electrical (4)			
Frames, Steering and Suspension Diagnose and Repair	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 30.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes (Advanced) (6) Diagnose and Repair (Advanced)	(TTM)	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Structural Components and Accessories Diagnose and Repair Working Attachments	19.01 Diagnoses structural components. 19.02 Diagnoses operator station. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	32.01 Services interior cab components. 32.02 Services interior cab components. 32.03 Services interior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body. 20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.
Trailer (9) (TTM)	(TTM)	30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 30.03 Repairs hitches and couplers. 34.01 Services trailer components and accessories. 34.02 Diagnoses trailer components and accessories. 34.03 Repairs trailer components and accessories. 35.01 Services heating and refrigeration systems. 35.02 Services heating and refrigeration systems. 35.03 Services heating and refrigeration systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Agriculture Equipment and Accessories (10) (AET)	(AET)	(AET)	20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.

Notations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

11.4. Truck and Transport Mechanic – Phase 8 Review (2022)

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
	Context	Context	Context
	Routine Trade Activities	Routine Trade Activities	Routine Trade Activities
	Hybrid Vehicles	Hybrid Vehicles	
	Electric Vehicles (EV)	Electric Vehicles (EV)	
<p style="color: red; margin: 0;">Safety-Related Functions</p> <p>1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment 1.03 Implements specific safety protocols for hybrid and electric vehicles (EV)</p>			
<p style="color: red; margin: 0;">Tools and Equipment</p> <p>2.01 Uses hand, power, measuring, testing, and diagnostic tools 2.02 Uses shop equipment 2.03 Uses hoisting, lifting and staging equipment 2.04 Uses welding and cutting equipment 2.05 Uses electronic devices and systems for diagnostics and programming</p>			
<p style="color: red; margin: 0;">Routine Trade Activities</p> <p>3.01 Uses documentation and reference materials 3.02 Maintains fluids, lubricants, and coolants 3.03 Services hoses, tubing, and fittings 3.04 Services filters 3.05 Services bearings, bushing and seals 3.06 Uses fasteners, sealing devices, adhesives and gaskets</p>			
<p style="color: red; margin: 0;">Communication Techniques</p> <p>4.01 Uses communication techniques</p>			<p style="color: purple; margin: 0;">Mentoring Techniques</p> <p>4.02 Uses mentoring techniques</p>

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
	<p align="center">Base Engine</p> 5.01 Services base engine 5.02 Diagnoses base engine 5.03 Repairs base engine	<p align="center">Base Engine</p> 5.01 Services base engine 5.02 Diagnoses base engine 5.03 Repairs base engine	
	<p align="center">Lubrication System</p> 6.01 Services lubrication systems 6.02 Diagnoses lubrication systems 6.03 Repairs lubrication systems	<p align="center">Lubrication System</p> 6.01 Services lubrication systems 6.02 Diagnoses lubrication systems 6.03 Repairs lubrication systems	
	<p align="center">Intake and Exhaust Systems</p> 7.01 Services intake-systems 7.02 Diagnoses intake systems 7.03 Repairs intake systems	<p align="center">Intake and Exhaust Systems</p> 7.01 Services intake systems 7.02 Diagnoses intake systems 7.03 Repairs intake systems	
	<p align="center">Exhaust Systems</p> 8.01 Services exhaust systems 8.02 Diagnoses exhaust systems 8.03 Repairs exhaust systems	<p align="center">Exhaust Systems</p> 8.01 Services exhaust systems 8.02 Diagnoses exhaust systems 8.03 Repairs exhaust systems	
	<p align="center">Engine Management Systems</p> 9.01 Services engine management systems 9.02 Diagnoses engine management systems 9.03 Repairs engine management systems	<p align="center">Engine Management Systems</p> 9.01 Services engine management systems 9.02 Diagnoses engine management systems 9.03 Repairs engine management systems	
	<p align="center">Fuel Delivery System</p> 10.01 Services fuel delivery systems 10.02 Diagnoses fuel delivery systems 10.03 Repairs fuel delivery systems	<p align="center">Fuel Delivery System</p> 10.01 Services fuel delivery systems 10.02 Diagnoses fuel delivery systems 10.03 Repairs fuel delivery systems	
	<p align="center">Engine Retarder Systems</p> 11.01 Services engine retarder systems 11.02 Diagnoses engine retarder systems 11.03 Repairs engine retarder systems	<p align="center">Engine Retarder Systems</p> 11.01 Services engine retarder systems 11.02 Diagnoses engine retarder systems 11.03 Repairs engine retarder systems	
	<p align="center">Cooling System</p> 12.01 Services cooling system 12.02 Diagnoses cooling system 12.03 Repairs cooling system	<p align="center">Cooling System</p> 12.01 Services cooling system 12.02 Diagnoses cooling system 12.03 Repairs cooling system	

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
<p>Air Systems</p> <p>13.01 Services air systems 13.02 Diagnoses air systems 13.03 Repairs air systems</p>			<p>Air Systems</p> <p>13.01 Services air systems 13.02 Diagnoses air systems 13.03 Repairs air systems</p>
<p>Brake Systems</p> <p>14.01 Services brake systems 14.02 Diagnoses brake systems 14.03 Repairs brake systems</p>			<p>Brake Systems</p> <p>14.01 Services brake systems 14.02 Diagnoses brake systems 14.03 Repairs brake systems</p>
<p>Batteries</p> <p>15.01 Services battery systems 15.02 Diagnoses battery systems 15.03 Repairs battery systems</p>			
<p>Charging Systems</p> <p>16.01 Services charging systems 16.02 Diagnoses charging systems 16.03 Repairs charging systems</p>	<p>Charging Systems</p> <p>16.01 Services charging systems 16.02 Diagnoses charging systems 16.03 Repairs charging systems</p>		
		<p>Spark Ignition Systems</p> <p>17.01 Services spark ignition systems 17.02 Diagnoses spark ignition systems 17.03 Repairs spark ignition systems</p>	
<p>Starting Systems</p> <p>18.01 Services starting systems 18.02 Diagnoses starting systems 18.03 Repairs starting systems</p>	<p>Starting Systems</p> <p>18.01 Services starting systems 18.02 Diagnoses starting systems 18.03 Repairs starting systems</p>		
<p>Electrical Components and Accessories</p> <p>19.01 Services electrical components and accessories 19.02 Diagnoses electrical components and accessories 19.03 Repairs electrical components and accessories</p>	<p>Electrical Components and Accessories</p> <p>19.01 Services electrical components and accessories 19.02 Diagnoses electrical components and accessories 19.03 Repairs electrical components and accessories</p>		

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
	<p>Vehicle Management Systems and Electronic Components</p> <p>20.01 Services vehicle management systems and electronic components 20.02 Diagnoses vehicle management systems and electronic components 20.03 Repairs vehicle management systems and electronic components</p>	<p>Vehicle Management Systems and Electronic Components</p> <p>20.01 Services vehicle management systems and electronic components 20.02 Diagnoses vehicle management systems and electronic components 20.03 Repairs vehicle management systems and electronic components</p>	
	<p>Clutches</p> <p>21.01 Services clutches 21.02 Diagnoses clutches 21.03 Repairs clutches</p>	<p>Clutches</p> <p>21.01 Services clutches 21.02 Diagnoses clutches 21.03 Repairs clutches</p>	
	<p>Manual Transmission and Transfer Cases</p> <p>22.01 Services manual transmission and transfer cases 22.02 Diagnoses manual transmission and transfer cases 22.03 Repairs manual transmission and transfer cases</p>	<p>Manual Transmission and Transfer Cases</p> <p>22.01 Services manual transmission and transfer cases 22.02 Diagnoses manual transmission and transfer cases 22.03 Repairs manual transmission and transfer cases</p>	
	<p>Automatic Transmissions</p> <p>23.01 Services automatic transmissions 23.02 Diagnoses automatic transmissions 23.03 Repairs automatic transmissions</p>	<p>Automatic Transmissions</p> <p>23.01 Services automatic transmissions 23.02 Diagnoses automatic transmissions 23.03 Repairs automatic transmissions</p>	
	<p>Automated Transmissions</p> <p>24.01 Services automated transmissions 24.02 Diagnoses automated transmissions 24.03 Repairs automated transmissions</p>	<p>Automated Transmissions</p> <p>24.01 Services automated transmissions 24.02 Diagnoses automated transmissions 24.03 Repairs automated transmissions</p>	
	<p>Driveline Systems</p> <p>25.01 Services driveline systems 25.02 Diagnoses driveline systems 25.03 Repairs driveline systems</p>	<p>Driveline Systems</p> <p>25.01 Services driveline systems 25.02 Diagnoses driveline systems 25.03 Repairs driveline systems</p>	
	<p>Differentials</p> <p>26.01 Services differentials 26.02 Diagnoses differentials 26.03 Repairs differentials</p>	<p>Differentials</p> <p>26.02 Diagnoses differentials 26.03 Repairs differentials</p>	

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
	<p align="center">Drive Train Retarders</p> 27.01 Services drive train retarders 27.02 Diagnoses drive train retarders 27.03 Repairs drive train retarders	<p align="center">Drive Train Retarders</p> 27.01 Services drive train retarders 27.02 Diagnoses drive train retarders 27.03 Repairs drive train retarders	
<p align="center">Steering Systems</p> 28.01 Services steering systems 28.02 Diagnoses steering systems 28.03 Repairs steering systems			<p align="center">Steering Systems</p> 28.01 Services steering systems 28.02 Diagnoses steering 28.03 Repairs steering systems
<p align="center">Chassis/Frames</p> 29.01 Services, chassis/frames 29.02 Diagnoses chassis/frames 29.03 Repairs chassis/frames			<p align="center">Chassis/Frames</p> 29.01 Services, chassis/frames 29.02 Diagnoses chassis/frames 29.03 Repairs chassis/frames
<p align="center">Suspension</p> 30.01 Services suspension 30.02 Diagnoses suspension 30.03 Repairs suspension			<p align="center">Suspension</p> 30.01 Services suspension 30.02 Diagnoses suspension 30.03 Repairs suspension
<p align="center">Hitches and Couplers</p> 31.01 Services hitches and couplers 31.02 Diagnoses hitches and couplers 31.03 Repairs hitches and couplers			<p align="center">Hitches and Couplers</p> 31.01 Services hitches and couplers 31.02 Diagnoses hitches and couplers 31.03 Repairs hitches and couplers
<p align="center">Tires, Wheels and Hubs</p> 32.01 Services tires wheels and hubs 32.02 Diagnoses tires, wheels and hubs 32.03 Repairs tires, wheels and hubs			<p align="center">Tires, Wheels and Hubs</p> 32.01 Services tires wheels and hubs 32.02 Diagnoses tires, wheels and hubs 32.03 Repairs tires, wheels and hubs
<p align="center">Exterior Cab Components</p> 34.01 Services exterior cab components 34.02 Diagnoses exterior cab components 34.03 Repairs exterior cab components			<p align="center">Interior Cab Components</p> 33.01 Services interior cab components 33.02 Diagnoses interior cab components 33.03 Repairs interior cab components.

Level 1	Level 2	Level 3	Level 4 (Flexible Delivery Truck and Transport Mechanic Specific Level) *
<p>Heating and Ventilation Systems</p> <p>37.01 Services heating and ventilation systems 37.02 Diagnoses heating and ventilation systems 37.03 Repairs, heating and ventilation systems</p>		<p>Heating and Ventilation Systems</p> <p>37.01 Services heating and ventilation systems 37.02 Diagnoses heating and ventilation systems 37.03 Repairs, heating and ventilation systems</p>	<p>Trailer Components and Accessories</p> <p>35.01 Services trailer components and accessories 35.02 Diagnoses trailer components and accessories 35.03 Repairs trailer components and accessories</p>
<p>Air Conditioning Systems</p> <p>38.01 Services air conditioning systems 38.02 Diagnoses air conditioning systems 38.03 Repairs air conditioning systems</p>		<p>Air Conditioning Systems</p> <p>38.01 Services air conditioning systems 38.02 Diagnoses air conditioning systems 38.03 Repairs air conditioning systems</p>	<p>Heating and Refrigeration Systems</p> <p>36.01 Services heating and refrigeration systems 36.02 Diagnoses heating and refrigeration systems 36.03 Repairs heating and refrigeration systems</p>
<p>Hydraulic Systems</p> <p>39.01 Services hydraulic systems 39.02 Diagnoses hydraulic systems 39.03 Repairs hydraulic systems</p>			<p>Hydraulic Systems</p> <p>39.01 Services hydraulic systems 39.02 Diagnoses hydraulic systems 39.03 Repairs hydraulic systems</p>
<p>Hybrid Vehicles</p> <p>40.01 Services hybrid vehicles 40.02 Diagnoses hybrid vehicle 40.03 Repairs hybrid vehicles</p>			<p>Hybrid Vehicles</p> <p>40.01 Services hybrid vehicles 40.02 Diagnoses hybrid vehicle 40.03 Repairs hybrid vehicles</p>
<p>Electric Vehicles (EV)</p> <p>41.01 Services electric vehicles (EV) 41.02 Diagnoses electric vehicles (EV) 41.03 Repairs electric vehicles (EV)</p>			<p>Electric Vehicles (EV)</p> <p>41.01 Services electric vehicles (EV) 41.02 Diagnoses electric vehicles (EV) 41.03 Repairs electric vehicles (EV)</p>

*As a reminder, in Phase 2, Heavy Duty Equipment Technician, Truck and Transport Mechanic and Agricultural Equipment Technician were developed as a family of trades. Level four was developed as a sliding column or flexible delivery model. If you have any questions, please check with your ISEC member or the project analyst for Harmonization. (Also see the comprehensive report on the RSSN – Phase 2.)

**Note: Currently, Truck and Transport is common core with three other trades in Ontario.

12. Agricultural Equipment Technician

12.1. Agricultural Equipment Technician Recommendations

That provinces and territories adopt the **Red Seal trade name Agricultural Equipment Technician / Mécanicien/mécanicienne de machinerie agricole**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

12.2. Agricultural Equipment Technician – Snapshot

In Context	In Context	In Context	In Context
Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance	Scheduled Maintenance
Operational Testing	Operational Testing	Operational Testing	Operational Testing
Planning and Communication	Planning and Communication	Planning and Communication	Planning and Communication
		Electrical	Electrical
Level One	Level Two	Level Three	Trade-Specific Level
Safety			
Tools and Equipment (1)			
Hoisting and Lifting			
Hydraulic Systems			Hydraulic Systems - Advanced (2)
<ul style="list-style-type: none"> Basic Service, Introduction to Diagnostics (TTM) 			<ul style="list-style-type: none"> Diagnose and Repair (TTM)
Pneumatics			Hydraulics, Hydrostatics and Pneumatics - Advanced (3)
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostic Tools 			<ul style="list-style-type: none"> Diagnose and Repair (HDET, AET)
Electrical 1	Electrical 2		Electrical (4)
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostics 	<ul style="list-style-type: none"> Diagnose and Repair Starting and charging systems 		
Frames, Steering & Suspension (5)			Frames, Steering & Suspension
<ul style="list-style-type: none"> Basic Service Introduction to Diagnostics 			<ul style="list-style-type: none"> Diagnose and Repair
Brakes			Brakes Advanced (6)
<ul style="list-style-type: none"> Service Basic Diagnostics and Repair 			<ul style="list-style-type: none"> Diagnose and Repair (TTM)
Structural Components (7)			Structural Components and Accessories
<ul style="list-style-type: none"> Service Basic structural components 			<ul style="list-style-type: none"> Diagnose and repair working attachments
Heating, Ventilation and Air Conditioning / Environment Controls (8)		Heating, Ventilation and Air Conditioning / Environment Controls	
<ul style="list-style-type: none"> Safety and Awareness 			
			Trailer (9)
			(TTM)
			Agriculture Equipment and Accessories (10)

12.2. Agricultural Equipment Technician – Snapshot

			(AET)
	Engines and Engine Support Systems	Engines and Engine Support Systems (11)	
	Alternate Fuel (HDET, TTM only)		
	Drivetrain (Powertrain) (12)	Drivetrain (Powertrain)	

Notations/Variations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

12.3. Agricultural Equipment Technician – Topic Detail/ Sub-Task by NOA

(Displayed with the family of trades: Heavy Duty Equipment Technician and Truck and Transport Mechanic)

In context	HDET	TTM	AET
Scheduled Maintenance (In context with learning)	2.01 Maintains fluids. 2.02 Services fasteners, sealing devices, adhesives and gaskets. 2.03 Services hoses, tubing, piping, and fittings. 2.04 Services bearings and seals. 2.06 Performs scheduled maintenance procedures. 3.01 Uses documentation and reference materials. 3.02 Completes documentation.	3.01 Uses documentation and reference materials. 3.02 Maintains fluids, lubricants, and coolants. 3.03 Services hoses, tubing and fittings. 3.04 Services filters. 3.05 Services bearings, bushings, and seals. 3.06 Uses fasteners, adhesives and gaskets	2.02 Maintains fluids, lubricants, and coolants. 2.03 Services filters. 2.04 Maintains hoses, tubing, and fittings. 2.05 Services bearings/bushings, and seals. 2.06 Uses fasteners, sealing devices, adhesives, and gaskets.
Operational Testing (In context with learning)	2.07 Identifies operational faults. 2.08 Performs operational check-out.		2.01 Conducts operational tests. 2.10 Performs failure analysis.
Planning and Communication (In context with learning)	3.03 Communicates with others. 3.04 Prepares job action plan. (Level 3, Trade Specific Level as required.)	(Level 3, Trade Specific Level as required.)	2.09 Plans daily tasks. (Level 3, Trade Specific Level as required.)
Electrical (In context with learning – Level 3, Trade Specific Level as required.)			
Level One	HDET	TTM	AET
Safety	1.03 Operates access equipment. 1.04 Uses personal protective equipment (PPE) and safety equipment. 2.05 Services safety features. 3.05 Maintains safe work environment.	1.01 Maintains safe work environment. 1.02 Uses PPE and safety equipment.	1.01 Uses PPE 1.02 Maintains safe work environment.
Tools and Equipment (1)	1.01 Maintains tools and equipment. 4.01 Heats materials. 4.02 Cools materials. 4.03 Cuts materials. 4.04 Welds materials. 4.05 Cleans parts and materials.	2.01 Maintains hand, power, measuring, testing, and diagnostic tools. 2.02 Maintains shop equipment. 2.04 Uses welding and cutting equipment.	2.07 Cleans components. 2.08 Verifies equipment and components repairs. 3.01 Maintains tools and equipment.
Hoisting and Lifting	1.02 Uses hoisting and lifting equipment.	2.03 Uses hoisting and lifting equipment.	3.02 Uses hoisting, lifting, and securing equipment.

Level One	HDET	TTM	AET
Hydraulic Systems Service and Introduction to diagnosis	7.01 Diagnose hydraulic systems. 8.01 Repairs hydraulic systems.	38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Pneumatics Basic Service Introduction to Diagnostic Tools	7.03 Diagnose pneumatic systems 8.03 Repairs pneumatic systems (in the context of "service")		8.02 Diagnoses pneumatic systems. 9.02 Repairs pneumatic systems.
Electrical 1 Basic Service Introduction to Diagnostics	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories.	14.01 Performs servicing and repair of batteries. 14.02 Diagnoses batteries. 15.01 Services charging systems. 15.02 Diagnoses charging systems. 15.03 Repairs charging systems. 16.01 Performs servicing and repair of spark ignition systems. 16.02 Diagnose spark ignition systems. 17.01 Performs servicing and repairs of starting systems. 17.02 Diagnoses starting systems.	10.01 Diagnoses electrical power and control monitoring systems. 11.01 Repairs electrical power and control monitoring systems.

Level One	HDET	TTM	AET
Frames, Steering & Suspension (5) Basic Service Introduction to Diagnostics	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 31.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes Service Basic Diagnostics and Repair	11.03 Diagnoses brake systems. 12.03 Repairs brake systems.	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	12.02 Diagnoses brake systems. 13.02 Repairs brake systems.
Structural Components (7) Service Basic structural components	19.01 Diagnoses structural components. 19.02 Diagnoses operator station components. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 28.03 Repairs chassis/frames. 33.01 Services exterior cab components. 33.02 Services exterior cab components. 33.03 Services exterior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body.
Heating, Ventilation and Air Conditioning / Environment Controls (8) Safety and Awareness	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.

Level Two	HDET	TTM	AET
Electrical 2 Diagnose and Repair Starting and charging systems	13.01 Diagnoses starting/charging systems and batteries. 13.02 Diagnoses electrical components, motors and accessories. 14.01 Repairs starting/charging systems and batteries. 14.02 Repairs electrical components, motors and accessories. 15.01 Reads diagnostic trouble codes (DTCs). 15.02 Monitors parameters. 15.03 Interprets test results. 15.04 Tests system circuitry and components. 16.01 Updates component software. 16.02 Repairs component.	18.01 Performs servicing and repair of electrical components and accessories. 18.02 Diagnoses electrical components and accessories. 19.01 Services vehicle management systems and electronic components. 19.02 Diagnoses vehicle management systems and electronic components. 19.03 Repairs vehicle management systems and electronic components.	3.03 Uses computer diagnostics and programming. 10.02 Diagnoses electronic power and control monitoring systems. 11.02 Repairs electronic power and control monitoring systems.

Level Two	HDET		TTM		AET
Engines and Engine Support Systems	5.01 5.02 5.03 5.04 5.05 5.06 5.07 6.01 6.02 6.03 6.04 6.05 6.06 6.07	Diagnoses base engine. Diagnoses lubrication systems. Diagnoses cooling systems. Diagnoses intake and exhaust systems. Diagnoses fuel systems. Diagnoses engine control systems. Diagnoses emission control systems. Repairs base engine. Repairs lubrication systems. Repairs cooling systems. Repairs intake and exhaust systems. Repairs fuel systems. Repairs engine control systems. Repairs emission control systems.	4.01 4.02 4.03 5.01 5.02 5.03 6.01 6.02 6.03 7.01 7.02 7.03 8.01 8.02 8.03 9.01 9.02 9.03 10.01 10.02 11.01 11.02 11.03	Services base engine. Diagnoses base engine. Repairs base engine. Services lubrication systems. Diagnoses lubrication systems. Repairs lubrication systems. Services intake and exhaust systems. Diagnoses intake and exhaust systems. Repairs intake and exhaust systems. Services engine management systems. Diagnoses engine management systems. Repairs engine management systems. Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system. Services emission systems for diesel engines. Diagnoses emission systems for diesel engines Repairs emission systems for diesel engines. Services and repairs engine retarder systems. Diagnoses engine retarder systems Services cooling system. Diagnoses cooling system. Repairs cooling system.	4.01 4.02 4.03 4.04 4.05 4.06 4.07 5.01 5.02 5.03 5.04 5.05 5.06 5.07
Alternate Fuel (HDET, TTM)	5.05 6.05	Diagnoses fuel systems. Repairs fuel systems.	8.01 8.02 8.03	Services fuel delivery system. Diagnoses fuel delivery system. Repairs fuel delivery system.	(HDET, TTM)

Level Two	HDET		TTM		AET	
Drivetrain (Powertrain) (12)	9.01	Diagnoses clutch systems.	20.01	Services clutches.	6.01	Diagnoses dry clutches.
	9.02	Diagnoses torque converters, fluid couplers and retarders.	20.02	Diagnoses clutches.	6.02	Diagnoses driveline systems and components.
	9.03	Diagnoses driveline systems.	20.03	Repairs clutches.	6.03	Diagnoses wet clutches, transmissions and gear cases.
	9.04	Diagnoses transmission and transfer case systems.	21.01	Services manual transmission and transfer cases.	6.04	Diagnoses differentials and final drives.
	9.05	Diagnoses axle and differential systems.	21.02	Diagnoses manual transmission and transfer cases.	7.01	Repairs dry clutches.
	9.06	Diagnoses final drive systems.	21.03	Repairs manual transmission and transfer cases.	7.02	Repairs driveline systems and components.
	10.01	Repairs clutch systems.	22.01	Services automatic transmissions.	7.03	Repairs wet clutches, transmissions and gear cases.
	10.02	Repairs torque converters, fluid couplers and retarders.	22.02	Diagnoses automatic transmissions.	7.04	Repairs differentials and final drives.
	10.03	Repairs driveline systems.	22.03	Repairs automatic transmissions.		
	10.04	Repairs transmission and transfer case systems.	23.01	Services automated transmissions.		
	10.05	Repairs axle and differential systems	23.02	Diagnoses automated transmissions.		
	10.06	Repairs final drive systems.	23.03	Repairs automated transmissions.		
			24.01	Services driveline systems.		
			24.02	Diagnoses driveline systems.		
			24.03	Repairs driveline systems.		
			25.01	Services differentials.		
			25.02	Diagnoses differentials.		
			25.03	Repairs differentials.		
			26.01	Services drive train retarders.		
			26.02	Diagnoses drive train retarders.		
			26.03	Repairs drive train retarders.		

Level Three	HDET	TTM	AET
Heating, Ventilation and Air Conditioning / Environment Controls	17.01 Diagnoses heating systems 17.02 Diagnoses ventilation and filtration systems. 17.03 Diagnoses air conditioning systems. 17.04 Diagnoses sound suppression systems. 18.01 Repairs heating systems 18.02 Repairs ventilation and filtration systems. 18.03 Repairs air conditioning systems. 18.04 Repairs sound suppression systems.	36.01 Services heating and ventilation systems. 36.02 Diagnoses heating and ventilation systems. 36.03 Repairs heating and ventilation systems. 37.01 Services air conditioning systems. 37.02 Diagnoses air conditioning systems. 37.03 Repairs air conditioning systems.	18.01 Diagnoses heating and ventilation systems. 18.02 Diagnoses air conditioning systems. 19.01 Repairs heating and ventilation systems. 19.02 Repairs air conditioning systems.
Engines and Engine Support Systems (11)	5.01 Diagnoses base engine. 5.02 Diagnoses lubrication systems. 5.03 Diagnoses cooling systems. 5.04 Diagnoses intake and exhaust systems. 5.05 Diagnoses fuel systems. 5.06 Diagnoses engine control systems. 5.07 Diagnoses emission control systems. 6.01 Repairs base engine. 6.02 Repairs lubrication systems. 6.03 Repairs cooling systems. 6.04 Repairs intake and exhaust systems. 6.05 Repairs fuel systems. 6.06 Repairs engine control systems. 6.07 Repairs emission control systems.	4.01 Services base engine. 4.02 Diagnoses base engine. 4.03 Repairs base engine. 5.01 Services lubrication systems. 5.02 Diagnoses lubrication systems. 5.03 Repairs lubrication systems. 6.01 Services intake and exhaust systems. 6.02 Diagnoses intake and exhaust systems. 6.03 Repairs intake and exhaust systems. 7.01 Services engine management systems. 7.02 Diagnoses engine management systems. 7.03 Repairs engine management systems. 8.01 Services fuel delivery system. 8.02 Diagnoses fuel delivery system. 8.03 Repairs fuel delivery system. 9.01 Services emission systems for diesel engines. 9.02 Diagnoses emission systems for diesel engines 9.03 Repairs emission systems for diesel engines. 10.01 Services and repairs engine retarder systems. 10.02 Diagnoses engine retarder systems 11.01 Services cooling system. 11.02 Diagnoses cooling system. 11.03 Repairs cooling system.	4.01 Diagnoses base engine. 4.02 Diagnoses lubrication system. 4.03 Diagnoses cooling system. 4.04 Diagnoses intake and exhaust system. 4.05 Diagnoses fuel delivery system. 4.06 Diagnoses engine management systems. 4.07 Diagnoses emission systems. 5.01 Repairs base engine. 5.02 Repairs lubrication system. 5.03 Repairs cooling system. 5.04 Repairs intake and exhaust system. 5.05 Repairs fuel delivery system. 5.06 Repairs engine management systems. 5.07 Repairs emission systems.

Level Three	HDET	TTM	AET
Drivetrain (Powertrain)	9.01 Diagnoses clutch systems. 9.02 Diagnoses torque converters, fluid couplers and retarders. 9.03 Diagnoses driveline systems. 9.04 Diagnoses transmission and transfer case systems. 9.05 Diagnoses axle and differential systems. 9.06 Diagnoses final drive systems. 10.01 Repairs clutch systems. 10.02 Repairs torque converters, fluid couplers and retarders. 10.03 Repairs driveline systems. 10.04 Repairs transmission and transfer case systems. 10.05 Repairs axle and differential systems 10.06 Repairs final drive systems.	20.01 Services clutches. 20.02 Diagnoses clutches. 20.03 Repairs clutches. 21.01 Services manual transmission and transfer cases. 21.02 Diagnoses manual transmission and transfer cases. 21.03 Repairs manual transmission and transfer cases. 22.01 Services automatic transmissions. 22.02 Diagnoses automatic transmissions. 22.03 Repairs automatic transmissions. 23.01 Services automated transmissions. 23.02 Diagnoses automated transmissions. 23.03 Repairs automated transmissions. 24.01 Services driveline systems. 24.02 Diagnoses driveline systems. 24.03 Repairs driveline systems. 25.01 Services differentials. 25.02 Diagnoses differentials. 25.03 Repairs differentials. 26.01 Services drive train retarders. 26.02 Diagnoses drive train retarders. 26.03 Repairs drive train retarders.	6.01 Diagnoses dry clutches. 6.02 Diagnoses driveline systems and components. 6.03 Diagnoses wet clutches, transmissions and gear cases. 6.04 Diagnoses differentials and final drives. 7.01 Repairs dry clutches. 7.02 Repairs driveline systems and components. 7.03 Repairs wet clutches, transmissions and gear cases. 7.04 Repairs differentials and final drives.

Trade Specific Level	HDET	TTM	AET
Hydraulic Systems – Advanced (2) Diagnose and Repair		Hydraulic Systems 38.01 Services hydraulic components. 38.02 Diagnoses hydraulic components. 38.03 Repairs hydraulic components.	
Hydraulics, Hydrostatics and Pneumatics (3) Diagnose and Repair	7.01 Diagnoses hydraulic systems. 8.01 Repairs hydraulic systems.		8.01 Diagnoses hydraulic and hydrostatic systems. 9.01 Repairs hydraulic and hydrostatic systems.
Electrical (4)			
Frames, Steering and Suspension Diagnose and Repair	11.01 Diagnoses steering systems. 11.02 Diagnoses suspension systems. 11.04 Diagnoses wheel assemblies. 11.05 Diagnoses undercarriage systems. 12.01 Repairs steering systems. 12.02 Repairs suspension systems. 12.04 Repairs wheel assemblies. 12.05 Repairs undercarriage systems	27.01 Services steering systems. 27.02 Diagnoses steering systems. 28.01 Services chassis/frames. 28.02 Diagnoses chassis/frames. 29.01 Services suspension 29.02 Diagnoses suspension. 30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 31.01 Services tires, wheels, and hubs. 30.02 Diagnoses tires, wheels, and hubs.	12.01 Diagnoses steering systems. 13.01 Repairs steering systems. 14.01 Diagnoses wheels/tracks and track frames. 14.02 Diagnoses cushioning devices. 15.01 Repairs wheels/tracks and track frames. 15.02 Repairs cushioning devices. 16.01 Diagnoses frame components. 16.02 Verifies condition of roll-over protective structure. (ROPS) 17.01 Repairs frame components. 17.02 Repair roll-over protective structure. (ROPS)
Brakes (Advanced) (6) Diagnose and Repair (Advanced)	(TTM)	12.01 Services air systems. 12.02 Diagnoses air systems. 12.03 Repairs air systems. 13.01 Services air systems. 13.02 Diagnoses air systems. 13.03 Repairs air systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Structural Components and Accessories Diagnose and Repair Working Attachments	19.01 Diagnoses structural components. 19.02 Diagnoses operator station. 19.03 Diagnoses attachments and accessories. 20.01 Performs mechanical repairs on structural components. 20.02 Repairs operator station components. 20.03 Repairs attachments and accessories. 20.04 Installs attachments and accessories.	32.01 Services interior cab components. 32.02 Services interior cab components. 32.03 Services interior cab components.	16.03 Diagnoses equipment body. 17.03 Repairs equipment body. 20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.
Trailer (9) (TTM)	(TTM)	30.01 Services hitches and couplers. 30.02 Diagnoses hitches and couplers. 30.03 Repairs hitches and couplers. 34.01 Services trailer components and accessories. 34.02 Diagnoses trailer components and accessories. 34.03 Repairs trailer components and accessories. 35.01 Services heating and refrigeration systems. 35.02 Services heating and refrigeration systems. 35.03 Services heating and refrigeration systems.	(TTM)

Trade Specific Level	HDET	TTM	AET
Agriculture Equipment and Accessories (10) (AET)	(AET)	(AET)	20.01 Performs assembly and pre-delivery adjustments on agricultural equipment. 20.02 Installs agricultural equipment. 21.01 Diagnoses land preparation and tillage implements. 21.02 Diagnoses seeding and planting implements. 22.01 Repairs land preparation and tillage implements. 22.02 Repairs seeding and planting implements. 23.01 Diagnoses cutting, conditioning, gathering, and processing equipment. 23.02 Diagnoses delivery equipment. 24.01 Repairs cutting, conditioning, gathering, and processing equipment. 24.02 Repairs delivery equipment. 25.01 Diagnoses application equipment. 26.01 Repairs applications equipment.

Notations

1. *Tools and Equipment* - in ON, oxy-fuel welding is taught in levels 1 and 2, and welding is taught in level 3
2. *Hydraulic Systems - Advanced* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics; exceptions for ON (exception) covered across all levels, and AB (exception) covered in Level 3.
3. *Hydraulics, Hydrostatics and Pneumatics* - Jurisdictions may meet or exceed by providing additional training in other levels in context with other topics. ON (exception), covered across all levels and for HDET and AET, in ON, specialized pneumatic training is an employer responsibility, SK (exception) SK (exception) covered in Level 3.
4. *Electrical* - L4 BC (exceed) Electrical Drive Systems, Hybrid Systems; L3 AB (exceed) Off Road Electrical Circuit Fundamentals and Service.
5. *Frames, Steering and Suspension* - Exception for ON HD trade where it will be delivered in level 3. Exception for AB, where it will be delivered in Level 3.
6. *Brakes - Advanced* - ON will deliver advanced brakes across level 2 and 3.
7. *Structural Components* - In AB, this content may be delivered in context at later levels.
8. *Heating, Ventilation and Air Conditioning/ Environmental Controls*: Jurisdictions may include HRAI training elsewhere in the program to meet regulatory or licensing issues.
9. *Trailer* - AB delivery in level 1. Refrigeration components of trailers is a separate trade in AB. Exclusion of some trailer topics may occur where a jurisdiction has a separate trade designated for Transport Trailer Technician.
10. *Agriculture Equipment and Accessories* - AB delivery in level 1 and 4.
11. *Engines and Engine Support Systems* - AB and BC delivery in level 2.
12. *Drivetrain (Powertrain)* - AB and BC delivery in level 3

12.4. Agricultural Equipment Technician – Phase 7 Review (2021)

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Routine Work Practices	Routine Work Practices	Routine Work Practices
	Organizes Work	Organizes Work	Organizes Work
Safety-Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe work environment			
Routine Work Practices 2.01 Conducts operational tests 2.02 Maintains fluids, lubricants and coolants 2.03 Services filters 2.04 Maintains hoses, tubing and fittings 2.05 Services bearings, bushings and seals 2.06 Uses fasteners, sealants, adhesives and gaskets 2.07 Cleans components 2.08 Verifies equipment and components repairs 2.09 Performs failure analysis			
Organizes Work 3.01 Uses documentation 3.02 Plans daily tasks			
Tools and Equipment 4.01 Uses tools and equipment 4.02 Uses hoisting, lifting and securing equipment	Tools and Equipment 4.03 Uses electronic devices and systems for diagnostics and programming		
Communication and Mentoring Techniques 5.01 Uses communications techniques 5.02 Uses mentoring techniques			Mentoring Techniques 5.02 Uses mentoring techniques

	<p>Engine and Engine Support Systems (Diagnoses)</p> <p>6.01 Diagnoses base engines</p> <p>6.02 Diagnoses lubrication systems</p> <p>6.03 Diagnoses cooling systems</p> <p>6.04 Diagnoses intake and exhaust systems</p> <p>6.05 Diagnoses fuel delivery systems</p> <p>6.06 Diagnoses engine management systems</p> <p>6.07 Diagnoses emissions control systems</p>	<p>Engine and Engine Support Systems (Diagnoses)</p> <p>6.01 Diagnoses base engines</p> <p>6.02 Diagnoses lubrication systems</p> <p>6.03 Diagnoses cooling systems</p> <p>6.04 Diagnoses intake and exhaust systems</p> <p>6.05 Diagnoses fuel delivery systems</p> <p>6.06 Diagnoses engine management systems</p> <p>6.07 Diagnoses emissions control systems</p>	
	<p>Engine and Engine Support Systems (Repairs)</p> <p>7.01 Repairs base engines</p> <p>7.02 Repairs lubrication systems</p> <p>7.03 Repairs cooling systems</p> <p>7.04 Repairs intake and exhaust systems</p> <p>7.05 Repairs fuel delivery systems</p> <p>7.06 Repairs engine management systems</p> <p>7.07 Repairs emissions control systems</p>	<p>Engine and Engine Support Systems (Repairs)</p> <p>7.01 Repairs base engine</p> <p>7.02 Repairs lubrication system</p> <p>7.03 Repairs cooling systems</p> <p>7.04 Repairs intake and exhaust system</p> <p>7.05 Repairs fuel delivery system</p> <p>7.06 Repairs engine management systems</p> <p>7.07 Repairs emissions control systems</p>	
	<p>Drive Train (Diagnoses)</p> <p>8.01 Diagnoses dry clutches</p> <p>8.02 Diagnoses driveline systems and components</p> <p>8.03 Diagnoses wet clutches, transmissions and gear cases</p> <p>8.04 Diagnoses differentials and final drives</p>	<p>Drive Train (Diagnoses)</p> <p>8.01 Diagnoses dry clutches</p> <p>8.02 Diagnoses driveline systems and components</p> <p>8.03 Diagnoses wet clutches, transmissions and gear cases</p> <p>8.04 Diagnoses differentials and final drives</p>	
	<p>Drive Train (Repairs)</p> <p>9.01 Repairs dry clutches</p> <p>9.02 Repairs driveline systems and components</p> <p>9.03 Repairs wet clutches, transmissions and gear cases.</p> <p>9.04 Repair differentials and final drives</p>	<p>Drive Train (Repairs)</p> <p>9.01 Repairs dry clutches</p> <p>9.02 Repairs driveline systems and components</p> <p>9.03 Repairs wet clutches, transmissions and gear cases</p> <p>9.04 Repairs differentials and final drives</p>	
<p>Hydraulic, Hydrostatic and Pneumatic Systems (Diagnoses)</p> <p>10.02 Diagnoses pneumatic systems</p>			<p>Hydraulic, Hydrostatic and Pneumatic Systems (Diagnoses)</p> <p>10.01 Diagnoses hydraulic and hydrostatic systems</p>
<p>Hydraulic, Hydrostatic and Pneumatic Systems (Repairs)</p> <p>11.02 Repairs pneumatic systems</p>			<p>Hydraulic, Hydrostatic and Pneumatic Systems (Repairs)</p> <p>11.01 Repairs hydraulic and hydrostatic systems</p>

Electrical Power and Control Monitoring Systems (Diagnoses) 12.01 Diagnoses electrical power and control monitoring systems	Electrical Power and Control Monitoring Systems (Diagnoses) 12.02 Diagnoses electronic power and control monitoring systems		
Electrical Power and Control Monitoring Systems (Repairs) 13.01 Repairs electrical power and control monitoring systems	Electrical Power and Control Monitoring Systems (Repairs) 13.02 Repairs electronic power and control monitoring systems		
Steering and Brake Systems (Diagnoses) 14.01 Diagnoses steering systems 14.02 Diagnoses brake systems			Steering and Brake Systems (Diagnoses) 14.01 Diagnoses steering systems
Steering and Brake Systems (Repairs) 15.01 Repairs steering systems 15.02 Repairs brake systems			Steering and Brake Systems (Repairs) 15.01 Repairs steering systems
Track, Wheel and Suspension Systems (Diagnoses) 16.01 Diagnoses track systems 16.02 Diagnoses wheel assemblies 16.03 Diagnoses suspension systems			Track, Wheel and Suspension Systems (Diagnoses) 16.01 Diagnoses track systems 16.02 Diagnoses wheel assemblies 16.03 Diagnoses suspension systems
Track, Wheel and Suspension Systems (Repairs) 17.01 Repairs track systems 17.02 Repairs wheel assemblies 17.03 Repairs suspension systems			Track, Wheel and Suspension Systems (Repairs) 17.01 Repairs track systems 17.02 Repairs wheel assemblies 17.03 Repairs suspension systems
Structural Components (Diagnoses) 18.01 Diagnoses frame components 18.02 Verifies condition of operator protective structures 18.03 Diagnoses equipment body			Structural Components (Diagnoses) 18.01 Diagnoses frame components 18.02 Verifies condition of operator protective structures 18.03 Diagnoses equipment body
Structural Components (Repairs) 19.01 Repairs frame components 19.02 Replaces operator protective structures 19.03 Repairs equipment body			Structural Components (Repairs) 19.01 Repairs frame components 19.02 Replaces operator protective structures 19.03 Repairs equipment body
Climate Control Systems (Diagnoses) 20.01 Diagnoses heating and ventilation systems 20.02 Diagnoses air conditioning systems		Climate Control Systems (Diagnoses) 20.01 Diagnoses heating and ventilation systems 20.02 Diagnoses air conditioning systems	

Climate Control Systems (Repairs) 21.01 Repairs heating and ventilation systems 21.02 Repairs air conditioning systems		Climate Control Systems (Repairs) 21.01 Repairs heating and ventilation systems 21.02 Repairs air conditioning systems	
	Agricultural Equipment (Prepares) 22.03 Installs precision farming equipment		Agricultural Equipment (Prepares) 22.01 Performs assembly and pre-delivery adjustments on agricultural equipment 22.02 Performs preparation and installation of agricultural equipment 22.03 Installs precision farming equipment
	Precision Farming Equipment (Diagnoses) <i>Introduction</i> 23.01 Diagnoses precision farming equipment on site 23.02 Diagnoses precision farming equipment remotely		Precision Farming Equipment (Diagnoses) 23.01 Diagnoses precision farming equipment on site 23.02 Diagnoses precision farming equipment remotely
			Precision Farming Equipment (Repairs) 24.01 Repairs precision farming equipment on site 24.02 Repairs precision farming equipment remotely
			Land Preparation, Tillage and Seeding/Planting Equipment (Diagnoses) 25.01 Diagnoses land preparation and tillage equipment 25.02 Diagnoses seeding and planting equipment
			Land Preparation, Tillage and Seeding/Planting Equipment (Repairs) 26.01 Repairs land preparation and tillage equipment 26.02 Repairs seeding and planting equipment
			Harvesting, Hay and Forage Equipment (Diagnoses) 27.01 Diagnoses cutting, conditioning, gathering and processing equipment 27.02 Diagnoses delivery equipment

			Harvesting, Hay and Forage Equipment (Repairs) 28.01 Repairs cutting, conditioning, gathering and processing equipment 28.02 Repairs delivery equipment
			Application and Irrigation Equipment (Diagnoses) 29.01 Diagnoses application equipment 29.02 Diagnoses irrigation equipment
			Application and Irrigation Equipment (Diagnoses) 30.01 Repairs application equipment 30.02 Repairs irrigation equipment

Current Situation as of July 2021:

- **Manitoba and Saskatchewan have just finished implementing the harmonized sequencing for AET. Manitoba and Saskatchewan do not have comments posted to the Red Flag Report.**
- **Upon consulting with Alberta, their comments reflect that their program is substantively aligned with the implemented sequencing for AET.**
- **Ontario currently has three levels of training (in the AET trade) and has done its best to align sequencing within those three levels. Ontario has provided 14 comments on the implemented sequencing.**

With Ontario’s situation in flux, and considering the other factors, ISEC has agreed to archive these comments and wait for any resequencing. ISEC will add to the Harmonization work plan as necessary.

13. Automotive Service Technician

13.1. Automotive Service Technician Recommendations

That provinces and territories adopt the **Red Seal trade name Automotive Service Technician / Mécanicien/ mécanicienne de véhicules automobiles**

Slight variations include; Nunavut – Motor Vehicle Mechanic (**French**) New Brunswick - Technicien d'entretien Automobile; Ontario - Technicien ou technicienne d'entretien automobile; Nunavut – Mécanicien d'automobiles

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

13.2. Automotive Service Technician – Snapshot

In Context	In Context	In Context	In Context
Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation
Maintenance Inspection*	Maintenance Inspection*	Maintenance Inspection*	Maintenance Inspection*
Vehicle Networking Systems	Vehicle Networking Systems	Vehicle Networking Systems	Vehicle Networking Systems
Safety-Related Functions <ul style="list-style-type: none"> • Refrigerant □ • Restraints • Hybrid and Electric Vehicles (EV) 			
Fundamentals of Tools, Equipment, Materials and Documentation			
Communication Techniques			Mentoring Techniques
Tires, Wheels, Hubs and Wheel Bearings			
Body Components Accessories and Trim◇			
Steering, Suspension and Control Systems <ul style="list-style-type: none"> • Conventional steering and suspension systems 	Steering, Suspension and Control Systems <ul style="list-style-type: none"> • Electronically controlled steering and suspension systems 		
Braking and Control Systems <ul style="list-style-type: none"> • Non-ABS 	Braking and Control Systems <ul style="list-style-type: none"> • ABS 		
Electrical Systems and Components <ul style="list-style-type: none"> • Batteries 	Electrical Systems and Components <ul style="list-style-type: none"> • Starting/charging • Lighting and wipers 	Electrical Systems and Components <ul style="list-style-type: none"> • Electrical accessories • Electrical options 	Electrical Systems and Components <ul style="list-style-type: none"> • Entertainment systems • Instrumentation and information displays
		Vehicle Networking Systems	
Driveline Systems <ul style="list-style-type: none"> • Introduction to drive shafts and axles 	Driveline Systems <ul style="list-style-type: none"> • Clutches and manual transmissions • Final drive assemblies 	Driveline Systems <ul style="list-style-type: none"> • Transfer cases 	Driveline Systems <ul style="list-style-type: none"> • Automatic transmissions • Intelligent/computer controlled all-wheel drive/four-wheel drive systems
Engine Systems (Introduction)	Engine Systems☀		
		Gasoline Engine Support Systems	Diesel Engine Support Systems■
			HVAC and Comfort Control Systems□
			Hybrid and Electrical Vehicle (EV)
			Restraint Systems*

- * Topic cards are derived from tasks within the RSOS. However, subject matter experts and instructors requested an additional card: “Maintenance Inspection”, as this activity is integral to the context of the topics being taught.
- ◇ Some components of this topic card are covered by the Alberta Auto Body Service Technician program.
- Jurisdictions may need to deliver refrigerant evacuation and recharge elsewhere in the program to meet regulatory or licensing issues.
- ☀ NB may provide additional training to exceed requirements by more training on engine assembly in level 3.

13.3. Automotive Service Technician – Topic Detail by Sub-task - RSOS 2016

In Context	In Context	In Context	In Context
Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation	Tools, Equipment, Materials and Documentation
Maintenance Inspection*	Maintenance Inspection*	Maintenance Inspection*	Maintenance Inspection*
Vehicle Networking Systems	Vehicle Networking Systems	Vehicle Networking Systems	Vehicle Networking Systems
Level One	Level Two	Level Three	Level Four
Safety-Related Functions 1.01-Maintains safe work environment 1.02-Uses personal protective equipment (PPE) and safety equipment 17.02-Repairs refrigerant systems □ 22.01-Implements specific safety protocols for hybrid and electric vehicles (EV)			
Fundamentals of Tools, Equipment, Materials and Documentation 2.01-Uses tools and equipment 2.02-Uses fasteners, tubing, hoses and fittings 2.03-Uses hoisting and lifting equipment 2.04-Uses technical information			
Communication Techniques 3.01-Uses communication techniques			Mentoring Techniques 3.02-Uses mentoring techniques
Tires, Wheels, Hubs and Wheel Bearings 18.03-Diagnoses tires, wheels, hubs and wheel bearings 19.03-Repairs tires, wheels, hubs and wheel bearings			
Body Components, Accessories and Trim 20.02-Diagnoses wind noises, rattles and water leaks 20.03-Diagnoses interior and exterior components, accessories and trim 20.04-Diagnoses latches, locks and movable glass 21.02- Repairs wind noises, rattles and water leaks 21.03- Repairs interior and exterior components, accessories and trim			

21.04- Repairs latches, locks and movable glass			
Level One	Level Two	Level Three	Level Four
Steering, Suspension and Control Systems 18.01-Diagnoses steering, suspension and control systems 19.01-Repairs steering, suspension and control systems	Steering, Suspension and Control Systems 18.01-Diagnoses steering, suspension and control systems 19.01-Repairs steering, suspension and control systems		
Braking and Control Systems 18.02-Dignoses braking and control systems 19.02-Repairs braking and control systems	Braking and Control Systems 18.02-Dignoses braking and control systems 19.02-Repairs braking and control systems		
Electrical Systems and Components 14.01-Diagnoses basic wiring and electrical systems 14.02-(batteries) Diagnoses starting/charging systems and batteries 15.01-Repairs basic wiring and electrical systems 15.02-(batteries) Repairs starting/charging systems and batteries	Electrical Systems and Components 14.02-(starting/charging)-Diagnoses starting/charging systems and batteries 14.03-Diagnoses lighting and wiper systems 15.02-(starting/charging) Repairs starting/charging systems and batteries 15.03-Reparis lighting and wiper systems 15.08-Repairs instrumentation	Electrical Systems and Components 14.05-Diagnoses electrical options 14.07-Diagnoses electrical accessories 15.05-Repairs electrical options 15.07-Installs electrical accessories	Electrical Systems and Components 14.04-Diagnoses entertainment systems 14.06-Diagnoses instrumentation and information displays 15.04-Repairs entertainment systems 15.06-Repairs instrumentation and information displays
		Vehicle Networking Systems 10.01-Reads diagnostic trouble codes (DTCs) 10.02-Monitors data 10.03-Interprets test results 10.04-Tests system circuitry and components 11.01-Updates component software 11.02-Replaces components 11.03-Verifies vehicle module communications system repair	
Driveline Systems 12.01-Diagnoses drive shafts and axles 13.01-Repairs drive shafts and axles	Driveline Systems 12.02-Diagnoses manual transmissions/transaxles 12.04-Diagnoses clutches 12.06-Diagnoses final drive assemblies 13.02-Repairs manual transmissions/transaxles 13.04-Repairs clutches 13.06-Repairs final drive assemblies	Driveline Systems 12.05-Diagnoses transfer cases 13.05-Repairs transfer cases	Driveline Systems 12.03-Diagnoses automatic transmissions/transaxles 12.05-(AWD) Diagnoses transfer cases 13.03-Repairs automatic transmissions/transaxles 13.05-(AWD) Repairs transfer cases
Engine Systems (Introduction)	Engine Systems ☀️ 4.01-Diagnoses cooling systems 4.02-Diagnoses lubricating systems 4.03-Diagnoses engine assembly 4.04-Diagnoses accessory drive systems 5.01-Repairs cooling systems 5.02-Repairs lubricating systems		

	5.03-Repairs engine assembly 5.04-Repairs accessory drive systems		
Level One	Level Two	Level Three	Level Four
		Gasoline Engine Support Systems 6.01-Diagnoses gasoline fuel delivery and injection systems 6.02-Diagnoses gasoline ignition systems 6.03-Diagnoses gasoline intake/exhaust systems 6.04-Diagnoses gasoline emission control systems 7.01-Repairs gasoline fuel delivery and injection systems 7.02-Repairs gasoline ignition systems 7.03-Repairs gasoline intake/exhaust systems 7.04-Repairs gasoline emission control systems	Diesel Engine Support Systems ■ 8.01-Diagnoses diesel fuel delivery and injection systems 8.02-Diagnoses diesel intake/exhaust systems 8.03-Diagnoses diesel emission control systems 9.01-Repairs diesel fuel delivery and injection systems 9.02-Repairs diesel intake/exhaust systems 9.03-Repairs diesel emission control systems
			HVAC and Comfort Control Systems □ 16.01-Diagnoses air flow control systems 16.02-Diagnoses refrigerant systems 16.03-Diagnoses heating systems 17.01-Repairs air flow control systems 17.02-Repairs refrigerant systems 17.03-Repairs heating systems
			Hybrid and Electrical Vehicle (EV) 22.01-Implements specific safety protocols for hybrid and electric vehicles (EV) 22.02-Diagnoses hybrid and electric vehicle (EV) systems 23.01-Repairs hybrid vehicle systems 23.02-Repairs electric vehicles (EV) systems
			Restraint Systems 20.01-Diagnoses restraint systems 21.01-Repairs restraint systems

* Topic cards are derived from tasks within the RSOS. However, subject matter experts and instructors requested an additional card: “Maintenance Inspection”, as this activity is integral to the context of the topics being taught.

◇ Some components of this topic card are covered by the Alberta Auto Body Service Technician program.

□ Jurisdictions may need to deliver refrigerant evacuation and recharge elsewhere in the program to meet regulatory or licensing issues.

☼ NB may provide additional training to exceed requirements by more training on engine assembly in level 3.

14. Industrial Mechanic (Millwright)

14.1. Industrial Mechanic (Millwright) Recommendations

Industrial Mechanic (Millwright):

- That provinces and territories adopt the **Red Seal trade name Industrial Mechanic (Millwright) / Mécanicien industriel/mécanicienne industrielle (de chantier)**
- Slight variations include; Ontario – Industrial Mechanic Millwright; British Columbia – Millwright; Northwest Territories - Millwright-Industrial Mechanic (**French**) New Brunswick - Mécanicien-monteur industriel (de chantier); Ontario – Mécanicien industriel/mécanicienne industrielle de chantier; Manitoba – Mécanicien Industriel (de chantier); Northwest Territories – Mécanicien-monteur industriel
- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

14.2. Industrial Mechanic (Millwright) – Snapshot

In Context	In Context	In Context	In Context
Safety Related Functions☼	Safety Related Functions☼	Safety Related Functions☼	Safety Related Functions☼
Routine Trade Tasks☼	Routine Trade Tasks☼	Routine Trade Tasks☼	Routine Trade Tasks☼
Drawings and Schematics☼	Drawings and Schematics☼	Drawings and Schematics☼	Drawings and Schematics☼
Level One	Level Two	Level Three	Level Four
Safety Related Functions∞			
Tools and Equipment			
Communications Techniques			Mentoring Techniques
Measuring and Layout			
Cutting and Welding	Cutting and Welding		
Rigging, Hoisting/Lifting and Moving			
	Shafts, Bearings and Seals		
	Couplings, Clutches and Brakes		
	Chain and Belt Drive Systems		
	Gear Systems		
	Shaft Alignment Procedures (rough alignment; rim and face dial alignment)	Shaft Alignment Procedures (cross dial and reverse [double] dial; laser)	
			Conveying Systems
		Fans and Blowers	
		Pumps	
		Compressors	
		Process Piping, Tanks and Containers	
		Hydraulic Systems	
		Pneumatic and Vacuum Systems	
			Prime Movers
			Preventative and Predictive Maintenance*
			Commissioning and Decommissioning Equipment
			Robotics and Automated Equipment

☼ “In Context Topic Cards” reflect topics that are applied in the context of teaching other tasks in the stated level.

∞ It is recommended that jurisdictions address awareness of basic electrical safety and function.

* Jurisdictions may address awareness of electrical content as it relates to troubleshooting of mechanical systems.

** ON will meet and exceed by delivering cutting and welding training in additional levels.

14.3. Industrial Mechanic (Millwright) – Topic - Sub-Task by RSOS 2016

In Context	In Context	In Context	In Context
Safety Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.	Safety Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.	Safety Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.	Safety Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.
Routine Trade Tasks 3.01 Plans work. 3.02 Fabricates workpiece. 3.03 Lubricates systems and components. 3.04 Performs leveling of components and systems. 3.05 Uses fastening and retaining devices. 3.06 Performs material identification. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 7.01 Determines load. 7.02 Selects rigging equipment. 7.03 Selects hoisting/lifting and moving equipment. 7.04 Secures area. 8.01 Sets up rigging, hoisting/lifting and moving equipment. 8.02 Performs hoist/lift and move. 8.03 Maintains rigging, hoisting/ lifting and moving equipment.	Routine Trade Tasks 3.01 Plans work. 3.02 Fabricates workpiece. 3.03 Lubricates systems and components. 3.04 Performs leveling of components and systems. 3.05 Uses fastening and retaining devices. 3.06 Performs material identification. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 7.01 Determines load. 7.02 Selects rigging equipment. 7.03 Selects hoisting/lifting and moving equipment. 7.04 Secures area. 8.01 Sets up rigging, hoisting/lifting and moving equipment. 8.02 Performs hoist/lift and move. 8.03 Maintains rigging, hoisting/ lifting and moving equipment.	Routine Trade Tasks 3.01 Plans work. 3.02 Fabricates workpiece. 3.03 Lubricates systems and components. 3.04 Performs leveling of components and systems. 3.05 Uses fastening and retaining devices. 3.06 Performs material identification. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 7.01 Determines load. 7.02 Selects rigging equipment. 7.03 Selects hoisting/lifting and moving equipment. 7.04 Secures area. 8.01 Sets up rigging, hoisting/lifting and moving equipment. 8.02 Performs hoist/lift and move. 8.03 Maintains rigging, hoisting/ lifting and moving equipment.	Routine Trade Tasks 3.01 Plans work. 3.02 Fabricates workpiece. 3.03 Lubricates systems and components. 3.04 Performs leveling of components and systems. 3.05 Uses fastening and retaining devices. 3.06 Performs material identification. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 7.01 Determines load. 7.02 Selects rigging equipment. 7.03 Selects hoisting/lifting and moving equipment. 7.04 Secures area. 8.01 Sets up rigging, hoisting/lifting and moving equipment. 8.02 Performs hoist/lift and move. 8.03 Maintains rigging, hoisting/ lifting and moving equipment.
Drawings and Schematics 3.08 Uses mechanical drawings and schematics	Drawings and Schematics 3.08 Uses mechanical drawings and schematics	Drawings and Schematics 3.08 Uses mechanical drawings and schematics	Drawings and Schematics 3.08 Uses mechanical drawings and schematics

Level One	Level Two	Level Three	Level Four
<p>Safety Related Functions</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.</p>	<p>Safety Related Functions</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.</p>	<p>Safety Related Functions</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.</p>	<p>Safety Related Functions</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe worksite. 1.03 Protects the environment. 1.04 Performs lock-out/tag-out and zero energy procedures.</p>
<p>Tools and Equipment</p> <p>2.01 Uses hand and portable power tools. 2.02 Uses shop machines. 2.03 Uses access equipment. 3.02 Fabricates workpiece. 3.03 Lubricates systems and components. 3.04 Performs leveling of components and systems. 3.05 Uses fastening and retaining devices. 5.04 Maintains precision measuring and layout tools.</p>			
<p>Communications Techniques</p> <p>4.01 Uses communication techniques.</p>			<p>Mentoring Techniques</p> <p>4.02 Uses mentoring techniques</p>
<p>Measuring and Layout</p> <p>3.02 Fabricates workpiece. 3.04 Performs leveling of components and systems 5.01 Prepares work area, tools and materials. 5.02 Measures material and components. 5.03 Lays out components. 5.04 Maintains precision measuring and layout tools.</p>			
<p>Cutting and Welding</p> <p>3.02 Fabricates workpiece. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 6.01 Cuts material with gas and plasma arc cutting equipment. 6.02 Joins material using oxy-fuel welding equipment. 6.06 Maintains welding equipment.</p>	<p>Cutting and Welding</p> <p>3.02 Fabricates workpiece. 3.07 Performs heat treatment of metal. 5.01 Prepares work area, tools and materials. 6.03 Welds material using arc welding equipment (SMAW). 6.04 Welds material with gas metal arc welding (GMAW) equipment. 6.05 Welds material with gas tungsten arc welding (GTAW) equipment.</p>		

Level One	Level Two	Level Three	Level Four
<p>Rigging, Hoisting/Lifting and Moving</p> <p>2.03 Uses access equipment. 7.01 Determines load. 7.02 Selects rigging equipment. 7.03 Selects hoisting/lifting and moving equipment. 7.04 Secures area. 8.01 Sets up rigging, hoisting/lifting and moving equipment. 8.02 Performs hoist/lift and move. 8.03 Maintains rigging, hoisting/ lifting and moving equipment.</p>			
	<p>Shafts, Bearings and Seals</p> <p>3.03 Lubricates systems and components. 10.01 Installs shafts, bearings and seals. 10.02 Diagnoses shafts, bearings and seals. 10.03 Maintains shafts, bearings and seals. 10.04 Repairs shafts, bearings and seals.</p>		
	<p>Couplings, Clutches and Brakes</p> <p>11.01 Installs couplings, clutches and brakes. 11.02 Diagnoses couplings, clutches and brakes. 11.03 Maintains couplings, clutches and brakes. 11.04 Repairs couplings, clutches and brakes.</p>		
	<p>Chain and Belt Drive Systems</p> <p>12.01 Installs chain and belt drive systems. 12.02 Diagnoses chain and belt drive systems. 12.03 Maintains chains and belt drive systems. 12.04 Repairs chains and belt drive systems.</p>		
	<p>Gear Systems</p> <p>13.01 Installs gear systems. 13.02 Diagnoses gear systems. 13.03 Maintains gear systems. 13.04 Repairs gear systems.</p>		
	<p>Shaft Alignment Procedures (rough alignment; rim and face dial alignment)</p> <p>14.01 Performs rough alignment. 14.02 Performs dial alignment.</p>	<p>Shaft Alignment Procedures (cross dial and reverse [double] dial; laser)</p> <p>14.02 Performs dial alignment. 14.03 Performs laser alignment.</p>	

Level One	Level Two	Level Three	Level Four
			Conveying Systems 20.01 Installs conveying systems. 20.02 Diagnoses conveying systems. 20.03 Maintains conveying systems. 20.04 Repairs conveying systems.
		Fans and Blowers 16.01 Installs fans and blowers. 16.02 Diagnoses fans and blowers. 16.03 Maintains fans and blowers. 16.04 Repairs fans and blowers.	
		Pumps 17.01 Installs pumps. 17.02 Diagnoses pumps. 17.03 Maintains pumps. 17.04 Repairs pumps.	
		Compressors 18.01 Installs compressors. 18.02 Diagnoses compressors. 18.03 Maintains compressors. 18.04 Repairs compressors.	
		Process Piping, Tanks and Containers 19.01 Installs process tanks and containers. 19.02 Installs process piping. 19.03 Diagnoses process tanks and containers. 19.04 Diagnoses process piping. 19.05 Maintains process tanks and containers. 19.06 Maintains process piping. 19.07 Repairs process tanks and containers. 19.08 Repairs process piping.	
		Hydraulic Systems 21.01 Installs hydraulic systems. 21.02 Diagnoses hydraulic systems. 21.03 Maintains hydraulic systems. 21.04 Repairs hydraulic systems.	

Level One	Level Two	Level Three	Level Four
		Pneumatic and Vacuum Systems 22.01 Installs pneumatic and vacuum systems. 22.02 Diagnoses pneumatic and vacuum systems. 22.03 Maintains pneumatic and vacuum systems. 22.04 Repairs pneumatic and vacuum systems.	
			Prime Movers 9.01 Installs prime movers. 9.02 Diagnoses prime movers. 9.03 Maintains prime movers. 9.04 Repairs prime movers
			Preventative and Predictive Maintenance* 23.01 Performs preventative maintenance activities. 23.02 Performs vibration analysis procedures. 23.03 Performs balancing procedures. 23.04 Performs non-destructive evaluation (NDE) procedures. 23.05 Performs fluid analysis procedures. 23.06 Performs predictive maintenance activities.
			Commissioning and Decommissioning Equipment 24.01 Commissions systems and components 24.02 Decommissions systems and components
			Robotics and Automated Equipment 15.01 Installs robotics and automated equipment. 15.02 Diagnoses robotics and automated equipment. 15.03 Maintains robotics and automated equipment. 15.04 Repairs robotics and automated equipment.

15. Construction Electrician

15.1. Construction Electrician Recommendations

That provinces and territories adopt the **Red Seal trade name Construction Electrician / Électricien/électricienne (construction)**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

15.2. Construction Electrician – Snapshot

In Context	In Context	In Context	In Context	In Context
Organizes Work	Organizes Work	Organizes Work	Organizes Work	Organizes Work
Protection Devices	Protection Devices	Protection Devices	Protection Devices	Protection Devices
Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications
Electronics (No task in the RSOS) (BC only)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)
Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)
	Support Components	Support Components	Support Components	Support Components
		Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures
Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems
Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
Safety				
Tools and Equipment				
Support Components				
Communication and Mentoring Techniques				
Grounding, Bonding	Grounding, Bonding (Single-Phase)	Grounding, Bonding (Three-Phase)	Grounding, Bonding Ground Fault Detection Systems	Grounding, Bonding Ground Fault Detection Systems
Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures			
Branch Circuitry and Devices (AC/DC introduction)	Branch Circuitry and Devices (AC/DC introduction)	Branch Circuitry and Devices (Three-Phase)	Branch Circuitry and Devices (Specialty)	
Consumer/Supply Services and Metering Equipment (Single-Phase)		Consumer/Supply Services and Metering Equipment (Single-Phase) ⁴⁰		
Distribution Equipment (Single-Phase)		Distribution Equipment (Three-Phase)		
	Power Generating Systems (DC)	Power Generating Systems (AC)		
	Transformers (Single-Phase)	Transformers (Three-Phase)		

⁴⁰ *Consumer/Supply Services and Metering Equipment* - Ontario will cover three-phase in Level 2

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	Exit and Emergency Lighting Systems			
	Cathodic Protection Systems			
			Signaling Systems ^{41 42}	Signaling Systems ⁴³
	Electric Heating Systems and Controls			
	Heating, Ventilation and Air Conditioning (HVAC) ⁴⁴			
	Motor Starters and Controls	Motor Starters and Controls		
				Non-Rotating Equipment and Controls
	Motors	Motors (Single-Phase and Three-Phase) (Motor) Drives ⁴⁵	Motors (Install/Maintain)	Motors (Install/Maintain)
			High Voltage Systems	High Voltage Systems
			UPS and Surge Suppression Systems	Power Conditioning Systems
	Renewable Energy Generating and Storage Systems		Renewable Energy Generating and Storage Systems	Renewable Energy Generating and Storage Systems
Communication Systems			Communication Systems	Communication Systems
			Building Automation Systems	Building Automation Systems
				Input/Output Field Devices
			Automated Control Systems	Automated Control Systems
				Predictive and Preventative Maintenance ⁴⁶
				Pneumatic and Hydraulic Control Systems

⁴¹ **Signaling Systems** – (Variations) Saskatchewan and Alberta will deliver in Level 1 as well. Ontario will deliver in Levels 1 and 2.

⁴² **Signaling Systems** – In Alberta, Journeyperson Certification is required to install, maintain, test and verify fire alarm systems.

⁴³ **Signaling Systems** – (Variation) Ontario will deliver in Levels 1 and 2.

⁴⁴ **HVAC** - (Variations) NB, PE, MB and NL will deliver HVAC controls in Level 3

⁴⁵ **(Motor) Drives** – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4.

⁴⁶ **Predictive and Preventative Maintenance** – Maintenance within the Industrial Electrician Trade may be described differently than within the Construction Electrician Trade. A card for “Predictive and Preventative Maintenance” is not based on a task, but rather a performance indicator, and is illustrated to verify the content.

15.3. Construction Electrician – Topic Detail/ Sub-Task by RSOS 2015
(Displayed with the family of trades: Construction Electrician/Industrial Electrician)

Colour Coding:

0.00 – Construction Electrician sub-tasks

0.00 – Industrial Electrician sub-tasks

In Context	In Context	In Context	In Context	In Context
Organizes Work	Organizes Work	Organizes Work	Organizes Work	Organizes Work
Protection Devices	Protection Devices	Protection Devices	Protection Devices	Protection Devices
Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications
Electronics (No task in the RSOS) (BC only)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)
Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)
	Support Components	Support Components	Support Components	Support Components
		Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures
Commissions and Decommissions Systems ⁴⁷	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems

⁴⁷ *Commissions and Decommissions Systems* – will include CE sub-tasks 5.01, 5.02; IE sub-tasks 5.01, 5.02, and 5.03 as required in context.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Safety</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment.</p> <p>1.02 Maintains safe work environment.</p> <p>1.03 Performs lock-out and tag-out procedures.</p> <p>1.01 Maintains safe work environment.</p> <p>1.02 Uses personal protective equipment (PPE) and safety equipment.</p> <p>1.03 Performs lock out and tag out procedures.</p> <p>1.04 Identifies environmental conditions.</p>				
<p>Tools and Equipment</p> <p>2.01 Uses common and specialty tools and equipment.</p> <p>2.02 Uses access equipment.</p> <p>2.03 Uses rigging, hoisting and lifting equipment.</p> <p>2.01 Uses common and specialty tools and equipment.</p> <p>2.02 Uses access equipment.</p> <p>2.03 Uses rigging, hoisting and lifting equipment.</p>				
<p>Support Components</p> <p>4.01 Fabricates support structures.</p> <p>4.02 Installs brackets, hangers and fasteners</p> <p>4.03 Installs seismic restraint systems.</p> <p>4.01 Fabricates support structures</p> <p>4.02 Installs brackets, hangers and fasteners.</p> <p>4.03 Installs seismic restraint systems.</p>				
<p>Communication and Mentoring Techniques</p> <p>6.01 Uses communication techniques.</p> <p>6.01 Uses communication techniques.</p>			<p>Communication and Mentoring Techniques</p> <p>6.02 Uses mentoring techniques</p>	<p>Communication and Mentoring Techniques</p> <p>6.02 Uses mentoring techniques</p>

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Grounding, Bonding</p> <p>11.01 Installs grounding and bonding systems.</p> <p>11.01 Installs grounding systems.</p> <p>11.03 Installs bonding systems.</p>	<p>Grounding, Bonding (Single-Phase)</p> <p>11.01 Installs grounding and bonding systems.</p> <p>11.02 Installs ground fault systems.</p> <p>11.03 Installs lightning protection systems.</p> <p>11.01 Installs grounding systems.</p> <p>11.02 Maintains grounding systems.</p> <p>11.03 Installs bonding systems.</p> <p>11.04 Maintains bonding systems.</p> <p>11.05 Installs ground fault detection systems.</p>	<p>Grounding, Bonding (Three-Phase)</p> <p>11.01 Installs grounding and bonding systems.</p> <p>11.02 Installs ground fault systems.</p> <p>11.03 Installs lightning protection systems.</p> <p>11.01 Installs grounding systems.</p> <p>11.02 Maintains grounding systems.</p> <p>11.03 Installs bonding systems.</p> <p>11.04 Maintains bonding systems.</p> <p>11.05 Installs ground fault detection systems.</p>	<p>Grounding, Bonding Ground Fault Detection Systems</p> <p>11.04 Performs servicing and maintenance of bonding and grounding systems.</p>	<p>Grounding, Bonding Ground Fault Detection Systems</p> <p>11.06 Maintains ground fault detection systems.</p>
<p>Raceways, Cables, Conductors and Enclosures</p> <p>16.01 Installs conductors and cables</p> <p>16.02 Installs conduit, tubing and fittings.</p> <p>16.03 Installs raceways.</p> <p>16.04 Installs boxes and enclosures.</p> <p>16.05 Performs servicing and maintenance of raceways, cables and enclosures.</p> <p>16.01 Installs conductors and cables.</p> <p>16.02 Maintains conductors and cables.</p> <p>16.03 Installs conduit, tubing and fittings.</p> <p>16.04 Installs raceways.</p> <p>16.05 Installs boxes and enclosures.</p> <p>16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures.</p>	<p>Raceways, Cables, Conductors and Enclosures</p> <p>16.01 Installs conductors and cables</p> <p>16.02 Installs conduit, tubing and fittings.</p> <p>16.03 Installs raceways.</p> <p>16.04 Installs boxes and enclosures.</p> <p>16.05 Performs servicing and maintenance of raceways, cables and enclosures.</p> <p>16.01 Installs conductors and cables.</p> <p>16.02 Maintains conductors and cables.</p> <p>16.03 Installs conduits, tubing and fittings.</p> <p>16.04 Installs raceways.</p> <p>16.05 Installs boxes and enclosures.</p> <p>16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures.</p>			

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Branch Circuitry and Devices (AC/DC introduction)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Single-Phase)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Three-Phase)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Specialty)</p> <p>17.06 Installs, services and maintains airport runway lighting systems. 17.07 Installs, services and maintains traffic signal lights and controls.</p>	
<p>Consumer/Supply Services and Metering Equipment (Single-Phase)</p> <p>7.01 Installs single-phase consumer/supply services and metering equipment. 7.01 Installs single-phase consumer/supply services and metering equipment. 7.02 Maintains single-phase consumer/supply services and metering equipment.</p>		<p>Consumer/Supply Services and Metering Equipment (Single-Phase)⁴⁸</p> <p>7.02 Installs three-phase consumer/supply services and metering equipment. 7.04 Performs servicing and maintenance of three-phase services and metering equipment. 7.03 Installs three-phase consumer/supply services and metering equipment. 7.04 Maintains three-phase consumer/supply services and metering equipment.</p>		

⁴⁸ *Consumer/Supply Services and Metering Equipment* - Ontario will cover three-phase in Level 2

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Distribution Equipment (Single-Phase) 9.01 Installs power distribution equipment. 9.01 Installs low-voltage distribution equipment.</p>		<p>Distribution Equipment (Three-Phase) 9.02 Performs servicing and maintenance of power distribution equipment. 9.02 Maintains low voltage distribution equipment.</p>		
	<p>Power Generating Systems (DC) 12.03 Installs DC (direct current) generating systems. 12.04 Performs servicing and maintenance of DC generating systems. 12.03 Installs DC (direct current) generating systems. 12.04 Maintains DC generating systems.</p>	<p>Power Generating Systems (AC) 12.01 Installs AC (alternating current) generating systems. 12.02 Performs servicing and maintenance of AC generating systems. 12.01 Installs AC (alternating current) generating systems. 12.02 Maintains AC generating systems.</p>		
	<p>Transformers (Single-Phase) 15.01 Installs extra-low voltage transformers. 15.02 Installs low-voltage single-phase transformers. 15.01 Installs extra-low voltage transformers. 15.02 Maintains extra-low voltage transformers. 15.03 Installs low voltage single-phase transformers. 15.04 Maintains low voltage single-phase transformers.</p>	<p>Transformers (Three-Phase) 15.03 Installs low-voltage three-phase transformers. 15.04 Installs high voltage transformers. 15.05 Performs servicing and maintenance of transformers. 15.05 Installs low voltage three-phase transformers. 15.06 Maintains low voltage three-phase transformers. 15.07 Installs high voltage transformers. 15.08 Maintains high voltage transformers.</p>		

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Exit and Emergency Lighting Systems 20.01 Installs exit and emergency lighting. 20.02 Performs servicing and maintenance of exit and emergency lighting systems. 20.01 Installs exit and emergency lighting. 20.02 Maintains exit and emergency lighting systems.</p>			
	<p>Cathodic Protection Systems 21.01 Installs cathodic protection systems. 21.02 Performs servicing and maintenance of cathodic protection systems. 21.01 Installs cathodic protection systems. 21.02 Maintains cathodic protection systems.</p>			
			<p>Signaling Systems^{49 50} 26.01 Installs fire alarm systems. 26.02 Performs servicing and maintenance of fire alarm systems. 26.03 Installs security and surveillance systems. 26.04 Performs servicing and maintenance of security and surveillance systems.</p>	<p>Signaling Systems⁵¹ 26.01 Installs fire alarm systems. 26.02 Maintains fire alarm systems. 26.03 Installs security and surveillance systems. 26.04 Maintains security and surveillance systems.</p>

⁴⁹ **Signaling Systems** – (Variations) Saskatchewan and Alberta will deliver in Level 1 as well. Ontario will deliver in Levels 1 and 2.

⁵⁰ **Signaling Systems** – In Alberta, Journeyperson Certification is required to install, maintain, test and verify fire alarm systems.

⁵¹ **Signaling Systems** – (Variation) Ontario will deliver in Levels 1 and 2.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Electric Heating Systems and Controls</p> <p>19.01 Installs electric heating systems.</p> <p>19.02 Installs electric heating system controls.</p> <p>19.03 Performs servicing and maintenance of electric heating systems and controls.</p> <p>19.01 Installs electric heating systems and controls.</p> <p>19.02 Maintains electric heating systems and controls.</p>			
	<p>Heating, Ventilation and Air Conditioning (HVAC)⁵²</p> <p>18.01 Connects HVAC systems.</p> <p>18.02 Installs HVAC controls.</p> <p>18.03 Performs servicing and maintenance of HVAC systems and controls.</p> <p>18.01 Connects power to HVAC systems and associated equipment.</p> <p>18.02 Installs HVAC controls.</p> <p>18.03 Maintains HVAC electrical components.</p>			
	<p>Motor Starters and Controls</p> <p>22.01 Installs motor starters.</p> <p>22.02 Performs servicing and maintenance of motor starters.</p> <p>22.03 Installs motor controls.</p> <p>22.04 Performs servicing and maintenance of motor controls.</p> <p>22.01 Installs motor starters.</p> <p>22.02 Maintains motor starters.</p> <p>22.03 Installs motor control devices.</p> <p>22.04 Maintains motor control devices</p>	<p>Motor Starters and Controls</p> <p>22.01 Installs motor starters.</p> <p>22.02 Performs servicing and maintenance of motor starters.</p> <p>22.03 Installs motor controls.</p> <p>22.04 Performs servicing and maintenance of motor controls.</p> <p>22.01 Installs motor starters.</p> <p>22.02 Maintains motor starters.</p> <p>22.03 Installs motor control devices.</p> <p>22.04 Maintains motor control devices.</p>		
				<p>Non-Rotating Equipment and Controls</p> <p>24.01 Installs non-rotating equipment and associated controls.</p>

⁵² HVAC - (Variations) NB, PE, MB and NL will deliver HVAC controls in Level 3

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Motors (DC)</p> <p>24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>	<p>Motors (Single-Phase and Three-Phase)</p> <p>24.01 Installs single-phase motors. 24.02 Performs servicing and maintenance of single-phase 24.03 Installs three-phase motors. 24.04 Performs servicing and maintenance of three-phase motors. 24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors. 25.01 Installs single-phase motors. 25.02 Maintains single-phase motors. 25.03 Installs three-phase motors. 25.04 Maintains three-phase motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>	<p>Motors (Install/Maintain)</p> <p>24.01 Installs single-phase motors. 24.02 Performs servicing and maintenance of single-phase motors. 24.03 Installs three-phase motors. 24.04 Performs servicing and maintenance of three-phase motors. 24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors.</p>	<p>Motors (Install/Maintain)</p> <p>25.01 Installs single-phase motors. 25.02 Maintains single-phase motors. 25.03 Installs three-phase motors. 25.04 Maintains three-phase motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>
		<p>(Motor) Drives⁵³</p> <p>23.01 Installs AC drives. 23.02 Performs servicing and maintenance of AC drives. 23.03 Installs DC drives. 23.04 Performs servicing and maintenance of DC drives. 23.01 Installs AC drives. 23.02 Maintains AC drives. 23.03 Installs DC drives. 23.04 Maintains DC drives.</p>		

⁵³ **(Motor) Drives** – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
			High Voltage Systems 14.01 Installs high voltage equipment. 14.02 Installs high voltage cables. 14.03 Performs servicing and maintenance of high voltage systems.	High Voltage Systems 14.01 Installs high voltage, equipment. 14.02 Maintains high voltage systems.
			UPS and Surge Suppression Systems 10.01 Installs power conditioning, UPS and surge suppression systems. 10.02 Performs servicing and maintenance of power conditioning, UPS and surge suppression systems.	Power Conditioning Systems 10.01 Installs power conditioning systems. 10.02 Maintains power conditioning systems.
	Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems. 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.		Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.	Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Communication Systems 27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems. 27.02 Installs public address (PA) and intercom systems. 27.03 Installs nurse call systems. 27.01 Installs communication systems.</p>			<p>Communication Systems 27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems. 27.02 Installs public address (PA) and intercom systems. 27.03 Installs nurse call systems 27.04 Performs servicing and maintenance of communication systems.</p>	<p>Communication Systems 27.01 Installs communication systems. 27.02 Maintains communications systems.</p>
			<p>Building Automation Systems (Integrated Control Systems) 28.01 Installs building automation systems. 28.02 Installs building control systems. 28.03 Performs servicing and maintenance of integrated control systems</p>	<p>Building Automation Systems 28.01 Installs building automation systems. 28.02 Maintains building automation systems.</p>
				<p>Input / Output Field Devices 29.01 Installs discrete input/output devices. 29.02 Maintains discrete input/output devices. 29.03 Installs analog input/output devices. 29.04 Maintains analog input/output devices.</p>

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
			<p>Automated Control Systems</p> <p>25.01 Installs automated control systems.</p> <p>25.02 25.02 Performs servicing and maintenance of automated control systems.</p> <p>25.03 Programs and configures automated control systems.</p>	<p>Automated Control Systems</p> <p>30.01 Installs automated control systems.</p> <p>30.02 Maintains automated control systems.</p> <p>30.03 Programs automated control systems.</p> <p>30.04 Optimizes system performance.</p>
				<p>Predictive and Preventative Maintenance⁵⁴</p>
				<p>Pneumatic and Hydraulic Control Systems</p> <p>31.01 Installs pneumatic control systems.</p> <p>31.02 Maintains pneumatic control systems.</p> <p>31.03 Installs hydraulic control systems.</p> <p>31.04 Maintains hydraulic control systems.</p>

⁵⁴ **Predictive and Preventative Maintenance** – Maintenance within the Industrial Electrician Trade may be described differently than within the Construction Electrician Trade. A card for “Predictive and Preventative Maintenance” is not based on a task, but rather a performance indicator, and is illustrated to verify the content.

15.4. Construction Electrician – Phase 7 Sequencing Review

Level 1	Level 2	Level 3	Level 4
	Context	Context	Context
	Organizes Work	Organizes Work	Organizes Work
	Electrical Systems (Commissions and Decommissions)	Electrical Systems (Commissions and Decommissions)	Electrical Systems (Commissions and Decommissions)
	Protection Devices	Protection Devices	Protection Devices
	Support Components	Support Components	Support Components
		Raceways, Cables, Enclosures	Raceways, Cables, Enclosures

With newer formatting, a reminder that in context cards only appear after L1.

Safety-Related Functions

1.01 Uses personal protective equipment (PPE) and safety equipment
 1.02 Maintains safe work environment.
 1.03 Performs lock-out and tag-out procedures

Tools and Equipment

2.01 Uses common and specialty tools and equipment
 2.02 Uses access equipment
 2.03 Uses rigging, hoisting and lifting equipment

Organizes Work

3.01 Interprets plans, drawings and specifications
 3.02 Organizes materials and supplies
 3.03 Plans project tasks and procedures
 3.04 Prepares worksite
 3.05 Finalizes required documentation

Support Components

4.01 Fabricates support structures
 4.02 Installs brackets, hangers and fasteners
 4.03 Installs seismic restraint systems

**Electrical Systems
(Commissions and Decommissions)**

5.01 Performs startup and shutdown procedures
 5.02 Performs commissioning and decommissioning of systems

Communication Techniques
6.01 Uses communication techniques

Consumer/Supply Services and Metering Equipment
7.01 Installs single-phase consumer/supply services and metering equipment
7.03 Performs servicing and maintenance of single-phase consumer/supply services and metering equipment

Protection Devices
8.01 Installs overcurrent protection devices
8.02 Installs ground fault, arc fault and surge protection devices
8.03 Performs servicing and maintenance of protection devices

Power Distribution Equipment
9.01 Installs power distribution equipment

Bonding, Grounding and Ground-Fault Protection and Detection Systems
11.01 Installs grounding and bonding systems

Bonding, Grounding and Ground-Fault Protection and Detection Systems
11.01 Installs grounding and bonding systems
11.02 Installs ground- fault protection and detection systems
11.03 Installs lightning protection systems

Power Generation and Conversion Systems
12.03 Installs direct current (DC) generating and conversion systems (NCC)
12.04 Performs servicing and maintenance of DC generating and conversion systems (NCC)

Consumer/Supply Services and Metering Equipment
7.02 Installs three-phase consumer/supply services and metering equipment
7.04 Performs servicing and maintenance of three-phase consumer/supply services and metering equipment

Power Distribution Equipment
9.02 Performs servicing and maintenance of power distribution equipment

Bonding, Grounding and Ground-Fault Protection and Detection Systems
11.01 Installs grounding and bonding systems
11.02 Installs ground- fault protection and detection systems
11.03 Installs lightning protection systems

Power Generation and Conversion Systems
12.01 Installs alternating current (AC) generating systems
12.02 Performs servicing and maintenance of AC generating systems

Mentoring Techniques
6.02 Uses mentoring techniques

Power Conditioning, Uninterruptible Power Supply (UPS) and Surge Suppression Systems
10.01 Installs power conditioning, UPS and surge suppression systems
10.02 Performs servicing and maintenance of power conditioning, UPS and surge suppression systems

Bonding, Grounding and Ground-Fault Protection and Detection Systems
11.04 Performs servicing and maintenance of bonding and grounding systems

Renewable Energy Generating and Storage Systems

13.01 Installs renewable energy generating and storage systems
13.02 Performs servicing and maintenance of renewable energy generating and storage systems

Renewable Energy Generating and Storage Systems

13.01 Installs renewable energy generating and storage systems
13.02 Performs servicing and maintenance of renewable energy generating and storage systems

High-Voltage Systems

14.01 Installs high-voltage equipment
14.02 Installs high-voltage cables
14.03 Performs servicing and maintenance of high-voltage systems

Transformers

15.01 Installs extra-low-voltage transformers
15.02 Installs low-voltage single-phase transformers

Transformers

15.03 Installs low-voltage three-phase transformers
15.04 Installs high voltage transformers
15.05 Performs servicing and maintenance of transformers

Raceways, Conductors, Cables and Enclosures

16.01 Installs conductors and cables
16.02 Installs conduit and fittings
16.03 Installs raceways.
16.04 Installs boxes and enclosures
16.05 Performs servicing and maintenance of raceways, conductors, cables and enclosures

Raceways, Conductors, Cables, Enclosures

16.01 Installs conductors and cables
16.02 Installs conduit and fittings
16.03 Installs raceways
16.04 Installs boxes and enclosures
16.05 Performs servicing and maintenance of raceways, conductors, cables and enclosures

Branch Circuitry and Devices

17.01 Installs luminaires
17.02 Installs wiring devices
17.03 Installs lighting controls
17.04 Installs lighting standards
17.05 Performs servicing of branch circuitry

Branch Circuitry and Devices

17.01 Installs luminaires
17.02 Installs wiring devices
17.03 Installs lighting controls
17.04 Installs lighting standards
17.05 Performs servicing of branch circuitry

Branch Circuitry and Devices

17.01 Installs luminaires
17.02 Installs wiring devices
17.03 Installs lighting controls
17.04 Installs lighting standards
17.05 Performs servicing of branch circuitry

Branch Circuitry and Devices

17.06 Installs, services and maintains airport visual aid systems
17.07 Installs, services and maintains traffic signal lights and controls

HVAC Systems

18.01 Connects HVAC systems and associated equipment
18.02 Installs HVAC controls
18.03 Performs servicing and maintenance of HVAC systems and controls

Electric Heating Systems

- 19.01 Installs electric heating systems
- 19.02 Installs electric heating system controls
- 19.03 Performs servicing and maintenance of electric heating systems and controls

Exit and Emergency Lighting Systems

- 20.01 Installs exit and emergency lighting
- 20.02 Performs servicing and maintenance of exit and emergency lighting systems

Cathodic Protection Systems

- 21.01 Installs cathodic protection systems
- 21.02 Performs servicing and maintenance of cathodic protection systems

Motors and Controls

- 22.01 Installs motor starters
- 22.02 Performs servicing and maintenance of motor starters
- 22.03 Installs motor control devices
- 22.04 Performs servicing and maintenance of motor control devices

Motors and Controls

- 22.01 Installs motor starters
- 22.02 Performs servicing and maintenance of motor starters
- 22.03 Installs motor control devices
- 22.04 Performs servicing and maintenance of motor control devices

Drives

- 23.01 Installs AC drives
- 23.02 Performs servicing and maintenance of AC drives
- 23.03 Installs DC drives
- 23.04 Performs servicing and maintenance of DC drives

Motors

- 24.05 Installs DC motors
- 24.06 Performs servicing and maintenance of DC motors

Motors

- 24.01 Installs single-phase motors
- 24.02 Performs servicing and maintenance of single-phase motors
- 24.03 Installs three-phase motors
- 24.04 Performs servicing and maintenance of three-phase motors
- 24.05 Installs DC motors
- 24.06 Performs servicing and maintenance of DC motors

Motors

- 24.01 Installs single-phase motors
- 24.02 Performs servicing and maintenance of single-phase motors
- 24.03 Installs three-phase motors
- 24.04 Performs servicing and maintenance of three-phase motors
- 24.05 Installs DC motors
- 24.06 Performs servicing and maintenance of DC motors

Communication Systems

- 27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems
- 27.02 Installs public address (PA) and intercom systems.
- 27.03 Installs nurse call systems

Automated Control Systems

- 25.01 Installs automated control systems
- 25.02 Performs servicing and maintenance of automated control systems
- 25.03 Programs and configures automated control systems

Signalling Systems

- 26.01 Installs fire alarm systems
- 26.02 Performs servicing and maintenance of fire alarm systems
- 26.03 Installs security and surveillance systems
- 26.04 Performs servicing and maintenance of security and surveillance systems

Communication Systems

- 27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems
- 27.02 Installs public address (PA) and intercom systems
- 27.03 Installs nurse call systems
- 27.04 Performs servicing and maintenance of communication systems

Integrated Control Systems

- 28.01 Installs building automation systems
- 28.02 Installs building control systems
- 28.03 Performs servicing and maintenance of integrated control systems

Notation of Exceptions (at original implementation):

1. **Consumer/Supply Services and metering Equipment** – Ontario will cover three-phase in Level 2.
2. **Signaling Systems** (Variations) – Saskatchewan and Alberta will deliver in Level 1 as well (meet and exceed), Ontario will deliver in Levels 1 and 2.
3. **Signaling Systems** – In Alberta, Journeyperson Certification is required to install, maintain test and verify fire alarm systems.
4. **HVAC** – (Variations) New Brunswick, Prince Edward Island, Manitoba, and Newfoundland and Labrador will deliver HVAC controls in Level 3.
5. **(Motor) Drives** – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4.
6. **Predictive and Preventative Maintenance** – is not based on a task but rather a performance indicator and is illustrated to verify the content. (No card.)

16. Industrial Electrician

16.1. Industrial Electrician Recommendations

That provinces and territories adopt the **Red Seal trade name Industrial Electrician / Électricien industriel/électricienne industrielle**

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

16.2. Industrial Electrician – Snapshot

In Context	In Context	In Context	In Context	In Context
Organizes Work	Organizes Work	Organizes Work	Organizes Work	Organizes Work
Protection Devices	Protection Devices	Protection Devices	Protection Devices	Protection Devices
Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications
Electronics (No task in the RSOS) (BC only)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)
Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)
	Support Components	Support Components	Support Components	Support Components
		Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures
Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems
Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
Safety				
Tools and Equipment				
Support Components				
Communication and Mentoring Techniques				Communication and Mentoring Techniques
Grounding, Bonding	Grounding, Bonding (Single-Phase)	Grounding, Bonding (Three-Phase)	Grounding, Bonding Ground Fault Detection Systems	Grounding, Bonding Ground Fault Detection Systems
Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures			
Branch Circuitry and Devices (AC/DC introduction)	Branch Circuitry and Devices (AC/DC introduction)	Branch Circuitry and Devices (Three-Phase)	Branch Circuitry and Devices (Specialty)	
Consumer/Supply Services and Metering Equipment (Single-Phase)		Consumer/Supply Services and Metering Equipment (Single-Phase) ⁵⁵		
Distribution Equipment (Single-Phase)		Distribution Equipment (Three-Phase)		
	Power Generating Systems (DC)	Power Generating Systems (AC)		
	Transformers (Single-Phase)	Transformers (Three-Phase)		

⁵⁵ *Consumer/Supply Services and Metering Equipment* - Ontario will cover three-phase in Level 2

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	Exit and Emergency Lighting Systems			
	Cathodic Protection Systems			
			Signaling Systems ^{56 57}	Signaling Systems ⁵⁸
	Electric Heating Systems and Controls			
	Heating, Ventilation and Air Conditioning (HVAC) ⁵⁹			
	Motor Starters and Controls	Motor Starters and Controls		
				Non-Rotating Equipment and Controls
	Motors	Motors (Single-Phase and Three-Phase)	Motors (Install/Maintain)	Motors (Install/Maintain)
		(Motor) Drives ⁶⁰		
			High Voltage Systems	High Voltage Systems
			UPS and Surge Suppression Systems	Power Conditioning Systems
	Renewable Energy Generating and Storage Systems		Renewable Energy Generating and Storage Systems	Renewable Energy Generating and Storage Systems
Communication Systems			Communication Systems	Communication Systems
			Building Automation Systems	Building Automation Systems
				Input/Output Field Devices
			Automated Control Systems	Automated Control Systems
				Predictive and Preventative Maintenance ⁶¹
				Pneumatic and Hydraulic Control Systems

⁵⁶ **Signaling Systems** – (Variations) Saskatchewan and Alberta will deliver in Level 1 as well. Ontario will deliver in Levels 1 and 2.

⁵⁷ **Signaling Systems** – In Alberta, Journeyperson Certification is required to install, maintain, test and verify fire alarm systems.

⁵⁸ **Signaling Systems** – (Variation) Ontario will deliver in Levels 1 and 2.

⁵⁹ **HVAC** - (Variations) NB, PE, MB and NL will deliver HVAC controls in Level 3

⁶⁰ **(Motor) Drives** – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4.

⁶¹ **Predictive and Preventative Maintenance** – Maintenance within the Industrial Electrician Trade may be described differently than within the Construction Electrician Trade. A card for “Predictive and Preventative Maintenance” is not based on a task, but rather a performance indicator, and is illustrated to verify the content.

16.3. Industrial Electrician – Topic Detail/ Sub-Task by RSOS 2015

(Displayed with the family of trades: Industrial Electrician and Construction Electrician)

Colour Coding:

0.00 – Construction Electrician sub-tasks

0.00 – Industrial Electrician sub-tasks

In Context	In Context	In Context	In Context	In Context
Organizes Work	Organizes Work	Organizes Work	Organizes Work	Organizes Work
Protection Devices	Protection Devices	Protection Devices	Protection Devices	Protection Devices
Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications	Plans, Drawings and Specifications
Electronics (No task in the RSOS) (BC only)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)	Electronics (No task in the RSOS)
Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)	Canadian Electrical Code (No task in the RSOS)
	Support Components	Support Components	Support Components	Support Components
		Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures
Commissions and Decommissions Systems ⁶²	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems	Commissions and Decommissions Systems

⁶² *Commissions and Decommissions Systems* – will include CE sub-tasks 5.01, 5.02; IE sub-tasks 5.01, 5.02, and 5.03 as required in context.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Safety</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment.</p> <p>1.02 Maintains safe work environment.</p> <p>1.03 Performs lock-out and tag-out procedures.</p> <p>1.01 Maintains safe work environment.</p> <p>1.02 Uses personal protective equipment (PPE) and safety equipment.</p> <p>1.03 Performs lock out and tag out procedures.</p> <p>1.04 Identifies environmental conditions.</p>				
<p>Tools and Equipment</p> <p>2.01 Uses common and specialty tools and equipment.</p> <p>2.02 Uses access equipment.</p> <p>2.03 Uses rigging, hoisting and lifting equipment.</p> <p>2.01 Uses common and specialty tools and equipment.</p> <p>2.02 Uses access equipment.</p> <p>2.03 Uses rigging, hoisting and lifting equipment.</p>				

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Support Components</p> <p>4.01 Fabricates support structures. 4.02 Installs brackets, hangers and fasteners 4.03 Installs seismic restraint systems.</p> <p>4.01 Fabricates support structures 4.02 Installs brackets, hangers and fasteners. 4.03 Installs seismic restraint systems.</p>				
<p>Communication and Mentoring Techniques</p> <p>6.01 Uses communication techniques. 6.01 Uses communication techniques.</p>			<p>Communication and Mentoring Techniques</p> <p>6.02 Uses mentoring techniques</p>	<p>Communication and Mentoring Techniques</p> <p>6.02 Uses mentoring techniques</p>
<p>Grounding, Bonding</p> <p>11.01 Installs grounding and bonding systems. 11.01 Installs grounding systems. 11.03 Installs bonding systems.</p>	<p>Grounding, Bonding (Single-Phase)</p> <p>11.01 Installs grounding and bonding systems. 11.02 Installs ground fault systems. 11.03 Installs lightning protection systems. 11.01 Installs grounding systems. 11.02 Maintains grounding systems. 11.03 Installs bonding systems. 11.04 Maintains bonding systems. 11.05 Installs ground fault detection systems.</p>	<p>Grounding, Bonding (Three-Phase)</p> <p>11.01 Installs grounding and bonding systems. 11.02 Installs ground fault systems. 11.03 Installs lightning protection systems. 11.01 Installs grounding systems. 11.02 Maintains grounding systems. 11.03 Installs bonding systems. 11.04 Maintains bonding systems. 11.05 Installs ground fault detection systems.</p>	<p>Grounding, Bonding Ground Fault Detection Systems</p> <p>11.04 Performs servicing and maintenance of bonding and grounding systems.</p>	<p>Grounding, Bonding Ground Fault Detection Systems</p> <p>11.06 Maintains ground fault detection systems.</p>

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Raceways, Cables, Conductors and Enclosures</p> <p>16.01 Installs conductors and cables</p> <p>16.02 Installs conduit, tubing and fittings.</p> <p>16.03 Installs raceways.</p> <p>16.04 Installs boxes and enclosures.</p> <p>16.05 Performs servicing and maintenance of raceways, cables and enclosures.</p> <p>16.01 Installs conductors and cables.</p> <p>16.02 Maintains conductors and cables.</p> <p>16.03 Installs conduit, tubing and fittings.</p> <p>16.04 Installs raceways.</p> <p>16.05 Installs boxes and enclosures.</p> <p>16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures.</p>	<p>Raceways, Cables, Conductors and Enclosures</p> <p>16.01 Installs conductors and cables</p> <p>16.02 Installs conduit, tubing and fittings.</p> <p>16.03 Installs raceways.</p> <p>16.04 Installs boxes and enclosures.</p> <p>16.05 Performs servicing and maintenance of raceways, cables and enclosures.</p> <p>16.01 Installs conductors and cables.</p> <p>16.02 Maintains conductors and cables.</p> <p>16.03 Installs conduits, tubing and fittings.</p> <p>16.04 Installs raceways.</p> <p>16.05 Installs boxes and enclosures.</p> <p>16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures.</p>			

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Branch Circuitry and Devices (AC/DC introduction)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Single-Phase)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Three-Phase)</p> <p>17.01 Installs luminaires. 17.02 Installs wiring devices 17.03 Installs lighting controls. 17.04 Installs lighting standards. 17.05 Performs servicing of branch circuitry.</p> <p>17.01 Installs luminaires. 17.02 Maintains luminaires. 17.03 Installs wiring devices. 17.04 Maintains wiring devices.</p>	<p>Branch Circuitry and Devices (Specialty)</p> <p>17.06 Installs, services and maintains airport runway lighting systems. 17.07 Installs, services and maintains traffic signal lights and controls.</p>	
<p>Consumer/Supply Services and Metering Equipment (Single-Phase)</p> <p>7.01 Installs single-phase consumer/supply services and metering equipment. 7.01 Installs single-phase consumer/supply services and metering equipment. 7.02 Maintains single-phase consumer/supply services and metering equipment.</p>		<p>Consumer/Supply Services and Metering Equipment (Single-Phase)⁶³</p> <p>7.02 Installs three-phase consumer/supply services and metering equipment. 7.04 Performs servicing and maintenance of three-phase services and metering equipment. 7.03 Installs three-phase consumer/supply services and metering equipment. 7.04 Maintains three-phase consumer/supply services and metering equipment.</p>		

⁶³ *Consumer/Supply Services and Metering Equipment* - Ontario will cover three-phase in Level 2

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Distribution Equipment (Single-Phase) 9.01 Installs power distribution equipment. 9.01 Installs low-voltage distribution equipment.</p>		<p>Distribution Equipment (Three-Phase) 9.02 Performs servicing and maintenance of power distribution equipment. 9.02 Maintains low voltage distribution equipment.</p>		
	<p>Power Generating Systems (DC) 12.03 Installs DC (direct current) generating systems. 12.04 Performs servicing and maintenance of DC generating systems. 12.03 Installs DC (direct current) generating systems. 12.04 Maintains DC generating systems.</p>	<p>Power Generating Systems (AC) 12.01 Installs AC (alternating current) generating systems. 12.02 Performs servicing and maintenance of AC generating systems. 12.01 Installs AC (alternating current) generating systems. 12.02 Maintains AC generating systems.</p>		
	<p>Transformers (Single-Phase) 15.01 Installs extra-low voltage transformers. 15.02 Installs low-voltage single-phase transformers. 15.01 Installs extra-low voltage transformers. 15.02 Maintains extra-low voltage transformers. 15.03 Installs low voltage single-phase transformers. 15.04 Maintains low voltage single-phase transformers.</p>	<p>Transformers (Three-Phase) 15.03 Installs low-voltage three-phase transformers. 15.04 Installs high voltage transformers. 15.05 Performs servicing and maintenance of transformers. 15.05 Installs low voltage three-phase transformers. 15.06 Maintains low voltage three-phase transformers. 15.07 Installs high voltage transformers. 15.08 Maintains high voltage transformers.</p>		
	<p>Exit and Emergency Lighting Systems 20.01 Installs exit and emergency lighting. 20.02 Performs servicing and maintenance of exit and emergency lighting systems. 20.01 Installs exit and emergency lighting. 20.02 Maintains exit and emergency lighting systems.</p>			

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Cathodic Protection Systems</p> <p>21.01 Installs cathodic protection systems.</p> <p>21.02 Performs servicing and maintenance of cathodic protection systems.</p> <p>21.01 Installs cathodic protection systems.</p> <p>21.02 Maintains cathodic protection systems.</p>			
			<p>Signaling Systems^{64 65}</p> <p>26.01 Installs fire alarm systems.</p> <p>26.02 Performs servicing and maintenance of fire alarm systems.</p> <p>26.03 Installs security and surveillance systems.</p> <p>26.04 Performs servicing and maintenance of security and surveillance systems.</p>	<p>Signaling Systems⁶⁶</p> <p>26.01 Installs fire alarm systems.</p> <p>26.02 Maintains fire alarm systems.</p> <p>26.03 Installs security and surveillance systems.</p> <p>26.04 Maintains security and surveillance systems.</p>
	<p>Electric Heating Systems and Controls</p> <p>19.01 Installs electric heating systems.</p> <p>19.02 Installs electric heating system controls.</p> <p>19.03 Performs servicing and maintenance of electric heating systems and controls.</p> <p>19.01 Installs electric heating systems and controls.</p> <p>19.02 Maintains electric heating systems and controls.</p>			

⁶⁴ **Signaling Systems** – (Variations) Saskatchewan and Alberta will deliver in Level 1 as well. Ontario will deliver in Levels 1 and 2.

⁶⁵ **Signaling Systems** – In Alberta, Journeyperson Certification is required to install, maintain, test and verify fire alarm systems.

⁶⁶ **Signaling Systems** – (Variation) Ontario will deliver in Levels 1 and 2.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Heating, Ventilation and Air Conditioning (HVAC)⁶⁷ 18.01 Connects HVAC systems. 18.02 Installs HVAC controls. 18.03 Performs servicing and maintenance of HVAC systems and controls. 18.01 Connects power to HVAC systems and associated equipment. 18.02 Installs HVAC controls. 18.03 Maintains HVAC electrical components.</p>			
	<p>Motor Starters and Controls 22.01 Installs motor starters. 22.02 Performs servicing and maintenance of motor starters. 22.03 Installs motor controls. 22.04 Performs servicing and maintenance of motor controls. 22.01 Installs motor starters. 22.02 Maintains motor starters. 22.03 Installs motor control devices. 22.04 Maintains motor control devices</p>	<p>Motor Starters and Controls 22.01 Installs motor starters. 22.02 Performs servicing and maintenance of motor starters. 22.03 Installs motor controls. 22.04 Performs servicing and maintenance of motor controls. 22.01 Installs motor starters. 22.02 Maintains motor starters. 22.03 Installs motor control devices. 22.04 Maintains motor control devices.</p>		
				<p>Non-Rotating Equipment and Controls 24.01 Installs non-rotating equipment and associated controls. 24.02 Maintains non-rotating equipment and associated controls.</p>

⁶⁷ HVAC - (Variations) NB, PE, MB and NL will deliver HVAC controls in Level 3

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
	<p>Motors (DC)</p> <p>24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>	<p>Motors (Single-Phase and Three-Phase)</p> <p>24.01 Installs single-phase motors. 24.02 Performs servicing and maintenance of single-phase 24.03 Installs three-phase motors. 24.04 Performs servicing and maintenance of three-phase motors. 24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors. 25.01 Installs single-phase motors. 25.02 Maintains single-phase motors. 25.03 Installs three-phase motors. 25.04 Maintains three-phase motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>	<p>Motors (Install/Maintain)</p> <p>24.01 Installs single-phase motors. 24.02 Performs servicing and maintenance of single-phase motors. 24.03 Installs three-phase motors. 24.04 Performs servicing and maintenance of three-phase motors. 24.05 Installs DC motors. 24.06 Performs servicing and maintenance of DC motors.</p>	<p>Motors (Install/Maintain)</p> <p>25.01 Installs single-phase motors. 25.02 Maintains single-phase motors. 25.03 Installs three-phase motors. 25.04 Maintains three-phase motors. 25.05 Installs DC motors. 25.06 Maintains DC motors.</p>
		<p>(Motor) Drives⁶⁸</p> <p>23.01 Installs AC drives. 23.02 Performs servicing and maintenance of AC drives. 23.03 Installs DC drives. 23.04 Performs servicing and maintenance of DC drives. 23.01 Installs AC drives. 23.02 Maintains AC drives. 23.03 Installs DC drives. 23.04 Maintains DC drives.</p>		

⁶⁸ **(Motor) Drives** – (Variations) Alberta and Manitoba will deliver additional content in VFD Electronics in Level 4.

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
			<p>High Voltage Systems 14.01 Installs high voltage equipment. 14.02 Installs high voltage cables. 14.03 Performs servicing and maintenance of high voltage systems.</p>	<p>High Voltage Systems 14.01 Installs high voltage, equipment. 14.02 Maintains high voltage systems.</p>
			<p>UPS and Surge Suppression Systems 10.01 Installs power conditioning, UPS and surge suppression systems. 10.02 Performs servicing and maintenance of power conditioning, UPS and surge suppression systems.</p>	<p>Power Conditioning Systems 10.01 Installs power conditioning systems. 10.02 Maintains power conditioning systems.</p>
	<p>Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems. 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.</p>		<p>Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.</p>	<p>Renewable Energy Generating and Storage Systems 13.01 Installs renewable energy systems. 13.02 Performs servicing and maintenance of renewable energy systems.</p>

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
<p>Communication Systems</p> <p>27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems.</p> <p>27.02 Installs public address (PA) and intercom systems.</p> <p>27.03 Installs nurse call systems.</p> <p>27.01 Installs communication systems.</p>			<p>Communication Systems</p> <p>27.01 Installs voice/data/video (VDV) and community antenna television (CATV) systems.</p> <p>27.02 Installs public address (PA) and intercom systems.</p> <p>27.03 Installs nurse call systems</p> <p>27.04 Performs servicing and maintenance of communication systems.</p>	<p>Communication Systems</p> <p>27.01 Installs communication systems.</p> <p>27.02 Maintains communications systems.</p>
			<p>Building Automation Systems (Integrated Control Systems)</p> <p>28.01 Installs building automation systems.</p> <p>28.02 Installs building control systems.</p> <p>28.03 Performs servicing and maintenance of integrated control systems</p>	<p>Building Automation Systems</p> <p>28.01 Installs building automation systems.</p> <p>28.02 Maintains building automation systems.</p>
				<p>Input / Output Field Devices</p> <p>29.01 Installs discrete input/output devices.</p> <p>29.02 Maintains discrete input/output devices.</p> <p>29.03 Installs analog input/output devices.</p> <p>29.04 Maintains analog input/output devices.</p>

Level 1	Level 2	Level 3	Level 4 Construction	Level 4 Industrial
			<p>Automated Control Systems</p> <p>25.01 Installs automated control systems.</p> <p>25.02 25.02 Performs servicing and maintenance of automated control systems.</p> <p>25.03 Programs and configures automated control systems.</p>	<p>Automated Control Systems</p> <p>30.01 Installs automated control systems.</p> <p>30.02 Maintains automated control systems.</p> <p>30.03 Programs automated control systems.</p> <p>30.04 Optimizes system performance.</p>
				<p>Predictive and Preventative Maintenance⁶⁹</p>
				<p>Pneumatic and Hydraulic Control Systems</p> <p>31.01 Installs pneumatic control systems.</p> <p>31.02 Maintains pneumatic control systems.</p> <p>31.03 Installs hydraulic control systems.</p> <p>31.04 Maintains hydraulic control systems.</p>

⁶⁹ **Predictive and Preventative Maintenance** – Maintenance within the Industrial Electrician Trade may be described differently than within the Construction Electrician Trade. A card for “Predictive and Preventative Maintenance” is not based on a task, but rather a performance indicator, and is illustrated to verify the content.

15.4. Industrial Electrician – Phase 7 Sequencing Review

Level 1	Level 2	Level 3	Level 4
	Context	Context	Context
	Organizes Work	Organizes Work	Organizes Work
	Support Components	Support Components	Support Components
	Electrical Systems (Commissions and Decommissions)	Electrical Systems (Commissions and Decommissions)	Electrical Systems (Commissions and Decommissions)
	Protection Devices	Protection Devices	Protection Devices
		Raceways, Cables, Conductors and Enclosures	Raceways, Cables, Conductors and Enclosures

Safety-Related Functions

- 1.01 Maintains safe work environment
- 1.02 Uses personal protective equipment (PPE) and safety equipment
- 1.03 Performs lock-out and tag-out procedures
- 1.04 Identifies environmental conditions

Tools and Equipment

- 2.01 Uses common and specialty tools and equipment
- 2.02 Uses access equipment
- 2.03 Uses rigging, hoisting and lifting equipment

Organizes Work

- 3.01 Interprets plans, drawings and specifications
- 3.02 Identifies hazardous installations
- 3.03 Organizes materials and supplies
- 3.04 Plans project tasks and procedures
- 3.05 Prepares specific location in facility
- 3.06 Finalizes required documentation

Support Components

- 4.01 Fabricates support structures
- 4.02 Installs brackets, hangers and fasteners
- 4.03 Installs seismic restraint systems

**Electrical Systems
(Commissions and Decommissions)**

- 5.01 Commissions systems
- 5.02 Performs shutdown and startup procedures
- 5.03 Decommissions systems

Communication Techniques

- 6.01 Uses communication techniques

**Utility and non-Utility/Supply Services and
Metering Equipment**

- 7.01 Installs single-phase utility and non-utility/supply services and metering equipment
- 7.02 Maintains single-phase utility and non-utility/supply services and metering equipment

Protection Devices

- 8.01 Installs overcurrent protection devices
- 8.02 Maintains overcurrent protection devices
- 8.03 Installs ground fault, arc fault and surge protection devices
- 8.04 Maintains ground fault, arc fault and surge protection devices
- 8.05 Installs under-and-over voltage protection devices
- 8.06 Maintains under-and-over voltage protection devices

Low-Voltage Distribution Systems

- 9.01 Installs low-voltage distribution equipment
- 9.02 Maintains low-voltage distribution equipment

Mentoring Techniques

- 6.02 Uses mentoring techniques

**Utility and non-Utility/Supply Services and
Metering Equipment**

- 7.03 Installs three-phase utility and non-utility/supply services and metering equipment
- 7.04 Maintains three-phase utility and non-utility/supply services and metering equipment

Low-Voltage Distribution Systems

- 9.01 Installs low-voltage distribution equipment
- 9.02 Maintains low-voltage distribution equipment

Power Conditioning Systems

- 10.01 Installs power conditioning systems
- 10.02 Maintains power conditioning systems

Bonding and Grounding and Ground-Fault Protection and Detection Systems

- 11.01 Installs grounding systems
- 11.03 Installs bonding systems

Bonding and Grounding and Ground-Fault Protection and Detection Systems

- 11.01 Installs grounding systems
- 11.02 Maintains grounding systems
- 11.03 Installs bonding systems
- 11.04 Maintains bonding systems
- 11.05 Installs ground-fault protection and detection systems

Bonding and Grounding and Ground-Fault Protection and Detection Systems

- 11.01 Installs grounding systems
- 11.02 Maintains grounding systems
- 11.03 Installs bonding systems
- 11.04 Maintains bonding systems
- 11.05 Installs ground-fault protection and detection systems

Bonding and Grounding and Ground-Fault Protection and Detection Systems

- 11.06 Maintains ground-fault protection and detection systems

Power Generating and Conversion Systems

- 12.03 Installs direct current (DC) generating and conversion systems
- 12.04 Maintains DC generating and conversion systems

Power Generating and Conversion Systems

- 12.01 Installs alternating current (AC) generating systems
- 12.02 Maintains AC generating systems

Renewable Energy Generating and Energy Storage Systems

- 13.01 Installs renewable energy generating and energy storage systems
- 13.02 Maintains renewable energy generating and energy storage systems

Renewable Energy Generating and Energy Storage Systems

- 13.01 Installs renewable energy generating and energy storage systems
- 13.02 Maintains renewable energy generating and energy storage systems

High-Voltage Systems

- 14.01 Installs high-voltage systems
- 14.02 Maintains high-voltage systems

Transformers

- 15.01 Installs extra-low voltage transformers
- 15.02 Maintains extra-low voltage transformers
- 15.03 Installs low voltage single-phase transformers
- 15.04 Maintains low voltage single-phase transformers

Transformers

- 15.05 Installs low voltage three-phase transformers
- 15.06 Maintains low voltage three-phase transformers
- 15.07 Installs high voltage transformers.
- 15.08 Maintains high voltage transformers

Raceways, Cables, Conductors and Enclosures

- 16.01 Installs conductors and cables
- 16.02 Maintains conductors and cables
- 16.03 Installs conduit, tubing and fittings
- 16.04 Installs raceways
- 16.05 Installs boxes and enclosures
- 16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures

Raceways, Cables, Conductors and Enclosures

- 16.01 Installs conductors and cables
- 16.02 Maintains conductors and cables
- 16.03 Installs conduit, tubing and fittings
- 16.04 Installs raceways
- 16.05 Installs boxes and enclosures
- 16.06 Maintains conduit, tubing, fittings, raceways, boxes and enclosures

Branch Circuitry and Devices

- 17.01 Installs luminaires
- 17.02 Maintains luminaires
- 17.03 Installs wiring devices
- 17.04 Maintains wiring devices

Branch Circuitry and Devices

- 17.01 Installs luminaires
- 17.02 Maintains luminaires
- 17.03 Installs wiring devices
- 17.04 Maintains wiring devices

Branch Circuitry and Devices

- 17.01 Installs luminaires
- 17.02 Maintains luminaires
- 17.03 Installs wiring devices
- 17.04 Maintains wiring devices

HVAC Electrical Components

- 18.01 Connects power to HVAC systems and associated equipment
- 18.02 Installs HVAC controls
- 18.03 Maintains HVAC electrical components

Electric Heating Systems and Controls

- 19.01 Installs electric heating systems and controls
- 19.02 Maintains electric heating systems and controls

Exit and Emergency Lighting Systems

- 20.01 Installs exit and emergency lighting systems
- 20.02 Maintains exit and emergency lighting systems

Cathodic Protection Systems

- 21.01 Installs cathodic protection systems
- 21.02 Maintains cathodic protection systems

Motors, Starters and Control Devices

- 22.01 Installs motor starters
- 22.02 Maintains motor starters
- 22.03 Installs motor control devices
- 22.04 Maintains motor control devices

Motors, Starters and Control Devices

- 22.01 Installs motor starters
- 22.02 Maintains motor starters
- 22.03 Installs motor control devices
- 22.04 Maintains motor control devices

Drives

- 23.01 Installs AC drives
- 23.02 Maintains AC drives
- 23.03 Installs DC drives
- 23.04 Maintains DC drives

Other Fixed Equipment and Associated Controls

- 24.01 Installs other fixed equipment and associated controls
- 24.02 Maintains other fixed equipment and associated controls

Motors

- 25.05 Installs DC motors
- 25.06 Maintains DC motors

Motors

- 25.01 Installs single-phase motors
- 25.02 Maintains single-phase motors
- 25.03 Installs three-phase motors
- 25.04 Maintains three-phase motors
- 25.05 Installs DC motors
- 25.06 Maintains DC motors

Motors

- 25.01 Installs single-phase motors
- 25.02 Maintains single-phase motors
- 25.03 Installs three-phase motors
- 25.04 Maintains three-phase motors
- 25.05 Installs DC motors.
- 25.06 Maintains DC motors

Signalling Systems

- 26.01 Installs fire alarm systems
- 26.02 Maintains fire alarm systems
- 26.03 Installs security and surveillance systems
- 26.04 Maintains security and surveillance systems

Communication Systems

- 27.01 Installs communications systems
- 27.02 Maintains communication systems

Communication Systems

- 27.02 Maintains communication systems

Building Automation Systems

- 28.01 Installs building automation systems
- 28.02 Maintains building automation systems

Input/Output (I/O) Devices

- 29.01 Installs discrete input/output (I/O) devices
- 29.02 Maintains discrete input/output (I/O) devices
- 29.03 Installs analog input/output (I/O) devices
- 29.04 Maintains analog input/output (I/O) devices

Automated Control Systems

- 30.01 Installs automated control systems
- 30.02 Maintains automated control systems
- 30.03 Programs automated control systems
- 30.04 Optimizes system performance

Pneumatic and Hydraulic Control Systems

- 31.01 Installs pneumatic control systems
- 31.02 Maintains pneumatic control systems
- 31.03 Installs hydraulic control systems
- 31.04 Maintains hydraulic control systems

17. Steamfitter/Pipefitter

17.1. Steamfitter/Pipefitter Recommendations

That provinces and territories adopt the **Red Seal trade name Steamfitter/Pipefitter / Monteur/Monteuse d'appareils de chauffage**

Slight variations include; Ontario – Steamfitter; Manitoba - Steamfitter-Pipefitter; Saskatchewan – Steamfitter-Pipefitter; Alberta – Steamfitter-Pipefitter; Northwest Territories – Steamfitter and Pipefitter (French) New Brunswick – Tuyauteur-monteur de tuyaux à vapeur; Ontario – Monteur de tuyaux de vapeurs; Manitoba – Monteur d'appareils de chauffage; Northwest Territories – Tuyauteur-monteur d'appareils à vapeur.

- That the total number of training hours be **7200 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

17.2. Steamfitter/Pipefitter – Snapshot

In context	In context	In context	In context	
Organizes Job	Organizes Job	Organizes Job	Organizes Job	
	Rigging, Hoisting, Lifting	Rigging, Hoisting, Lifting		
	Valves	Fabrication	Fabrication	
		Layout	Layout	
	Steam Systems	Valves	Valves	Valves
		Commissions Systems		Heat Tracing Systems
				Industrial Water and Waste Treatment Systems
			Fuel Systems	
Commissions Systems	Commissions Systems	Commissions Systems	Commissions Systems	
Level One	Level Two	Level Three	Level Four	
Safety				
Tools and Equipment	Tools and Equipment			
Rigging, Hoisting, Lifting			Complex Rigging	
Fabrication	Fabrication			
Layout	Layout			
Valves				
	Heat Tracing Systems Liquid	Heat Tracing Systems Steam		
			Process Piping	
			Hydraulic Systems	
			Air and Pneumatic Systems	
		Industrial Water Treatment Equipment		
	Hydronic Systems	Hydronic Systems Controls		
		Steam Systems Low Pressure	Steam Systems High Pressure	
			HVACR	
		Fuel Systems		
		Medical Gas		
			Heat Recovery Systems	
			Geothermal Systems and Solar Heating Systems	
			Commissions System	

-Additional credentials such as cross-connection certification, gas licensing, fire protection and other credentials are considered to **meet and exceed** the topics sequenced in this document.

-Trade related Math, Science and Electrical Theory/Safety are integral to the Steamfitter/Pipefitter trade. While not a specific occupational training topic in this document, training providers may include Math and Science training as required to perform activities outlined in the RSOS. Components in the RSOS that may inform such training are knowledge and skill elements and range of variables.

17.3. Steamfitter/Pipefitter – Topic - Sub-Task by RSOS 2015

In context	In context	In context	In context
Organizes Job 3.01 Plans work. 3.02 Generates drawings. 3.03 Interprets drawings and specifications. 3.04 Develops piping templates. 3.05 Performs preliminary quality control functions.	Organizes Job 3.01 Plans work. 3.02 Generates drawings. 3.03 Interprets drawings and specifications. 3.04 Develops piping templates. 3.05 Performs preliminary quality control functions.	Organizes Job 3.01 Plans work. 3.02 Generates drawings. 3.03 Interprets drawings and specifications. 3.04 Develops piping templates. 3.05 Performs preliminary quality control functions.	Organizes Job 3.01 Plans work. 3.02 Generates drawings. 3.03 Interprets drawings and specifications. 3.04 Develops piping templates. 3.05 Performs preliminary quality control functions.
	Rigging, Hoisting, Lifting	Rigging, Hoisting, Lifting	
		Fabrication	Fabrication
		Layout	Layout
	Valves	Valves	Valves
			Heat Tracing Systems
			Industrial Water Treatment Equipment
	Steam Systems		
			Fuel Systems
Commissions Systems	Commissions Systems	Commissions Systems	

Level One	Level Two	Level Three	Level Four
<p>Safety</p> <p>1.01 Maintains safe work environment. 1.02 Selects, inspects and uses personal protective equipment (PPE) and safety equipment. 1.03 Follows lock-out procedures.</p>			
<p>Tools and Equipment</p> <p>2.01 Uses common tools and equipment 2.02 Uses access equipment. 2.03 Uses Welding Equipment 2.04 Uses soldering and brazing equipment.</p>	<p>Tools and Equipment</p> <p>2.03 Uses Welding Equipment 2.05 Uses oxy-fuel equipment. 8.06 Sets up rigging, hoisting, lifting and positioning equipment.</p>		
<p>Rigging, Hoisting, Lifting</p> <p>8.01 Determines load. 8.02 Prepares lift plan(s). 8.03 Selects rigging, hoisting, lifting and positioning equipment. 8.04 Inspects rigging, hoisting, lifting and positioning equipment. 8.05 Secures lift area. 8.06 Sets up rigging, hoisting, lifting and positioning equipment 8.07 Performs lift and positioning. 8.08 Maintains and stores rigging, hoisting, lifting and positioning equipment.</p>			<p>Complex Rigging</p> <p>9.01 Prepares lift plan for complex and critical rigging, hoisting, lifting and positioning. 9.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning. 9.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts. 9.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts. 9.05 Performs complex and critical lifts and positioning.</p>
<p>Fabrication</p> <p>4.02 Fabricates brackets, supports, hangers, guides and anchors.</p>	<p>Fabrication</p> <p>4.01 Fabricates piping system components.</p>		
<p>Layout</p> <p>5.01 Lays out, identifies and installs copper piping, tubing, fittings and related components. 5.02 Lays out, identifies and installs plastic piping, tubing, fittings and related components. 5.03 Lays out, identifies and installs carbon steel piping, tubing, fittings and related components. 5.04 Lays out, identifies and installs stainless steel piping, tubing, fittings and related components.</p>	<p>Layout</p> <p>5.05 Lays out, identifies and installs fibreglass piping, fittings and related components. 5.06 Lays out, identifies and installs specialty piping, fittings and related components.</p>		

Level One	Level Two	Level Three	Level Four
Valves 6.01 Installs valves. 6.02 Maintains, troubleshoots, repairs and tests valves.			
	Heat Tracing Systems (Liquid) 7.03 Installs liquid-filled tracing systems. 7.04 Maintains, troubleshoots, repairs and tests liquid-filled tracing systems.	Heat Tracing Systems (Steam) 7.01 Installs steam tracing systems. 7.02 Maintains, troubleshoots, repairs and tests steam tracing systems.	
			Process Piping 13.01 Installs equipment for process piping systems. 13.02 Installs piping for process piping systems. 13.03 Tests process piping systems. 13.04 Maintains, troubleshoots and repairs process piping systems.
			Hydraulic Systems 15.01 Installs equipment for hydraulic systems. 15.02 Installs piping, tubing and hoses for hydraulic systems. 15.03 Tests hydraulic systems. 15.04 Maintains, troubleshoots and repairs hydraulic systems.
			Air and Pneumatic Systems 19.01 Installs equipment for compressed air and pneumatic systems. 19.02 Installs piping and tubing for compressed air and pneumatic systems. 19.03 Tests compressed air and pneumatic systems. 19.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems.

Level One	Level Two	Level Three	Level Four
		<p>Industrial Water Treatment Equipment</p> <p>14.01 Installs equipment for industrial water and waste treatment systems.</p> <p>14.02 Installs piping for industrial water and waste treatment systems.</p> <p>14.03 Tests industrial water and waste treatment systems.</p> <p>14.04 Maintains, troubleshoots and repairs industrial water and waste treatment systems.</p>	
	<p>Hydronic Systems</p> <p>12.01 Installs equipment for hydronic systems.</p> <p>12.02 Installs piping for hydronic systems.</p> <p>12.03 Tests hydronic systems.</p> <p>12.04 Maintains, troubleshoots and repairs hydronic systems.</p>	<p>Hydronic Systems (Controls)</p> <p>12.01 Installs equipment for hydronic systems.</p> <p>12.02 Installs piping for hydronic systems.</p> <p>12.03 Tests hydronic systems.</p> <p>12.04 Maintains, troubleshoots and repairs hydronic systems.</p>	
		<p>Steam Systems (Low Pressure)</p> <p>10.01 Installs equipment for low pressure steam and condensate systems.</p> <p>10.02 Installs piping for low pressure steam and condensate systems.</p> <p>10.03 Tests low pressure steam and condensate systems.</p> <p>10.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems.</p>	<p>Steam Systems (High Pressure)</p> <p>11.01 Installs equipment for high pressure steam and condensate systems.</p> <p>11.02 Installs piping for high pressure steam and condensate systems.</p> <p>11.03 Tests high pressure steam and condensate systems.</p> <p>11.04 Maintains, troubleshoots and repairs high pressure steam and condensate systems.</p>
			<p>HVACR</p> <p>16.01 Installs equipment for HVACR systems.</p> <p>16.02 Installs hydronic piping and refrigeration tubing for HVACR systems.</p> <p>16.03 Tests associated components of HVACR systems.</p> <p>16.04 Maintains, troubleshoots and repairs associated components of HVACR systems.</p>

Level One	Level Two	Level Three	Level Four
		Fuel Systems 17.01 Installs equipment for fuel systems. 17.02 Installs piping and tubing for fuel systems. 17.03 Tests fuel systems. 17.04 Maintains, troubleshoots and repairs fuel systems.	
			Heat Recovery Systems 23.01 Installs equipment for heat recovery systems. 23.02 Installs piping for heat recovery systems. 23.03 Tests heat recovery systems. 23.04 Maintains, troubleshoots and repairs heat recovery systems.
			Geothermal Systems Solar Heating Systems 21.01 Installs equipment for geo-exchange and geothermal systems. 21.02 Installs piping for geo-exchange and geothermal systems. 21.03 Tests geo-exchange and geothermal systems. 21.04 Maintains, troubleshoots and repairs geo-exchange and geothermal systems. 22.01 Installs equipment for solar heating systems. 22.02 Installs piping for solar heating systems. 22.03 Tests solar heating systems. 22.04 Maintains, troubleshoots and repairs solar heating systems.

			<p>Commissions System</p> <p>24.01 Flushes system.</p> <p>24.02 Chemically treats system.</p> <p>24.03 Pre-checks system for commissioning.</p> <p>24.04 Selects and connects commissioning equipment.</p> <p>25.01 Secures commissioning area.</p> <p>25.02 Pressurizes system.</p> <p>25.03 Inspects system</p> <p>25.04 Corrects faulty conditions.</p> <p>25.05 Participates in start-up and turnover</p>
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-Additional credentials such as cross-connection certification, gas licensing, fire protection and other credentials are considered to **meet and exceed** the topics sequenced in this document.

-Trade related Math, Science and Electrical Theory/Safety are integral to the Steamfitter/Pipefitter trade. While not a specific occupational training topic in this document, training providers may include Math and Science training as required to perform activities outlined in the RSOS. Components in the RSOS that may inform such training are knowledge and skill elements and range of variables.

17.3. Steamfitter/Pipefitter – Phase 7 Review

Level 1	Level 2	Level 3	Level 4
	Context	Context	Context
	Tools and Equipment		
		Organizes Job	Organizes Job
	Rigging, Hoisting Lifting	Rigging, Hoisting Lifting	
		Fabrication	Fabrication
		Piping, Tubing, Fittings, Fitting and Related Components (Layout)	Piping, Tubing, Fittings, Fitting and Related Components (Layout)
	Valves	Valves	Valves
			Heat Tracing Systems
			Industrial Water and Waste Treatment Systems
			Fuel Systems
	Commissions Systems	Commissions Systems	
Safety-Related Functions 1.01 Maintains safe work environment. 1.02 Selects, inspects and uses personal protective equipment (PPE) and safety equipment. 1.03 Follows lock-out and tag-out (LOTO) procedures.			
Tools and Equipment 2.01 Uses common tools and equipment 2.02 Uses access equipment 2.03 Uses welding equipment 2.04 Uses soldering and brazing equipment 2.05 Uses oxy-fuel and plasma cutting equipment			

<p style="text-align: center;">Organizes Job</p> <p>3.01 Plans work 3.02 Generates drawings 3.03 Interprets drawings and specifications 3.04 Develops piping templates 3.05 Performs quality control functions 3.06 Handles materials and components</p>	<p style="text-align: center;">Organizes Job</p> <p>3.04 Develops piping templates</p>		
<p>Communication Techniques</p> <p>4.01 Uses communication techniques</p>			<p style="text-align: center;">Mentoring Techniques</p> <p>4.02 Uses mentoring techniques</p>
<p>Fabrication</p> <p>5.02 Fabricates brackets, supports, hangers, guides and anchors</p>	<p style="text-align: center;">Fabrication</p> <p>5.01 Fabricates piping system components</p>		
<p>Piping, Tubing, Fittings, Fitting and Related Components (Layout)</p> <p>6.01 Lays out and installs copper tube, tubing, fittings and related components 6.02 Lays out and installs plastic piping, fittings and related components 6.03 Lays out and installs carbon steel piping, fittings and related components 6.04 Lays out and installs stainless steel piping, tubing, fittings and related components</p>	<p style="text-align: center;">Piping, Tubing, Fittings, Fitting and Related Components (Layout)</p> <p>6.05 Lays out and installs fiberglass piping, fittings and related components 6.06 Lays out and installs specialty piping, fittings and related components</p>		
<p>Valves</p> <p>7.01 Installs valves 7.02 Maintains, troubleshoots, repairs and tests valves</p>			
	<p style="text-align: center;">Heat Tracing Systems (Liquid)</p> <p>8.03 Installs liquid-filled tracing systems 8.04 Maintains, troubleshoots, repairs and tests liquid-filled tracing systems</p>	<p style="text-align: center;">Heat Tracing Systems (Steam)</p> <p>8.01 Installs steam tracing systems 8.02 Maintains, troubleshoots, repairs and tests steam tracing systems</p>	

<p>Rigging, Hoisting, Lifting and Positioning (Common)</p> <p>9.01 Determines load.</p> <p>9.02 Prepares lift plan(s) for common rigging, hoisting, lifting and positioning</p> <p>9.03 Selects rigging, hoisting, lifting and positioning equipment for common lifts</p> <p>9.04 Inspects rigging, hoisting, lifting and positioning equipment</p> <p>9.05 Secures lift area</p> <p>9.06 Sets up rigging, hoisting, lifting and positioning equipment for common lifts</p> <p>9.07 Performs common lift and positioning</p> <p>9.08 Maintains and stores rigging, hoisting, lifting and positioning equipment</p>			
			<p>Rigging, Hoisting, Lifting and Positioning (Complex)</p> <p>10.01 Prepares lift plan for complex and critical rigging, hoisting, lifting and positioning</p> <p>10.02 Performs calculations for complex and critical rigging, hoisting, lifting and positioning</p> <p>10.03 Selects rigging, hoisting, lifting and positioning equipment for complex and critical lifts</p> <p>10.04 Sets up rigging, hoisting, lifting and positioning equipment for complex and critical lifts</p> <p>10.05 Performs complex and critical lifts and positioning</p>

		<p>Low Pressure Steam and Condensate Systems</p> <p>11.01 Installs equipment for low pressure steam and condensate systems</p> <p>11.02 Installs piping for low pressure steam and condensate systems</p> <p>11.03 Tests low pressure steam and condensate systems</p> <p>11.04 Maintains, troubleshoots and repairs low pressure steam and condensate systems</p>	
			<p>High Pressure Steam and Condensate Systems</p> <p>12.01 Installs equipment for high pressure steam and condensate systems.</p> <p>12.02 Installs piping for high pressure steam and condensate systems.</p> <p>12.03 Tests high pressure steam and condensate systems.</p> <p>12.04 Maintains, troubleshoots and repairs high pressure steam and condensate systems</p>
	<p>Hydronic Systems</p> <p>13.01 Installs equipment for hydronic systems</p> <p>13.02 Installs piping for hydronic systems</p> <p>13.03 Test hydronic systems</p> <p>13.04 Maintains, troubleshoots and repairs hydronic systems</p>	<p>Hydronic Systems</p> <p>13.01 Installs equipment for hydronic systems</p> <p>13.02 Installs piping for hydronic systems</p> <p>13.03 Tests hydronic systems</p> <p>13.04 Maintains, troubleshoots and repairs hydronic systems</p>	
			<p>Process Piping Systems</p> <p>14.01 Installs equipment for process piping systems</p> <p>14.02 Installs piping for process piping systems</p> <p>14.03 Tests process piping systems</p> <p>14.04 Maintains, troubleshoots and repairs process piping systems</p>

		<p>Industrial Water and Waste Water Treatment Systems</p> <p>15.01 Installs equipment for industrial water and waste treatment systems.</p> <p>15.02 Installs piping for industrial water and waste treatment systems.</p> <p>15.03 Tests industrial water and waste treatment systems.</p> <p>15.04 Maintains, troubleshoots and repairs industrial water and waste treatment systems</p>	
			<p>Hydraulic Systems</p> <p>16.01 Installs equipment for hydraulic systems</p> <p>16.02 Installs piping, tubing and hoses for hydraulic systems</p> <p>16.03 Tests hydraulic systems</p> <p>16.04 Maintains, troubleshoots and repairs hydraulic systems</p>
			<p>Heating, Ventilation, Air Conditioning and Refrigeration (HVACR)</p> <p>17.01 Installs equipment for HVACR systems</p> <p>17.02 Installs piping for HVACR systems</p> <p>17.03 Tests HVACR systems</p> <p>17.04 Maintains, troubleshoots and repairs HVACR systems</p>
		<p>Fuel Systems</p> <p>18.01 Installs equipment for fuel systems.</p> <p>18.02 Installs piping and tubing for fuel systems.</p> <p>18.03 Tests fuel systems.</p> <p>18.04 Maintains, troubleshoots and repairs fuel systems.</p>	
		<p>Medical Gas Systems</p> <p>19.01 Installs equipment for medical gas systems</p> <p>19.02 Installs piping and tubing for medical gas systems</p> <p>19.03 Tests medical gas systems</p> <p>19.04 Maintains, troubleshoots and repairs medical gas systems</p>	

			<p>Compressed Air and Pneumatic Systems</p> <p>20.01 Installs equipment for compressed air and pneumatic systems</p> <p>20.02 Installs piping and tubing for compressed air and pneumatic systems</p> <p>20.03 Tests compressed air and pneumatic systems</p> <p>20.04 Maintains, troubleshoots and repairs compressed air and pneumatic systems</p>
<p>Fire Protection Systems (NCC)</p> <p>21.01 Installs equipment for fire protection systems</p> <p>21.02 Installs piping for fire protection systems</p> <p>21.03 Tests fire protection systems</p>			
			<p>Geo-Exchange and Geothermal Systems</p> <p>22.01 Installs equipment for geo-exchange and geothermal systems</p> <p>22.02 Installs piping for geo-exchange and geothermal systems</p> <p>22.03 Tests geo-exchange and geothermal systems</p> <p>22.04 Maintains, troubleshoots and repairs geo-exchange and geothermal systems</p>
			<p>Solar Heating Systems</p> <p>23.01 Installs equipment for solar heating systems</p> <p>23.02 Installs piping for solar heating systems</p> <p>23.03 Tests solar heating systems</p> <p>23.04 Maintains, troubleshoots and repairs solar heating systems</p>

			<p>Heat Recovery Systems</p> <p>24.01 Installs equipment for heat recovery systems</p> <p>24.02 Installs piping for heat recovery systems</p> <p>24.03 Tests heat recovery systems</p> <p>24.04 Maintains, troubleshoots and repairs heat recovery systems</p>
			<p>Prepares System for Commissioning, Start-Up and Turnover</p> <p>25.01 Flushes system</p> <p>25.02 Chemically treats system</p> <p>25.03 Pre-checks system for commissioning</p> <p>25.04 Selects and connects commissioning equipment</p>
			<p>Commission Systems</p> <p>26.01 Secures commissioning area</p> <p>26.02 Pressurizes system</p> <p>26.03 Inspects system</p> <p>26.04 Corrects faulty conditions</p> <p>26.05 Participates in start-up and turnover</p>

18. Plumber

18.1. Plumber Recommendations

That provinces and territories adopt the Red Seal trade name **Plumber / Plombier/plombière**

Slight variations include (French) New Brunswick and Manitoba - Plombier

- That the total number of training hours be 7200 hours (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers 4 training levels.
- That the sequencing reflects the topic and sub-task mapping in the sequencing documents.

18.2. Plumber – Snapshot

In Context	In Context	In Context	In Context
Organizes Work	Organizes Work	Organizes Work	Organizes Work
		Plumbing Fixtures and Appliances	Plumbing Fixtures and Appliances
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		Routine Trade Activities	Routine Trade Activities
			Interior Drainage, Waste and Vent (DWV) Systems
	Pipe Preparation	Pipe Preparation	Pipe Preparation
	Tube, Tubing, Pipe (Join)	Tube, Tubing, Pipe (Join)	Tube, Tubing, Pipe (Join)
			Water Services
			Potable Water Distribution
			Hydronic Systems
Level One	Level Two	Level Three	Level Four
Safety-Related Functions			
Tools and Equipment			
Routine Trade Activities	Routine Trade Activities		
Communication Techniques (Communication)			Communication Techniques (Mentoring)
	Plumbing Fixtures and Appliances		
Pipe Preparation			
Tube, Tubing, Pipe (Join)			
		Sewers	Sewage Treatment Systems
Interior Drainage, Waste and Vent (DWV) Systems -Introduction <i>(variation for BC and AB who will not cover in Level 1)</i>	Interior Drainage, Waste and Vent (DWV) Systems	Interior Drainage, Waste and Vent (DWV) Systems	
		Water Services	
		Potable Water Distribution	
			Pressure Systems
			Low Pressure Steam Systems <i>(variation for BC and AB who do not deliver steam training in this trade)</i>
	Hydronic Systems	Hydronic Systems	
			Water Treatment Equipment

		Specialized Systems -residential irrigation -compressed air -green systems	Specialized Systems -fuel systems -medical gas systems
			Process Piping <i>(variation for BC and AB who will not be delivering this in the Plumber program, but would deliver in SFPE)</i>

-Additional credentials such as gas licensing, fire protection and other credentials are considered to meet and exceed the topics sequenced in this document.

-Trade related Math, Science and Electrical Theory/Safety are integral to the Plumber trade. While not a specific occupational training topic in this document, training providers may include Math and Science and Electrical Theory/Safety training as required to perform activities outlined in the RSOS. Components in the RSOS that may inform such training are knowledge and skill elements and range of variables.

18.3. Plumber – Topic - Sub-Task by RSOS 2015

In Context	In Context	In Context	In Context
Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Organizes tools and supplies.	Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Organizes tools and supplies.	Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Organizes tools and supplies.	Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Organizes tools and supplies.
		Plumbing Fixtures and Appliances	Plumbing Fixtures and Appliances
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		Routine Trade Activities	Routine Trade Activities
			Interior Drainage, Waste and Vent (DWV) Systems
	Pipe Preparation	Pipe Preparation	Pipe Preparation
	Tube, Tubing, Pipe (Join)	Tube, Tubing, Pipe (Join)	Tube, Tubing, Pipe (Join)
			Water Services
			Potable Water Distribution
			Hydronic Systems
Level One	Level Two	Level Three	Level Four
Safety-Related Functions 1.01 Maintains safe work environment. 1.02 Uses personal protective equipment (PPE) and safety equipment. 1.03 Performs lock-out and tag-out procedures.			
Tools and Equipment 2.01 Uses common tools and equipment. 2.02 Uses access equipment. 2.03 Uses rigging, hoisting, lifting and positioning equipment. 2.04 Rigs loads for cranes. 2.05 Uses welding equipment. 2.06 Uses soldering and brazing equipment. 2.07 Uses oxy-fuel equipment.			

Level One	Level Two	Level Three	Level Four
<p>Routine Trade Activities</p> <p>4.01 Performs piping system layout. 4.02 Calculates pipe, tube and tubing lengths. 4.03 Calculates piping offsets. 4.04 Installs piping supports. 4.05 Installs sleeves. 4.06 Commissions systems. 4.07 Protects piping systems, equipment and structure from damage. 4.08 Coordinates excavation and backfilling of trenches. 4.09 Installs fire stopping devices and materials.</p>	<p>Routine Trade Activities</p> <p>4.01 Performs piping system layout. 4.02 Calculates pipe, tube and tubing lengths. 4.03 Calculates piping offsets. 4.04 Installs piping supports. 4.05 Installs sleeves. 4.06 Commissions systems. 4.07 Protects piping systems, equipment and structure from damage. 4.08 Coordinates excavation and backfilling of trenches. 4.09 Installs fire stopping devices and materials.</p>		
<p>Communication Techniques</p> <p>5.01 Uses communication techniques.</p>			<p>Communication Techniques</p> <p>5.02 Uses mentoring techniques.</p>
<p>Pipe Preparation</p> <p>6.01 Inspects tube, tubing, pipe and fittings before installation. 6.02 Cuts tube, tubing and pipe. 6.03 Bends tube, tubing and pipe. 6.04 Prepares tube, tubing and pipe connections.</p>			
<p>Tube, Tubing and Pipe (Join)</p> <p>7.01 Joins copper tube, tubing and pipe. 7.02 Joins plastic pipe and tubing. 7.03 Joins steel pipe. 7.04 Joins cast iron pipe. 7.05 Joins specialized pipe. (7.05 May be covered in later levels in context.)</p>			
		<p>Sewers</p> <p>8.01 Sizes pipe for sewers. 8.02 Installs manholes and catch basins. 8.03 Installs piping for sewers. 8.04 Tests manholes, catch basins and piping for sewers. 8.05 Services manholes catch basins and piping for sewers.</p>	<p>Sewer Treatment Systems</p> <p>9.01 Plans installation of sewage treatment systems. 9.02 Installs sewage treatment system components. 9.03 Tests sewage treatment systems and components. 9.04 Services sewage treatment systems and components.</p>
Level One	Level Two	Level Three	Level Four

<p>Interior Drainage, Waste and Vent (DWV) Systems (Introduction)</p> <p>10.01 Sizes pipe for interior drainage waste and vent (DWV) systems.</p> <p>10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.</p> <p>10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.</p> <p>10.04 Tests interior drainage, waste and vent (DWV) systems.</p> <p>10.05 Services piping and components for interior drainage waste and vent (DWV) systems.</p>	<p>Interior Drainage, Waste and Vent (DWV) Systems</p> <p>10.01 Sizes pipe for interior drainage waste and vent (DWV) systems.</p> <p>10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.</p> <p>10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.</p> <p>10.04 Tests interior drainage, waste and vent (DWV) systems.</p> <p>10.05 Services piping and components for interior drainage waste and vent (DWV) systems.</p>	<p>Interior Drainage, Waste and Vent (DWV) Systems</p> <p>10.01 Sizes pipe for interior drainage waste and vent (DWV) systems.</p> <p>10.02 Installs underground piping and components for interior drainage, waste and vent (DWV) systems.</p> <p>10.03 Installs piping and components for interior drainage, waste and vent (DWV) systems above-ground.</p> <p>10.04 Tests interior drainage, waste and vent (DWV) systems.</p> <p>10.05 Services piping and components for interior drainage waste and vent (DWV) systems.</p>	
		<p>Water Services</p> <p>11.01 Sizes pipe for water services.</p> <p>11.02 Installs piping for water services.</p> <p>11.03 Installs water service equipment.</p> <p>11.04 Tests water service piping and components.</p> <p>11.05 Services water services.</p>	
		<p>Potable Water Distribution</p> <p>12.01 Sizes piping and equipment for potable water distribution systems.</p> <p>12.02 Installs piping for potable water distribution systems.</p> <p>12.03 Installs potable water distribution equipment.</p> <p>12.04 Installs cross-connection control devices and methods.</p> <p>12.05 Tests potable water distribution systems.</p> <p>12.06 Services potable water distribution systems.</p>	
			<p>Pressure Systems</p> <p>13.01 Sizes pressure systems.</p> <p>13.02 Installs piping fore pressure systems.</p> <p>13.03 Installs equipment and components for pressure systems.</p> <p>13.04 Tests pressure systems.</p> <p>13.05 Services pressure systems.</p>

Level One	Level Two	Level Three	Level Four
	<p>Plumbing Fixtures and Appliances</p> <p>14.01 Installs fixture supports. 14.02 Installs plumbing fixtures and appliances. 14.03 Tests plumbing fixtures and appliances. 14.04 Services plumbing fixtures and appliances.</p>		
			<p>(Low Pressure) Steam Systems***</p> <p>16.01 Sizes piping and components for low pressure steam systems. 16.02 Installs piping and components for low pressure steam systems. 16.03 Tests piping and components for low pressure steam systems. 16.04 Services piping and components for low pressure steam systems.</p>
	<p>Hydronic Systems</p> <p>17.01 Sizes piping and components for hydronic systems. 17.02 Installs piping and components for hydronic systems. 17.03 Tests piping and components for hydronic systems. 17.04 Services piping and components for hydronic systems. 18.01 Installs hydronic heating generating systems. 18.02 Installs hydronic cooling generating systems. 18.03 Tests hydronic heating and cooling generating systems. 19.01 Installs hydronic system controls. 19.02 Installs hydronic transfer units. 19.03 Tests hydronic system controls and transfer units. 19.04 Services hydronic system controls and transfer units.</p>	<p>Hydronic Systems</p> <p>17.01 Sizes piping and components for hydronic systems. 17.02 Installs piping and components for hydronic systems. 17.03 Tests piping and components for hydronic systems. 17.04 Services piping and components for hydronic systems. 18.01 Installs hydronic heating generating systems. 18.02 Installs hydronic cooling generating systems. 18.03 Tests hydronic heating and cooling generating systems. 19.01 Installs hydronic system controls. 19.02 Installs hydronic transfer units. 19.03 Tests hydronic system controls and transfer units. 19.04 Services hydronic system controls and transfer units.</p>	
			<p>Water Treatment Equipment</p> <p>15.01 Sizes water treatment equipment. 15.02 Installs water treatment equipment. 15.03 Tests water treatment equipment. 15.04 Services water treatment equipment.</p>

		Specialized Systems 22.01 Installs piping for specialized systems. 22.02 Installs equipment and components for specialized systems. 22.03 Tests specialized systems. 22.04 Services specialized systems.	Specialized Systems 22.01 Installs piping for specialized systems. 22.02 Installs equipment and components for specialized systems. 22.03 Tests specialized systems. 22.04 Services specialized systems.
Level One	Level Two	Level Three	Level Four
			Process Piping*** 23.01 Installs piping for process piping systems. 23.02 Installs equipment and components for process piping systems. 23.03 Tests process piping systems. 23.04 Services process piping systems.

*Additional credentials such as gas licensing, fire protection (NCC) and other credentials are considered to **meet and exceed** the topics sequenced in this document.

**Trade related Math, Science and Electrical Theory/Safety are integral to the Plumber trade. While not a specific occupational training topic in this document, training providers may include Math and Science and Electrical Theory/Safety training as required to perform activities outlined in the RSOS. Components in the RSOS that may inform such training are knowledge and skill elements and range of variables.

***Variation for BC and AB, who will not be delivering this in the plumber program, but would deliver in SPPF.

19. Boilermaker

19.1. Boilermaker Recommendations

That provinces and territories adopt the **Red Seal trade name Boilermaker / Chaudronnier / chaudronnière**

Slight variations include; Ontario –Construction Boilermaker (**French**) New Brunswick – Chaudronnier-monteur; Ontario – Chaudronnier/chaudronnière de construction; Manitoba - Chaudronnier

- That the total number of training hours be **5400 hours** (jurisdictions will determine the ratio of in-class vs. on-the-job training).
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

19.2. Boilermaker – Snapshot

In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions
	Communication and Mentoring	
Level One	Level Two	Level Three
Safety-Related Functions		
Tools, Equipment and Work Platforms	Tools, Equipment and Work Platforms	Tools, Equipment and Work Platforms
Organizes Work <ul style="list-style-type: none"> • Project Tasks/Procedures 	Organizes Work <ul style="list-style-type: none"> • Drawings/Specifications 	Organizes Work <ul style="list-style-type: none"> • Drawings/Specifications • Preparation/Layout/Fabrication/Fitting
Communication and Mentoring Techniques		Communication and Mentoring Techniques
Cutting and Welding Activities	Cutting and Welding Activities	Cutting and Welding Activities
Rigging and Hoisting	Rigging and Hoisting	Rigging and Hoisting
Fabrication	Fabrication	Fabrication
Fastens Components	Fastens Components	Fastens Components
Vessels and Components (Introduction)	Vessels and Components (Assemble and Fit)	Vessels and Components (Assemble and Fit)

	Vessels and Components (Service)	Vessels and Components (Service)
	Vessels and Components (Removal) +	Vessels and Components (Removal) +

Final advanced welding may be performed by Boilermakers as Allowed by jurisdictional regulations (see 5.06).

+ Exception - BC will be delivering dismantling and removal of vessels and components in levels 1 and 2

19.3. Boilermaker – Topic - Sub-Task by RSOS 2016

In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions
	Communication and Mentoring	
Level One	Level Two	Level Three
Safety-related functions 1.01 Uses PPE and safety equipment. 1.02 Maintains safe work environment. 1.03 Monitors confined spaces.		
Tools, equipment and work platforms 2.01 Uses hand tools. 2.02 Uses power tools. 2.03 Uses shop equipment 2.04 Uses cutting and welding tools and equipment. 2.05 Uses work platforms and access equipment. 2.06 Uses aerial work platforms.	Tools, equipment and work platforms 2.02 Uses power tools. 2.03 Uses shop equipment 2.04 Uses cutting and welding tools and equipment. 2.05 Uses work platforms and access equipment. 2.06 Uses aerial work platforms.	Tools, equipment and work platforms 2.02 Uses power tools. 2.03 Uses shop equipment 2.04 Uses cutting and welding tools and equipment. 2.05 Uses work platforms and access equipment. 2.06 Uses aerial work platforms.
Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Uses drawings and specifications. 3.03 Handles materials and components. 3.04 Demobilizes site.	Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Uses drawings and specifications. 3.03 Handles materials and components. 3.04 Demobilizes site.	Organizes Work 3.01 Organizes project tasks and procedures. 3.02 Uses drawings and specifications. 3.03 Handles materials and components
Communication and Mentoring Techniques 4.01 Uses communication techniques.		Communication and Mentoring Techniques 1.01 Uses communication techniques. 1.02 Uses mentoring techniques.
Cutting and Welding Activities* 5.01 Cuts materials. 5.02 Prepares joints for fitting. 5.03 Fits joints.	Cutting and Welding Activities 5.01 Cuts materials. 5.02 Prepares joints for fitting. 5.03 Fits joints.	Cutting and Welding Activities 5.02 Prepares joints for fitting. 5.03 Fits joints. 5.05 Performs basic welding.

5.04 Performs tack welds. 5.05 Performs basic welding.	5.05 Performs basic welding.	
Level One	Level Two	Level Three
Rigging and Hoisting 6.01 Determines load. 6.03 Selects rigging and hoisting equipment. 6.04 Secures lift area. *** 7.01 Inspects rigging equipment. **** 7.03 Attaches rigging equipment to load. ***** 8.01 Inspects hoisting equipment. ***** 8.03 Performs hoisting operations. 9.01 Conducts post-lift inspection. 9.02 Disassembles hoisting equipment. 9.03 Maintains rigging and hoisting equipment.*****	Rigging and Hoisting 6.01 Determines load. 6.03 Selects rigging and hoisting equipment. 7.01 Inspects rigging equipment. **** 7.03 Attaches rigging equipment to load. ***** 8.01 Inspects hoisting equipment. ***** 8.02 Assembles hoisting equipment. ***** 8.03 Performs hoisting operations. 8.04 Secures load before rigging removal. ***** 9.01 Conducts post-lift inspection. 9.02 Disassembles hoisting equipment.	Rigging and Hoisting 6.01 Determines load. 6.02 Performs pre-lift analysis. ** 6.03 Selects rigging and hoisting equipment. 7.02 Fabricates rigging equipment. 8.02 Assembles hoisting equipment. ***** 8.03 Performs hoisting operations. 9.02 Disassembles hoisting equipment.
Fabrication 10.01 Lays out components for fabrication. 10.02 Cuts components for fabrication. 10.04 Constructs components.	Fabrication 10.01 Lays out components for fabrication. 10.02 Cuts components for fabrication. 10.03 Forms components for fabrication. # 10.04 Constructs components.	Fabrication 10.01 Lays out components for fabrication. 10.03 Forms components for fabrication. # 10.04 Constructs components.
Fastens Components 12.01 Bolts components.	Fastens Components 12.01 Bolts components. 12.02 Expands tubes. 12.03 Lays up fibreglass.	Fastens Components 12.02 Expands tubes.
Vessels and Components (Introduction) 13.02 Prepares vessels and components for servicing.	Vessels and Components (Assemble and Fit) 11.01 Aligns vessels and components. ^ 11.02 Fits vessels and components. ^	Vessels and Components (Assemble and Fit) 11.01 Aligns vessels and components. ^ 11.02 Fits vessels and components. ^
	Vessels and Components (Service) 13.01 Inspects vessels and components for defects. 13.02 Prepares vessels and components for servicing. 13.03 Repairs vessels and components. 13.04 Performs preventative maintenance and upgrades. 13.05 Tests materials, vessels and components.	Vessels and Components (Service) 13.02 Prepares vessels and components for servicing. 13.03 Repairs vessels and components. 13.04 Performs preventative maintenance and upgrades. 13.05 Tests materials, vessels and components.
	Vessels and Components (Removal) + 14.01 Dismantles vessels and components. +	Vessels and Components (Removal) + 14.01 Dismantles vessels and components. + 14.02 Removes materials. +

* Final advanced welding may be performed by Boilermakers as allowed by jurisdictional regulations (see 5.06).

** BC will meet and exceed by delivering training on 6.02 “Performs pre-lift analysis” across all 3 levels.

*** AB, NS, NB, PE, NL will meet and exceed by delivering training on 6.04 “Secures lift area” across all 3 levels.

**** BC will meet and exceed by delivering additional training on 7.01 “Inspects rigging equipment” in Level 3 as well.
***** AB and NB will meet and exceed by delivering training on 7.03 “Attaches rigging to load” in Level 3 as well.
***** AB, NB and BC will meet and exceed by delivering training on 8.01 “Inspects hoisting equipment” in Level 3 as well.
***** BC will meet and exceed by delivering training on 8.02 “Assembles hoisting equipment” in Level 1 as well.
***** BC will meet and exceed by delivering training on 8.04 “Secures load before rigging removal” in Level 1 as well.
***** AB will cover “Maintains rigging and hoisting equipment” in Levels 2 and 3 as well.

BC will introduce training on “Forms components for fabrication” in Level 1

^ BC will deliver 11.01 “Aligns vessels and components.” and 11.02 “Fits vessels and components.” in Level 1 as well

+ Exception - BC will be delivering training on dismantling and removal of vessels and components and their subtasks (14.01 and 14.02) in levels 1 and 2

Please note: BC has a *23-week* foundational program / Level 1.

20.1. Sprinkler Fitter - Recommendations

That provinces and territories adopt the **Red Seal trade name** Sprinkler Fitter / Mécanicien/mécanicienne en protection-incendie

- That the total number of training hours be **7200 hours**
- That the technical training program offers three **(3) training levels over four (4) years**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

20.2. Sprinkler Fitter – Snapshot

In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
		Organizes Work
	Pipe, Tube and Fittings (Prepare)	
	Pipe, Tube and Fittings (Installs)	Pipe, Tube and Fittings (Installs)
	Water-Based Systems	
Signal-Initiating Devices (Installs)*		Signal-Initiating Devices (Installs)
Level One	Level Two	Level Three
Safety-Related Functions		
Tools and Equipment		
Organizes Work	Organizes Work	Organizes Work
	Commissions Systems	Commissions Systems
Communication		Mentoring
	Underground Water Supply	
		Fire Pump Units
	Fire Department Connections	
		Private Water Supply Systems**
Pipe, Tube and Fittings (Prepare)		
Pipe, Tube and Fittings (Installs)		
Piping Components	Piping Components	
Water-Based Systems***	Water-Based Systems***	Water-Based Systems***
		Specialty Fire Suppression Systems
	Detection Devices (Installs)	Detection Devices (Installs)
	Signal-Initiating Devices (Installs)	
		Inspection, Testing and Maintenance

* Directly related to water-based (e.g. flow/pressure/tamper switches.)

**Components of fire pumps may be included.

*** Components of fire pumps may be included.

20.3. Sprinkler Fitter – Topic - Sub-Task by RSOS 2017

In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
		Organizes Work
	Pipe, Tube and Fittings (Prepare)	
	Pipe, Tube and Fittings (Installs)	Pipe, Tube and Fittings (Installs)
	Water-Based Systems	
Signal-Initiating Devices (Installs)		Signal-Initiating Devices (Installs)
Level One	Level Two	Level Three
Safety-Related Functions 1.01 Maintains safe work environment. 1.02 Uses personal protective equipment (PPE) and safety equipment. 1.03 Performs lock-out and tag-out procedures. 1.04 Performs work in confined space.		
Tools and Equipment 2.01 Uses hand tools. 2.02 Uses portable and stationary power tools. 2.03 Uses measuring and testing equipment 2.04 Uses access equipment. 2.05 Uses rigging, hoisting and lifting equipment. 2.06 Uses soldering and brazing equipment.		
Organizes Work 3.01 Interprets codes, regulations and procedures. 3.02 Uses drawings and specifications. 3.03 Uses documentation and reference material. 3.04 Plans job tasks and procedures. 3.05 Prepares work site. 3.06 Performs layout of systems. <i>(introduction)</i>	Organizes Work 3.01 Interprets codes, regulations and procedures. 3.02 Uses drawings and specifications. 3.03 Uses documentation and reference material. 3.04 Plans job tasks and procedures. 3.05 Prepares work site. 3.06 Performs layout of systems.	Organizes Work 3.01 Interprets codes, regulations and procedures. 3.02 Uses drawings and specifications.
	Commissions Systems 4.01 Commissions water supply systems. 4.02 Commissions fire protection systems.	Commissions Systems 4.01 Commissions water supply systems. 4.02 Commissions fire protection systems
Communication 5.01 Uses communication techniques. 5.02 Uses mentoring techniques.		Mentoring 5.01 Uses communication techniques. 5.02 Uses mentoring techniques.
	Underground Water Supply	

	<p>6.01 Supervises trenching and backfilling. (NCC)</p> <p>6.02 Installs underground piping and components. (NCC)</p> <p>6.03 Flushes underground system.</p>	
		<p>Fire Pump Units</p> <p>7.01 Determines location of pumps, drivers, controllers and components.</p> <p>7.02 Installs pumps, drivers, controllers and components.</p>
	<p>Fire Department Connections</p> <p>8.01 Determines location, size and type of fire department connections.</p> <p>8.02 Installs fire department piping and components.</p>	
		<p>Private Water Supply Systems</p> <p>9.01 Installs water tanks.</p> <p>9.02 Installs related equipment.</p>
<p>Pipe, Tube and Fittings (Prepare)</p> <p>10.01 Cuts pipe and tube.</p> <p>10.02 Bends pipe and tube.</p> <p>10.03 Threads pipe.</p> <p>10.04 Grooves pipe.</p> <p>10.05 Drills pipe and tube.</p> <p>10.06 Grinds pipe.</p> <p>10.07 Prepares fittings.</p>		
<p>Pipe, Tube and Fittings (Installs)</p> <p>11.01 Installs steel pipe, tube and fittings.</p> <p>11.02 Installs plastic pipe, tube and fittings.</p> <p>11.03 Installs copper pipe, tube and fittings.</p> <p>11.04 Paints and labels pipe and tube.</p>		
<p>Piping Components</p> <p>12.01 Selects sprinklers.</p> <p>12.02 Installs sprinklers and nozzles.</p> <p>12.03 Installs sleeves.</p> <p>12.04 Installs supports and hangers.</p> <p>12.07 Installs system drainage.</p>	<p>Piping Components</p> <p>12.05 Installs seismic protection.</p> <p>12.06 Installs cross-connection control assemblies.</p> <p>12.07 Installs system drainage.</p>	
<p>Water-Based Systems</p> <p>13.01 Installs wet pipe systems.</p> <p>13.02 Installs dry pipe systems.</p> <p>13.03 Installs antifreeze systems.</p> <p>13.04 Installs preaction/deluge systems.</p>	<p>Water-Based Systems</p> <p>13.04 Installs preaction/deluge systems.</p> <p>13.06 Installs standpipe systems.</p>	<p>Water-Based Systems</p> <p>13.05 Installs foam systems.</p> <p>13.07 Installs water mist and hybrid systems.</p>
		<p>Specialty Fire Suppression Systems</p>

		<p>14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems.</p> <p>14.02 Installs portable extinguishers.</p>
	<p>Detection Devices (Installs)</p> <p>15.01 Installs wet and dry pilot lines.</p> <p>15.02 Installs heat-actuated devices (HAD). (NCC)</p>	<p>Detection Devices (Installs)</p> <p>15.03 Installs spark detection systems. (NCC)</p> <p>15.04 Installs air sampling systems. (NCC)</p> <p>15.05 Installs electrical detection systems. (NCC)</p>
	<p>Signal-Initiating Devices (Installs)</p> <p>16.01 Installs alarm-initiating devices.</p> <p>16.02 Installs supervisory-initiating devices.</p>	
		<p>Inspection, Testing and Maintenance</p> <p>17.01 Troubleshoots fire protection systems.</p> <p>17.02 Repairs deficiencies.</p> <p>17.03 Performs scheduled maintenance.</p> <p>18.01 Performs scheduled tests.</p> <p>18.02 Performs scheduled inspections.</p> <p>18.03 Inspects portable fire extinguishers.</p>

Sprinkler Fitter - Not Common Core Inventory – The following subtasks are performed by industry in less than 70% of jurisdictions, and therefore will not be tested on the Red Seal Examinations. However, some jurisdictions may provide training, depending on their industry’s needs.

6.01 Supervises trenching and backfilling (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	no	no	no	yes	NV	NV	NV

6.02 Installs underground piping and components (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	no	no	no	yes	NV	NV	NV

15.02 Installs heat-actuated devices (HADs) (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	NV	yes,	no	yes	no	yes	NV	NV	NV

15.03 Installs spark detection systems (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	NV	yes	yes	no	yes	yes	NV	NV	NV

15.04 Installs air sampling systems (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	yes	NV	yes	yes	no	yes	yes	NV	NV	NV

15.05 Installs electrical detection systems (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	NV	yes	no	no	no	yes	NV	NV	NV

21.1. Concrete Finisher - Recommendations

Trade Here:

- That provinces and territories adopt the **Red Seal trade name** Concrete Finisher / Finisseur/finisseuse de béton
- That the total number of training hours be **3600 hours**
- That the technical training program offers **two (2) training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

21.2. Concrete Finisher – Snapshot

In Context	In Context
	Safety-Related Functions
	Cures Concrete
	Protects Concrete
Level One	Level Two
Safety-Related Functions	
Tools and Equipment	Tools and Equipment
Organizes Work	Organizes Work
Communication	Communication and Mentoring
Prepares Site	Prepares Site
Formwork	Formwork
Places Concrete	Places Concrete
Levels Concrete	Levels Concrete
Floats Concrete	Floats Concrete
Hand-tools Concrete	Hand-tools Concrete
Trowels Concrete	Trowels Concrete
	Applies Surface Treatment (Plastic)
Cures Concrete	
Creates Contraction Joints	
Protects Concrete	
Repairs Concrete	Repairs and Restores Concrete
	Applies Surface Treatment (Hardened Concrete)
	Grouts
	Cutting and Coring

21.3. Concrete Finisher – Topic - Sub-Task by RSOS 2017

In Context	In Context
	Safety-Related Functions
	Cures Concrete
	Protects Concrete
Level One	Level Two
Safety-Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment. 1.02 Maintains safe work environment.	
Tools and Equipment 2.01 Uses hand tools. 2.03 Uses measuring equipment.	Tools and Equipment 2.02 Uses power tools. 2.03 Uses measuring equipment.
Organizes Work 3.01 Uses documentation. 3.02 Determines material requirements and quantities. 3.03 Sequences work procedures.	Organizes Work 3.01 Uses documentation. 3.02 Determines material requirements and quantities. 3.03 Sequences work procedures.
Communication 4.01 Uses communication techniques.	Communication and Mentoring 4.01 Uses communication techniques. 4.02 Uses mentoring techniques.
Prepares Site 5.01 Inspects site. 5.02 Prepares sub-grade and elevations.	Prepares Site 5.01 Inspects site. 5.02 Prepares sub-grade and elevations.
Formwork 6.01 Constructs concrete formwork. 6.02 Installs reinforcement. 6.03 Inspects formwork and reinforcements. 6.04 Installs construction, isolation and expansion joints. 6.05 Removes forms.	Formwork 6.01 Constructs concrete formwork. 6.02 Installs reinforcement. 6.03 Inspects formwork and reinforcements. 6.05 Removes forms.
Places Concrete 7.01 Transports concrete onsite. 7.02 Spreads concrete. 7.03 Consolidates concrete.	Places Concrete 7.01 Transports concrete. 7.03 Consolidates concrete.
Levels Concrete 8.01 Establishes elevation. 8.02 Screeds concrete. 8.03 Bull floats concrete.	Levels Concrete 8.01 Establishes elevation. 8.02 Screeds concrete.
Floats Concrete 9.01 Floats concrete by hand.	Floats Concrete 9.02 Floats concrete by machine.

<p>Hand-tools Concrete 10.01 Edges perimeter of slab. 10.03 Tools contraction joints.</p>	<p>Hand-tools Concrete 10.02 Finishes extruded concrete surfaces.</p>
<p>Trowels Concrete 11.01 Trowels concrete by hand.</p>	<p>Trowels Concrete 11.02 Trowels concrete by machine.</p>
	<p>Applies Surface Treatment (Plastic) 12.01 Applies dry-shake aggregate surface hardeners. 12.02 Applies exposed aggregate finish. 12.03 Textures concrete surface. 12.04 Applies stamped concrete surface finish. 12.05 Applies evaporation reducers.</p>
<p>Cures Concrete 13.01 Wet-cures concrete. 13.02 Chemical cures concrete.</p>	
<p>Creates Contraction Joints 14.01 Saw cuts contraction joints. 14.02 Fills joints.</p>	
<p>Protects Concrete 15.01 Protects plastic concrete. 15.02 Protect hardened concrete.</p>	
<p>Repairs Concrete 16.01 Inspects concrete. 16.02 Removes materials. 16.03 Prepares surface for repair and restoration. 16.04 Installs repair materials.</p>	<p>Repairs and Restores Concrete 16.01 Inspects concrete. 16.02 Removes materials. 16.03 Prepares surface for repair and restoration. 16.04 Installs repair materials.</p>
	<p>Applies Surface treatment (Hardened Concrete) 17.01 Prepares surface for surface treatments. 17.02 Abrades surface to achieve architectural finish. 17.03 Applies seamless systems. 17.04 Applies bonded and non-bonded toppings to concrete. 17.05 Parges vertical surfaces. 17.06 Applies chemical surface treatment.</p>
	<p>Grouts 18.01 Prepares surface for grouting. 18.02 Mixes grout. 18.03 Installs grout. 18.04 Finishes exposed grout surfaces.</p>

Cutting and Coring

19.01 Performs cutting.

19.02 Performs coring.

22.1. Landscape Horticulturist - Recommendations

That provinces and territories adopt the **Red Seal Name Landscape Horticulturist/Horticulteur-paysagiste/horticultrice-paysagiste**

- That the total number of training hours be **6000 hours**
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

22.2. Landscape Horticulturist – Snapshot

Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
			Tools, Equipment and Vehicles
	Communication		
Level One	Level Two	Level Three	Level Four
Safety-Related Functions			
Tools, Equipment and Vehicles	Tools, Equipment and Vehicles	Tools, Equipment and Vehicles	
Organizes Work	Organizes Work	Organizes Work	Organizes Work
		Marketing and Sales	Marketing and Sales
Communication			Mentoring
Horticultural Practices	Horticultural Practices	Horticultural Practices	Horticultural Practices
Environmental Practices	Environmental Practices	Environmental Practices	Environmental Practices
Pre-Construction Activities	Pre-Construction Activities		Pre-Construction Activities
	Hardscape Installation	Hardscape Installation	
Softscape Installation	Softscape Installation	Softscape Installation	
	Hardscape Maintenance	Hardscape Maintenance	
Softscape Maintenance	Softscape Maintenance	Softscape Maintenance	
			Green Infrastructure Installation
			Green Infrastructure Maintenance

Please note: MWA E is Not Common Core (NCC)

22.3. Landscape Horticulturist – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
			Tools, Equipment and Vehicles
	Communication		
Level One	Level Two	Level Three	Level Four
Safety-Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment. 1.02 Maintains safe work environment.			
Tools, Equipment and Vehicles 2.01 Uses hand tools. 2.02 Uses power tools. 2.03 Uses measuring equipment. 2.04 Uses vehicles, motorized equipment, trailers and attachments.	Tools, Equipment and Vehicles 2.01 Uses hand tools. 2.02 Uses power tools. 2.03 Uses measuring equipment. 2.04 Uses vehicles, motorized equipment, trailers and attachments.	Tools, Equipment and Vehicles 2.01 Uses hand tools. 2.02 Uses power tools. 2.03 Uses measuring equipment. 2.04 Uses vehicles, motorized equipment, trailers and attachments.	
Organizes Work 3.01 Performs site assessments 3.02 Uses documentation and reference material. 3.03 Maintains records. 3.07 Transports materials. 3.08 Transports equipment.	Organizes Work 3.01 Performs site assessments 3.02 Uses documentation and reference material. 3.03 Maintains records. 3.06 Organizes materials and equipment. 3.07 Transports materials. 3.08 Transports equipment.	Organizes Work 3.01 Performs site assessments 3.02 Uses documentation and reference material. 3.03 Maintains records. 3.04 Participates in job planning activities. 3.05 Orders materials. 3.06 Organizes materials and equipment.	Organizes Work 3.01 Performs site assessments 3.02 Uses documentation and reference material. 3.03 Maintains records 3.04 Participates in job planning activities.
		Marketing and Sales 4.01 Controls inventory. 4.02 Sells products and services. 4.03 Maintains customer relations.	Marketing and Sales 4.04 Prepares estimates.
Communication 5.01 Uses communication techniques.			Mentoring 5.02 Uses mentoring techniques.
Horticultural Practices 6.01 Identifies plants and plant requirements. 6.02 Manages plant health and growing conditions.	Horticultural Practices 6.01 Identifies plants and plant requirements. 6.02 Manages plant health and growing conditions. 6.03 Prunes plant material.	Horticultural Practices 6.01 Identifies plants and plant requirements. 6.03 Prunes plant material. 6.04 Manages pests, diseases and invasive species.	Horticultural Practices 6.01 Identifies plants and plant requirements. 6.04 Manages pests, diseases and invasive species.

Environmental Practices 7.01 Practices environmental stewardship.	Environmental Practices 7.01 Practices environmental stewardship. 7.03 Practices soil stewardship. 7.04 Practices water stewardship.	Environmental Practices 7.01 Practices environmental stewardship. 7.04 Practices water stewardship.	Environmental Practices 7.01 Practices environmental stewardship. 7.02 Practices biodiversity enhancement.
Pre-Construction Activities 8.03 Performs grading.* 8.04 Installs drainage systems.*	Pre-Construction Activities 8.02 Prepares construction site.		Pre-Construction Activities 8.01 Participates in landscape design activities.
	Hardscape Installation 9.02 Installs surface materials. 9.03 Installs steps and retaining walls.	Hardscape Installation 9.01 Installs landscape structures. 9.04 Installs irrigation systems. 9.05 Installs water features. 9.06 Installs low voltage landscape lighting.	
Softscape Installation 10.01 Installs growing media. 10.05 Installs turf from seed. 10.06 Installs sod.	Softscape Installation 10.02 Installs exterior landscape plants. 10.03 Transplants plants. 10.04 Installs mulch.	Softscape Installation 10.07 Installs interior landscape plants.	
	Hardscape Maintenance 12.01 Maintains drainage systems. 12.03 Maintains surface materials. 12.04 Maintains steps and retaining walls.	Hardscape Maintenance 12.02 Maintains landscape structures. 12.05 Maintains irrigation systems. 12.06 Maintains water features. 12.07 Maintains landscape lighting. 12.08 Practices snow and ice control. 12.09 Repairs hardscape.	
Softscape Maintenance 13.01 Maintains exterior softscape. 13.03 Maintains turfgrass.	Softscape Maintenance 13.01 Maintains exterior softscape. 13.04 Propagates plant materials.	Softscape Maintenance 13.02 Maintains interior softscape. 13.05 Repairs softscape.	
			Green Infrastructure Installation 11.01 Selects green infrastructure. 11.02 Installs green roofs and walls. 11.03 Installs rainwater and stormwater management systems. 11.04 Installs erosion control. 11.05 Installs biodiverse plantings and natural areas.

			<p>Green Infrastructure Maintenance 14.01 Maintains green roofs and walls. 14.02 Maintains rainwater and stormwater management systems. 14.03 Maintains erosion control. 14.04 Maintains biodiverse plantings and natural areas.</p>
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*Grading and drainage in pre-construction activities are concepts that are reinforced throughout all levels of training

Please note: MWA E is Not Common Core (NCC) – Please see below

Landscape Horticulturist - Not Common Core Inventory – The following subtasks are performed by industry in less than 70% of jurisdictions, and therefore will not be tested on the Red Seal Examinations. However, some jurisdictions may provide training, depending on their industry’s needs.

15.01 Builds growing facilities (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	no	no	no	yes	yes	yes	no	NV	NV	NV

15.02 Installs growing facility components (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	no	no	no	yes	yes	yes	no	NV	NV	NV

16.01 Operates growing facility structures and amenities (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

16.02 Maintains sanitary environment (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

16.03 Operates climate control systems (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

16.04 Operates irrigation and fertigation systems (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

17.01 Develop greenhouse crop production plan (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	no	no	no	yes	yes	yes	no	NV	NV	NV

17.02 Propagates greenhouse crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

17.03 Transplants greenhouse crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

17.04 Grows greenhouse crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

17.05 Harvests greenhouse crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

17.06 Ships greenhouse crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.01 Develop nursery crop production plan (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	no	no	no	yes	yes	yes	no	NV	NV	NV

18.02 Propagates field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.03 Transplants field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.04 Grows field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.05 Harvests field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.06 Ships field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

18.07 Winterizes field and container crops (NCC)

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	no	no	yes	yes	yes	no	NV	NV	NV

23.1. Sheet Metal Worker - Recommendations

That provinces and territories adopt the **Red Seal Name Sheet Metal Worker / Ferblantier/ferblantière**

- That the total number of training hours be **7200 hours**
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

23.2. Sheet Metal Worker – Snapshot

Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
		Installation Site (prepares)	Installation Site (prepares)
		Organizes Work	Organizes Work
	Communication	Communication	Communication
			Specialty Products (fabricates)
			Specialty Products (installs)
		Chimney, Breeching, Venting (installs, connects)	Chimney, Breeching, Venting (installs, connects)
			Scheduled Maintenance
			Repair
Level One	Level Two	Level Three	Level Four
Safety-Related Functions			
Tools and Equipment	Tools and Equipment	Tools and Equipment	
Organizes Work	Organizes Work		
Communication			Mentoring
Pattern Development	Pattern Development	Pattern Development	Pattern Development
Air/Material handling components (fabricates)	Air/Material handling components (fabricates)	Air/Material handling components (fabricates)	Air/Material handling components (fabricates)
	Flashing, roofing, sheeting, and cladding (fabricates)		
		Specialty Products (fabricates)	
		Specialty Products (installs)	
	Installation Site (prepares)		
Level One	Level Two	Level Three	Level Four
	Chimney, Breeching, Venting (installs, connects)		
Air Handling System Components (installs)	Air Handling System Components (installs)	Air Handling System Components (installs)	Air Handling System Components (installs)
			Material Handling System Components (installs)
			Thermal Insulation, Lagging, Cladding and Flashing
		Leak Testing, Air Balancing, Commissioning	Leak Testing, Air Balancing, Commissioning
	Metal Roofing and Cladding Systems		
	Exterior Components (installs)		

		Scheduled Maintenance*	
		Repair*	

◆ **Variation AB** - Pattern Development – L1 – 5.01, L2 – 5.02, L3 – 5.04, 5.05, L4 – 5.03

* **Variation AB** - Scheduled Maintenance and Repair will be delivered in L2 and L4 (residential/commercial)

23.3. Sheet Metal Worker – Topic - Sub-Task by RSOS 2017			
Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
		Installation Site (prepares)	Installation Site (prepares)
		Organizes Work	Organizes Work
	Communication	Communication	Communication
			Specialty Products (fabricates)
			Specialty Products (installs)
		Chimney, Breeching, Venting (installs, connects)	Chimney, Breeching, Venting (installs, connects)
			Scheduled Maintenance
			Repair

Level One	Level Two	Level Three	Level Four
<p>Safety-Related Functions</p> <p>1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe work environment 1.03 Performs lock-out and tag-out procedures</p>			
<p>Tools and Equipment</p> <p>2.01 Uses hand and portable power tools 2.02 Uses shop tools and equipment 2.03 Uses gas metal arc welding (GMAW) equipment 2.04 Uses resistance spot welding equipment 2.07 Uses oxy-fuel and plasma arc cutting equipment 2.08 Uses soldering and brazing equipment 2.09 Uses measuring and layout equipment 2.11 Uses stationary and mobile work platforms 2.12 Uses hoisting, rigging and positioning equipment</p>	<p>Tools and Equipment</p> <p>2.02 Uses shop tools and equipment 2.03 Uses gas metal arc welding (GMAW) equipment 2.06 Uses shielded metal arc welding (SMAW) equipment 2.08 Uses soldering and brazing equipment 2.10 Uses testing and inspection devices</p>	<p>Tools and Equipment</p> <p>2.02 Uses shop tools and equipment 2.03 Uses gas metal arc welding (GMAW) equipment 2.05 Uses gas tungsten arc welding (GTAW) equipment 2.10 Uses testing and inspection devices</p>	<p>Tools and Equipment</p> <p>2.03 Uses gas metal arc welding (GMAW) equipment 2.10 Uses testing and inspection devices</p>
<p>Organizes Work</p> <p>3.01 Uses trade-related documentation 3.02 Interprets drawings 3.03 Organizes materials and equipment for project</p>	<p>Organizes Work</p> <p>3.01 Uses trade-related documentation 3.02 Interprets drawings 3.04 Performs basic design and field modifications</p>		
<p>Communication</p> <p>4.01 Uses communication techniques</p>			<p>Mentoring</p> <p>4.02 Uses mentoring techniques</p>
<p>Pattern Development♦</p> <p>5.01 Develops patterns using simple and straight line layout</p> <p>(Identification of other types of pattern development methods)</p>	<p>Pattern Development♦</p> <p>5.02 Develops patterns using parallel line method 5.03 Develops patterns using radial line method 5.04 Develops patterns using triangulation method</p>	<p>Pattern Development♦</p> <p>5.02 Develops patterns using parallel line method 5.03 Develops patterns using radial line method 5.04 Develops patterns using triangulation method</p>	<p>Pattern Development♦</p> <p>5.05 Uses computer technology for pattern development</p>
<p>Air/Material handling components (fabricates)</p> <p>6.01 Cuts ductwork, fittings and components 6.02 Forms ductwork, fittings and flexible connectors 6.03 Insulates ductwork and fittings 6.04 Assembles ductwork, fittings and flexible connectors 6.06 Fabricates hanger systems, supports and bases</p>	<p>Air/Material handling components (fabricates)</p> <p>6.02 Forms ductwork, fittings and flexible connectors 6.04 Assembles ductwork, fittings and flexible connectors</p>	<p>Air/Material handling components (fabricates)</p> <p>6.02 Forms ductwork, fittings and flexible connectors 6.04 Assembles ductwork, fittings and flexible connectors</p>	<p>Air/Material handling components (fabricates)</p> <p>6.02 Forms ductwork, fittings and flexible connectors 6.04 Assembles ductwork, fittings and flexible connectors 6.05 Fabricates dampers</p>

Level One	Level Two	Level Three	Level Four
	Flashing, roofing, sheeting, and cladding (fabricates) 7.01 Cuts metal for flashing, roofing, sheeting and cladding 7.02 Forms flashing, roofing, sheeting and cladding		
		Specialty Products (fabricates) 8.01 Cuts material for specialty products 8.02 Forms specialty products 8.03 Assembles specialty products 8.04 Finishes specialty products	
		Specialty Products (installs) 17.01 Installs stainless steel specialty products 17.02 Installs non-stainless steel specialty products 17.03 Installs marine products*	
	Installation Site (prepares) 9.01 Performs on-site measurements 9.02 Performs demolitions for renovations 9.03 Installs penetrations and sleeves 9.04 Installs supports and bases 9.05 Installs hangers, cables, braces and brackets		
	Chimney, Breeching, Venting (installs, connects) 10.01 Installs chimney 10.02 Connects appliances or mechanical equipment to chimney and breeching 10.03 Installs high efficiency appliances and mechanical equipment		
Air Handling System Components (installs) 11.01 Installs air handling equipment 11.02 Installs sheet metal ducts and fittings 11.03 Installs dampers 11.05 Installs registers, grilles, diffusers and louvers 11.09 Installs plenums	Air Handling System Components (installs) 11.01 Installs air handling equipment 11.04 Installs fire and fire/smoke dampers 11.08 Installs system component accessories	Air Handling System Components (installs) 11.01 Installs air handling equipment 11.06 Installs terminal boxes 11.07 Installs coils 11.08 Installs system component accessories 11.09 Installs plenums	Air Handling System Components (installs) 11.01 Installs air handling equipment 11.08 Installs system component accessories
			Material Handling System Components (installs) 12.01 Installs pneumatic and gravity material handling system components 12.02 Installs mechanized material handling system components

Level One	Level Two	Level Three	Level Four
			Thermal Insulation, Lagging, Cladding and Flashing 13.01 Applies thermal insulation to components 13.02 Applies lagging and cladding to components 13.03 Applies flashing to components
		Leak Testing, Air Balancing, Commissioning 14.01 Performs leak tests 14.02 Performs testing, adjusting and balancing (TAB) 14.03 Participates in the commissioning of air and material handling systems	Leak Testing, Air Balancing, Commissioning 14.01 Performs leak tests 14.02 Performs testing, adjusting and balancing (TAB) 14.03 Participates in the commissioning of air and material handling systems
	Metal Roofing and Cladding Systems 15.01 Lays out roof and walls 15.02 Installs insulation, isolation material and building envelope components 15.03 Installs roofing and cladding system components 15.04 Seals exposed joints 15.05 Installs decking		
	Exterior Components (installs) 16.01 Prepares surface 16.02 Fastens exterior components		
		Scheduled Maintenance** 18.01 Performs maintenance inspections 18.02 Services components	
		Repair** 19.01 Diagnoses system faults 19.02 Repairs worn or faulty components	

♦ **Variation AB** - Pattern Development – L1 – 5.01, L2 – 5.02, L3 – 5.04, 5.05, L4 – 5.03

* **Variation AB** - Scheduled Maintenance and Repair will be delivered in L2 and L4 (residential/commercial)

* **Exception ON** – 17.03, 18.01-18.02, 19.01-19.02 not in scope of practice, please see weighting and validation in the RSOS.

24.1. Machinist - Recommendations

That provinces and territories adopt the **Red Seal Name Machinist / Machiniste**

- That the total number of training hours be **7200 hours**
- That the technical training program offers **4 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

24.2. Machinist – Snapshot

Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Organizes Work	Organizes Work	Organizes Work
	Communication and Mentoring	Communication and Mentoring	Communication and Mentoring
	Hand Processes		
		Component Refurbishment	Machine and Tooling Maintenance
			Component Refurbishment
Level One	Level Two	Level Three	Level Four
Safety-Related Tasks	Safety-Related Tasks	Safety-Related Tasks	Safety-Related Tasks
Organizes Work			
Communication and Mentoring			
Workpiece Material Processing	Workpiece Material Processing	Workpiece Material Processing	Workpiece Material Processing
Machine, Tooling and Inspection Equipment Maintenance	Machine, Tooling and Inspection Equipment Maintenance	Machine, Tooling and Inspection Equipment Maintenance	
Hand Processes			
Components (Introduction)	Component Refurbishment		
Power Saw Set Up			
Power Saw Operation			
Drill Press Set Up			
Drill Press Operation			
Conventional Lathe Set Up	Conventional Lathe Set Up		
Conventional Lathe Operation	Conventional Lathe Operation		
Conventional Milling Machine (Introduction)	Conventional Milling Machine Set Up	Conventional Milling Machine Set Up	Conventional Milling Machine Set Up
	Conventional Milling Machine Operation	Conventional Milling Machine Operation	Conventional Milling Machine Operation
Level One	Level Two	Level Three	Level Four
	Precision Grinding Machine Set Up	Precision Grinding Machine Set Up	
	Precision Grinding Machine Operation	Precision Grinding Machine Operation	
	CNC Programming	CNC Programming	CNC Programming
	CNC Machine Set Up	CNC Machine Set Up	CNC Machine Set Up
	CNC Machine Operation	CNC Machine Operation	CNC Machine Operation

24.3. Machinist – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three	Level Four
In Context	In Context	In Context	In Context
	Organizes Work	Organizes Work	Organizes Work
	Communication and Mentoring	Communication and Mentoring	Communication and Mentoring
	Hand Processes		
		Component Refurbishment	Machine and Tooling Maintenance
			Component Refurbishment
Level One	Level Two	Level Three	Level Four
Safety-Related Tasks 1.01 Maintain safe work environment 1.02 Use PPE and safety equipment	Safety-Related Tasks 1.01 Maintain safe work environment	Safety-Related Tasks 1.01 Maintain safe work environment	Safety-Related Tasks 1.01 Maintain safe work environment
Organizes Work 2.01 Interprets documentation 2.02 Plans sequence of operation			
Communication and Mentoring 3.01 Uses communication techniques 3.02 Uses mentoring techniques			
Workpiece Material Processing 4.01 Selects workpiece material 4.02 Uses hoisting, lifting and rigging equipment 4.03 Marks workpiece for identification 4.05 Performs quality control of workpiece 4.06 Deburrs workpiece 4.07 Sketches parts	Workpiece Material Processing 4.01 Selects workpiece material 4.04 Performs heat treatment 4.05 Performs quality control of workpiece 4.07 Sketches parts	Workpiece Material Processing 4.04 Performs heat treatment 4.05 Performs quality control of workpiece	Workpiece Material Processing 4.05 Performs quality control of workpiece
Machine and Tooling Maintenance 5.01 Cleans machines 5.02 Lubricates machines 5.03 Sharpens tooling 5.04 Applies cutting fluid and coolant 5.05 Troubleshoots equipment 5.06 Maintains machine alignment 5.07 Maintains inspection equipment	Machine and Tooling Maintenance 5.01 Cleans machines 5.05 Troubleshoots equipment 5.06 Maintains machine alignment	Machine and Tooling Maintenance 5.03 Sharpens tooling 5.05 Troubleshoots equipment	

<p>Hand Processes</p> <p>6.01 Performs layout 6.02 Saws workpiece 6.03 Files workpiece 6.04 Performs hole making operations 6.05 Performs threading operations 6.06 Installs thread inserts 6.07 Broaches workpiece 6.08 Performs pressing operations 6.09 Forms workpiece 6.10 Finishes workpiece</p>			
<p>Components (Introduction) 7.01 Disassembles components 7.02 Analyzes components</p>	<p>Component Refurbishment 7.02 Analyzes components 7.03 Assembles components</p>		
<p>Power Saw Set Up</p> <p>8.01 Selects power saw types 8.02 Selects saw blades 8.03 Installs saw blades 8.04 Selects power saw speeds and feeds 8.05 Makes power saw adjustments 8.06 Sets up workpiece on power saw</p>			
<p>Power Saw Operation</p> <p>9.01 Saws straight and angle cuts 9.02 Cuts irregular shapes</p>			
<p>Drill Press Set Up</p> <p>10.01 Selects drill press types 10.02 Plans operation of drill presses 10.03 Selects drill press speeds and feeds 10.04 Sets up jig, fixtures and work holding devices for drill presses 10.05 Sets up tooling for drill presses</p>			
<p>Drill Press Operation</p> <p>11.01 Drills holes using a drill press 11.02 Cuts countersinks, counterbores, chamfers and spot faces using a drill press 11.03 Performs tapping using a drill press 11.04 Finishes holes using a drill press</p>			

<p>Conventional Lathe Set Up</p> <p>12.01 Selects conventional lathes types 12.02 Plans operation of conventional lathes 12.03 Sets up work holding devices for conventional lathes 12.04 Sets up tooling for conventional lathes 12.05 Sets up conventional lathe accessories 12.06 Sets up workpiece on conventional lathe 12.07 Selects conventional lathe speeds and feeds</p>	<p>Conventional Lathe Set Up</p> <p>12.02 Plans operation of conventional lathes 12.03 Sets up work holding devices for conventional lathes 12.04 Sets up tooling for conventional lathes 12.05 Sets up conventional lathe accessories 12.06 Sets up workpiece on conventional lathe</p>		
<p>Conventional Lathe Operation</p> <p>13.01 Faces surfaces using a conventional lathe 13.02 Turns external surfaces using a conventional lathe 13.03 Drills using a conventional lathe 13.04 Bores holes using a conventional lathe 13.05 Reams holes using a conventional lathe 13.06 Turns tapers using a conventional lathe 13.07 Knurls using a conventional lathe 13.08 Cuts grooves using a conventional lathe 13.09 Cuts threads using a conventional lathe 13.10 Parts off workpiece using a conventional lathe</p>	<p>Conventional Lathe Operation</p> <p>13.02 Turns external surfaces using a conventional lathe 13.04 Bores holes using a conventional lathe 13.06 Turns tapers using a conventional lathe 13.08 Cuts grooves using a conventional lathe 13.09 Cuts threads using a conventional lathe</p>		
<p>Conventional Milling Machine (Introduction)</p> <p>14.01 Selects conventional milling machine types 14.04 Sets up tooling for conventional milling machines</p>	<p>Conventional Milling Machine Set Up</p> <p>14.01 Selects conventional milling machine types 14.02 Plans operation of conventional lathes 14.03 Sets up work holding devices for conventional milling machines 14.04 Sets up tooling for conventional milling machines 14.05 Sets up milling accessories 14.06 Sets up workpiece on a conventional milling machine 14.07 Selects conventional milling machine speeds and feeds</p>	<p>Conventional Milling Machine Set Up</p> <p>14.02 Plans operation of conventional lathes 14.03 Sets up work holding devices for conventional milling machines 14.04 Sets up tooling for conventional milling machines 14.05 Sets up milling accessories 14.06 Sets up workpiece on a conventional milling machine 14.07 Selects conventional milling machine speeds and feeds</p>	<p>Conventional Milling Machine Set Up</p> <p>14.05 Sets up milling accessories</p>

	<p>Conventional Milling Machine Operation</p> <p>15.01 Mills surfaces using a conventional milling machine 15.02 Mills profiles and pockets using a conventional milling machine 15.03 Mills slots, grooves and keyways using a conventional milling machine 15.04 Cuts gears and splines using a conventional milling machine (<i>indexing calculations</i>) 15.05 Drills holes using a conventional milling machine 15.06 Reams holes using a conventional milling machine 15.07 Cuts countersinks, counterbores, chamfers and spot faces using a conventional milling machine 15.08 Performs tapping using a conventional milling machine 15.09 Bores holes using a conventional milling machine</p>	<p>Conventional Milling Machine Operation</p> <p>15.01 Mills surfaces using a conventional milling machine 15.02 Mills profiles and pockets using a conventional milling machine 15.03 Mills slots, grooves and keyways using a conventional milling machine 15.04 Cuts gears and splines using a conventional milling machine 15.09 Bores holes using a conventional milling machine</p>	<p>Conventional Milling Machine Operation</p> <p>15.04 Cuts gears and splines using a conventional milling machine</p>
	<p>Precision Grinding Machine Set Up</p> <p>16.01 Selects precision grinding machine types 16.02 Plans operation of grinding machines 16.03 Sets up work holding devices for precision grinding machines 16.04 Mounts grinding wheel 16.05 Sets up grinding accessories 16.06 Sets up workpiece on precision grinding machines 16.07 Selects precision grinding machine speeds and feeds</p>	<p>Precision Grinding Machine Set Up</p> <p>16.01 Selects precision grinding machine types 16.02 Plans operation of grinding machines 16.03 Sets up work holding devices for precision grinding machines 16.04 Mounts grinding wheel 16.05 Sets up grinding accessories 16.06 Sets up workpiece on precision grinding machines 16.07 Selects precision grinding machine speeds and feeds</p>	
	<p>Precision Grinding Machine Operation</p> <p>17.01 Grinds flat surfaces using a surface grinder</p>	<p>Precision Grinding Machine Operation</p> <p>17.02 Grinds profiles 17.03 Grinds internal and external cylindrical and tapered surfaces 17.04 Grinds tools and cutters 17.05 Finishes holes using a honing machine</p>	
	<p>CNC Programming</p> <p>18.01 Creates process documentation 18.02 Creates manual input program 18.03 Transfers program to and from control memory</p>	<p>CNC Programming</p> <p>18.01 Creates process documentation 18.02 Creates manual input program 18.04 Optimizes program 18.05 Creates 2D and 3D models 18.06 Programs using CAM</p>	<p>CNC Programming</p> <p>18.04 Optimizes program 18.05 Creates 2D and 3D models 18.06 Programs using CAM</p>

	CNC Machine Set Up 19.01 Selects tooling and tool holders for CNC machines 19.02 Sets up tooling and tool holders on CNC machines 19.03 Sets up workpiece on CNC machines 19.04 Establishes work datum 19.05 Verifies program	CNC Machine Set Up 19.01 Selects tooling and tool holders for CNC machines 19.02 Sets up tooling and tool holders on CNC machines 19.03 Sets up workpiece on CNC machines 19.04 Establishes work datum	CNC Machine Set Up 19.03 Sets up workpiece on CNC machines
	CNC Machine Operation 20.01 Adjusts offsets 20.02 Monitors machining processes 20.03 Interrupts program cycle 20.04 Restarts program cycle	CNC Machine Operation 20.01 Adjusts offsets	CNC Machine Operation 20.01 Adjusts offsets

25.1. Rig Technician - Recommendations

That provinces and territories adopt the **Red Seal Name Rig Technician / Technicien/Technicienne en forage (pétrolier et gazier)**

- That the total number of training hours be **4860**
- That the technical training program offers **3 training levels**.
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

25.2. Rig Technician – Snapshot

Level One	Level Two	Level Three
Tools and Equipment		
Supplies and Materials		
Documentation and Reports	Documentation and Reports	Documentation and Reports
Supervision and Communication	Supervision and Communication	Supervision and Communication
Safety-Related Activities	Safety-Related Activities	Safety-Related Activities
	On-Pad Move	
Rig Move	Rig Move	
Rig Up Operations	Rig Up Operations	Rig Up Operations
Rig Out Operations	Rig Out Operations	
Rig Equipment Inspection	Rig Equipment Inspection	Rig Equipment Inspection
Rig Equipment Maintenance	Rig Equipment Maintenance	Rig Equipment Maintenance
Drill String Preparation		Drill String Preparation
Blowout Preventer (BOP) Equipment and Associated Components Operation		Blowout Preventer (BOP) Equipment and Associated Components Operation
Drilling Activities	Drilling Activities	Drilling Activities
Tripping Activities	Tripping Activities	Tripping Activities
Casing Activities	Casing Activities	Casing Activities
		Specialized Drilling
		Specialized Well Operation

25.3. Rig Technician – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three
Tools and Equipment 1.01 Uses hand and power tools. 1.02 Operates loaders and aerial work platforms. 1.03 Uses rigging/hoisting equipment.		
Supplies and Materials 2.01 Maintains parts and supply inventory. 2.02 Disposes of waste materials.		
Documentation and Reports 3.01 Uses personal documentation. 3.02 Uses safety and environmental documentation. 3.05 Uses maintenance documentation.	Documentation and Reports 3.01 Uses personal documentation. 3.02 Uses safety and environmental documentation. 3.05 Uses maintenance documentation.	Documentation and Reports 3.01 Uses personal documentation. 3.02 Uses safety and environmental documentation. 3.03 Completes tour sheets. 3.04 Interprets trade documentation. 3.05 Uses maintenance documentation.
Supervision and Communication 4.01 Supervises crew members. 4.02 Trains crew members. 4.03 Leads crew meetings. 4.04 Communicates with third-party service providers.	Supervision and Communication. 4.01 Supervises crew members. 4.02 Trains crew members. 4.03 Leads crew meetings. 4.04 Communicates with third-party service providers.	Supervision and Communication 4.01 Supervises crew members. 4.02 Trains crew members. 4.03 Leads crew meetings. 4.04 Communicates with third-party service providers.
Safety-Related Activities 5.01 Uses Personal Protective Equipment (PPE) and safety equipment. 5.02 Maintains safe work environment. 5.03 Performs lock-out procedures. 5.04 Participates in journey management.	Safety Related Activities 5.01 Uses Personal Protective Equipment (PPE) and safety equipment.	Safety Related Activities 5.01 Uses Personal Protective Equipment (PPE) and safety equipment.
	On-Pad Move 6.01 Performs rig walk. 6.02 Performs rig skidding.	
Rig Move 7.01 Moves rig on and off location. 7.02 Assembles/disassembles rig components.	Rig Move 7.02 Assembles/disassembles rig components.	

<p>Rig Up Operations 8.01 Rigs up air, fuel, water, hydraulic, electrical and communication systems. 8.02 Starts equipment. 8.03 Raises derrick. 8.06 Rigs up boiler and steam circulating systems.</p>	<p>Rig Up Operations 8.02 Starts equipment. 8.03 Raises derrick. 8.04 Rigs up rig floor and related equipment. 8.05 Rigs up mud tanks, pumps and circulation systems.</p>	<p>Rig Up Operations 8.02 Starts equipment. 8.03 Raises derrick.</p>
<p>Rig Out Operations 9.01 Rigs out floor and related equipment. 9.02 Lays down derrick. 9.04 Rigs out boiler and steam circulation systems. 9.05 Rigs out air, fuel, water, hydraulic, electrical and communication systems. 9.06 Prepares equipment for transport.</p>	<p>Rig Out Operations 9.02 Lays down derrick. 9.03 Rigs out mud tanks, pumps and circulation systems.</p>	
<p>Rig Equipment Inspection 10.02 Determines required repairs.</p>	<p>Rig Equipment Inspection 10.01 Performs daily walk-around and detailed rig inspection. 10.02 Determines required repairs.</p>	<p>Rig Equipment Inspection 10.02 Determines required repairs.</p>
<p>Rig Equipment Maintenance 11.01 Maintains mechanical and pneumatic systems. 11.02 Maintains hydraulic systems. 11.03 Maintains electrical and communication systems. 11.04 Maintains boiler and steam systems. 11.07 Maintains rig floor equipment. 11.10 Maintains water and fuel circulating systems.</p>	<p>Rig Equipment Maintenance 11.08 Maintains mud pump and high pressure mud system. 11.09 Maintains mud tanks and low pressure mud system.</p>	<p>Rig Equipment Maintenance 11.05 Maintains overhead equipment. 11.06 Maintains top drives. 11.11 Performs slip and cut.</p>
<p>Drill String Preparation 12.01 Takes measurements of bottom hole assembly (BHA) and drill string.</p>		<p>Drill String Preparation 12.02 Picks up bottom hole assembly (BHA) and drill string. 12.03 Makes up bottom hole assembly (BHA).</p>
<p>Blowout Preventer (BOP) Equipment and Associated Components Operation 13.01 Prepares for blowout preventer (BOP) installation. 13.02 Nipples up blowout preventer (BOP). 13.05 Nipples down blowout preventer (BOP) and related equipment.</p>		<p>Blowout Preventer (BOP) Equipment and Associated Components Operation 13.01 Prepares for blowout preventer (BOP) installation. 13.02 Nipples up blowout preventer (BOP). 13.03 Performs blowout preventer (BOP) accumulator functions. (BOP). 13.04 Pressure tests blowout preventer (BOP) and components. 13.05 Nipples down blowout preventer (BOP) and related equipment.</p>

<p>Drilling Activities 14.05 Responds to changing well conditions. 14.06 Performs well control operations.</p>	<p>Drilling Activities 14.01 Maintains drilling fluids. 14.05 Responds to changing well conditions. 14.06 Performs well control operations.</p>	<p>Drilling Activities 14.02 Operates electrical drive systems. 14.03 Operates drilling equipment. 14.04 Monitors drilling operations. 14.05 Responds to changing well conditions. 14.06 Performs well control operations.</p>
<p>Tripping Activities 15.01 Prepares for trip. 15.02 Trips drill string and bottom hole assembly (BHA). 15.03 Lays down tubulars.</p>	<p>Tripping Activities 15.01 Prepares for trip. 15.02 Trips drill string and bottom hole assembly (BHA).</p>	<p>Tripping Activities 15.01 Prepares for trip. 15.02 Trips drill string and bottom hole assembly (BHA).</p>
<p>Casing Activities 16.01 Prepares casing. 16.02 Installs casing equipment. 16.03 Runs casing.</p>	<p>Casing Activities 16.03 Runs casing. 16.04 Circulates casing.</p>	<p>Casing Activities 16.03 Runs casing. 16.04 Circulates casing. 16.05 Performs cementing operations.</p>
		<p>Specialized Drilling Operations 17.01 Performs coring activities. 17.02 Performs directional drilling. 17.03 Performs underbalanced drilling (UBD) and managed pressure drilling (MPD).</p>
		<p>Specialized Well Operations 18.01 Performs fishing and stuck pipe operations. 18.02 Rigs wireline loggers in and out. 18.03 Performs drill stem testing (DST). 18.04 Performs sour well operations. 18.05*</p>
<p>*Subtask 18.05 (Completes the well) is <i>usually</i> performed by a third party. This subtask will not be considered for the sequencing process for Harmonization.</p>		

26.1. Insulator (Heat and Frost) - Recommendations

That provinces and territories adopt the **Red Seal Name Insulator (Heat and Frost) / Calorifugeur/calorifugeuse (chaleur et froid)**

- That the total number of training hours be **7200 hours**
- That the technical training program offers **4 training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

26.2. Insulator (Heat and Frost) – Snapshot

Level One	Level Two	Level Three	Level Four
Context	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
	Communication	Communication	
	Piping and Fitting Insulation <i>(in context with other industrial and commercial systems)</i>		
			Mechanical Equipment Insulation <i>(in context with Removable Covers)</i>
Safety-Related Functions			
Tools and Equipment			
Organizes Work			Organizes Work
Communication			Mentoring
Routine Trade Practices	Routine Trade Practices	Routine Trade Practices	Routine Trade Practices
Preparation for Industrial Applications	Preparation for Industrial Applications	Preparation for Industrial Applications	Preparation for Industrial Applications
Piping and Fitting Insulation		Piping and Fitting Insulation	Piping and Fitting Insulation
	Tank, Vessel and Equipment Insulation	Tank, Vessel and Equipment Insulation	
Preparation for Commercial Applications	Preparation for Commercial Applications	Preparation for Commercial Applications	
Plumbing and Mechanical Piping System Insulation	Plumbing and Mechanical Piping System Insulation		
	Mechanical Ducting Insulation	Mechanical Ducting Insulation	
Level One	Level Two	Level Three	Level Four
	Mechanical Equipment Insulation	Mechanical Equipment Insulation	Mechanical Equipment Insulation
Fire Stop System Installation			Fire Stop System Installation
	Soundproofing Insulation		
		Removable Cover Installation (soft cover)	Removable Cover Installation (hard cover)
	Underground Insulating System Installation		
	Sealers, Coatings and Spray-on Insulation		

Fireproofing Installation			Fireproofing Installation
	Insulation Systems for Refractory Applications		
	Insulation Systems for Cryogenic Applications		
		Marine Applications	
Preparation for Asbestos Abatement			
Asbestos Removal			
Asbestos - Maintenance and Repair			
Lead Abatement and Mould Remediation			

26.3. Insulator (Heat and Frost) – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three	Level Four
Context	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
	Communication	Communication	
	Piping and Fitting Insulation <i>(in context with other industrial and commercial systems)</i>		
			Mechanical Equipment Insulation <i>(in context with Removable Covers)</i>
Safety-Related Functions 1.01 Uses personal protective (PPE) and safety equipment 1.02 Maintains safe work environment			
Tools and Equipment 2.01 Uses tools and equipment 2.02 Uses access equipment			
Organizes Work 3.01 Performs task scheduling 3.02 Organizes materials on site			
Communication 4.01 Uses communication techniques			Mentoring 4.02 Uses mentoring techniques
Routine Trade Practices 5.01 Performs measurements and calculations 5.03 Prepares substrates	Routine Trade Practices 5.01 Performs measurements and calculations 5.02 Interprets specifications and drawings (Introduction) 5.03 Prepares substrates	Routine Trade Practices 5.01 Performs measurements and calculations 5.02 Interprets specifications and drawings	Routine Trade Practices 5.01 Performs measurements and calculations 5.02 Interprets specifications and drawings
Preparation for Industrial Applications 6.01 Selects materials for industrial applications 6.02 Performs layout for industrial applications	Preparation for Industrial Applications 6.01 Selects materials for industrial applications 6.02 Performs layout for industrial applications	Preparation for Industrial Applications 6.01 Selects materials for industrial applications 6.02 Performs layout for industrial applications	Preparation for Industrial Applications 6.02 Performs layout for industrial applications
Piping and Fitting Insulation 7.01 Installs insulation on piping, fittings and hangers 7.02 Applies vapour barriers on piping and fittings		Piping and Fitting Insulation 7.03 Installs cladding, jacketing and finishes on piping and fittings	Piping and Fitting Insulation 7.03 Installs cladding, jacketing and finishes on piping and fittings

	Tank, Vessel and Equipment Insulation 8.01 Installs insulation on tanks, vessels and equipment 8.02 Applies vapour barriers on tanks, vessels and equipment	Tank, Vessel and Equipment Insulation 8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment	
Preparation for Commercial Applications 9.01 Selects materials for commercial applications 9.02 Performs layout for commercial applications	Preparation for Commercial Applications 9.01 Selects materials for commercial applications 9.02 Performs layout for commercial applications	Preparation for Commercial Applications 9.02 Performs layout for commercial applications	
Plumbing and Mechanical Piping System Insulation 10.01 Installs insulation on plumbing and mechanical piping systems 10.02 Applies vapour barriers on insulated plumbing and mechanical piping systems	Plumbing and Mechanical Piping System Insulation 10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems		
	Mechanical Ducting Insulation 11.01 Installs insulation on mechanical ducting 11.02 Installs vapour barrier on insulated mechanical ducting	Mechanical Ducting Insulation 11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting	
	Mechanical Equipment Insulation 12.01 Installs insulation on mechanical equipment 12.02 Applies vapour barriers on insulated mechanical equipment	Mechanical Equipment Insulation 12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment	
Fire Stop System Installation 13.01 Identifies approved fire stop system 13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components			Fire Stop System Installation 13.01 Identifies approved fire stop system 13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components
	Soundproofing Insulation 14.01 Insulates piping for soundproofing 14.02 Insulates turbines, equipment and mechanical systems for soundproofing 14.03 Fabricates acoustic panels 14.04 Installs acoustic panels to ceilings and walls		
		Removable Cover Installation (soft cover) 15.01 Fabricates removable covers 15.02 Fastens removable covers	Removable Cover Installation (hard cover) 15.01 Fabricates removable covers 15.02 Fastens removable covers

	<p>Underground Insulating System Installation</p> <p>16.01 Installs pipe insulation to underground systems</p> <p>16.02 Installs pour-in-place and spray-on insulation to underground systems</p>		
	<p>Sealers, Coatings and Spray-on Insulation</p> <p>17.01 Protects surrounding work area for spraying</p> <p>17.02 Prepares material, equipment and substrate for spraying</p> <p>17.03 Installs reinforcing material for spraying</p> <p>17.04 Applies spray-on insulation, coatings, and sealers</p>		
<p>Fireproofing Installation</p> <p>18.01 Applies fireproofing to architectural, structural, mechanical and electrical components</p>			<p>Fireproofing Installation</p> <p>18.02 Applies protective covering to fireproofing materials</p>
	<p>Insulation Systems for Refractory Application</p> <p>19.01 Applies insulation to refractory systems</p> <p>19.02 Installs reflective systems</p> <p>19.03 Installs cladding, jacketing and finishes to refractory systems</p>		
	<p>Insulation Systems for Cryogenic Application</p> <p>20.01 Applies insulation to cryogenic systems</p> <p>20.02 Applies vapour barriers to insulated components of cryogenic systems</p> <p>20.03 Installs cladding, jacketing and finishes to cryogenic systems</p>		
		<p>Marine Applications</p> <p>21.01 Insulates bulkheads, deckheads and hulls</p> <p>21.02 Installs cladding, jacketing, and finishes on marine applications</p>	
<p>Preparation for Asbestos Abatement</p> <p>22.01 Determines required PPE for asbestos abatement</p> <p>22.02 Retrieves sample of asbestos for testing</p> <p>22.03 Determines scope of work</p> <p>22.04 Prepares site for removal and containment of asbestos</p> <p>22.05 Builds temporary enclosure</p>			

Asbestos - Removal 23.01 Removes asbestos 23.02 Disposes of asbestos materials 23.03 Performs decontamination of area and equipment			
Asbestos - Maintenance and Repair 24.01 Encapsulates asbestos 24.02 Encloses asbestos			
Lead Abatement and Mould Remediation 25.01 Performs lead abatement 25.02 Performs mould remediation			

27.1. Refrigeration and Air Conditioning Mechanic - Recommendations

That provinces and territories adopt the **Red Seal Name Refrigeration and Air Conditioning Mechanic / Mécanicien/mécanicienne de réfrigération et d'air climatisé**

- That the total number of training hours be **7200 hours**
- That the technical training program offers **4 training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

27.2. Refrigeration and Air Conditioning Mechanic – Snapshot

Level One	Level Two	Level Three	Level Four
Context	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		HVAC/R Systems (Maintain)	HVAC/R Systems (Maintain)
Safety-Related Functions			
Tools and Equipment			
Organizes Work	Organizes Work	Organizes Work	Organizes Work
Communication			Communication and Mentoring
Work Site Preparation			
Trade Activities	Trade Activities		
Basic HVAC/R Systems (Plans Installation)	HVAC/R Systems (Plans Installation)	HVAC/R Systems (Plans Installation)	HVAC/R Systems (Plans Installation)
Basic Control Systems (Plans Installation)	Control Systems (Plans Installation)	Control Systems (Plans Installation)	Control Systems (Plans Installation)
Basic HVAC/R Systems (Installation)	HVAC/R Systems (Installs)	HVAC/R Systems (Installs)	
Basic Control Systems (Installation)	Control Systems (Installs)	Control Systems (Installs)	
		HVAC/R Systems (Commissions)	HVAC/R Systems (Commissions)
		Control Systems (Commissions)	Control Systems (Commissions)
HVAC/R Systems (Basic Maintenance)	HVAC/R Systems (Maintain)		
	HVAC/R Systems (Basic Service)	HVAC/R Systems (Service)	HVAC/R Systems (Service)
	Control Systems (Basic Maintenance and Service)	Control Systems (Maintain and Service)	Control Systems (Maintain and Service)

27.3. Refrigeration and Air Conditioning Mechanic – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three	Level Four
Context	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		HVAC/R Systems (Maintain)	HVAC/R Systems (Maintain)
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Performs lock-out, tag-out and isolation procedures 1.03 Uses personal protective equipment (PPE) and safety equipment			
Tools and Equipment 2.01 Uses hand tools 2.02 Uses portable and stationary power tools 2.03 Uses brazing and soldering equipment 2.04 Uses recovery and recycling equipment 2.05 Uses evacuation tools and equipment 2.06 Uses charging tools and equipment 2.07 Uses diagnostic and measuring tools and equipment 2.08 Uses access equipment 2.09 Uses rigging, hoisting and lifting equipment 2.10 Uses digital technology			
Organizes Work 3.02 Uses documentation and reference material 3.03 Plans job tasks and procedures	Organizes Work 3.01 Interprets blueprints, drawings and specifications 3.02 Uses documentation and reference material 3.03 Plans job tasks and procedures	Organizes Work 3.01 Interprets blueprints, drawings and specifications 3.02 Uses documentation and reference material 3.03 Plans job tasks and procedures	Organizes Work 3.01 Interprets blueprints, drawings and specifications 3.02 Uses documentation and reference material 3.03 Plans job tasks and procedures
Communication 4.01 Uses communication techniques			Communication and Mentoring 4.01 Uses communication techniques 4.02 Uses mentoring techniques
Work Site Preparation 5.01 Prepares work site 5.02 Handles materials and supplies			

<p>Trade Activities</p> <p>6.01 Performs brazing and soldering 6.02 Performs leak and pressure tests on system 6.03 Evacuates systems 6.04 Uses refrigerants, gases and oils 6.05 Performs field wiring of systems 6.06 Applies sealants and adhesives</p>	<p>Trade Activities</p> <p>6.04 Uses refrigerants, gases and oils 6.05 Performs field wiring of systems</p>		
<p>Basic HVAC/R Systems (Plans Installation)</p> <p>7.03 Determines placement of HVAC/R equipment, components and accessories</p>	<p>HVAC/R Systems (Plans Installation)</p> <p>7.02 Selects HVAC/R equipment, components and accessories 7.03 Determines placement of HVAC/R equipment, components and accessories 7.04 Performs HVAC/R material take-off</p>	<p>HVAC/R Systems (Plans Installation)</p> <p>7.01 Verifies HVAC/R system parameters and requirements 7.02 Selects HVAC/R equipment, components and accessories 7.03 Determines placement of HVAC/R equipment, components and accessories 7.04 Performs HVAC/R material take-off</p>	<p>HVAC/R Systems (Plans Installation)</p> <p>7.01 Verifies HVAC/R system parameters and requirements 7.02 Selects HVAC/R equipment, components and accessories 7.03 Determines placement of HVAC/R equipment, components and accessories 7.04 Performs HVAC/R material take-off</p>
<p>Basic Control Systems (Plans Installation)</p> <p>8.03 Determines placement of control system components and accessories</p>	<p>Control Systems (Plans Installation)</p> <p>8.02 Selects control system components and accessories 8.03 Determines placement of control system components and accessories 8.04 Performs control system material take-off</p>	<p>Control Systems (Plans Installation)</p> <p>8.01 Verifies control system parameters and requirements 8.02 Selects control system components and accessories 8.03 Determines placement of control system components and accessories 8.04 Performs control system material take-off</p>	<p>Control Systems (Plans Installation)</p> <p>8.01 Verifies control system parameters and requirements 8.02 Selects control system components and accessories 8.03 Determines placement of control system components and accessories 8.04 Performs control system material take-off</p>
<p>Basic HVAC/R Systems (Installation)</p> <p>9.03 Places HVAC/R equipment, components and accessories 9.04 Installs fasteners, brackets and hangers 9.05 Installs HVAC/R piping and tubing 9.06 Applies HVAC/R holding charge</p>	<p>HVAC/R Systems (Installs)</p> <p>9.02 Assembles HVAC/R equipment, components and accessories 9.03 Places HVAC/R equipment, components and accessories</p>	<p>HVAC/R Systems (Installs)</p> <p>9.01 Confirms system layout 9.02 Assembles HVAC/R equipment, components and accessories 9.03 Places HVAC/R equipment, components and accessories</p>	
<p>Basic Control Systems (Installation)</p> <p>10.01 Places control system components 10.02 Connects control systems</p>	<p>Control Systems (Installs)</p> <p>10.01 Places control system components 10.02 Connects control systems</p>	<p>Control Systems (Installs)</p> <p>10.01 Places control system components 10.02 Connects control systems</p>	

		HVAC/R Systems (Commissions) 11.01 Performs pre-start-up checks for HVAC/R systems 11.02 Performs start-up of HVAC/R systems 11.03 Completes HVAC/R system charge 11.04 Sets up primary and secondary HVAC/R system components	HVAC/R Systems (Commissions) 11.01 Performs pre-start-up checks for HVAC/R systems 11.02 Performs start-up of HVAC/R systems 11.03 Completes HVAC/R system charge 11.04 Sets up primary and secondary HVAC/R system components
		Control Systems (Commissions) 12.01 Performs start-up checks for control systems 12.02 Verifies/sets operating parameters	Control Systems (Commissions) 12.01 Performs start-up checks for control systems 12.02 Verifies/sets operating parameters
HVAC/R Systems (Basic Maintenance) 13.01 Inspects HVAC/R systems 13.02 Performs predictive and scheduled maintenance on HVAC/R systems 13.03 Tests HVAC/R system components and accessories	HVAC/R Systems (Maintain) 13.01 Inspects HVAC/R systems 13.02 Performs predictive and scheduled maintenance on HVAC/R systems 13.03 Tests HVAC/R system components and accessories		
	HVAC/R Systems (Basic Service) 14.01 Troubleshoots HVAC/R systems 14.02 Repairs HVAC/R systems	HVAC/R Systems (Service) 14.01 Troubleshoots HVAC/R systems 14.02 Repairs HVAC/R systems	HVAC/R Systems (Service) 14.01 Troubleshoots HVAC/R systems 14.02 Repairs HVAC/R systems
	Control Systems (Basic Maintenance and Service) 15.01 Performs maintenance and inspection on control systems 15.02 Troubleshoots control systems 15.03 Calibrates operating and safety controls 15.04 Repairs control systems	Control Systems (Maintain and Service) 15.01 Performs maintenance and inspection on control systems 15.02 Troubleshoots control systems 15.03 Calibrates operating and safety controls 15.04 Repairs control systems	Control Systems (Maintain and Service) 15.01 Performs maintenance and inspection on control systems 15.02 Troubleshoots control systems 15.03 Calibrates operating and safety controls 15.04 Repairs control systems

28.1. Tool and Die Maker - Recommendations

That provinces and territories adopt the **Red Seal Name Tool and Die Maker / Outilleur-ajusteur/outilleuse-ajusteuse**

- That the total number of training hours be **7200 hours**
- That the technical training program offers **3 training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

28.2. Tool and Die Maker – Snapshot

Level One	Level Two	Level Three
Context	Context	Context
	Benchwork	Benchwork
		Grinding Machine Operation
Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
Machine-Tools, Accessories And Cutting Tool Maintenance	Machine-Tools, Accessories And Cutting Tool Maintenance	Machine-Tools, Accessories And Cutting Tool Maintenance
Organizes Work	Organizes Work	Organizes Work
Benchwork		
Communication	Communication and Mentoring	Mentoring
Power Saw Operation		
Drill Press Operation		
Conventional Lathe Operation	Conventional Lathe Operation	
Conventional Milling Machine Operation	Conventional Milling Machine Operation	
Grinding Machine Operation	Grinding Machine Operation	
	CNC Operation	CNC Operation
		EDM Operation
	Heat Treatment of Materials	Heat Treatment of Materials
	Heat Treatment Testing	Heat Treatment Testing
	Production Tool Design	Production Tool Design
	Prototype Development	Prototype Development
	Production Tools (Fit and Assembly)	Production Tools (Fit and Assembly)
	Production Tools (Proves out)	Production Tools (Proves out)
	Production Tools (Repair and Maintenance)	Production Tools (Repair and Maintenance)

28.3. Tool and Die Maker – Topic - Sub-Task by RSOS 2017

Level One	Level Two	Level Three
Context	Context	Context
	Benchwork	Benchwork
		Grinding Machine Operation
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses PPE and safety equipment 1.03 Uses hoisting, lifting and rigging equipment	Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses PPE and safety equipment 1.03 Uses hoisting, lifting and rigging equipment	Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses PPE and safety equipment 1.03 Uses hoisting, lifting and rigging equipment
Machine-Tools, Accessories And Cutting Tool Maintenance 2.01 Maintains machine-tools and accessories 2.02 Maintains cutting tools	Machine-Tools, Accessories And Cutting Tool Maintenance 2.01 Maintains machine-tools and accessories 2.02 Maintains cutting tools	Machine-Tools, Accessories And Cutting Tool Maintenance 2.01 Maintains machine-tools and accessories 2.02 Maintains cutting tools
Organizes Work 3.01 Interprets drawings, specifications and applications 3.02 Plans project activities	Organizes Work 3.01 Interprets drawings, specifications and applications 3.02 Plans project activities	Organizes Work 3.01 Interprets drawings, specifications and applications 3.02 Plans project activities
Benchwork 4.01 Performs layout 4.02 Finishes workpiece 4.03 Inspects workpiece		
Communication 5.01 Uses communication techniques	Communication and Mentoring 5.01 Uses communication techniques 5.02 Uses mentoring techniques	Mentoring 5.02 Uses mentoring techniques
Power Saw Operation 6.01 Sets up power saws 6.02 Saws straight and angle cuts 6.03 Cuts irregular shapes		

<p>Drill Press Operation</p> <p>7.01 Sets up drill presses 7.02 Drills holes using a drill press 7.03 Cuts countersinks, counterbores, chamfers and spot faces using a drill press 7.04 Performs tapping using a drill press 7.05 Finishes holes using a drill press</p>		
<p>Conventional Lathe Operation</p> <p>8.01 Sets up conventional lathes 8.02 Faces surface using a conventional lathe 8.03 Turns internal and external surfaces using conventional lathes 8.04 Creates holes using conventional lathes</p>	<p>Conventional Lathe Operation</p> <p>8.01 Sets up conventional lathes 8.03 Turns internal and external surfaces using conventional lathes 8.04 Creates holes using conventional lathes</p>	
<p>Conventional Milling Machine Operation</p> <p>9.01 Sets up conventional milling machines 9.02 Mills surfaces using conventional milling machines 9.03 Creates holes and hole features using conventional milling machines</p>	<p>Conventional Milling Machine Operation</p> <p>9.01 Sets up conventional milling machines 9.02 Mills surfaces using conventional milling machines 9.03 Creates holes and hole features using conventional milling machines</p>	
<p>Grinding Machine Operation</p> <p>10.01 Sets up grinding machines 10.02 Grinds flat surfaces using a surface grinder 10.03 Grinds profiles</p>	<p>Grinding Machine Operation</p> <p>10.01 Sets up grinding machines 10.02 Grinds flat surfaces using a surface grinder 10.03 Grinds profiles 10.04 Grinds internal and external cylindrical and tapered surfaces 10.05 Grinds tools and cutters 10.06 Finishes holes using a honing machine</p>	
	<p>CNC Operation</p> <p>11.01 Performs CNC programming 11.02 Inputs program data into control memory 11.03 Establishes workpiece datum 11.04 Verifies program 11.05 Monitors machining processes*</p>	<p>CNC Operation</p> <p>11.01 Performs CNC programming 11.04 Verifies program</p>

		EDM Operation 12.01 Determines flushing methods 12.02 Sets cutting conditions
	Heat Treatment of Materials 13.01 Selects heat treating process 13.02 Hardens materials 13.03 Tempers materials 13.04 Anneals materials 13.05 Normalizes materials 13.06 Case hardens materials	Heat Treatment of Materials 13.01 Selects heat treating process 13.02 Hardens materials 13.06 Case hardens materials
	Heat Treatment Testing 14.01 Performs visual inspection 14.02 Performs hardness test	Heat Treatment Testing 14.01 Performs visual inspection 14.02 Performs hardness test
	Production Tool Design 15.01 Identifies production tool requirements 15.02 Prepares shop sketches 15.03 Determines production tool material specifications and engineered components 15.04 Prepares information for designing or drafting	Production Tool Design 15.01 Identifies production tool requirements 15.02 Prepares shop sketches 15.03 Determines production tool material specifications and engineered components 15.04 Prepares information for designing or drafting
	Prototype Development 16.01 Selects prototyping technique and materials 16.02 Fabricates prototype components 16.03 Assembles prototype components 16.04 Inspects prototype 16.05 Proves out prototypes	Prototype Development 16.01 Selects prototyping technique and materials 16.02 Fabricates prototype components 16.03 Assembles prototype components 16.04 Inspects prototype 16.05 Proves out prototypes
	Production Tools (Fit and Assembly) ** 17.01 Verifies dimensions of production tool components 17.02 Performs production tool assembly	Production Tools (Fit and Assembly) ** 17.01 Verifies dimensions of production tool components 17.02 Performs production tool assembly 17.03 Sets production tool timing

	Production Tools (Proves out) ** 18.01 Sets up production tools 18.02 Verifies production part material 18.04 Cycles equipment with production tools 18.05 Evaluates production part 18.06 Checks production tool for damage 18.07 Modifies production tools to enhance productivity	Production Tools (Proves out) ** 18.01 Sets up production tools 18.02 Verifies production part material 18.03 Develops blank/strip 18.04 Cycles equipment with production tools 18.05 Evaluates production part 18.06 Checks production tool for damage 18.07 Modifies production tools to enhance productivity
	Production Tools (Repair and Maintenance) ** 19.01 Identifies condition of production tools 19.02 Identifies repair procedures 19.03 Adjusts production tool components 19.04 Reconditions production tool components	Production Tools (Repair and Maintenance) ** 19.01 Identifies condition of production tools 19.02 Identifies repair procedures 19.03 Adjusts production tool components 19.04 Reconditions production tool components

*This may apply to EDM Operation and may be incorporated into EDM training.

**Level 2 is developed to focus on jigs and fixtures; Level 3 is developed to focus on stamping tools (moulds as applies in jurisdictions).

29.1. Automotive Refinishing Technician (Formerly: Automotive Painter) - Recommendations

That provinces and territories adopt the **Red Seal Name – Automotive Refinishing Technician / Technicien/technicienne en peinture d’automobiles**.

- That the total number of training hours be **3600**
- That the technical training program offers **2 training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

29.2. Automotive Refinishing Technician (Formerly: Automotive Painter) – Snapshot

Level One	Level Two
	In Context
	Safety-Related Functions
Safety-Related Functions	
Tools and Equipment	Tools and Equipment
Work Organization	Work Organization
Communication	Communication and Mentoring
Surface Preparation	Surface Preparation
Repair Materials	
Equipment Preparation	Equipment Preparation
Preparation of Refinishing Materials (Introduction)	Preparation of Refinishing Materials
Application of Refinishing Materials (Introduction)	Application of Refinishing Materials
	Post-Refinishing Functions

29.3. Automotive Refinishing Technician (Formerly: Automotive Painter) – Topic - Sub-Task by RSOS 2018

Level One	Level Two
	In Context
	Safety-Related Functions
<p>Safety-Related Functions</p> <p>1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment</p>	
<p>Tools and Equipment</p> <p>2.01 Maintains hand and power tools 2.02 Maintains spray booth 2.03 Maintains spray equipment 2.04 Maintains mixing equipment 2.05 Maintains shop equipment</p>	<p>Tools and Equipment</p> <p>2.03 Maintains spray equipment 2.04 Maintains mixing equipment</p>
<p>Work Organization</p> <p>3.01 Uses documentation 3.02 Performs inspections</p>	<p>Work Organization</p> <p>3.01 Uses documentation 3.02 Performs inspections 3.03 Contributes to development of repair plan 3.04 Organizes refinish production schedule</p>
<p>Communication</p> <p>4.01 Uses communication techniques</p>	<p>Communication and Mentoring</p> <p>4.01 Uses communication techniques 4.02 Uses mentoring techniques</p>
<p>Surface Preparation</p> <p>5.01 Performs initial preparation 5.02 Masks surface 5.03 Strips surface 5.04 Sands surface</p>	<p>Surface Preparation</p> <p>5.02 Masks surface (<i>specialized and advanced techniques</i>)</p>
<p>Repair Materials</p> <p>6.01 Mixes repair materials 6.02 Applies repair materials 6.03 Applies protective coating</p>	
<p>Equipment Preparation</p> <p>7.01 Prepares spray booth 7.02 Performs spray gun setup</p>	<p>Equipment Preparation</p> <p>7.01 Prepares spray booth 7.02 Performs spray gun setup</p>

<p>Preparation of Refinishing Materials 8.01 Mixes refinishing materials (introduction)</p>	<p>Preparation of Refinishing Materials 8.01 Mixes refinishing materials 8.02 Performs colour adjustments</p>
<p>Application of Refinishing Materials 9.02 Applies base coat (introduction) 9.03 Applies single-stage paint (introduction)</p>	<p>Application of Refinishing Materials 9.01 Applies sealers 9.02 Applies base coat 9.03 Applies single-stage paint 9.04 Applies clear coat</p>
	<p>Post-Refinishing Functions 10.01 Removes masking materials 10.02 Corrects surface imperfections 10.03 Performs final check</p>

30.1. Auto Body and Collision Technician (Formerly Motor Vehicle Body Repairer (Metal and Paint)) - Recommendations

That provinces and territories adopt the **Red Seal Name** – Auto Body and Collision Technician / Technicien/technicienne en collision et en carrosserie automobile

- That the total number of training **hours** be 7200
- That the technical training program offers 4 **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

30.2 Auto Body and Collision Technician (Formerly Motor Vehicle Body Repairer (Metal and Paint)) – Snapshot

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Communication	Communication	
		Refinishing Materials (Prepares)	Refinishing Materials (Prepares)
		Structural and Laminated Glass (Removes, Installs and Repairs)	
		Non-Structural Glass (Removes and Installs)	
Safety-Related Functions			
Tools and Equipment	Tools and Equipment	Tools and Equipment	Tools and Equipment
Welding Equipment (Basic/Introduction)	Welding Equipment	Welding Equipment	Welding Equipment
Work Organization and Document Use	Work Organization and Document Use	Work Organization and Document Use	Work Organization and Document Use
Communication			Mentoring
Trim and Hardware			
		Final Inspections	Final Inspections
	Corrosion Protection and Sound Deadening Materials		
		Structural Components (Prepares)	Structural Components (Prepares)

		Structural Components (Removes, Repairs and Installs)	Structural Components (Removes, Repairs and Installs)
	Structural and Laminated Glass (Removes, Installs and Repairs)		
Metal Panels and Components (Removes, Repairs and Installs)	Metal Panels and Components (Removes, Repairs and Installs)		
Plastic and Composite Panels and Components (Removes, Repairs and Installs)	Plastic and Composite Panels and Components (Removes, Repairs and Installs)		
	Non-Structural Glass (Removes and Installs)		
		Alternate Fuel Systems (Deactivates and Reactivates)	
		Mechanical Components (Removes and Installs)	Mechanical Components (Removes and Installs)
		Electrical and Electronic Components (Removes, Repairs and Installs)	Electrical and Electronic Components (Removes, Repairs and Installs)
	Interior Components (Repairs and Replaces)		
		Supplemental Restraint Systems (SRS)	
Surface Preparation			
Repair Materials			
Refinishing Equipment Preparation	Refinishing Equipment Preparation		
Refinishing Materials (Prepares)	Refinishing Materials (Prepares)		
Refinishing Materials (Applies)	Refinishing Materials (Applies)		
Post-Refinishing Functions	Post-Refinishing Functions		
Exterior Detailing			
Vehicle Cleaning			

30.3 Auto Body and Collision Technician (Formerly Motor Vehicle Body Repairer (Metal and Paint)) – Topic - Sub-Task by RSOS 2018

Level One	Level Two	Level Three	Level Four
Context	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Communication	Communication	
		Refinishing Materials (Prepares)	Refinishing Materials (Prepares)
		Structural and Laminated Glass (Removes, Installs and Repairs)	
		Non-Structural Glass (Removes and Installs)	
Safety-Related Functions 1.01 Maintains safe work environment. 1.02 Uses personal protective equipment (PPE) and safety equipment.			
Tools and Equipment 2.01 Maintains hand and power tools. 2.03 Uses lifting equipment. 2.05 Maintains refinishing tools and equipment.	Tools and Equipment 2.03 Uses lifting equipment. 2.05 Maintains refinishing tools and equipment.	Tools and Equipment 2.02 Maintains frame and unibody repair and measuring equipment. 2.04 Uses diagnostic equipment.	Tools and Equipment 2.02 Maintains frame and unibody repair and measuring equipment. 2.04 Uses diagnostic equipment.
Welding Equipment (Basic/Introduction) 3.01 Uses welding equipment. 3.02 Maintains welding equipment.	Welding Equipment 3.01 Uses welding equipment. 3.02 Maintains welding equipment.	Welding Equipment 3.01 Uses welding equipment. 3.02 Maintains welding equipment.	Welding Equipment 3.01 Uses welding equipment. 3.02 Maintains welding equipment.
Work Organization and Document Use 4.03 Organizes parts, materials and work area. 4.04 Uses documentation.	Work Organization and Document Use 4.02 Prepares repair plan. 4.03 Organizes parts, materials and work area. 4.04 Uses documentation.	Work Organization and Document Use 4.01 Prepares estimates and supplements. 4.04 Uses documentation.	Work Organization and Document Use 4.01 Prepares estimates and supplements. 4.04 Uses documentation.
Communication 5.01 Uses communication techniques.			Mentoring 5.02 Uses mentoring techniques.
Trim and Hardware 6.01 Removes trim and hardware. 6.02 Installs trim and hardware.			

		Final Inspections 7.01 Performs final operational check.	Final Inspections 7.02 Performs final quality control inspection.
	Corrosion Protection and Sound Deadening Materials 8.01 Applies corrosion inhibitors and undercoats. 8.02 Applies seam sealers and sound deadeners.		
		Structural Components (Prepares) 9.01 Identifies extent of damage. 9.02 Removes components for access. 9.03 Performs vehicle set-up.	Structural Components (Prepares) 9.01 Identifies extent of damage. 9.02 Removes components for access. 9.03 Performs vehicle set-up.
		Structural Components (Removes, Repairs and Installs) 10.01 Repairs structural components. 10.02 Removes structural components. 10.03 Installs structural components.	Structural Components (Removes, Repairs and Installs) 10.01 Repairs structural components. 10.02 Removes structural components. 10.03 Installs structural components.
	Structural and Laminated Glass (Removes, Installs and Repairs) 11.01 Removes structural glass. 11.02 Installs structural glass. 11.03 Repairs laminated glass.		
Metal Panels and Components (Removes, Repairs and Installs) 12.01 Prepares metal panels and components for repair. 12.02 Removes metal panels and components. 12.03 Repairs metal panels and components. 12.04 Installs metal panels and components.	Metal Panels and Components (Removes, Repairs and Installs) 12.03 Repairs metal panels and components.		

<p>Plastic and Composite Panels and Components (Removes, Repairs and Installs) 13.01 Prepares plastic and composite panels and components for repair. (Introduction) 13.02 Removes plastic and composite panels and components. (Introduction) 13.03 Repairs plastic and composite panels and components. (Introduction) 13.04 Installs plastic and composite panels and components. (Introduction)</p>	<p>Plastic and Composite Panels and Components (Removes, Repairs and Installs) 13.01 Prepares plastic and composite panels and components for repair. 13.02 Removes plastic and composite panels and components. 13.03 Repairs plastic and composite panels and components. 13.04 Installs plastic and composite panels and components.</p>		
	<p>Non-Structural Glass (Removes and Installs) 14.01 Removes non-structural glass. 14.02 Installs non-structural glass.</p>		
		<p>Alternate Fuel Systems (Deactivates and Reactivates) 15.01 Deactivates alternate-fuel systems. 15.02 Reactivates alternate-fuel systems.</p>	
		<p>Mechanical Components (Removes and Installs) 16.01 Removes mechanical components. 16.02 Installs mechanical components.</p>	<p>Mechanical Components (Removes and Installs) 16.01 Removes mechanical components. 16.02 Installs mechanical components.</p>
		<p>Electrical and Electronic Components (Removes, Repairs and Installs) 17.01 Removes electrical components. 17.02 Repairs damaged wires and protective coverings. 17.03 Installs electrical components. 17.04 Services advanced electronic components.</p>	<p>Electrical and Electronic Components (Removes, Repairs and Installs) 17.04 Services advanced electronic components.</p>

	Interior Components (Repairs and Replaces) 18.01 Repairs interior components. 18.02 Replaces interior components.		
		Supplemental Restraint Systems (SRS) 19.01 Services seat belt restraint systems. 19.02 Services air bags and related components.	
Surface Preparation 20.01 Performs initial preparation. 20.02 Masks surface. 20.03 Strips surface. 20.04 Sands surface.			
Repair Materials 21.01 Mixes repair materials. 21.02 Applies repair materials.			
Refinishing Equipment Preparation 22.01 Prepares spray booth. 22.02 Performs spray gun setup.	Refinishing Equipment Preparation 22.01 Prepares spray booth. 22.02 Performs spray gun setup.		
Refinishing Materials (Prepares) 23.01 Mixes refinishing materials. (Introduction)	Refinishing Materials (Prepares) 23.01 Mixes refinishing materials. 23.02 Performs colour adjustments.		
Refinishing Materials (Applies) ⁷⁰ 24.01 Applies sealers. (Introduction) 24.02 Applies base coat. (Introduction) 24.03 Applies single-stage paint. (Introduction) 24.04 Applies clear coat. (Introduction)	Refinishing Materials (Applies) 24.01 Applies sealers. 24.02 Applies base coat. 24.03 Applies single-stage paint. 24.04 Applies clear coat.		
Post-Refinishing Functions 25.01 Removes masking materials.	Post-Refinishing Functions 25.02 Corrects surface imperfections.		
Exterior Detailing 26.01 Removes minor imperfections. 26.02 Polishes vehicle. 26.03 Touches up stone chips.			

Exterior Detailing 26.01 Removes minor imperfections. 26.02 Polishes vehicle. 26.03 Touches up stone chips.			
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⁷⁰ Alberta will stand as an exception and deliver training solely in Level 2.

31.1. Powerline Technician - Recommendations

That provinces and territories adopt the **Red Seal Name** – Powerline Technician / Monteur/monteuse de lignes sous tension

- That the total number of training **hours** be 7200
- That the technical training program offers 4 **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

31.2 Powerline Technician – Snapshot

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-related functions	Safety-related functions	Safety-related functions
	Organizes Work	Organizes Work	Organizes Work
	Tools and equipment	Tools and equipment	Tools and equipment
Safety-related functions			
Tools and equipment			
Organizes Work			
Work Area Access			
Live-Line Methods (Introduction)	Live-Line Methods	Live-Line Methods	Live-Line Methods
Communication			Mentoring
Pole Structures			
Steel Lattice Structures			
Overhead Conductors and Cables	Overhead Conductors and Cables ⁷¹	Overhead Conductors and Cables	Overhead Conductors and Cables
	Underground and Underwater Cable (Secondary)	Underground and Underwater Cable (Primary)	
	Lighting Systems		
Voltage Control Equipment	Voltage Control Equipment	Voltage Control Equipment	Voltage Control Equipment
	Protection Equipment	Protection Equipment	Protection Equipment
	Metering Equipment	Metering Equipment	
Communication Devices			Communication Equipment
	Distribution and Transmission Systems (Operation)	Distribution and Transmission Systems (Operation)	Distribution and Transmission Systems (Operation)
	Distribution and Transmission Systems (Maintenance)	Distribution and Transmission Systems (Maintenance)	Distribution and Transmission Systems (Maintenance)
	Distribution Systems (Repair)	Distribution Systems (Troubleshoot and Repair)	Distribution Systems (Troubleshoot and Repair)
	Transmission Systems (Repair)	Transmission Systems (Troubleshoot and Repair)	Transmission Systems (Troubleshoot and Repair)

⁷¹ Ontario – unable to incorporate in L2

31.3 Powerline Technician – Topic - Sub-Task by RSOS 2018

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-related functions	Safety-related functions	Safety-related functions
	Organizes Work	Organizes Work	Organizes Work
	Tools and Equipment	Tools and Equipment	Tools and Equipment
Safety-related functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Controls powerline hazards 1.03 Controls environmental hazards 1.04 Performs lock-out and tag-out procedures 1.05 Performs temporary grounding and bonding procedures			
Tools and Equipment 2.01 Uses hand, power and powder-actuated tools and equipment 2.02 Uses electrical measuring and testing equipment 2.03 Uses rigging, hoisting and lifting equipment			
Organizes Work 3.01 Interprets plans, drawings and specifications 3.02 Prepares worksite 3.03 Plans job tasks and procedures			
Work Area Access 4.01 Climbs poles and steel lattice structures 4.02 Uses access equipment 4.03 Uses on- and off-road equipment			
Live-Line Methods (Introduction) 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)	Live-Line Methods 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)	Live-Line Methods 5.01 Uses cover-up 5.02 Uses rubber gloves 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)	Live-Line Methods 5.01 Uses cover-up 5.02 Uses rubber gloves 5.03 Uses bare hand methods 5.04 Uses fibreglass reinforced plastic (FRP) tools (hot sticks)
Communication 6.01 Uses communication techniques			Mentoring 6.02 Uses mentoring techniques

Pole Structures 7.01 Frames pole structures 7.02 Sets pole structures 7.03 Installs pole structure guys and anchors			
Steel Lattice Structures 8.01 Assembles steel lattice structures 8.02 Erects steel lattice structures 8.03 Installs steel lattice structure guy wires and anchors			
Overhead Conductors and Cables 9.01 Strings overhead conductors and cables (<i>Non-tension method</i>) 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	Overhead Conductors and Cables 9.01 Strings overhead conductors and cables (<i>Introduction to tension stringing method</i>) 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	Overhead Conductors and Cables 9.01 Strings overhead conductors and cables (<i>Distribution tension method</i>) 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables	Overhead Conductors and Cables 9.01 Strings overhead conductors and cables (<i>Transmission tension method</i>) 9.02 Sags overhead conductors and cables 9.03 Ties in overhead conductors and cables 9.04 Installs splices and connections to overhead conductors and cables
	Underground and Underwater Cable (Secondary) 10.01 Installs conduit and cable 10.02 Places direct buried cable 10.03 Splices underground and underwater cable 10.04 Terminates underground and underwater cable	Underground and Underwater Cable (Primary) 10.01 Installs conduit and cable 10.02 Places direct buried cable 10.03 Splices underground and underwater cable 10.04 Terminates underground and underwater cable	
	Lighting Systems 11.01 Installs street lights 11.02 Maintains street lights		
Voltage Control Equipment 12.01 Installs transformers (<i>single-phase</i>) 12.04 Installs switches	Voltage Control Equipment 12.01 Installs transformers ⁷² (<i>single-phase</i>) 12.04 Installs switches	Voltage Control Equipment 12.01 Installs transformers (<i>three-phase</i>) 12.03 Installs voltage regulators 12.04 Installs switches	Voltage Control Equipment 12.02 Installs capacitors 12.03 Installs voltage regulators 12.05 Installs reactors
	Protection Equipment 13.03 Installs fuses 13.04 Installs lightning arrestors	Protection Equipment ⁷³ 13.01 Installs reclosers 13.02 Installs sectionalizers 13.03 Installs fuses	Protection Equipment 13.01 Installs reclosers 13.02 Installs sectionalizers 13.03 Installs fuses
	Metering Equipment 14.02 Installs secondary metering equipment	Metering Equipment 14.01 Installs primary metering equipment	
Communication Devices 15.02 Transfers communication lines			Communication Equipment 15.01 Installs cellular antennas

	Distribution and Transmission Systems (Operation) 16.02 Operates distribution systems	Distribution and Transmission Systems (Operation) 16.01 Operates transmission systems	Distribution and Transmission Systems (Operation) 16.01 Operates transmission systems 16.02 Operates distribution systems 16.03 Performs station switching
	Distribution and Transmission Systems (Maintenance) 17.02 Maintains pole structures 17.04 Maintains system components 17.05 Trims trees	Distribution and Transmission Systems (Maintenance) 17.01 Inspects distribution and transmission systems 17.02 Maintains pole structures 17.04 Maintains system components	Distribution and Transmission Systems (Maintenance) 17.01 Inspects distribution and transmission systems 17.02 Maintains pole structures 17.03 Maintains steel lattice structures 17.04 Maintains system components
	Distribution Systems (Repair) 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems	Distribution Systems (Troubleshoot and Repair) 18.01 Troubleshoots overhead distribution systems 18.02 Troubleshoots underground and underwater distribution systems 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems	Distribution Systems (Troubleshoot and Repair) 18.01 Troubleshoots overhead distribution systems 18.02 Troubleshoots underground and underwater distribution systems 18.03 Repairs overhead distribution systems 18.04 Repairs underground and underwater distribution systems
	Transmission Systems (Repair) 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems	Transmission Systems (Troubleshoot and Repair) 19.01 Troubleshoots overhead transmission systems 19.02 Troubleshoots underground and underwater transmission systems 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems	Transmission Systems (Troubleshoot and Repair) 19.01 Troubleshoots overhead transmission systems 19.02 Troubleshoots underground and underwater transmission systems 19.03 Repairs overhead transmission systems 19.04 Repairs underground and underwater transmission systems

⁷² Alberta, British Columbia (meet and exceed) 12.01 (Three-Phase) will be delivered in L2 and L3

⁷³ Ontario 13.01, 13.02 delivered in L2

32.1. Hairstylist - Recommendations

That provinces and territories adopt the **Red Seal Name** – Hairstylist / Coiffeur/Coiffeuse

- That the total number of training **hours** be 3600
- That the technical training program offers 2 **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

32.2 Hairstylist – Snapshot

Level One	Level Two
	Context
	Safety-Related and Hygienic Functions
	Client Service (Preparation)
	Hair and Scalp (Analysis and Response)
Safety-Related and Hygienic Functions	
Tools and Equipment	Tools and Equipment
Client Service (Preparation)	
Communication Techniques	Mentoring Techniques
Hair and Scalp (Analysis and Response)	
Shampoo and Condition Hair	
Hair Cutting (Basic)	Hair Cutting (Advanced)
Facial and Nape Hair Services	Facial and Nape Hair Services
Wet Hair Styling	Wet Hair Styling
Dry Hair Finishing and Styling	Dry Hair Finishing and Styling
	Chemical Waving
	Chemical Relaxing
Colouring ⁷⁴	Colouring
Lightening ⁷⁵	Lightening
	Colour Correction
	Extensions, Wigs and Hairpieces
	Face and Nape Services (Basic)
Front Desk ⁷⁶	
Business Fundamentals	Business Fundamentals

⁷⁴ Alberta will deliver in L2

⁷⁵ Alberta will deliver in L2

⁷⁶ Ontario will deliver in L1 and L2

32.3 Hairstylist – Topic - Sub-Task by RSOS 2018

Level One	Level Two
	Context
	Safety-Related and Hygienic Functions
	Client Service (Preparation)
	Hair and Scalp (Analysis and Response)
Safety-Related and Hygienic Functions 1.01 Disinfects tools and equipment. 1.02 Sanitizes towels, capes and smocks. 1.03 Maintains safe and hygienic work environment.	
Tools and Equipment 2.01 Uses manual tools. 2.02 Uses electric tools. 2.03 Uses major equipment.	Tools and Equipment 2.01 Uses manual tools.
Client Service (Preparation) 3.01 Consults with client. 3.02 Plans client services. 3.03 Drapes client. 3.04 Uses documentation.	
Communication Techniques 4.01 Uses communication techniques.	Mentoring Techniques 4.02 Uses mentoring techniques.
Hair and Scalp (Analysis and Response) 5.01 Analyzes hair and scalp for non-chemical services. 5.02 Analyzes hair and scalp for chemical services. 5.03 Responds to unfavourable hair and scalp reactions.	
Shampoo and Condition Hair 6.01 Brushes hair. 6.02 Controls flow and temperature of water. 6.03 Manipulates hair and scalp using shampoo and conditioner. 6.04 Performs hair and scalp treatment.	

<p>Hair Cutting (Basic)</p> <p>7.01 Cuts hair with elevation. 7.02 Cuts hair without elevation. 7.03 Customizes haircuts.</p>	<p>Hair Cutting (Advanced)</p> <p>7.01 Cuts hair with elevation. 7.02 Cuts hair without elevation. 7.03 Customizes haircuts.</p>
<p>Facial and Nape Hair Services</p> <p>8.01 Trims facial and nape hair. 8.02 Removes facial and nape hair with straight razor.</p>	<p>Facial and Nape Hair Services</p> <p>8.02 Removes facial and nape hair with straight razor.</p>
<p>Wet Hair Styling</p> <p>9.01 Uses styling aids for wet hair. 9.02 Dries hair. 9.03 Places hair using freestyle techniques.</p>	<p>Wet Hair Styling</p> <p>9.04 Sets wet hair into style pattern using setting tools. 9.05 Styles hair using finger waves and pincurls.</p>
<p>Dry Hair Finishing and Styling</p> <p>10.01 Uses styling and finishing aids for dry hair. 10.02 Styles hair using thermal tools and equipment. 10.05 Finishes hair.</p>	<p>Dry Hair Finishing and Styling</p> <p>10.03 Styles up-dos 10.04 Creates hair style with hair additions. 10.05 Finishes hair.</p>
	<p>Chemical Waving</p> <p>11.01 Wraps hair. 11.02 Processes waving and neutralizing solutions. 11.03 Removes tools.</p>
	<p>Chemical Relaxing</p> <p>12.01 Applies chemical relaxers and neutralizing products. 12.02 Processes hair with chemical relaxers and neutralizing products. 12.03 Removes chemical relaxers and neutralizing products.</p>
<p>Colouring</p> <p>13.01 Colours virgin hair. 13.02 Colours regrowth. 13.03 Colours hair using colour placement and techniques.</p>	<p>Colouring</p> <p>13.03 Colours hair using colour placement and techniques.</p>
<p>Lightening (Introduction)</p> <p>14.01 Lightens virgin hair. 14.02 Lightens regrowth. 14.03 Lightens hair using customized placement and techniques. 14.04 Tones pre-lightened hair.</p>	<p>Lightening</p> <p>14.01 Lightens virgin hair. 14.02 Lightens regrowth. 14.03 Lightens hair using customized placement and techniques. 14.04 Tones pre-lightened hair.</p>
	<p>Colour Correction</p> <p>15.01 Determines process. 15.02 Removes unwanted colour. 15.03 Completes colour correction.</p>

	<p>Extensions, Wigs and Hairpieces</p> <p>16.01 Selects hair extensions, wigs and hairpieces. 16.02 Customizes hair extensions, wigs and hairpieces. 16.03 Maintains hair extensions, wigs and hairpieces.</p>
	<p>Face and Nape Services (Basic)</p> <p>17.01 Performs depilatory facial and nape services. 17.02 Colours facial hair.</p>
<p>Front Desk</p> <p>18.01 Performs communications duties. 18.02 Schedules appointments. 18.03 Interacts with clients. 18.04 Completes financial transactions. 18.05 Maintains inventory. 18.06 Prices retail products. 18.07 Maintains retail displays.</p>	
<p>Business Fundamentals</p> <p>19.02 Presents professionalism. 19.03 Markets products and services.</p>	<p>Business Fundamentals</p> <p>19.01 Develops business plan. 19.02 Presents professionalism. 19.03 Markets products and services.</p>

33.1. Cook - Recommendations

That provinces and territories adopt the **Red Seal Name - COOK / CUISINIER/CUISINIÈRE**

- That the total number of training **hours** be **5400**
- That the technical training program offers **three (3) training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

33.2 Cook – Snapshot

Level One	Level Two	Level Three
	Context	Context
	Food Safety Procedures	Food Safety Procedures
	Vegetables	
	Fruit	Fruit
		Soups
		Thickening and Binding Agents
		Cake Assembly
Safety-Related Functions		
Food Safety Procedures		
Tools and Equipment		
Organizes Work		Organizes Work
Information Management		Information Management
Manages Products		Manages Products
Trade Activities	Trade Activities	Trade Activities
		Adaptive Cooking
Communication		Mentoring
Herbs and Spices		
Vegetables		
Fruit		
Stocks and Broths	Stocks and Broths	
Soups (Introduction)	Soups	
Thickening and Binding Agents ⁷⁷	Thickening and Binding Agents	
	Sauces	Sauces
Cheese, Dairy, Plant-Based Dairy Alternatives		Cheese, Dairy, Plant-Based Dairy Alternatives
Eggs and Egg-Based Dishes		
Pastas and Noodles (Dry)	Pastas and Noodles (Fresh)	
	Dumplings	
Grains and Pulses		

Seeds and Nuts		
	Alternative Proteins	Alternative Proteins
Meats	Meats	Game Meats
Poultry	Poultry	Game Birds
		Variety Meats
Fin Fish	Fin Fish	
	Seafood	Seafood
Sandwiches		
Salads		
Dressings		Condiments and Preserves
		Hors D'œuvres and Finger Foods
		Charcuterie and Cured Products
		Gels and Glazes
	Marinades, Rubs and Brines	
Dough-Based Products	Dough-Based Products	Dough-Based Products
Batter-Based Products	Batter-Based Products	Batter-Based Products
	Creams, Mousses, Frozen Desserts, Fillings, Icings, Toppings and Sugar Works	Creams, Mousses, Frozen Desserts, Fillings, Icings, Toppings and Sugar Works
	Cake Assembly	
	Savoury and Sweet Pastries and Pies	Savoury and Sweet Pastries and Pies
		Chocolate

⁷⁷ Some jurisdictions deliver training on Thickening and Binding Agents as a standalone topic, while others deliver in combination with the preparation of specific food items

33.3 Cook – Topic - Sub-Task by RSOS 2019		
Level One	Level Two	Level Three
	Context	Context
	Food Safety Procedures	Food Safety Procedures
	Vegetables	
	Fruit	Fruit
		Soups
		Thickening and Binding Agents
		Cake Assembly
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment 1.03 Maintains personal hygiene		
Food Safety Procedures 2.01 Maintains safe condition and temperature of raw and finished product 2.02 Cools food rapidly 2.03 Re-thermalizes foods 2.04 Prevents cross-contamination 2.05 Cleans tools and equipment 2.06 Sanitizes tools and equipment		
Tools and Equipment 3.01 Uses knives 3.02 Uses pots, pans and utensils 3.03 Uses equipment and appliances		
Organizes Work 4.01 Organizes kitchen workplace		Organizes Work 4.02 Schedules production
Information Management 5.02 Uses documentation		Information Management 5.01 Plans menu and mise en place 5.02 Uses documentation

<p>Manages Products 6.02 Receives products 6.03 Stores products 6.04 Maintains inventory</p>		<p>Manages Products 6.01 Orders products 6.04 Maintains inventory</p>
<p>Trade Activities 7.01 Uses recipes 7.02 Performs portion control 7.03 Presents finished product 7.04 Prepares convenience foods</p>	<p>Trade Activities 7.03 Presents finished product</p>	<p>Trade Activities 7.03 Presents finished product</p>
		<p>Adaptive Cooking 8.01 Adapts kitchen practices to meet dietary requirements 8.02 Selects ingredients to meet dietary requirements 8.03 Prepares food to meet dietary requirements</p>
<p>Communication 9.01 Uses communication</p>		<p>Mentoring 9.02 Uses mentoring techniques</p>
<p>Herbs and Spices 10.01 Selects herbs and spices 10.02 Cleans herbs 10.03 Processes herbs and spices</p>		
<p>Vegetables 11.01 Selects vegetables 11.02 Cleans vegetables 11.03 Processes vegetables 11.04 Cooks vegetables 11.05 Finishes vegetables</p>		
<p>Fruit 12.01 Selects fruit 12.02 Cleans fruit 12.03 Processes fruit 12.04 Cooks fruit 12.05 Finishes fruit</p>		

<p>Stocks and Broths</p> <p>13.01 Selects stock and broth ingredients 13.02 Processes stock and broth ingredients 13.03 Cooks stocks and broths</p>	<p>Stocks and Broths</p> <p>13.01 Selects stock and broth ingredients 13.02 Processes stock and broth ingredients 13.03 Cooks stocks and broths</p>	
<p>Soups (Introduction)</p> <p>14.01 Selects soup ingredients 14.02 Processes soup ingredients 14.03 Cooks soups 14.04 Finishes soups</p>	<p>Soups</p> <p>14.01 Selects soup ingredients 14.02 Processes soup ingredients 14.03 Cooks soups 14.04 Finishes soups</p>	
<p>Thickening and Binding Agents*</p> <p>15.01 Selects thickening and binding ingredients 15.02 Processes thickening and binding ingredients</p>	<p>Thickening and Binding Agents</p> <p>15.01 Selects thickening and binding ingredients 15.02 Processes thickening and binding ingredients</p>	
	<p>Sauces</p> <p>16.01 Selects sauce ingredients 16.02 Processes sauce ingredients 16.03 Cooks sauces 16.04 Finishes sauces</p>	<p>Sauces</p> <p>16.02 Processes sauce ingredients 16.03 Cooks sauces 16.04 Finishes sauces</p>
<p>Cheese, Dairy, Plant-Based Dairy Alternatives</p> <p>17.01 Selects cheese, dairy and plant-based dairy alternative ingredients 17.02 Processes cheese, dairy and plant-based dairy alternative ingredients</p>		<p>Cheese, Dairy, Plant-Based Dairy Alternatives</p> <p>17.01 Selects cheese, dairy and plant-based dairy alternative ingredients 17.02 Processes cheese, dairy and plant-based dairy alternative ingredients 17.03 Finishes cheese, dairy and plant-based dairy alternative products</p>
<p>Eggs and Egg-Based Dishes</p> <p>18.01 Selects ingredients for eggs and egg-based dishes 18.02 Processes ingredients for eggs and egg-based dishes 18.03 Cooks eggs and egg-based dishes 18.04 Finishes eggs and egg-based dishes</p>		
<p>Pastas and Noodles (Dry)</p> <p>19.01 Selects pasta and noodle ingredients 19.02 Processes pastas and noodles 19.03 Cooks pastas and noodles 19.04 Finishes pastas and noodles</p>	<p>Pastas and Noodles (Fresh)</p> <p>19.01 Selects pasta and noodle ingredients 19.02 Processes pastas and noodles 19.03 Cooks pastas and noodles 19.04 Finishes pastas and noodles</p>	

	Dumplings 20.01 Selects dumpling ingredients 20.02 Processes dumplings 20.03 Cooks dumplings 20.04 Finishes dumplings	
Grains and Pulses 21.01 Selects grains and pulses 21.02 Processes grains and pulses 21.03 Cooks grains and pulses		
Seeds and Nuts 22.01 Selects seeds and nuts 22.02 Processes seeds and nuts 22.03 Cooks seeds and nuts		
	Alternative Proteins 23.01 Selects alternative proteins	Alternative Proteins 23.01 Selects alternative proteins 23.02 Processes alternative proteins 23.03 Cooks alternative proteins
Meats 24.01 Selects meats 24.02 Processes meats 24.03 Cooks meats 24.04 Finishes meats	Meats 24.01 Selects meats 24.02 Processes meats 24.03 Cooks meats 24.04 Finishes meats	Game Meats 24.01 Selects meats 24.02 Processes meats 24.03 Cooks meats 24.04 Finishes meats
Poultry 25.01 Selects poultry and game birds 25.02 Processes poultry and game birds 25.03 Cooks poultry and game birds 25.04 Finishes poultry and game birds	Poultry 25.01 Selects poultry and game birds 25.02 Processes poultry and game birds 25.03 Cooks poultry and game birds 25.04 Finishes poultry and game birds	Game Birds 25.01 Selects poultry and game birds 25.02 Processes poultry and game birds 25.03 Cooks poultry and game birds 25.04 Finishes poultry and game birds
		Variety Meats 26.01 Selects variety meats 26.02 Processes variety meats 26.03 Cooks variety meats 26.04 Finishes variety meats

<p>Fin Fish 27.01 Selects fin fish 27.02 Processes fin fish 27.03 Cooks fin fish 27.04 Finishes fin fish</p>	<p>Fin Fish 27.01 Selects fin fish 27.02 Processes finfish 27.03 Cooks fin fish 27.04 Finishes fin fish</p>	
	<p>Seafood 28.01 Selects seafood 28.02 Processes seafood 28.03 Cooks seafood 28.04 Finishes seafood</p>	<p>Seafood 28.01 Selects seafood 28.02 Processes seafood 28.03 Cooks seafood 28.04 Finishes seafood</p>
<p>Sandwiches 29.01 Selects sandwich ingredients 29.02 Processes sandwich ingredients 29.03 Assembles sandwiches 29.04 Cooks sandwiches</p>		
<p>Salads 30.01 Selects salad ingredients 30.02 Processes salad ingredients 30.03 Finishes salad</p>		
<p>Dressings 31.01 Selects ingredients for condiments, preserves and dressings 31.02 Processes ingredients for condiments, preserves and dressings</p>		<p>Condiments and Preserves 31.01 Selects ingredients for condiments, preserves and dressings 31.02 Processes ingredients for condiments, preserves and dressings</p>
		<p>Hors D'œuvres and Other Finger Foods 32.01 Selects ingredients for hors d'oeuvres and other finger foods 32.02 Processes ingredients for hors d'oeuvre and other finger food ingredients 32.03 Assembles hors d'oeuvres and other finger foods 32.04 Cooks hors d'oeuvres and finger foods 32.05 Finishes hors d'oeuvres and other finger foods</p>

		<p>Charcuterie and Cured Products</p> <p>33.01 Selects ingredients for charcuterie and cured products</p> <p>33.02 Processes ingredients for charcuterie and cured products</p> <p>33.03 Cooks charcuterie and cured products</p> <p>33.01 Finishes charcuterie and cured products</p>
		<p>Gels and Glazes</p> <p>34.01 Selects ingredients for gels and glazes</p> <p>34.02 Processes ingredients for gels and glazes</p> <p>34.03 Finishes gels and glazes</p>
	<p>Marinades, Rubs and Brines</p> <p>35.01 Selects marinade, rub and brine ingredients</p> <p>35.02 Processes marinade, rub and brine ingredients</p>	
<p>Dough-Based Products</p> <p>36.01 Selects ingredients for dough</p> <p>36.02 Processes ingredients for dough</p> <p>36.03 Cooks dough-based products</p> <p>36.04 Finishes dough-based products</p>	<p>Dough-Based Products</p> <p>36.01 Selects ingredients for dough</p> <p>36.02 Processes ingredients for dough</p> <p>36.03 Cooks dough-based products</p> <p>36.04 Finishes dough-based products</p>	<p>Dough-Based Products</p> <p>36.01 Selects ingredients for dough</p> <p>36.02 Processes ingredients for dough</p> <p>36.03 Cooks dough-based products</p> <p>36.04 Finishes dough-based products</p>
<p>Batter-Based Products</p> <p>37.01 Selects ingredients for batters</p> <p>37.02 Processes ingredients for batters</p> <p>37.03 Cooks batter-based products</p> <p>37.04 Finishes batter-based products</p>	<p>Batter-Based Products</p> <p>37.01 Selects ingredients for batters</p> <p>37.02 Processes ingredients for batters</p> <p>37.03 Cooks batter-based products</p> <p>37.04 Finishes batter-based products</p>	<p>Batter-Based Products</p> <p>37.01 Selects ingredients for batters</p> <p>37.02 Processes ingredients for batters</p> <p>37.03 Cooks batter-based products</p> <p>37.04 Finishes batter-based products</p>
	<p>Creams, Mousses, Frozen Desserts, Fillings, Icings, Toppings and Sugar Works</p> <p>38.01 Selects ingredients for creams, mousses, frozen desserts, filling, icings, toppings and sugar works</p> <p>38.02 Processes ingredients for creams, mousses, frozen desserts, filling, icings, toppings and sugar works</p> <p>38.03 Finishes ingredients for creams, mousses, frozen desserts, filling, icings, toppings and sugar works</p>	<p>Creams, Mousses, Frozen Desserts, Fillings, Icings, Toppings and Sugar Works</p> <p>38.01 Selects ingredients</p> <p>38.02 Processes ingredients</p> <p>38.03 Finishes ingredients</p>
	<p>Cake Assembly</p> <p>39.01 Selects cake components for assembly</p> <p>39.02 Finishes cakes</p>	

	<p>Savoury and Sweet Pastries and Pies</p> <p>40.01 Selects ingredients for savoury and sweet pastries and pies</p> <p>40.02 Assembles savoury and sweet pastries and pies</p> <p>40.03 Cooks savoury and sweet pastries and pies</p> <p>40.04 Finishes savoury and sweet pastries and pies</p>	<p>Savoury and Sweet Pastries and Pies</p> <p>40.01 Selects ingredients for savoury and sweet pastries and pies</p> <p>40.02 Assembles savoury and sweet pastries and pies</p> <p>40.03 Cooks savoury and sweet pastries and pies</p> <p>40.04 Finishes savoury and sweet pastries and pies</p>
		<p>Chocolate</p> <p>41.01 Selects chocolate and ingredients</p> <p>41.02 Processes chocolate and ingredients</p> <p>41.03 Finishes chocolate</p>

34.1. Instrumentation and Control Technician - Recommendations

That provinces and territories adopt the **Red Seal Name** – Instrumentation and Control Technician / Technicien/technicienne en instrumentation et contrôle

- That the total number of training **hours** be **7200**
- That the technical training program offers four **(4) training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

34.2 Instrumentation and Control Technician – Snapshot

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		Installs and Service Electrical and Electronic Equipment	Installs and Service Electrical and Electronic Equipment
Safety-Related Functions			
Tools and Equipment			
Organizes Work		Organizes Work	
Communication			Mentoring
Installs and Services Pressure, Temperature, Level and Flow Devices	Installs and Services Pressure, Temperature, Level and Flow Devices		
	Installs and Services Signal Transducers		
		Installs and Services Motion, Speed, Position and Vibration Devices	
	Installs and Services Mass, Density and Consistency Devices	Installs and Services Mass, Density and Consistency Devices	
		Installs and Services Process Analyzers (Liquids)	Installs and Services Process Analyzers (Gas)
			Installs and Services Multiple Variable Computing Devices
			Installs and Services Safety Systems and Devices ⁷⁸
			Installs and Services Facility Security Systems
			Installs and Services Safety Instrumented Systems (SIS)
	Installs and Services Control Devices for Hydraulic Systems		
Installs and Services Pneumatic Equipment (Components)	Installs and Services Pneumatic Equipment (Systems)		
Installs and Service Electrical and Electronic Equipment ⁷⁹ (Electrical)	Installs and Service Electrical and Electronic Equipment (Electronic)		
Installs and Services Valves (Fundamentals)	Installs and Services Valves (Application)		

Installs and Services Actuators (Fundamentals)	Installs and Services Actuators (Application)		
Installs and Services Positioners (Fundamentals)	Installs and Services Positioners (Application)		
		Configures and Services Variable Speed Drives (VSD)	
		Installs and Services Control Network Systems (Fundamentals)	Installs and Services Control Network Systems (Application)
		Installs and Services Signal Converters (Fundamentals)	Installs and Services Signal Converters (Application)
		Installs and Services Gateways, Bridges and Media Converters (Fundamentals)	Installs and Services Gateways, Bridges and Media Converters (Application)
		Establishes and Optimizes Process Control Strategies (Basic)	Establishes and Optimizes Process Control Strategies (Advanced)
		Installs and Services Stand-Alone Controllers (SAC)	Installs and Services Stand-Alone Controllers (SAC)
		Installs and Services Programmable Logic Controllers (PLC) (Fundamentals)	Installs and Services Programmable Logic Controllers (PLC) (Application)
			Installs and Services Distributed Control Systems (DCS)
		Installs and Services Human Machine Interface (HMI) (Fundamentals)	Installs and Services Human Machine Interface (HMI) (Application)
			Installs and Services Supervisory Control and Data Acquisition (SCADA) Systems

⁷⁸ In the jurisdiction of BC, limited exposure to PLCs: Instruction List programming.

⁷⁹ In the jurisdictions of BC and AB, safety valves for natural gas are introduced earlier in the program.

34.3 Instrumentation and Control Technician – Topic and Sub-Task - RSOS 2019

Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
		Installs and Service Electrical and Electronic Equipment	Installs and Service Electrical and Electronic Equipment
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment 1.03 Performs de-energizing, lock-out and tag-out procedures			
Tools and Equipment 2.01 Uses calibration configuration and test equipment 2.02 Uses hand and power tools 2.03 Uses access equipment 2.04 Uses rigging and hoisting and lifting equipment			
Organizes Work 3.01 Uses documentation 3.02 Interprets drawings and schematics		Organizes Work 3.03 Plans tasks	
Communication 4.01 Uses communication techniques			Mentoring 4.02 Uses mentoring techniques
Services Pressure, Temperature, Level and Flow Devices 5.01 Installs pressure, temperature, level and flow devices 5.02 Maintains pressure, temperature, level and flow devices 5.03 Diagnoses pressure, temperature, level and flow devices 5.04 Repairs pressure, temperature, level and flow devices	Services Pressure, Temperature, Level and Flow Devices 5.01 Installs pressure, temperature, level and flow devices 5.02 Maintains pressure, temperature, level and flow devices 5.03 Diagnoses pressure, temperature, level and flow devices 5.04 Repairs pressure, temperature, level and flow devices		

	Installs and Services Signal Transducers 6.01 Performs installation and configuration of signal transducers 6.02 Diagnoses signal transducers 6.03 Performs maintenance and repairs on signal transducers		
		Installs and Services Motion, Speed, Position and Vibration Devices 7.01 Installs motion speed, position and vibration devices 7.02 Maintains motion, speed, position and vibration devices 7.03 Diagnoses motion, speed, position and vibration devices 7.04 Repairs motion, speed, position and vibration devices	
	Installs and Services Mass, Density and Consistency Devices 8.01 Installs mass, density and consistency devices 8.02 Maintains mass, density and consistency devices 8.03 Diagnoses mass, density and consistency devices 8.04 Repairs mass, density and consistency devices	Installs and Services Mass, Density and Consistency Devices 8.01 Installs mass, density and consistency devices 8.02 Maintains mass, density and consistency devices 8.03 Diagnoses mass, density and consistency devices 8.04 Repairs mass, density and consistency devices	
		Installs and Services Process Analyzers (Liquids) 9.01 Installs process analyzers 9.02 Maintains process analyzers 9.03 Diagnoses process analyzers 9.04 Repairs process analyzers	Installs and Services Process Analyzers (Gas) 9.01 Installs process analyzers 9.02 Maintains process analyzers 9.03 Diagnoses process analyzers 9.04 Repairs process analyzers

			Installs and Services Multiple Variable Computing Devices 10.01 Installs multiple variable computing devices 10.02 Maintains multiple variable computing devices 10.03 Diagnoses multiple variable computing devices 10.04 Repairs multiple variable computing devices
			Installs and Services Safety Systems and Devices 11.01 Installs safety system and devices 11.02 Maintains safety system and devices 11.03 Diagnoses safety system and devices 11.04 Repairs safety system and devices
			Installs and Services Facility Security Systems 12.01 Installs facility security systems 12.02 Maintains facility security systems 12.03 Diagnoses facility security systems 12.04 Repairs facility security systems
			Installs and Services Safety Instrumented Systems (SIS) 13.01 Installs SIS 13.02 Configures SIS 13.03 Maintains SIS 13.04 Diagnoses SIS 13.05 Repairs SIS
	Installs and Services Control Devices for Hydraulic Systems 14.01 Installs control devices for hydraulic systems 14.02 Diagnoses control devices for hydraulic systems 14.03 Performs maintenance and repairs on control devices for hydraulic systems		

<p>Installs and Services Pneumatic Equipment (Components) 15.01 Installs pneumatic equipment 15.02 Diagnoses pneumatic equipment 15.03 Performs maintenance and repairs pneumatic equipment</p>	<p>Installs and Services Pneumatic Equipment (Systems) 15.01 Installs pneumatic equipment 15.02 Diagnoses pneumatic equipment 15.03 Performs maintenance and repairs pneumatic equipment</p>		
<p>Installs and Service Electrical and Electronic Equipment (Electrical) 16.01 Installs electrical and electronic equipment 16.02 Diagnoses electrical and electronic equipment 16.03 Performs maintenance and repairs for electrical and electronic equipment</p>	<p>Installs and Service Electrical and Electronic Equipment (Electronic) 16.01 Installs electrical and electronic equipment 16.02 Diagnoses electrical and electronic equipment 16.03 Performs maintenance and repairs for electrical and electronic equipment</p>		
<p>Installs and Services Valves (Fundamentals) 17.01 Installs valves 17.02 Maintains valves 17.03 Diagnoses valves 17.04 Repairs valves</p>	<p>Installs and Services Valves (Application) 17.01 Installs valves 17.02 Maintains valves 17.03 Diagnoses valves 17.04 Repairs valves</p>		
<p>Installs and Services Actuators (Fundamentals) 18.01 Installs actuators 18.02 Maintains actuators 18.03 Diagnoses actuators 18.04 Repairs actuators</p>	<p>Installs and Services Actuators (Application) 18.01 Installs actuators 18.02 Maintains actuators 18.03 Diagnoses actuators 18.04 Repairs actuators</p>		
<p>Installs and Services Positioners (Fundamentals) 19.01 Installs positioners 19.02 Maintains positioners 19.03 Diagnoses positioners 19.04 Repairs positioners</p>	<p>Installs and Services Positioners (Application) 19.01 Installs positioners 19.02 Maintains positioners 19.03 Diagnoses positioners 19.04 Repairs positioners</p>		
		<p>Configures and Services Variable Speed Drives (VSD) 20.01 Configures VSD 20.02 Maintains VSD 20.03 Diagnoses VSD 20.04 Repairs VSD</p>	

		<p>Installs and Services Control Network Systems (Fundamentals)</p> <p>21.01 Performs installation and configuration on control network systems</p> <p>21.02 Diagnoses control network systems</p> <p>21.03 Performs maintenance and repairs on control network systems</p>	<p>Installs and Services Control Network Systems (Application)</p> <p>21.01 Performs installation and configuration on control network systems</p> <p>21.02 Diagnoses control network systems</p> <p>21.03 Performs maintenance and repairs on control network systems</p>
		<p>Installs and Services Signal Converters (Fundamentals)</p> <p>22.01 Performs installation and configuration of signal converters</p> <p>22.02 Diagnoses signal converters</p> <p>22.03 Performs maintenance and repairs on signal converters</p>	<p>Installs and Services Signal Converters (Application)</p> <p>22.01 Performs installation and configuration of signal converters</p> <p>22.02 Diagnoses signal converters</p> <p>22.03 Performs maintenance and repairs on signal converters</p>
		<p>Installs and Services Gateways, Bridges and Media Converters (Fundamentals)</p> <p>23.01 Performs installation and configuration of gateways, bridges and media converters</p> <p>23.02 Diagnoses gateways, bridges and media converters</p> <p>23.03 Performs maintenance and repairs on gateways, bridges and media converters</p>	<p>Installs and Services Gateways, Bridges and Media Converters (Application)</p> <p>23.01 Performs installation and configuration of gateways, bridges and media converters</p> <p>23.02 Diagnoses gateways, bridges and media converters</p> <p>23.03 Performs maintenance and repairs on gateways, bridges and media converters</p>
		<p>Establishes and Optimizes Process Control Strategies (Basic)</p> <p>24.01 Determines process control strategy</p> <p>24.02 Optimizes process control</p>	<p>Establishes and Optimizes Process Control Strategies (Advanced)</p> <p>24.01 Determines process control strategy</p> <p>24.02 Optimizes process control</p>
		<p>Installs and Services Stand-Alone Controllers (SAC)</p> <p>25.01 Installs SAC</p> <p>25.02 Configures SAC</p> <p>25.03 Performs maintenance, diagnostics and repairs on SAC</p>	<p>Installs and Services Stand-Alone Controllers (SAC)</p> <p>25.01 Installs SAC</p> <p>25.02 Configures SAC</p> <p>25.03 Performs maintenance, diagnostics and repairs on SAC</p>

		Installs and Services Programmable Logic Controllers (PLC) (Fundamentals) 26.01 Installs PLC 26.02 Configures PLC 26.03 Performs maintenance diagnostics and repairs on PLC	Installs and Services Programmable Logic Controllers (PLC) (Application) 26.01 Installs PLC 26.02 Configures PLC 26.03 Performs maintenance diagnostics and repairs on PLC
			Installs and Services Distributed Control Systems (DCS) 27.01 Installs DCS 27.02 Configures DCS 27.03 Performs maintenance diagnostics and repairs on DCS
		Installs and Services Human Machine Interface (HMI) (Fundamentals) 28.01 Installs HMI 28.02 Configures HMI 28.03 Performs maintenance diagnostics and repairs on HMI	Installs and Services Human Machine Interface (HMI) (Application) 28.01 Installs HMI 28.02 Configures HMI 28.03 Performs maintenance diagnostics and repairs on HMI
			Installs and Services Supervisory Control and Data Acquisition (SCADA) Systems 29.01 Installs SCADA systems 29.02 Configures SCADA systems 29.03 Performs maintenance diagnostics and repairs on SCADA systems

35.1. Glazier - Recommendations

That provinces and territories adopt the **Red Seal Name** – Glazier / Vitrier/vitrière (Please note that because there are ongoing proposals for a change to the Red Seal trade name, a recommendation for this element still pending. For the purpose of this report, “Glazier” will still be used.)

- That the total number of training **hours** be **7200**
- That the technical training program offers three **(3) training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

35.2 Glazier – Topic - RSOS 2020

Level One	Level Two	Level Three
	Context	Context
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
	Organizes Work	
Safety-Related Functions		
Tools and Equipment		
Rigging, Hoisting and Lifting Equipment		Rigging, Hoisting and Lifting Equipment
Organizes Work	Organizes Work	Organizes Work
Trade Activities	Trade Activities	Trade Activities
Communication		Mentoring
Commercial Window and Door Systems (Fabricates)	Commercial Window and Door Systems (Fabricates)	Commercial Window and Door Systems (Fabricates)
Commercial Window and Door Systems (Installs)	Commercial Window and Door Systems (Installs)	Commercial Window and Door Systems (Installs)
	Residential Window Systems (Installs)	
	Residential Door Frames (Installs)	
	Commercial Specialty Glass and Products (Fabricate and Install)	Commercial Specialty Glass and Products (Fabricate and Install)
Residential Specialty Glass and Products (Fabricates and Installs)	Residential Specialty Glass and Products (Fabricates and Installs)	
		Commercial Window and Door Systems (Services)
	Residential Window and Door Systems (Services)	
		Specialty Glass and Products (Services)

35.2 Glazier – Topic and Sub-task - RSOS 2020		
Level One	Level Two	Level Three
	Context	Context
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
	Organizes Work	
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		
Tools and Equipment 2.01 Uses hand tools 2.02 Uses portable and stationary power tools 2.03 Uses layout and measuring equipment 2.04 Uses access equipment		
Rigging, Hoisting and Lifting Equipment 3.01 Uses rigging equipment 3.02 Uses hoisting and lifting equipment		Rigging, Hoisting and Lifting Equipment 3.01 Uses rigging equipment 3.02 Uses hoisting and lifting equipment
Organizes Work 4.01 Uses documentation and reference material 4.02 Interprets plans, drawings and specifications	Organizes Work 4.03 Prepares list of materials and supplies	Organizes Work 4.01 Uses documentation and reference material 4.02 Interprets plans, drawings and specifications 4.04 Plans project tasks
Trade Activities 5.02 Handles glass and other materials 5.04 Stores glass and other materials 5.05 Performs glass cutting and edge treatment 5.06 Installs building envelope membranes 5.08 Applies sealants	Trade Activities 5.03 Prepares materials for installation 5.06 Installs building envelope membranes 5.07 Installs flashing 5.08 Applies sealants	Trade Activities 5.01 Prepares worksite 5.03 Prepares materials for installation 5.06 Installs building envelope membranes 5.07 Installs flashing 5.08 Applies sealants
Communication 6.01 Uses communication techniques		Mentoring 6.02 Uses mentoring techniques
Commercial Window and Door Systems (Fabricates) 7.02 Fabricates storefronts 7.03 Fabricates window systems	Commercial Window and Door Systems (Fabricates) 7.01 Fabricates curtain walls 7.05 Fabricates entrance systems	Commercial Window and Door Systems (Fabricates) 7.01 Fabricates curtain walls 7.04 Fabricates skylights and sloped glazing systems 7.05 Fabricates entrance systems

<p>Commercial Window and Door Systems (Installs) 8.02 Installs curtain wall systems 8.03 Installs storefront systems 8.04 Installs window systems</p>	<p>Commercial Window and Door Systems (Installs) 8.01 Lays out commercial window and door systems 8.02 Installs curtain wall systems</p>	<p>Commercial Window and Door Systems (Installs) 8.02 Installs curtain wall systems 8.05 Installs skylights and sloped glazing systems 8.06 Installs entrance systems</p>
	<p>Residential Window Systems (Installs) 9.01 Lays out residential window systems 9.02 Sets windows in openings 9.03 Glazes windows</p>	
	<p>Residential Door Frames (Installs) 10.01 Lays out residential door systems 10.02 Assembles residential door frames 10.03 Sets residential doors and frames 10.04 Installs residential door hardware 10.05 Glazes residential doors</p>	
	<p>Commercial Specialty Glass and Products (Fabricate and Install) 11.01 Lays out commercial specialty glass and products 11.02 Assembles commercial specialty glass, products and hardware 11.03 Installs commercial specialty glass, products and hardware</p>	<p>Commercial Specialty Glass and Products (Fabricate and Install) 11.01 Lays out commercial specialty glass and products 11.02 Assembles commercial specialty glass, products and hardware 11.03 Installs commercial specialty glass, products and hardware</p>
<p>Residential Specialty Glass and Products (Fabricates and Installs) 12.02 Assembles residential specialty glass, products and hardware 12.03 Installs residential specialty glass, products and hardware</p>	<p>Residential Specialty Glass and Products (Fabricates and Installs) 12.01 Lays out residential specialty glass and products 12.02 Assembles residential specialty glass, products and hardware 12.03 Installs residential specialty glass, products and hardware</p>	
		<p>Commercial Window and Door Systems (Services) 13.01 Assesses service requirements for commercial window and door systems 13.02 Repairs commercial window and door systems</p>
	<p>Residential Window and Door Systems (Services) 14.01 Assesses service requirements for residential window and door systems 14.02 Repairs residential window and door systems</p>	

		Specialty Glass and Products (Services) 15.01 Assesses service requirements for specialty glass and products 15.02 Repairs specialty glass and products
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36.1. Bricklayer - Recommendations

That provinces and territories adopt the **Red Seal Name** – Bricklayer / Briqueteur-maçon/briqueteuse-maçonne

- That the total number of training **hours** be **5400**
- That the technical training program offers three **(3) training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

36.2. Bricklayer – Topic and Sub-task - RSOS 2020

Level One	Level Two	Level Three
	Context	Context
	Tools and Equipment	Tools and Equipment
	Substrate Preparation	Substrate Preparation
		Natural Stone Walls
	Scaffolding	Scaffolding
		Prefabricated Masonry
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		
Tools and Equipment 2.01 Maintains tools and equipment 2.02 Uses rigging, hoisting and lifting equipment 2.03 Uses access equipment		
Scaffolding 3.01 Erects scaffolding 3.02 Dismantles scaffolding 3.03 Maintains scaffolding		
Organizes work 4.01 Uses drawings and specifications 4.02 Plans daily tasks and activities 4.03 Prepares jobsite and materials 4.04 Protects surrounding areas	Organizes work 4.01 Uses drawings and specifications	Organizes work 4.01 Uses drawings and specifications
Communication Techniques		Mentoring Techniques 5.02 Uses mentoring techniques

5.01 Uses communication techniques		
Substrate Preparation 6.01 Prepares vertical substrates and foundations 6.02 Applies parging 6.03 Installs anchoring/tie systems 6.04 Installs membrane and flashing 6.05 Installs insulation		
Fundamental Masonry Tasks 7.01 Lays out wall and coursing 7.02 Finishes joints 7.03 Cleans new masonry surfaces 7.04 Seals masonry surfaces		
Mortars, Grouts and Adhesives 8.01 Mixes mortar, concrete, grout and adhesives 8.02 Uses mortars 8.03 Uses concrete and grout 8.04 Uses adhesives	Mortars, Grouts and Adhesives 8.01 Mixes mortar, concrete, grout and adhesives 8.02 Uses mortars 8.03 Uses concrete and grout 8.04 Uses adhesives	Mortars, Grouts and Adhesives 8.01 Mixes mortar, concrete, grout and adhesives 8.02 Uses mortars 8.03 Uses concrete and grout 8.04 Uses adhesives
Masonry Walls 9.01 Builds non-load-bearing walls	Masonry Walls 9.02 Builds load-bearing walls	
		Horizontal Masonry Surfaces 10.01 Prepares horizontal substrate 10.02 Lays masonry units on horizontal surfaces
	Prefabricated Masonry 11.01 Builds prefabricated masonry 11.02 Erects prefabricated masonry	
	Surface-Bonded Masonry Units 12.01 Prepares substrate for surface-bonded masonry units 12.02 Applies surface-bonded masonry units	
	Natural Stone Walls 13.01 Prepares natural stone 13.02 Lays natural stone 13.03 Damp cures walls	
		Natural Stone Cladding (Mechanically Fastened) 14.01 Prepares substrate for cladding 14.02 Prepares natural stone for cladding 14.03 Installs natural stone cladding

		<p>Chimneys</p> <p>15.01 Builds foundation supports for chimneys 15.02 Lays masonry units to build chimneys 15.03 Installs flue lining 15.04 Installs related flashings 15.05 Installs caps</p>
		<p>Fireplaces</p> <p>16.01 Builds foundation for hearth, firebox, backup material and veneer 16.02 Builds hearth, firebox and backup 16.03 Installs damper 16.04 Builds smoke chamber 16.05 Prepares existing fireplace for insert 16.06 Faces fireplaces and inserts</p>
		<p>Refractories</p> <p>17.01 Prepares for installation of refractories and accessories 17.02 Prepares mortar for refractories 17.03 Removes existing refractories. 17.04 In Installs refractories 17.05 Repairs refractories</p>
		<p>Corrosion Resistant Materials</p> <p>18.01 Prepares for installation of corrosion resistant materials and accessories 18.02 Prepares mortar for corrosion resistant materials 18.03 Removes existing corrosion resistant materials 18.04 Installs corrosion resistant materials 18.05 Repairs corrosion resistant materials</p>
	<p>Masonry Work (Rebuilds)</p> <p>19.01 Disassembles unit masonry 19.02 Prepares restoration work area 19.03 Reinstalls masonry and accessories</p>	
	<p>Masonry Work (Repairs and Cleans)</p> <p>20.01 Removes deteriorated masonry units 20.02 Repoints joints 20.03 Repairs masonry units 20.04 Reinstalls masonry units and accessories 20.05 Cleans existing masonry surfaces</p>	<p>Masonry Work (Repairs and Cleans)</p> <p>20.01 Removes deteriorated masonry units 20.02 Repoints joints 20.03 Repairs masonry units 20.04 Reinstalls masonry units and accessories 20.05 Cleans existing masonry surfaces</p>

	Glass Blocks 21.01 Prepares work area for installation of glass blocks 21.02 Lays glass blocks	
		Ornamental and Sculpted Masonry Units 22.01 Prepares for installation of ornamental and sculpted masonry units 22.02 Installs ornamental and sculpted masonry units
	Arches 23.01 Prepares location for installation of arch 23.02 Builds template 23.03 Places template 23.04 Installs arch masonry units 23.05 Removes template	Arches 23.01 Prepares location for installation of arch 23.02 Builds template 23.03 Places template 23.04 Installs arch masonry units 23.05 Removes template

37.1. Motorcycle Technician - Recommendations

That provinces and territories adopt the **Red Seal Name** – Motorcycle Technician / Technicien/technicienne de motocyclettes

- That the total number of training **hours** be **6400**
- That the technical training program offers four (4) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

37.2. Motorcycle Technician – Topic and Sub-task - RSOS 2020

Level One	Level Two	Level Three	Level Four
			Context
			Electrical Systems (Diagnose)
			Electrical Systems (Service)
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses PPE and safety equipment			
Routine Work Practices 2.01 Uses trade-related consumables 2.02 Performs periodic maintenance 2.03 Performs storage procedures 2.04 Prepares new motorcycles			Routine Work Practices 2.05 Conducts safety inspection 2.06 Verifies repairs
Tools, Equipment and Documentation 3.01 Uses diagnostic tools and equipment 3.02 Uses precision measuring instruments 3.03 Uses hand tools 3.04 Uses heating/cutting tools and equipment 3.05 Uses pneumatic and electric power tools and equipment 3.06 Uses shop equipment 3.07 Uses documentation	Tools, Equipment and Documentation 3.01 Uses diagnostic tools and equipment 3.02 Uses precision measuring instruments 3.06 Uses shop equipment 3.07 Uses documentation	Tools, Equipment and Documentation 3.01 Uses diagnostic tools and equipment 3.02 Uses precision measuring instruments 3.06 Uses shop equipment 3.07 Uses documentation	Tools, Equipment and Documentation 3.01 Uses diagnostic tools and equipment 3.02 Uses precision measuring instruments 3.06 Uses shop equipment 3.07 Uses documentation
Communication 4.01 Uses communication techniques			Mentoring 4.02 Uses mentoring techniques
		Chassis and Components (Diagnose) 5.01 Diagnoses frame 5.02 Diagnoses steering head 5.03 Diagnoses steering systems for 3-wheel motorcycles 5.04 Diagnoses handle bars, foot rests and controls 5.05 Diagnoses chassis ancillary and accessory components	

	Chassis and Components (Service) 6.01 Services frame 6.02 Services steering head 6.03 Services steering systems for 3-wheel motorcycles 6.04 Services handle bars, foot rests and controls 6.05 Services chassis ancillary and accessory components		
		Suspension Systems (Diagnose) 7.01 Diagnoses front suspension components 7.02 Diagnoses front suspension components for 3-wheel motorcycles 7.03 Diagnoses rear suspension components 7.04 Diagnoses swing arm	
	Suspension Systems (Service) 8.01 Services front suspension components 8.02 Services front suspension components for 3-wheel motorcycles 8.03 Services rear suspension components 8.04 Services swing arm		
Wheels and Tires (Diagnose) 9.01 Diagnoses tires 9.03 Diagnoses one-piece wheels 9.04 Diagnoses multi-piece wheels		Wheels and Tires (Diagnose) 9.02 Diagnoses spoked wheels	
Wheels and Tires (Service) 10.01 Services tires 10.03 Services one-piece wheels 10.04 Services multi-piece wheels		Wheels and Tires (Service) 10.02 Services spoked wheels	
Braking Systems (Diagnose) 11.01 Diagnoses hydraulic braking systems 11.02 Diagnoses mechanical braking systems			Braking Systems (Diagnose) 11.03 Diagnoses braking control systems
Braking Systems (Service) 12.01 Services hydraulic braking systems 12.02 Services mechanical braking systems			Braking Systems (Service) 12.03 Services braking control systems

		Two-Stroke and Four-Stroke Engines (Diagnose) 13.01 Diagnoses cylinder heads (Two-Stroke) 13.02 Diagnoses valve systems on two-stroke engine 13.04 Diagnoses cylinders and pistons (Two-Stroke) 13.09 Diagnoses cooling system	Two-Stroke and Four-Stroke Engines (Diagnose) 13.01 Diagnoses cylinder heads (Four-Stroke) 13.03 Diagnoses valve train on four-stroke engine 13.04 Diagnoses cylinders and pistons (Four-Stroke) 13.05 Diagnoses crankshaft assembly 13.06 Diagnoses counterbalance assemblies 13.07 Diagnoses engine cases 13.08 Diagnoses lubrication system
	Two-Stroke and Four-Stroke Engines (Service) 14.02 Services valve systems on two-stroke engine 14.04 Services cylinders and pistons (Two-Stroke) 14.08 Services lubrication system (Two-Stroke) 14.09 Services cooling system	Two-Stroke and Four-Stroke Engines (Service) 14.01 Services cylinder heads on four-stroke engine 14.03 Services valve train on four-stroke engine 14.04 Services cylinders and pistons (Four-Stroke) 14.05 Services crankshaft assembly 14.06 Services counterbalance assemblies 14.07 Services engine cases 14.08 Services lubrication system (Four-Stroke)	
	Clutches and Primary Drive (Diagnose) 15.01 Diagnoses primary drive and driven gears 15.02 Diagnoses primary drive chain and sprockets 15.03 Diagnoses primary drive belt and pulleys 15.04 Diagnoses manual clutches 15.05 Diagnoses automatic clutches 15.06 Diagnoses kick start		
	Clutches and Primary Drive (Service) 16.01 Services primary drive and driven gears 16.02 Services primary drive chain and sprockets 16.03 Services primary drive belt and pulleys 16.04 Services manual clutches 16.05 Services automatic clutches 16.06 Services kick start		
	Transmissions (Diagnose) 17.02 Diagnoses continuously variable transmissions (CVT)		Transmissions (Diagnose) 17.01 Diagnoses constant mesh transmissions

	Transmissions (Service) 18.02 Services continuously variable transmissions (CVT)	Transmissions (Service) 18.01 Services constant mesh transmissions	Transmissions (Service) 18.01 Services constant mesh transmissions
Final Drive (Diagnose) 19.01 Diagnoses final drive chain and sprockets 19.03 Diagnoses final drive belt and pulleys		Final Drive (Diagnose) 19.02 Diagnoses final drive shaft and gears	
Final Drive (Service) 20.01 Services final drive chain and sprockets 20.03 Services final drive belt and pulleys		Final Drive (Service) 20.02 Services final drive shaft and gears	
Electrical Systems (Diagnose) 21.01 Diagnoses battery and charging system (battery) 21.02 Diagnoses electrical ancillary and accessory components	Electrical Systems (Diagnose) 21.01 Diagnoses battery and charging system (charging system) 21.02 Diagnoses electrical ancillary and accessory components 21.03 Diagnoses wiring harness systems 21.05 Diagnoses electric starting system	Electrical Systems (Diagnose) 21.02 Diagnoses electrical ancillary and accessory components 21.03 Diagnoses wiring harness systems 21.04 Diagnoses ignition system	
Electrical Systems (Service) 22.01 Services battery and charging system (battery) 22.02 Services electrical ancillary and accessory components	Electrical Systems (Service) 22.01 Services battery and charging system (charging system) 22.02 Services electrical ancillary and accessory components 22.03 Services wiring harness systems 22.05 Services electric starting system	Electrical Systems (Service) 22.02 Services electrical ancillary and accessory components 22.03 Services wiring harness systems 22.04 Services ignition system	
Vehicle Management Systems (Diagnose) 23.01 Reads fault codes			Vehicle Management Systems (Diagnose) 23.02 Interprets fault code results 23.03 Tests system circuitry and components
			Vehicle Management Systems (Service) 24.01 Updates software 24.02 Services system circuitry and components

		Fuel and Exhaust Systems (Diagnose) 25.01 Diagnoses fuel tanks and components 25.02 Diagnoses air delivery system 25.03 Diagnoses carburetor system 25.05 Diagnoses exhaust system	Fuel and Exhaust Systems (Diagnose) 25.04 Diagnoses fuel injection system
	Fuel and Exhaust Systems (Service) 26.01 Services fuel tanks and components 26.02 Services air delivery system 26.03 Services carburetor system 26.05 Services exhaust system		Fuel and Exhaust Systems (Service) 26.04 Services fuel injection system

38.1. Parts Technician - Recommendations

That provinces and territories adopt the **Red Seal Name** – Parts Technician / Technicien/technicienne au service des pièces

- That the total number of training **hours** be **5400**
- That the technical training program offers three (3) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

38.2. Parts Technician – Topic and Sub-task - RSOS 2020

Level One	Level Two	Level Three
	Context	Context
	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment
	Organizes Work	Organizes Work
		Retail Customers
		Wholesale Customers
	Internal Customers	
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		
Tools and Equipment 2.01 Uses catalogues and price lists 2.02 Uses hand tools 2.03 Operates power tools 2.04 Operates warehouse tools and equipment 2.05 Uses measuring and testing tools and equipment 2.06 Operates business machines 2.07 Uses computers and digital devices		
Organizes Work 3.01 Uses work-related documents 3.02 Prioritizes tasks		
Communication 4.01 Uses communication techniques		Mentoring 4.02 Uses mentoring technique
Retail Customers 5.01. Identifies retail customers' needs 5.02 Provides technical information to retail customers	Retail Customers 5.02 Provides technical information to retail customers	
Wholesale Customers 6.01 Identifies wholesale customers' needs 6.02. Provides training opportunities and technical information to wholesale customers	Wholesale Customers 6.01 Identifies wholesale customers' needs 6.02. Provides training opportunities and technical information to wholesale customers	
Internal Customers 7.01 Identifies internal customers' needs 7.02 Maintains inventory and records for internal customers		Internal Customers 7.02 Maintains inventory and records for internal customers
General Customer Service 8.02 Provides no-fee value-added services and information	General Customer Service 8.01 Prepares customer quotes	General Customer Service 8.01 Prepares customer quotes

8.03 Records customer information	8.02 Provides no-fee value-added services and information 8.03 Records customer information 8.04 Implements product improvement programs (PIP)	8.02 Provides no-fee value-added services and information 8.03 Records customer information
Parts (Identification) 9.01 Identifies parts function 9.02 Identifies parts application 9.03 Identifies parts number	Parts (Identification) 9.01 Identifies parts function 9.02 Identifies parts application 9.03 Identifies parts number	
Parts (Sourcing) 10.01 Searches inventory for parts 10.02 Identifies suppliers	Parts (Sourcing) 10.01 Searches inventory for parts 10.02 Identifies suppliers 10.03 Purchases parts 10.04 Arranges shipment of special orders	Parts (Sourcing) 10.02 Identifies suppliers 10.03 Purchases parts 10.04 Arranges shipment of special orders
	Parts and Materials (Handling) 11.03 Rotates stock 11.04 Places inventory in designated location	Parts and Materials (Handling) 11.01 Maintains storage design layout 11.02 Handles sensitive products 11.03 Rotates inventory 11.04 Places inventory in designated location
	Inventory Control 12.01 Manages core and warranty inventory 12.04 Participates in periodic physical inventory count	Inventory Control 12.01 Manages core and warranty inventory 12.02 Handles parts inventory recalls 12.03 Maintains inventory levels 12.04 Participates in periodic physical inventory count
Shipping and Receiving (Introduction) 13.01 Verifies estimated time of arrival (ETA) 13.02 Receives incoming shipment 13.03 Resolves order discrepancies 13.04 Prepares for shipment	Shipping and Receiving 13.01 Verifies estimated time of arrival (ETA) 13.02 Receives incoming shipment 13.03 Resolves order discrepancies 13.04 Prepares for shipment	Shipping and Receiving 13.01 Verifies estimated time of arrival (ETA) 13.02 Receives incoming shipment 13.03 Resolves order discrepancies 13.04 Prepares for shipment
	Products and Services Promotion 14.02 Uses digital marketing 14.03 Recommends parts and products to customer 14.04 Recommends services to customer	Products and Services Promotion 14.01 Displays products and literature 14.02 Uses digital marketing 14.03 Recommends parts and products to customer 14.04 Recommends services to customer
		Pricing Formula 15.01 Calculates additional costs 15.02 Overrides price
Financial Transactions 16.01 Generates invoices	Financial Transactions 16.01 Generates invoices 16.02 Accepts payments	Financial Transactions 16.03 Processes customer returns 16.04 Processes day-end reports

	16.03 Processes customer returns 16.04 Processes day-end reports	
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39.1. Roofer - Recommendations

That provinces and territories adopt the **Red Seal Name** – Roofer / Couvreur/couvreuse

- That the total number of training **hours** be 5400 hours
- That the technical training program offers three (3) levels
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

39.2. Roofer – Topic and Sub-task - RSOS 2020		
Level One	Level Two	Level Three
	Context	Context
	Performs safety-related functions	Performs safety-related functions
	Common steep slope practices	Common steep slope practices
Performs safety-related functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		
Uses tools and equipment (Overview) 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment	Uses tools and equipment (Task Specific) 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment	Uses tools and equipment (Task Specific) 2.01 Uses hand tools 2.02 Uses power tools, pneumatic tools, and hot-air welding, induction and fuelled equipment 2.03 Uses hoisting, lifting and rigging equipment 2.04 Uses access equipment 2.05 Uses hot process equipment 2.06 Uses motorized equipment
Organizes Work 3.01 Uses documentation and reference materials 3.02 Interprets blueprints and drawings 3.04 Assesses worksite conditions 3.05 Positions equipment and material on the ground and on the roof 3.06 Prepares material disposal systems	Organizes Work 3.01 Uses documentation and reference materials 3.02 Interprets blueprints and drawings 3.04 Assesses worksite conditions 3.05 Positions equipment and material on the ground and on the roof 3.06 Prepares material disposal systems	Organizes Work 3.02 Interprets blueprints and drawings 3.03 Estimates material 3.07 Evaluates roof conditions near roof-top equipment installations
Uses communication techniques 4.01 Uses communication techniques		Uses communication and mentoring techniques 4.01 Uses communication techniques 4.02 Uses mentoring techniques
Prepares roof for replacement 5.01 Protects surrounding area 5.02 Removes loose debris 5.03 Removes roofing and flashings	Prepares roof for replacement 5.04 Prepares roof substrate 5.05 Performs minor adjustments to penetrations, curbs and parapets	
Prepares deck for roof installation	Prepares deck for roof installation	Prepares deck for roof installation

6.02 Cleans deck 6.04 Dries deck	6.01 Inspects deck 6.03 Verifies placement of roof penetrations, curbs and parapets	6.01 Inspects deck 6.03 Verifies placement of roof penetrations, curbs and parapets
Applies low slope roofing components (Overview/Identification of Components) 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings	Applies low slope roofing components 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings	Applies low slope roofing components (Trade Science/Installation of Components) 7.01 Installs support panels 7.02 Primes substrate 7.03 Applies vapour retarder, vapour barrier and air barrier 7.04 Installs insulation 7.05 Installs cover board 7.06 Installs drains, vents, curbs and penetrations 7.07 Applies ballast, walkways and protective surfaces 7.08 Installs metal flashings
Applies low slope roofing membranes (BUR) 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains	Applies low slope roofing membranes (Modified Bitumen) 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.04 Applies membranes using torched-on method 8.05 Applies membranes using hot-air welding 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains	Applies low slope roofing membranes (Thermoplastics, Thermosets, Liquid-applied, Trade Science) 8.01 Relaxes membranes 8.02 Sets membranes 8.03 Applies membranes using hot-liquid process 8.05 Applies membranes using hot-air welding 8.06 Applies membranes using cold-applied methods 8.07 Applies membranes using mechanical fasteners 8.08 Applies loose-laid membranes 8.09 Applies liquid-applied membranes 8.10 Installs membrane flashings 8.11 Installs temporary seals and temporary drains
Common steep slope practices 9.01 Installs steep slope underlayment 9.02 Installs steep slope venting 9.03 Installs steep slope valley applications 9.04 Installs steep slope saddles/crickets 9.05 Installs steep slope penetration flashings		
Applies shingles (Asphalt) 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.05 Tabs shingles 10.06 Installs metal flashings for shingled roofs	Applies shingles (Wood and Composite) 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.06 Installs metal flashings for shingled roofs	Applies shingles (Metal) 10.01 Determines layout of shingles 10.02 Installs starter strip and starter course 10.03 Fastens shingles 10.04 Cuts shingles 10.06 Installs metal flashings for shingled roofs

		Applies roof tiles 11.01 Installs battens/strapping for roof tiles 11.02 Fastens roof tiles 11.03 Cuts roof tiles 11.04 Installs closure strips for roof tiles 11.05 Installs ridge and hip caps 11.06 Installs metal flashings for tiled roofs
		Applies pre-formed metal roofing 12.01 Installs battens/strapping for pre-formed metal roofing 12.02 Fastens pre-formed metal roofing 12.03 Cuts sheet metal 12.04 Installs closure strips for pre-formed metal roofing 12.05 Installs snow guards 12.06 Installs metal flashings for pre-formed metal roofs
	Waterproofs surfaces 13.01 Prepares waterproofing substrates 13.02 Applies waterproofing membrane	Waterproofs surfaces 13.03 Installs green, sustainable, vegetative and protected membrane components
	Damp-proofs surfaces 14.01 Applies damp-proofing materials 14.02 Applies protection layer	
		Assesses roof condition 15.01 Performs roof inspections 15.02 Performs cut test 15.03 Determines maintenance or repair required
	Maintains and repairs low slope roofing 16.01 Maintains low slope roofing 16.02 Repairs low slope roofing	Maintains and repairs low slope roofing 16.01 Maintains low slope roofing 16.02 Repairs low slope roofing
	Maintains and repairs steep slope roofing 17.01 Maintains steep slope roofing 17.02 Repairs steep slope roofing	Maintains and repairs steep slope roofing 17.01 Maintains steep slope roofing 17.02 Repairs steep slope roofing

40.1. Cabinetmaker - Recommendations

That provinces and territories adopt the **Red Seal Name** – Cabinetmaker / Ébéniste

- That the total number of training **hours** be 7200 hours
- That the technical training program offers four (4) levels
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

40.2. Cabinetmaker – Topic and Sub-task - RSOS 2020			
Level One	Level Two	Level Three	Level Four
	Context	Context	Context
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment		
	Organizes Work	Organizes Work	Organizes Work
			Routine Work Practices
	Surface Preparation	Surface Preparation	Surface Preparation
	Stationary and Portable Power Tools (Machines Components)	Stationary and Portable Power Tools (Machines Components)	Stationary and Portable Power Tools (Machines Components)
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment			
Tools and Equipment 2.01 Maintains hand, portable power and pneumatic tools and equipment 2.02 Maintains stationary power tools		Tools and Equipment 2.03 Maintains automated and CNC equipment 2.04 Maintains finishing equipment	Tools and Equipment 2.03 Maintains automated and CNC equipment 2.04 Maintains finishing equipment
Organizes Work 3.01 Interprets prints and drawings 3.02 Plans project 3.03 Creates design 3.04 Performs layout of cabinets, furniture and architectural millwork			
Routine Work Practices 4.01 Handles materials, supplies and products 4.04 Dry-fits components 4.05 Selects hardware 4.06 Selects adhesives and fasteners	Routine Work Practices 4.02 Fabricates jigs and templates 4.04 Dry-fits components 4.05 Selects hardware	Routine Work Practices 4.02 Fabricates jigs and templates 4.03 Builds prototypes	
Communication Techniques 5.01 Uses communication techniques			Mentoring Techniques 5.02 Uses mentoring techniques
Stationary and Portable Power Tools (Machine Components) 6.01 Breaks out solid wood 6.02 Dresses solid wood			

6.03 Shapes solid wood 6.04 Breaks out sheet materials 6.05 Machines sheet materials 6.06 Machines joints 6.07 Performs preliminary sanding			
		Automated and CNC Equipment (Machine Components) 7.01 Sets up automated and CNC equipment 7.02 Operates automated and CNC equipment	Automated and CNC Equipment (Machine Components) 7.01 Sets up automated and CNC equipment 7.02 Operates automated and CNC equipment
		Curved Components 8.01 Builds forms 8.02 Performs curved laminating 8.03 Steam-forms wood	Curved Components 8.01 Builds forms 8.02 Performs curved laminating 8.03 Steam-forms wood
Wood and Composite Materials (Laminating) 9.01 Arranges materials for laminating 9.02 Applies adhesive for laminating 9.03 Clamps pieces together	Wood and Composite Materials (Laminating) 9.01 Arranges materials for laminating 9.02 Applies adhesive for laminating 9.03 Clamps pieces together		
		Veneer (Application) 10.01 Selects veneers 10.02 Prepares veneer and substrate 10.03 Adheres veneers to substrates 10.04 Performs final clean-up of laminated sheets	Veneer (Application) 10.03 Adheres veneers to substrates 10.04 Performs final clean-up of laminated sheets
Laminate Sheets (Application) 11.01 Selects laminate sheets 11.02 Prepares laminate sheets and substrate	Laminate Sheets (Application) 11.01 Selects laminate sheets 11.02 Prepares laminate sheets and substrate 11.03 Adheres laminate sheets to substrate 11.04 Performs final clean-up of laminated sheets		
Cabinets and Furniture (Assembly) 12.01 Assembles cabinet components 12.02 Assembles furniture components 12.03 Combines cabinet and furniture components into final assemblies	Cabinets and Furniture (Assembly) 12.01 Assembles cabinet components 12.02 Assembles furniture components 12.03 Combines cabinet and furniture components into final assemblies	Cabinets and Furniture (Assembly) 12.01 Assembles cabinet components 12.02 Assembles furniture components 12.03 Combines cabinet and furniture components into final assemblies	
			Architectural Millwork Products 13.01 Assembles architectural millwork components in shop 13.02 Assembles architectural fixtures in shop

Surface Preparation 14.01 Repairs imperfections 14.02 Prepares parts for finishing 14.03 Performs final sanding of surfaces			
	Wood Products (Finishing) 15.01 Prepares finishing materials 15.02 Applies finishing material manually 15.03 Sprays on finishing material	Wood Products (Finishing) 15.01 Prepares finishing materials 15.02 Applies finishing material manually 15.03 Sprays on finishing material	
	Product Modification 16.01 Cuts access holes on site 16.02 Scribes product to fit on site		
	Cabinets and Countertops 17.01 Performs final on-site assembly and fastening of cabinets and countertops 17.02 Finalizes installation of cabinets and countertops		
			Architectural Millwork Products and Mouldings (Installation) 18.01 Performs final on-site assembly and fastening of architectural millwork products 18.02 Installs mouldings 18.03 Finalizes installation of architectural millwork products and mouldings
		Stairs and Balustrades 19.01 Lays out stair and balustrade components 19.02 Machines stair and balustrade components 19.03 Assembles stairs and balustrades 19.04 Installs stairs and balustrades	
		Solid Surface Material and Custom Countertops 20.01 Breaks out materials 20.02 Fabricates solid surface material 20.03 Installs solid surface material	
			Decorative Woodwork 21.01 Performs marquetry (NCC) 21.02 Performs carving (NCC) 21.03 Performs woodturning

			Restores Woodwork 22.01 Repairs woodwork for restoration purposes 22.02 Refinishes woodwork
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41.1. Lather (Interior Systems Mechanic) - Recommendations

That provinces and territories adopt the **Red Seal Name** – Lather (Interior Systems Mechanic) / Latteur / Latteuse (Spécialiste de systèmes intérieurs) – **Name survey being conducted by Red Seal Secretariat.**

- That the total number of training **hours** be **5400**
- That the technical training program offers three (3) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

41.2. Lather (Interior Systems Mechanic) – Topic and Sub-task - RSOS 2021		
Level One	Level Two	Level Three
	Context	Context
	Safety-Related Functions	Safety-Related Functions
	Organizes Work	Organizes Work
Safety-Related Functions 1.01 Maintains a safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment		
Tools and Equipment 2.01 Uses hand tools 2.02 Uses power tools and equipment 2.03 Uses powder-actuated tools 2.04 Uses gas-actuated tools 2.05 Uses pneumatic tools (NCC) 2.06 Uses layout and measuring devices 2.07 Uses scaffolding and access equipment		
Organizes Work 3.01 Uses documentation and reference materials 3.02 Uses blueprints and drawings 3.03 Plans project tasks 3.04 Estimates materials and supplies (introduction)		
Routine Trade Activities 4.01 Performs measurements 4.02 Uses jigs and templates 4.03 Handles materials, supplies and products 4.04 Lays out work 4.05 Applies sealants and gaskets	Routine Trade Activities 4.01 Performs measurements 4.02 Uses jigs and templates 4.03 Handles materials, supplies and products 4.04 Lays out work 4.05 Applies sealants and gaskets	Routine Trade Activities 4.01 Performs measurements 4.02 Uses jigs and templates 4.03 Handles materials, supplies and products 4.04 Lays out work
Communication Techniques 5.01 Uses communication techniques		Mentoring Techniques 5.02 Uses mentoring techniques
Non Load-Bearing Steel Assemblies 6.01 Frames non load-bearing walls 6.02 Frames spanned ceilings	Non Load-Bearing Steel Assemblies 6.01 Frames non load-bearing walls 6.02 Frames spanned ceilings	

6.03 Frames suspended drywall ceilings 6.04 Frames non load-bearing bulkheads 6.05 Installs metal door and window frames 6.06 Installs backing	6.03 Frames suspended drywall ceilings 6.04 Frames non load-bearing bulkheads 6.05 Installs metal door and window frames 6.06 Installs backing	
	Load-Bearing Steel Assemblies 7.01 Frames load-bearing walls 7.02 Frames exterior ceilings and soffits 7.03 Frames load-bearing bulkheads 7.04 Frames load-bearing floors 7.05 Frames load-bearing roofs	Load-Bearing Steel Assemblies 7.01 Frames load-bearing walls 7.02 Frames exterior ceilings and soffits 7.03 Frames load-bearing bulkheads 7.04 Frames load-bearing floors 7.05 Frames load-bearing roofs
Wall Systems and Components 8.02 Installs drywall 8.06 Installs access panels	Wall Systems and Components 8.02 Installs drywall 8.03 Finishes drywall 8.04 Installs drywall trims and mouldings 8.05 Installs security mesh 8.06 Installs access panels	Wall Systems and Components 8.01 Installs demountable walls
	Ceiling Systems 9.01 Installs suspended ceilings 9.02 Installs non-suspended ceilings	Ceiling Systems 9.01 Installs suspended ceilings 9.02 Installs non-suspended ceilings
		Access Flooring Systems 10.01 Installs pedestals and supporting hardware 10.02 Installs floor panels
	Sound Barriers 11.01 Installs sound barriers	Sound Barriers and Lead Radiation Shielding 11.01 Installs sound barriers 11.02 Installs lead radiation shielding
	Smoke and Fire Barriers 12.01 Installs shaft wall systems 12.02 Seals penetrations 12.03 Encloses beams, columns and staircases to achieve desired	Smoke and Fire Barriers 12.01 Installs shaft wall systems 12.02 Seals penetrations 12.03 Encloses beams, columns and staircases to achieve desired

	fire rating	fire rating
Insulation 13.01 Installs thermal insulation		Membranes 13.02 Installs interior/exterior membranes
		Surface Preparation for Exterior Finishes 14.01 Installs exterior sheathing 14.02 Installs lath 14.03 Installs Exterior Insulation Finish System (EIFS) (NCC)
		Exterior Finishes 15.01 Fabricates panels 15.02 Installs pre-manufactured panels

42.1. Recreation Vehicle Service Technician - Recommendations

That provinces and territories adopt the **Red Seal Name** – Recreation Vehicle Service Technician / Technicien/technicienne de véhicules récréatifs

- That the total number of training **hours** be 5400 hours
- That the technical training program offers three (3) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

42.2. Recreation Vehicle Service Technician – Topic and Sub-task - RSOS 2021		
Level One	Level Two	Level Three
Safety-Related Activities 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe work environment		
Tools and Equipment 2.01 Uses tools and equipment 2.02 Uses lifting, moving and access equipment		
Common Work Practices and Procedures 3.01 Uses documentation 3.02 Identifies recalls and service bulletins 3.03 Performs pre-delivery inspections (PDI)	Common Work Practices and Procedures 3.01 Uses documentation	Common Work Practices and Procedures* 3.01 Uses documentation *For the purpose of work including estimating
Communication Techniques 4.01 Uses communication techniques		Mentoring Techniques 4.02 Uses mentoring techniques
Plumbing Systems (Diagnoses) 5.01 Diagnoses potable water systems 5.02 Diagnoses waste water systems		
Potable Water Systems (Services) 6.01 Maintains potable water systems 6.02 Repairs potable water systems 6.03 Installs potable water systems		
Waste Water Systems (Services) 7.01 Maintains waste water systems 7.02 Repairs waste water systems 7.03 Installs waste water systems		
	Electrical Systems (Diagnoses) 8.01 Diagnoses AC electrical systems 8.02 Diagnoses DC electrical systems	Electrical Systems (Diagnoses) 8.03 Diagnoses generators
AC Electrical Systems (Operates) 9.01 Maintains AC electrical systems	AC Electrical Systems (Services) 9.01 Maintains AC electrical systems 9.02 Repairs AC electrical systems 9.03 Installs AC electrical systems	AC Electrical Systems (Services) 9.01 Maintains AC electrical systems 9.02 Repairs AC electrical systems 9.03 Installs AC electrical systems
DC Electrical Systems (Operates) 10.01 Maintains DC electrical systems	DC Electrical Systems (Services) 10.01 Maintains DC electrical systems	DC Electrical Systems (Services) 10.01 Maintains DC electrical systems

	10.02 Repairs DC electrical systems 10.03 Installs DC electrical systems	10.02 Repairs DC electrical systems 10.03 Installs DC electrical systems
		Generators (Services) 11.01 Maintains generators 11.02 Installs generators
	LP Gas Systems (Diagnoses) 12.01 Diagnoses LP gas supply systems (high pressure) 12.02 Diagnoses LP gas distribution systems (low pressure)	
LP Gas Systems (Operates) 13.01 Maintains LP gas supply systems	LP Gas Systems (Services) 13.01 Maintains LP gas supply systems 13.02 Repairs LP gas supply systems 13.03 Installs LP gas supply systems	
	Appliances (Diagnoses) 14.01 Diagnoses water heaters and components 14.02 Diagnoses furnaces and components 14.03 Diagnoses cooktops and ranges 14.04 Diagnoses refrigerators and ice makers 14.05 Diagnoses air conditioners and heat pumps	Appliances (Diagnoses) 14.02 Diagnoses furnaces and components 14.04 Diagnoses refrigerators and ice makers 14.05 Diagnoses air conditioners and heat pumps
Water Heaters (Operates) 15.01 Maintains water heaters	Water Heaters (Services) 15.01 Maintains water heaters 15.02 Repairs water heaters 15.03 Installs water heaters	
Furnaces (Operates) 16.01 Maintains furnaces	Furnaces (Services) 16.01 Maintains furnaces 16.02 Repairs furnaces 16.03 Installs furnaces	Furnaces (Services) 16.01 Maintains furnaces 16.02 Repairs furnaces 16.03 Installs furnaces
Cooktops and Ranges (Operates) 17.01 Maintains cooktops and ranges	Cooktops and Ranges (Services) 17.01 Maintains cooktops and ranges 17.02 Repairs cooktops and ranges 17.03 Installs cooktops and ranges	
Refrigerators and Ice Makers (Operates) 18.01 Maintains refrigerators and ice makers	Refrigerators and Ice Makers (Services) 18.01 Maintains refrigerators and ice makers 18.02 Repairs refrigerators and ice makers	Refrigerators and Ice Makers (Services) 18.01 Maintains refrigerators and ice makers 18.02 Repairs refrigerators and ice makers

	18.03 Installs refrigerators and ice makers	18.03 Installs refrigerators and ice makers
Air Conditioners and Heat Pumps (Operates) 19.01 Maintains air conditioners and heat pumps		Air Conditioners and Heat Pumps (Services) 19.01 Maintains air conditioners and heat pumps 19.02 Repairs air conditioners and heat pumps 19.03 Installs air conditioners and heat pumps
Consumer Products (Operates) 20.01 Replaces consumer products 20.02 Installs consumer products		Consumer Products (Services) 20.01 Replaces consumer products 20.02 Installs consumer products
	Interior and Exterior Components (Diagnoses) 21.01 Diagnoses interior components 21.02 Diagnoses exterior components	
	Interior Components (Services) 22.01 Maintains interior components 22.02 Repairs interior components 22.03 Installs interior components	
	Exterior Components (Services) 23.01 Maintains exterior components 23.02 Repairs exterior components 23.03 Installs exterior components	
Frames and Mechanical Components (Operates) 24.01 Diagnoses frames 24.02 Diagnoses running gear 24.03 Diagnoses levelling systems 24.04 Diagnoses slide-out systems 24.05 Diagnoses lifting systems		Frames and Mechanical Components (Diagnoses) 24.01 Diagnoses frames 24.02 Diagnoses running gear 24.03 Diagnoses levelling systems 24.04 Diagnoses slide-out systems 24.05 Diagnoses lifting systems
Frames (Operates) 25.01 Maintains frames		Frames (Services) 25.02 Repairs frames
Running Gear (Operates/Services) * 26.01 Maintains running gear 26.02 Repairs running gear		

*apprentices may have basic servicing included with running gears.		
Levelling Systems (Operates) 27.01 Maintains levelling systems		Levelling Systems (Services) 27.02 Repairs levelling systems 27.03 Installs levelling systems
Slide-Out Systems (Operates) 28.01 Maintains slide-out systems		Slide-Out Systems (Services) 28.02 Repairs slide-out systems
Lifting Systems (Operates) 29.01 Maintains lifting systems		Lifting Systems (Services) 29.02 Repairs lifting systems
	Towing Systems (Diagnoses) 30.01 Diagnoses tow vehicle systems	Towing Systems (Diagnoses) 30.02 Diagnoses towed vehicle systems
Tow Vehicle Systems (Operates) 31.01 Maintains tow vehicle systems	Tow Vehicle Systems (Services) 31.02 Repairs tow vehicle systems 31.03 Installs tow vehicle systems	Tow Vehicle Systems (Services) 31.02 Repairs tow vehicle systems 31.03 Installs tow vehicle systems
Towed Vehicle Systems (Operates) 32.01 Maintains towed vehicle systems		Towed Vehicle Systems (Services) 32.02 Repairs towed vehicle systems 32.03 Installs towed vehicle systems

43.1. Painter and Decorator

That provinces and territories adopt the **Red Seal Name** – xxx

- That the total number of training **hours** be 5400 hours
- That the technical training program offers three (3) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

43.2. Painter and Decorator – Topic and Sub-task - RSOS 2022

Level 1	Level 2	Level 3
	Context	Context
	Safety-Related Functions	Safety-Related Functions
	Routine Trade Practices	
	Quality Control Assessments	Quality Control Assessments
Safety-Related Functions 1.01 Uses personal protective equipment (PPE) and safety equipment 1.02 Maintains safe work environment		
Tools and Equipment 2.01 Maintains tools and equipment 2.02 Uses rigging, hoisting and lifting equipment 2.03 Uses access equipment	Tools and Equipment 2.02 Uses rigging, hoisting and lifting equipment 2.03 Uses access equipment	
Routine Trade Practices 3.01 Uses documentation 3.04 Protects surroundings 3.05 Handles materials		Routine Trade Practices 3.02 Determines project requirements 3.03 Plans job
Quality Control Assessments 4.01 Assesses substrate conditions and deficiencies 4.02 Assesses product conditions and deficiencies 4.03 Assesses quality of painted or coated surfaces and wall coverings		
Communication Techniques 5.01 Uses communication techniques		Mentoring Techniques 5.02 Uses mentoring techniques
General Surface Preparation 6.01 Removes existing paints and coatings 6.02 Removes existing wall coverings and adhesives 6.03 Cleans surfaces 6.04 Primes surfaces 6.05 Sands surfaces 6.06 Applies caulking		
Wood Surfaces for Paints, Coatings and Wall Coverings (Introduction/Overview) 7.01 Treats wood surfaces 7.02 Repairs imperfections in wood	Wood Surfaces for Paints, Coatings and Wall Coverings 7.01 Treats wood surfaces 7.02 Repairs imperfections in wood	

Concrete and Masonry Surfaces

8.01 Mechanically treats concrete and masonry surfaces (*Introduction to surfaces*)
8.02 Chemically treats concrete and masonry surfaces (*Introduction to surfaces*)

Concrete and Masonry Surfaces

8.01 Mechanically treats concrete and masonry surfaces
8.02 Chemically treats concrete and masonry surfaces
8.03 Repairs concrete and masonry surfaces

Concrete and Masonry Surfaces

8.01 Mechanically treats concrete and masonry surfaces
8.02 Chemically treats concrete and masonry surfaces
8.03 Repairs concrete and masonry surfaces

Metal Surfaces

9.01 Treats metal surfaces
9.02 Repairs metal surfaces

Plaster Surfaces and Drywall

10.01 Repairs existing plaster surfaces and drywall
10.02 Finishes new drywall

Plaster Surfaces and Drywall

10.01 Repairs existing plaster surfaces and drywall

Application of Residential, Institutional and Commercial Paints and Coatings (Preparation)

11.01 Prepares residential, institutional and commercial paints and coatings
11.02 Installs residential, institutional and commercial reinforcing mesh

Application of Residential, Institutional and Commercial Paints and Coatings (Preparation)

11.01 Prepares residential, institutional and commercial paints and coatings
11.02 Installs residential, institutional and commercial reinforcing mesh

Application of Residential, Institutional and Commercial Paints and Coatings (Applies)

12.01 Applies residential, institutional and commercial paints and coatings with brushes
12.02 Applies residential, institutional and commercial paints and coatings with rollers
12.03 Applies residential, institutional and commercial paints and coatings with applicators (NCC)
12.04 Applies residential, institutional and commercial paints and coatings with spray equipment

Application of Residential, Institutional and Commercial Paints and Coatings (Applies)

12.03 Applies residential, institutional and commercial paints and coatings with applicators (NCC)
12.04 Applies residential, institutional and commercial paints and coatings with spray equipment

Application of Residential, Institutional and Commercial Paints and Coatings (Applies)

12.04 Applies residential, institutional and commercial paints and coatings with spray equipment

Decorative/Specialty Finishes

13.01 Applies paints and coating using decorative techniques

Decorative/Specialty Finishes

13.01 Applies paints and coating using decorative techniques
13.02 Creates faux finishes
13.03 Applies gilding
13.04 Applies stencils and graphics
13.05 Creates textured finishes
13.06 Applies multi-spec coatings

**Wall Coverings
(Preparation)**

- 14.01 Treats surfaces for wall coverings
- 14.02 Lays out surface
- 14.03 Prepares wall coverings

**Wall Coverings
(Applies)**

- 15.01 Applies adhesives
- 15.02 Installs vinyl wall coverings
- 15.03 Installs fabric and natural material wall coverings
- 15.04 Installs rigid wall coverings
- 15.05 Repairs existing wall coverings

**Wall Coverings
(Applies)**

- 15.01 Applies adhesives
- 15.02 Installs vinyl wall coverings
- 15.03 Installs fabric and natural material wall coverings
- 15.04 Installs rigid wall coverings
- 15.05 Repairs existing wall coverings

Wood Finishing Applications (Prepares)

- 16.01 Conditions wood surfaces
- 16.02 Applies wood fillers
- 16.03 Seals wood surfaces
- 16.04 Prepares wood finishing products

Wood Surfaces (Finishes)

- 17.01 Brushes on wood finishes
- 17.02 Wipes on wood finishes
- 17.03 Sprays on wood finishes

**Industrial Paints and Coatings
(Prepares)**

- 18.01 Prepares industrial paints and coatings
- 18.02 Installs fibre reinforced plastics (FRP)

**Industrial Paints and Coatings
(Applies)**

- 19.01 Applies industrial paints and coatings with hand tools
- 19.02 Applies industrial paints and coatings with power tools

**Industrial Paints and Coatings
(Applies)**

- 19.01 Applies industrial paints and coatings with hand tools
- 19.02 Applies industrial paints and coatings with power tools

44.1. Transport Trailer Technician - Topic and Sub-task - RSOS 2022

That provinces and territories adopt the **Red Seal Name** – xxx

- That the total number of training **hours** be 5400 hours
- That the technical training program offers three (3) **training levels**
- That the **sequencing** reflects the topic and sub-task mapping in the sequencing documents.

44.2. Transport Trailer Technician - Topic and Sub-task - RSOS 2022

Level 1	Level 2
Safety-Related Functions 1.01 Maintains safe work environment 1.02 Uses personal protective equipment (PPE) and safety equipment	
Tools and Equipment 2.01 Uses hand, electric and pneumatic tools 2.02 Uses measuring, testing and diagnostic equipment 2.03 Uses hoisting, lifting, staging and access equipment 2.04 Uses welding equipment 2.05 Uses gas, plasma and arc air cutting equipment 2.06 Uses electronic devices and systems for diagnostics and programming	Tools and Equipment 2.04 Uses welding equipment 2.05 Uses gas, plasma and arc air cutting equipment 2.06 Uses electronic devices and systems for diagnostics and programming
Routine Work Practices 3.01 Maintains fluids and lubricants 3.02 Lubricates parts and components 3.03 Cleans parts and components 3.04 Uses fasteners, sealants, adhesives and gaskets 3.05 Maintains hoses, tubing and fittings	
Organizes Work 4.01 Uses documentation 4.02 Plans daily tasks	Organizes Work 4.01 Uses documentation
Communication Techniques 5.01 Uses communication techniques	Mentoring Techniques 5.02 Uses mentoring techniques
Suspension Systems (Diagnoses) 6.01 Diagnoses air suspension systems 6.02 Diagnoses spring suspension systems 6.03 Diagnoses rubber suspension systems	Suspension Systems (Diagnoses) 6.01 Diagnoses air suspension systems 6.02 Diagnoses spring suspension systems 6.03 Diagnoses rubber suspension systems
Suspension Systems (Services) 7.01 Maintains suspension systems	Suspension Systems (Services) 7.02 Repairs air suspension systems 7.03 Repairs spring suspension systems 7.04 Repairs rubber suspension systems

Brake Systems (Diagnoses)

- 8.01 Diagnoses disc brake systems
- 8.02 Diagnoses drum brake systems
- 8.03 Diagnoses air brake systems
- 8.04 Diagnoses hydraulic brake systems

Brake Systems (Services)

- 9.01 Maintains brake systems
- 9.02 Repairs disc brake systems
- 9.03 Repairs drum brake systems
- 9.04 Repairs air brake systems
- 9.05 Repairs hydraulic brake systems

Axles and Wheel End Assemblies (Diagnoses)

- 10.02 Diagnoses hubs and bearings
- 10.03 Diagnoses tires and rims

Axles and Wheel End Assemblies (Services)

- 11.01 Maintains axles and wheel end assemblies
- 11.02 Repairs fixed axles, hubs and bearings
- 11.04 Replaces tires and rims
- 11.05 Repairs tires

Trailer Chassis and Trailer Bodies (Services)

- 13.01 Maintains trailer chassis
- 13.02 Repairs trailer chassis
- 13.03 Maintains trailer bodies
- 13.04 Repairs trailer bodies

Brake Systems (Diagnoses)

- 8.01 Diagnoses disc brake systems
- 8.02 Diagnoses drum brake systems
- 8.03 Diagnoses air brake systems
- 8.04 Diagnoses hydraulic brake systems
- 8.05 Diagnoses electric brake systems
- 8.06 Diagnoses electronic braking control systems

Brake Systems (Services)

- 9.01 Maintains brake systems
- 9.02 Repairs disc brake systems
- 9.03 Repairs drum brake systems
- 9.04 Repairs air brake systems
- 9.05 Repairs hydraulic brake systems
- 9.06 Repairs electric brake systems
- 9.07 Repairs electronic braking control systems

Axles and Wheel End Assemblies (Diagnoses)

- 10.01 Diagnoses fixed, self-steering and lift axles
- 10.03 Diagnoses tires and rims

Axles and Wheel End Assemblies (Services)

- 11.02 Repairs fixed axles, hubs and bearings
- 11.03 Repairs self-steering and lift axles

Trailer Chassis and Trailer Bodies (Diagnoses)

- 12.01 Diagnoses trailer chassis
- 12.02 Diagnoses trailer bodies

Trailer Chassis and Trailer Bodies (Services)

- 13.02 Repairs trailer chassis
- 13.04 Repairs trailer bodies

Coupling Devices and Landing Gear (Diagnoses)

- 14.01 Diagnoses coupling devices
- 14.02 Diagnoses landing gear

Coupling Devices and Landing Gear (Services)

- 15.01 Maintains coupling devices
- 15.02 Repairs coupling devices
- 15.03 Maintains landing gear
- 15.04 Repairs landing gear

Electric and Electronic Systems (Diagnoses)

- 16.01 Diagnoses lighting systems
- 16.02 Diagnoses wiring systems

Electric and Electronic Systems (Services)

- 17.01 Maintains electric and electronic systems
- 17.02 Repairs lighting and wiring systems

Hydraulic Systems (Diagnoses)

- 18.01 Diagnoses self-contained hydraulic systems
- 18.02 Diagnoses auxiliary-powered hydraulic systems

Hydraulic Systems (Services)

- 19.01 Maintains hydraulic systems
- 19.02 Repairs hydraulic systems

Electric and Electronic Systems (Diagnoses)

- 16.02 Diagnoses wiring systems
- 16.03 Diagnoses trailer monitoring and control systems

Electric and Electronic Systems (Services)

- 17.02 Repairs lighting and wiring systems
- 17.03 Repairs trailer monitoring and control systems

Temperature Control Systems (Diagnoses)

- 20.01 Diagnoses fuel systems
- 20.02 Diagnoses charging and starting systems
- 20.03 Diagnoses high-voltage electric, hybrid and alternative drive systems
- 20.04 Diagnoses refrigeration and heating systems

Temperature Control Systems (Services)

- 21.01 Maintains fuel systems
- 21.02 Repairs fuel systems
- 21.03 Maintains charging and starting systems
- 21.04 Repairs charging and starting systems
- 21.05 Maintains high-voltage electric, hybrid and alternative drive systems
- 21.06 Repairs high-voltage electric, hybrid and alternative drive systems
- 21.07 Maintains refrigeration and heating systems
- 21.08 Repairs refrigeration and heating systems