



HOT TUB AND SPA INSTALLATION

Electrical conformity, field practice and commissioning for New Brunswick

GoRight Training Module - Expanded Contractor & Apprentice Edition 2.0
| August 2026

PURPOSE

A standalone GoRight learning and field-control system for electricians and apprentices who survey, design, install, inspect, commission and maintain hot tub and spa electrical systems in New Brunswick.

How to Use This Module	5
Learning outcomes	5
1. New Brunswick Conformity Foundation	6
1. Permit and Inspection Workflow	7
1. Classify the Installation Before Design	8
1. Rule-Level Code Navigation	9
1. Equipment Approval and Nameplate Control	10
2. Typical Electrical Architecture	11
2. Field Survey and Existing-System Verification	12
2. Site Layout and Measurement Control	13
2. Overhead and Underground Wiring	14
3. Service Capacity and Load Integration	15
3. Worked Problem: 240 V Residential Hot Tub	16
3. Conductor, OCPD and Terminal Compliance Chain	17
3. Worked Voltage-Drop Screen	18
4. Class A GFCI Protection	19
4. GFCI Selection, Installation and Testing	20
4. Disconnecting Means	21
5. Bonding Is Not Grounding	22
5. Perimeter Bonding for Hot Tubs	23
5. Field-Assembled Systems and Leakage-Current Collectors	24
5. Factory-Built Package versus Field Assembly	25
6. Wiring Methods in Wet, Corrosive and Cold Locations	26

6. Controls, Receptacles and Lighting Around the Tub	27
6. Non-Dwelling Emergency Shut-Off	28
6. New Brunswick Climate and Site Reliability	29
7. Representative Saint John Region Installation Case	30
7. Case Calculations and Selection Record	31
7. Case Layout and Installation Hold Points	32
7. Case Commissioning Record	33
8. Commissioning Test Plan	34
8. Fillable Commissioning Record	35
8. Troubleshooting by Evidence	36
8. Maintenance and Periodic Verification	37
8. Customer Handover	38
9. Apprentice Worked Exercises	39
9. Exercise Answers and Teaching Notes	40
10. GoRight Hot Tub Pre-Evaluation Form	41
10. Installation and Closeout Checklist	42
11. Complete GoRight Project Workflow	43
11. Authority and Evidence Hierarchy	44
11. Detailed Site-Survey Worksheet	45
11. Scaled Site-Plan Exercise	46
11. Representative 200 A Dwelling Load Integration	47
Illustrative arithmetic check	47
11. Branch-Circuit Selection - 40 A, 50 A and 60 A Cases	48
Selection chain	48
11. Worked Conductor and Voltage-Drop Case	49

Sensitivity check 49

11. Bonding by Perimeter Construction 50

11. GFCI Trip Diagnostic Workflow 51

11. Inspection Deficiency Recognition 52

11. Estimating and Material Takeoff Tool 53

11. Scope, Exclusions and Change-Control Language 54

11. Expanded Commissioning and Evidence Record 55

11. Advanced Apprentice Problems 56

11. Advanced Apprentice Answers 57

12. Field Photography: Hot Tub Site 58

12. Field Photography: Cabinet and Service Access 59

12. Field Photography: GFCI Concept 60

12. Field Photography: Disconnecting Equipment 61

13. One-Page Hot Tub Field Reference 62

Stop-work triggers 62

Photo Credits and Reuse Notices 63

Licence note 63

Governing References and Revision Basis 64

GoRight Electric Inc. 64

How to Use This Module

Begin with classification and site conditions, not conductor size. Confirm whether the product is factory-built or field-assembled, the installation is residential or public/commercial, the actual nameplate load, the available service capacity, and the complete water-zone layout before equipment is ordered.

SAFETY BOUNDARY

Water, bare skin and conductive surfaces reduce the margin for error. Establish an electrically safe work condition whenever feasible. Approved equipment, the current adopted Code, New Brunswick requirements, manufacturer instructions and inspection direction govern the installation.

Learning outcomes

- + Classify hot tubs, spas, hydromassage bathtubs and field-assembled systems correctly.
- + Navigate CEC Section 68 and the general Sections that still apply.
- + Complete service-load, branch-circuit, ampacity, OCPD and voltage-drop checks.
- + Design Class A GFCI protection, disconnecting, controls, receptacles and lighting around water.
- + Build and verify bonding and perimeter equipotential systems without confusing them with grounding.
- + Commission, troubleshoot and document the installation using measured evidence.

1. New Brunswick Conformity Foundation

New Brunswick Regulation 84-165 defines the adopted electrical Code as C22.1-24, Canadian Electrical Code, Part I, 26th Edition, including errata and provincial modifications. The Electrical Installation and Inspection Act and Regulation 84-165 establish licensing, permits, inspection and enforcement.

Authority layer	Hot tub project meaning
NB Electrical Installation and Inspection Act	Legal authority for electrical installation, inspection, orders and approval.
NB Regulation 84-165	Adopted CEC edition, NB amendments, contractor licensing, wiring permits and inspection administration.
CEC 2024 Section 68	Supplementary/amendatory rules for pools, tubs, spas and associated equipment.
CEC general Sections	Load calculation, conductors, wiring methods, protection/control, grounding/bonding, motors and electric heating still apply unless amended by Section 68.
CSA C22.2 No. 218.1:25	Current product standard for spas, hot tubs, cold tubs and associated equipment; verify the actual certification basis on the product.
Manufacturer instructions	Circuit rating, GFCI, conductor/terminal conditions, disconnecting, site, service access, winterization and commissioning.

CURRENT PROJECT FILE

Record the permit-date Code, NB modifications, relevant bulletins/directions, approved equipment markings, manufacturer instructions, site plan and inspection requirements.

1. Permit and Inspection Workflow

A hot tub is a substantial fixed electrical load in a wet environment. The electrical contractor should obtain the applicable wiring permit before regulated work, coordinate required inspections and retain the permit number in the closeout package.

Gate	Project control
Customer/site data	Civic address, service characteristics, ownership, installation location and tub delivery date.
Equipment data	Certification mark, model, voltage, phase, nameplate current/kW, required OCPD/GFCI and installation instructions.
Permit	Use the current NB wiring-permit process and correct installation classification.
Inspection hold points	Do not conceal underground wiring, perimeter bonding or other work that must be inspected.
Final approval	Test and label the completed system, resolve deficiencies and retain inspection evidence.

EARLY COORDINATION

The tub dealer, owner, deck contractor, concrete contractor and electrician must agree on location, access, base/deck design, conduit routes, bonding hold points and delivery sequence before surfaces are closed.

1. Classify the Installation Before Design

System	Recognition	Primary rule path
Factory-built hot tub/spa	Complete certified package with integral shell, controls, pumps, heater and instructions.	CEC Rules 68-400 to 68-404 plus general Rules 68-050 to 68-072 and the approved product instructions.
Field-assembled hot tub/spa	Individual pumps, heater, blower, controls, piping or shell assembled at site.	Rules 68-400 to 68-408, including leakage-current collectors and component suitability.
Hydromassage bathtub	Bathtub filled/drained for each use; different controls/receptacle rules.	Rules 68-300 to 68-308 - do not treat it as a hot tub.
Public/commercial spa	Used outside a dwelling context; may require emergency shut-off and additional building/health controls.	Rule 68-404 plus applicable public-facility, building, health and operating requirements.
Swimming pool with spa feature	Pool shell, deck, lighting, circulation and bonding architecture may invoke pool rules beyond hot-tub provisions.	Full applicable Section 68 pool requirements and approved design.

MISCLASSIFICATION RISK

A brand name, appearance or sales description is not a Code classification. Use the Section 68 definitions, product certification and actual construction.

1. Rule-Level Code Navigation

Use this map to find the governing rule, then read the complete adopted rule, appendices, tables, NB modifications and equipment instructions. The summary is not substitute Code text.

Rule	Design question
68-000 / 68-050	Is the work within Section 68, and which defined equipment category applies?
68-054 / 68-056	Are overhead and underground wiring routes acceptable around the water zone?
68-058	What metal parts, conductive infrastructure, perimeter surfaces and water-contact components require bonding?
68-064 / 68-066	Are nearby receptacles and lighting correctly located and GFCI protected?
68-068	Which equipment requires Class A GFCI protection, where may the device be located and how is it made testable?
68-072	Is the load-rated disconnect readily accessible, correctly spaced/barriered, outside where required and lockable when out of sight?
68-400 / 68-402	Do the spa/hot-tub rules apply, and are metal parts bonded through the required Section 68 system?
68-404	Are controls, receptacles, luminaires and any non-dwelling emergency shut-off correctly arranged?
68-406 / 68-408	For field assembly, are leakage-current collectors and all individual components correctly provided?

1. Equipment Approval and Nameplate Control

A certified complete package can be installed only within its approval and instructions. A field change to controls, heater, pump, bonding, cord, enclosure or internal wiring can move the assembly outside its evaluated configuration.

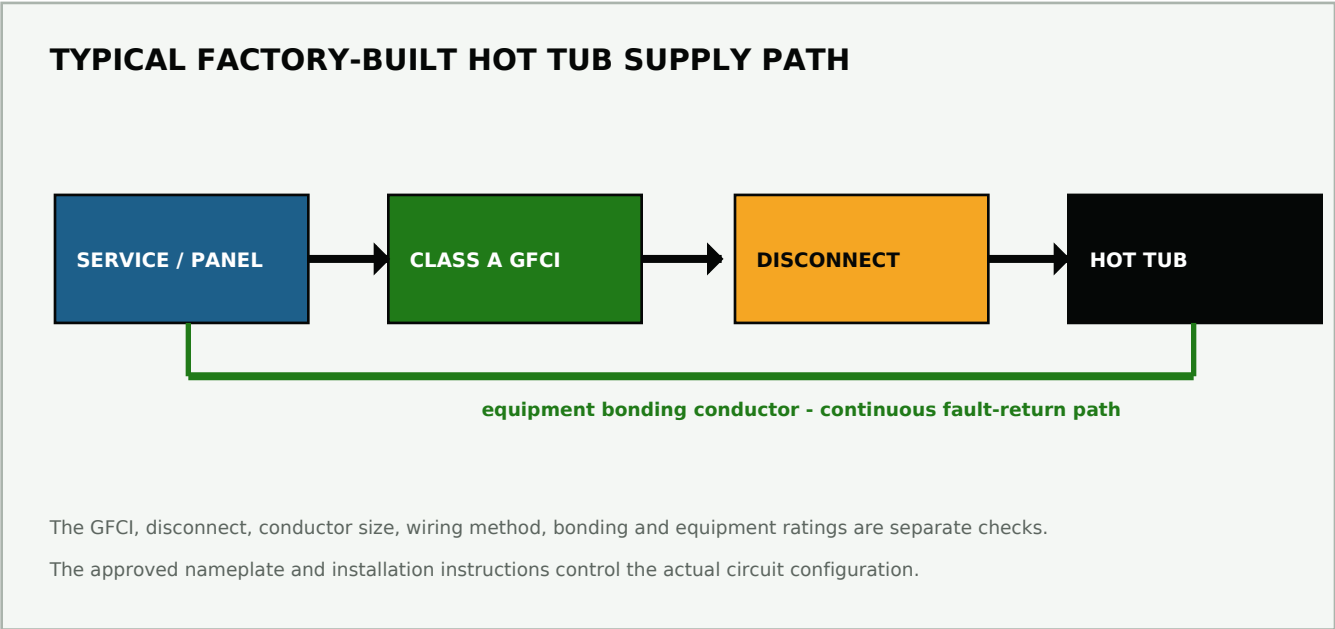
Evidence	What to record
Certification	Recognized Canadian certification mark, file/standard where available and model.
Electrical ratings	Voltage, phase, frequency, nameplate current or input, branch circuit/OCPD and GFCI requirements.
Terminations	Conductor material, temperature rating, torque and permitted wiring method.
Bonding	Factory bonding points, external bonding lug and required field connections.
Environmental	Indoor/outdoor, wet-location, enclosure, ambient and freeze/winterization limits.
Installation	Clearances, service access, base/support, disconnecting, controls and commissioning.

PRE-EVALUATION

Resolve missing approval, non-Canadian equipment, modifications or mismatched components before purchase and installation. Do not rely on a field evaluation as an automatic rescue after construction.

2. Typical Electrical Architecture

Every block in the supply path has a separate safety function. The breaker protects the circuit, the Class A GFCI responds to leakage imbalance, the disconnect establishes local isolation, and the bonding path supports fault clearing and equipotential control.



Block	Verification
Service/panel	Available capacity, breaker compatibility, fault rating, spaces and neutral/bonding condition.
Class A GFCI	Correct poles/voltage/current, all current-carrying conductors pass through the device, neutral isolated downstream where required.
Disconnect	Load-rated, correct enclosure, placement, accessibility, sight/lockability and labels.
Hot tub	Approved nameplate, conductor/terminal compatibility, external bond lug and service clearances.

2. Field Survey and Existing-System Verification

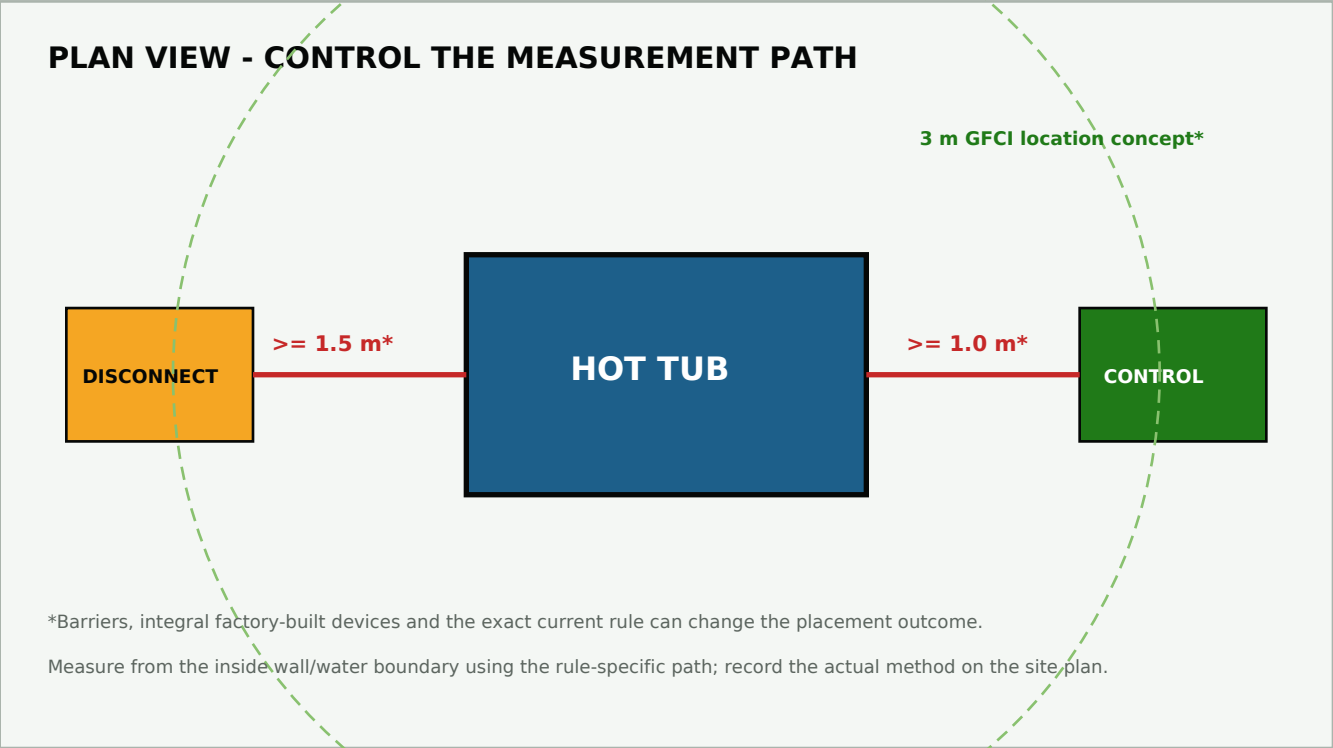
Survey item	Record before design
Service	Utility, voltage/phase, service ampacity, panel make/model, main rating, service load data and available fault information.
Panel	Approved breaker options, GFCI compatibility, spaces, bus condition, neutral/ground arrangement and signs of overheating/corrosion.
Route	One-way length, indoor/outdoor/underground portions, structural penetrations, physical damage, wet/corrosive exposure and expansion.
Tub site	Exact footprint, water boundary, access panels, steps/deck, controls, nearby metal, receptacles, lights, overhead/underground wiring.
Civil/structural	Base/deck capacity, drainage, frost/heave, snow/ice, access and concealment sequence.
Coordination	Dealer, concrete/deck contractor, inspector, owner, building permit and other trades.

SURVEY STOP

If the model, nameplate, certification, site dimensions or service capacity cannot be verified, issue a conditional estimate and stop final design.

2. Site Layout and Measurement Control

Draw the water boundary and every electrical/metal feature around it. Distances are rule-specific; some are measured horizontally, some from the inside wall, and some by the shortest usable cord path.



Feature	Record
Disconnect	Distance, barrier, outside location, line of sight and lockability.
Controls	Distance or barrier; identify integral factory-built controls.
GFCI	Location, accessibility for testing, distance/barrier or integral factory-built arrangement.
Receptacles/lights	Distance, barrier, height/location and GFCI status.
Metal/conductive surfaces	Type, distance, contact with water/perimeter and bonding connection.

2. Overhead and Underground Wiring

Section 68 creates special separation requirements because a person can handle long conductive objects near water and because excavation/deck work can expose wiring.

Condition	Design control
Overhead conductors	Review the prohibited/limited zone extending from the water and associated elevated surfaces. Use the exact Rule 68-054 voltage and clearance requirements.
Existing overhead service	Do not approve tub placement until the service drop and all communication wiring are plotted and accepted.
Underground branch circuit	Use the permitted wiring method, burial depth, mechanical protection, wet-rated conductors and Section 68 separation.
Crossing near tub	Rule 68-056 and Table 61 include specific horizontal separations and exceptions; document the selected route.
Bonding ring	Keep the perimeter bonding conductor identifiable and protect it from later deck/landscape damage.

HOLD POINT

Photograph and dimension underground wiring, sleeves and bonding before backfill, concrete, pavers or decking conceal the work.

3. Service Capacity and Load Integration

A spare breaker space does not prove capacity. Complete the applicable CEC Section 8 service/feeder calculation using the verified hot-tub load and the existing dwelling or building loads.

Step	Required evidence
1. Identify load	Use the product nameplate/input and instructions; do not estimate from tub size.
2. Existing calculation	Reconstruct the dwelling/building calculation from verified equipment and service characteristics.
3. Demand treatment	Apply the current Section 8 method and demand factors that actually govern the occupancy and equipment.
4. Service comparison	Compare calculated amperes to the service/feeder rating and equipment limitations.
5. Alternatives	If capacity is insufficient, evaluate service upgrade, approved load management or a different product/configuration.

3. Worked Problem: 240 V Residential Hot Tub

Representative training case: certified 120/240 V, 1-phase hot tub. Manufacturer specifies a 60 A maximum branch-circuit protective device and copper conductors with 75 degree C terminations. Verified maximum operating input is 11.5 kW.

Calculation	Result and interpretation
Operating current	$11,500\text{ W} / 240\text{ V} = 47.9\text{ A}$. Verify actual nameplate current and whether any 120 V internal loads require a neutral.
OCPD	Use the manufacturer-specified 60 A maximum only when consistent with the product marking, approved breaker/GFCI and CEC protection rules.
Conductor base selection	At 75 degree C copper assumptions, No. 6 AWG Cu is a representative 65 A Table 2 base ampacity. Final selection requires current table verification and all correction factors.
Correction check	If four current-carrying conductors share a raceway, high ambient, rooftop exposure or bundling applies, calculate corrected ampacity before accepting No. 6.
Service effect	Add the load using the applicable Rule 8-200/occupancy method; do not simply add breaker ratings.

NO UNIVERSAL 50 A OR 60 A RULE

The product determines the actual circuit. Some tubs are 120 V cord-connected; others are 240 V, 40 A, 50 A, 60 A or larger. Quote only from a verified model/nameplate.

3. Conductor, OCPD and Terminal Compliance Chain

Check	Field logic
Design current	Nameplate/input and applicable load rules.
OCPD	Equipment maximum/protection marking, conductor protection and approved breaker/GFCI combination.
Terminal temperature	Use the lowest governing equipment/conductor temperature limitation.
Base ampacity	Select from the current CEC conductor table for material/insulation/termination.
Correction factors	Apply ambient, conductor count, installation method and other applicable factors.
Neutral/current count	Determine from actual 120/240 V load and nonlinear components; never assume neutral is unused or exempt.
Bonding conductor	Size and route the equipment bonding conductor and Section 68 bonding system under their separate rules.
Voltage drop	Check full-load performance and motor/heater/control operation at the equipment terminals.
Fault ratings	Breaker, GFCI, disconnect and panel ratings must suit the available fault current.

3. Worked Voltage-Drop Screen

Representative 60 A circuit, 45 m one-way, No. 6 AWG copper. Use the actual conductor impedance from the approved engineering source and actual operating current. Illustrative resistance only: 0.0013 ohm/m conductor.

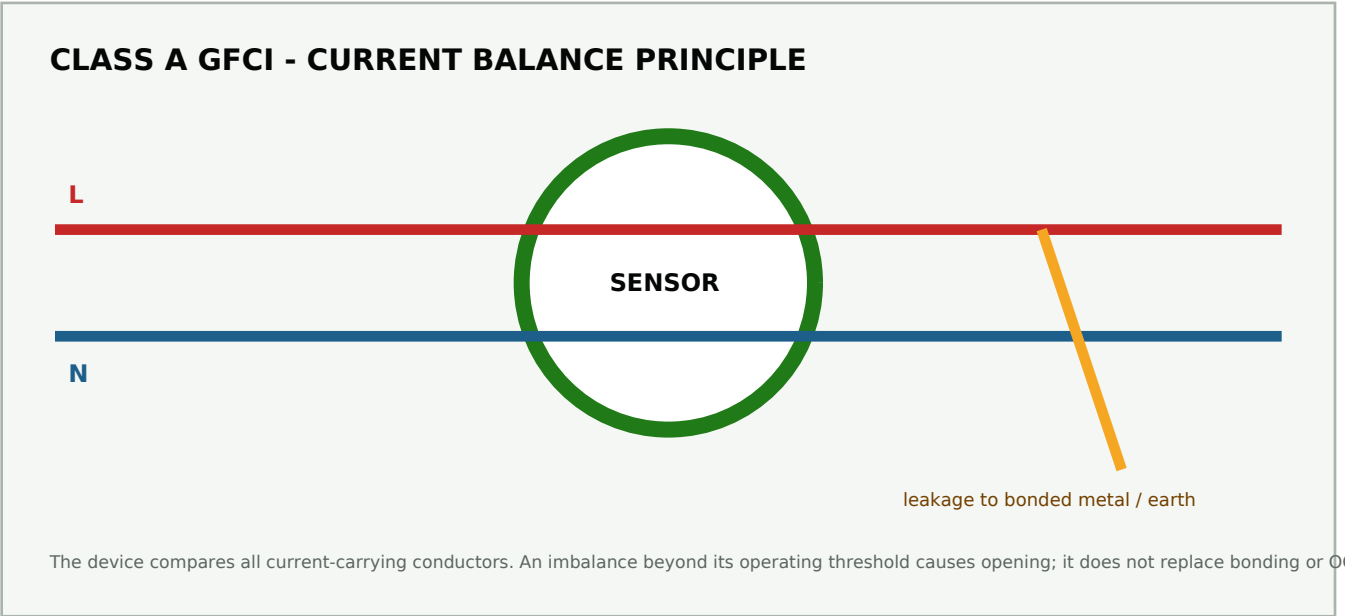
Step	Calculation
Loop resistance	$2 \times 45 \text{ m} \times 0.0013 \text{ ohm/m} = 0.117 \text{ ohm}.$
Drop at 47.9 A	$47.9 \text{ A} \times 0.117 \text{ ohm} = 5.60 \text{ V}.$
Percent at 240 V	$5.60 / 240 \times 100 = 2.33\%.$
Interpretation	Screen is below a common 3% branch-circuit design target, but verify Rule 8-102, total feeder/service drop, actual conductor temperature, terminals and product voltage limits.

DESIGN CHOICE

Upsizing for voltage drop can create termination and bending-space issues. Verify lugs, disconnect/GFCI enclosure, raceway fill and cost before finalizing.

4. Class A GFCI Protection

Rule 68-068 is the central shock-protection rule for spas and hot tubs. The device must protect the required circuit/equipment, be permanently connected where required, remain testable and be located according to the distance/barrier/integral-device provisions.



Do not confuse	Reason
GFCI with breaker OCPD	GFCI detects current imbalance; the breaker protects against overcurrent/short circuit.
GFCI with bonding	Bonding equalizes conductive parts and supports fault clearing; it does not measure leakage.
Equipment ground with neutral	Downstream neutral-to-bond connections can bypass the sensor and place current on metal.

4. GFCI Selection, Installation and Testing

Control	Verification
Voltage/poles/current	Approved for the circuit and product; all required current-carrying conductors pass through the sensing device.
Neutral	Load neutral isolated from equipment bond downstream; neutral routed through the device when required by its design.
Breaker compatibility	Listed/approved for the panel or installed in an approved spa/disconnect panel as designed.
Location	Facilitates testing; obeys 3 m/barrier/integral factory-built provisions in Rule 68-068.
Test	Use the built-in TEST function and approved instrument procedure. Record trip/opening result and restoration.
Label/instructions	Post the required warning/test information beside the circuit switch and explain routine testing to the owner.

NUISANCE TRIP IS A SYMPTOM

Never replace a Class A device with non-GFCI protection or increase its threshold to keep a faulty tub operating. Isolate circuits/components and find the leakage, neutral fault, moisture or wiring defect.

4. Disconnecting Means

Rule 68-072 requires a load-rated disconnect for each permanently connected pool pump, spa and hot tub. It must be readily accessible and arranged so a person in the water cannot casually reach it.

Requirement	Field application
Spacing/barrier	Not closer than 1.5 m to the inside walls unless behind a permanent barrier preventing occupant contact.
Outdoor equipment at dwelling	Disconnect located outside when the supplied equipment is outside.
Readily accessible	Not buried behind the tub skirt, fenced without access, blocked by snow storage or dependent on tools for normal access.
Sight/lockability	If not within sight, provide the required lockable capability.
Rating	Interrupts the connected load and has suitable voltage/current, poles, enclosure and fault rating.
Identification	Durable source/load and hot-tub labels; maintain working space and safe operating access.

5. Bonding Is Not Grounding

Bonding creates a low-impedance metallic network so exposed conductive parts remain at substantially the same potential and fault current has an effective return path. Grounding establishes system reference to earth. An earth electrode alone cannot replace the equipment bonding path.

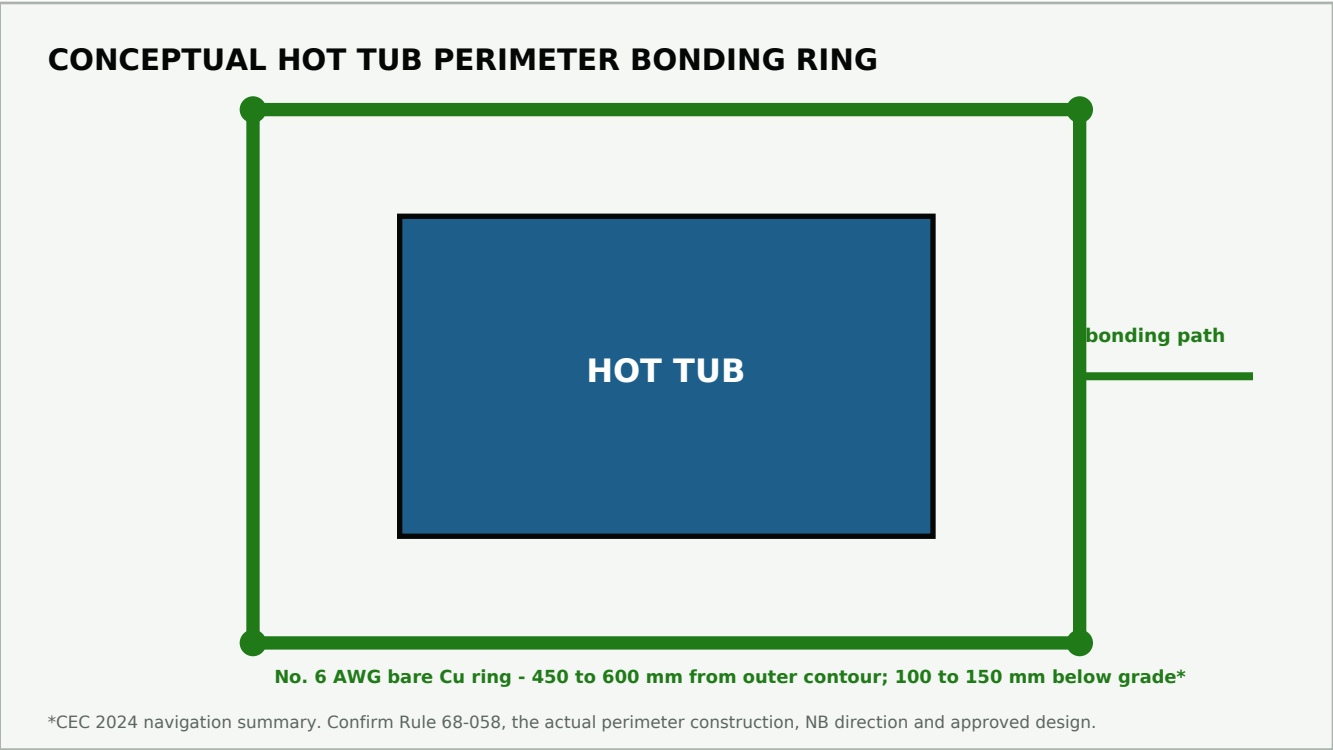
Bonding target	Examples to evaluate
Electrical equipment	Pump/heater/control enclosures, disconnect, raceways and factory external bonding lug.
Tub metal	Metal shell/frame, ladders/rails, covers or structural parts as governed by Rule 68-402/68-058.
Associated non-electrical metal	Piping, reinforcing steel and conductive infrastructure within the applicable zone.
Perimeter surface	Reinforcing steel, copper grid or hot-tub perimeter ring selected under Rule 68-058.
Water contact	Where required, corrosion-resistant conductive surface maintaining the specified contact with water.

CORROSION CONTROL

Use connectors, conductors and interfaces suitable for the materials and wet/chemical environment. A green-looking conductor or loose lug is not evidence of a reliable bond.

5. Perimeter Bonding for Hot Tubs

CEC 2024 expanded perimeter-surface bonding. For the applicable spa/hot-tub condition, the navigation path includes a No. 6 AWG bare copper ring secured 450 to 600 mm from the outer contour and 100 to 150 mm below grade. Confirm the complete current Rule 68-058 and the actual surface construction.



Construction condition	Coordination
Concrete with reinforcing steel	Plan and inspect the required steel connections before pour.
Pavers/grade	Place the ring at controlled offset/depth before base and pavers conceal it.
Wood/composite deck	Determine whether conductive infrastructure, fasteners/rails and the perimeter rule invoke connections or a specific accepted arrangement.
Existing patio/deck	Do not promise a compliant retrofit until concealed construction and inspector expectations are resolved.

5. Field-Assembled Systems and Leakage-Current Collectors

Rule 68-406 addresses leakage-current collectors at water inlets/outlets of field-assembled spas/hot tubs, or equal integral protection in factory-built-for-field-assembly equipment. Rule 68-408 governs field assembly and component suitability.

Item	Verification
Collector construction	Corrosion-resistant metal tubing and bonding lug meeting the rule geometry, or approved equal protection.
Location	All applicable water inlets and outlets.
Electrical isolation	Collector insulated from the spa/tub as required by the rule.
Bonding conductor	Minimum No. 6 AWG Cu or permitted Table 16 route/size when mechanically protected as specified; verify current rule text.
Insulated wet-end exception	Confirm the only electrical component and exact pump marking before relying on the exception.
Components	Pumps, heaters, blowers and controls suitable for spas/hot tubs; live parts protected from water.

FACTORY-BUILT DOES NOT MEAN FIELD-ASSEMBLED

Do not add collectors to a certified package by assumption or omit them from a field assembly because the completed tub looks manufactured. Classification and approval evidence control.

5. Factory-Built Package versus Field Assembly

Decision	Factory-built complete package	Field-assembled system
Approval	Whole assembly certification and instructions.	Each component suitable plus installation-level conformity/approval.
Internal wiring	Do not modify outside instructions.	Designed and installed under applicable CEC rules.
Bonding	Factory points plus required field/perimeter bonds.	Complete engineered/Code bonding network.
Leakage collectors	Integral/equal protection as evaluated where applicable.	Rule 68-406 collectors unless valid exception.
Controls/protection	Integral controls evaluated as a system.	Individual controls, enclosures and protection selected for the use.
Documentation	Nameplate, certification and manual.	One-line, component submittals, approval basis, calculations and test records.

6. Wiring Methods in Wet, Corrosive and Cold Locations

Condition	Design response
Underground/exterior raceway	Treat as wet; use wet-rated conductors, fittings and drainage/expansion provisions.
Chemical atmosphere	Select corrosion-resistant enclosures, fasteners, connectors and raceways compatible with treatment chemicals.
Physical damage	Protect at grade, under decks, near service access and where snow removal/landscaping can strike equipment.
Flexible connection	Use only approved flexible wiring method/cord arrangement permitted by equipment and Code.
Condensation	Avoid paths that drain into enclosures; seal/arrange raceways as required without trapping moisture.
Freeze movement	Coordinate frost depth, slabs, decks and raceway expansion so movement does not pull terminals or crack enclosures.

6. Controls, Receptacles and Lighting Around the Tub

Feature	Rule-navigation summary
Controls	Rule 68-404: at least 1 m horizontally unless behind a barrier or integral to an approved factory-built unit.
Receptacles	Rule 68-064: more than 1.5 m from inside walls; Class A GFCI when in the 1.5 m to 3 m zone using the specified measurement path.
Luminaires	Rule 68-066: evaluate luminaires, standards/supports below or within 3 m; Class A GFCI unless accepted barrier separation applies.
GFCI device	Rule 68-068: testable location, normally at least 3 m unless integral approved arrangement or barrier provision applies.
Communication equipment	Evaluate Rule 68-070 restrictions; do not add convenience controls/speakers without the water-zone review.

SITE CHANGE CONTROL

A new receptacle, gazebo light, TV, speaker, heater or metal handrail added after the tub can change compliance. Explain the controlled zone to the owner.

6. Non-Dwelling Emergency Shut-Off

For a spa/hot tub installed other than at a dwelling unit, Rule 68-404 requires an independent emergency shut-off that disconnects the circulating pump and is readily accessible to users, within sight and not more than 15 m away, permanently identified, and connected to immediate audible/visual trouble signaling.

Function	Acceptance test
Independent operation	Emergency device functions regardless of normal user controls.
Pump disconnection	Circulation pump stops as designed; identify any other loads that remain energized.
Location	Readily accessible, visible relationship to tub, distance recorded.
Identification	Conspicuous durable emergency label.
Signal	Immediate audible and visual trouble indication verified at the required locations.
Reset/restart	Safe manual reset sequence; no unintended automatic restart.

6. New Brunswick Climate and Site Reliability

Cold, snow, ice, salt air and freeze-thaw movement are not cosmetic issues. They affect accessibility, enclosure integrity, conductor terminations, raceways, bonding and customer behavior.

Hazard	Control
Snow/ice at disconnect	Maintain year-round access and operating clearance; avoid roof-slide and plow-storage zones.
Freeze/heave	Coordinate slab/deck and raceway movement; use expansion/transition fittings where required.
Condensation	Use wet-location wiring and drainage; inspect control pack and raceways for water entry.
Salt/coastal exposure	Increase corrosion resistance and inspection frequency; protect dissimilar-metal connections.
Winter servicing	Safe lighting, walking surface, access-panel removal and lockout must remain possible.
Power outage	Owner follows manufacturer freeze-protection/winterization instructions; electrical bypasses are prohibited.

7. Representative Saint John Region Installation Case

Training case - not a claimed GoRight customer installation. A certified outdoor 120/240 V, 1-phase hot tub is proposed beside a dwelling. Nameplate maximum input is 11.5 kW; manufacturer specifies a 60 A GFCI-protected circuit, copper conductors and 75 degree C terminals.

Design input	Representative value
Service	200 A, 120/240 V dwelling service; panel condition and approved breaker options verified.
Route	38 m one-way: indoor panel to exterior spa disconnect/panel, then short liquidtight/approved connection to tub.
Site	Paver patio; exact water boundary, access panel, nearby receptacles/light, underground wiring and metal rails surveyed.
Bonding	Perimeter ring/design determined from Rule 68-058 and actual patio construction; factory external lug connected as required.
Inspection	Underground and bonding photographed/dimensioned before concealment; final GFCI and functional tests recorded.

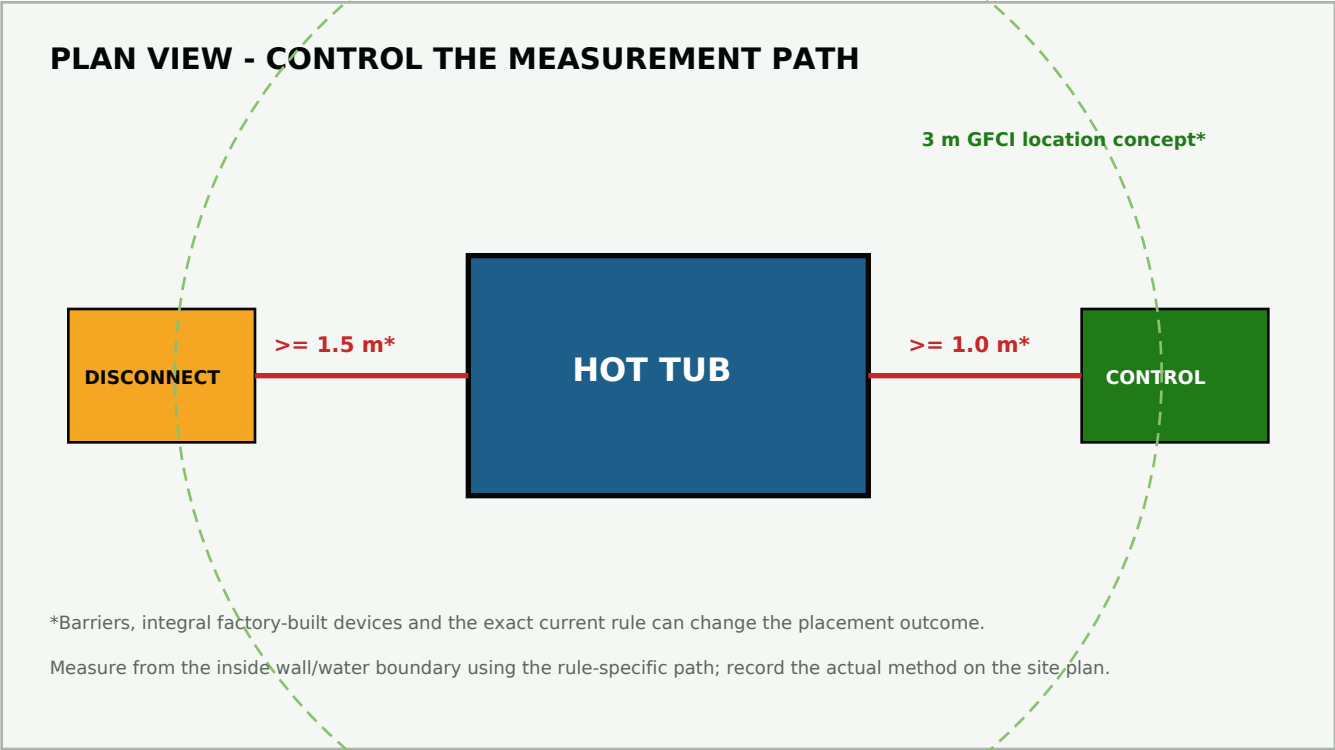
7. Case Calculations and Selection Record

Check	Representative result
Load current	$11,500 / 240 = 47.9 \text{ A}$; actual nameplate governs.
Service calculation	Existing reconstructed dwelling load 126 A. Hot-tub treatment added under the applicable Section 8 method; final result documented below 200 A. This value is case-specific.
OCPD/GFCI	Approved 2-pole 60 A Class A GFCI breaker/spa panel arrangement compatible with supply equipment and product instructions.
Conductors	Representative No. 6 AWG Cu base selection at 75 degree C; correction, neutral/current-carrying count, raceway fill and terminals verified.
Voltage drop	At 38 m and illustrative 0.0013 ohm/m, $\text{drop} = 47.9 \times 2 \times 38 \times 0.0013 = 4.73 \text{ V} = 1.97\%$ at 240 V.
Fault/ratings	Panel breaker, disconnect/spa panel and equipment ratings checked against available fault conditions.

ASSUMPTIONS REGISTER

The quote and design list the model, nameplate, service calculation, route length, conductor assumptions, civil work, bonding construction and inspection hold points. A changed tub model triggers re-design.

7. Case Layout and Installation Hold Points



Hold point	Evidence
Before trench/deck work	Approved site plan with exact tub/access orientation and controlled-zone measurements.
Before concealment	Photos and dimensions of raceway, warning tape/protection, bonding ring/grid/steel and connections.
Before tub placement	Base/deck accepted by responsible trade; conduit stub, disconnect and access coordinated.
Before energization	Terminations/torque, neutral isolation, bond continuity, enclosure seals and labels verified.
Final	GFCI, disconnect, controls, heater/pumps, voltage/current and customer handover completed.

7. Case Commissioning Record

Test	Representative evidence to capture
Supply before load	L1-L2, L1-N, L2-N; polarity/neutral condition and GFCI line/load verified.
Bonding	Low-resistance continuity by approved method among required metal parts and equipment bond path.
GFCI	Built-in TEST opens all intended conductors; reset restores only after test condition clears.
Operating loads	Heater, pump low/high, blower and controls; L1/L2/neutral current and terminal voltage.
Disconnect	Opens the complete intended supply, accessible and correctly labelled.
Final state	No faults/leaks/overheating; covers secured; controls normal; owner trained.

Supply voltage L-L / L-N

Current L1 / L2 / N

GFCI test result / device

Bond continuity test / result

Disconnect verification

Technician / licence / date

8. Commissioning Test Plan

Stage	Test activity
Documentation	Permit, inspection stage, model/certification, instructions, one-line, load/ampacity/VD calculations and site plan.
De-energized	Conductor identity, neutral isolation, bonding continuity, terminations/torque, enclosure integrity and physical protection.
Energized no-load	Correct supply voltage, GFCI line/load, control initialization and absence of fault indications.
Functional	Pumps, heater, blower, controls, lights, disconnect and non-dwelling emergency shut-off/signal where applicable.
Protection	GFCI TEST and approved instrument testing; OCPD/disconnect identification and operation.
Loaded	Voltage and current by conductor, heater/pump operation, temperature rise, abnormal sound/heat and nuisance trip observation.
Closeout	Covers, labels, access, owner training, maintenance/test schedule, inspection and final normal state.

8. Fillable Commissioning Record

Project / permit / date

Tub make / model / certification

Supply panel / breaker / GFCI

Conductor / raceway / route length

Voltage L-L / L1-N / L2-N

Current heater / pump / total

GFCI test method / result

Bonding test method / result

Disconnect / control / emergency stop result

Deficiencies / corrective action

Technician / licence / signature

Owner handover / date

8. Troubleshooting by Evidence

Symptom	Likely branches	Safe evidence
GFCI trips immediately	Load neutral bonded downstream, line/load error, damaged cable, water intrusion, failed component.	Isolate at approved points; continuity/insulation/leakage testing under manufacturer procedure.
Trips when heater starts	Heater leakage, moisture, element failure, control fault.	Component isolation, leakage/current measurement, controller fault record.
Trips during rain/thaw	Exterior enclosure/raceway water entry, condensation, damaged seals.	De-energized inspection, moisture path, enclosure rating and drainage.
Low heat / slow recovery	Low voltage, heater staging, pump/flow issue, cover/ambient loss.	Terminal voltage/current, controller state, flow/temperature per manufacturer.
Breaker trips but GFCI does not	Overload/short, conductor/terminal issue, wrong OCPD or pump seizure.	Trip indication, phase current, torque/thermal inspection after safe isolation.
Shock/tingle report	Potential bonding failure, leakage, external source or utility issue.	Immediately remove from service; qualified investigation of all possible sources.

STOP CONDITION

A reported shock, damaged bonding conductor, unavailable GFCI protection, water inside electrical equipment or repeated protective operation requires removal from service until the cause is corrected and verified.

8. Maintenance and Periodic Verification

Interval/event	Owner / contractor control
Manufacturer schedule	Follow approved GFCI testing, water-care, filter, pump, freeze-protection and service schedule.
Seasonal inspection	Disconnect access, labels, covers, cords/raceways, corrosion, drainage, snow/ice and pest damage.
After trip	Do not repeatedly reset. Record operating state/weather and obtain service when cause is not obvious and corrected.
After deck/patio work	Reinspect bonding, underground routing, barriers, metal additions and controlled-zone equipment.
After tub modification	Re-evaluate approval, load, GFCI, OCPD, conductors, bonding and instructions.
Property sale/service	Provide permit/inspection, manual, test records and system identification to the responsible owner.

8. Customer Handover

A safe installation can be made unsafe by later changes or disabled protection. The electrician should demonstrate—not merely mention—the operating and emergency controls.

- + How to use and test the Class A GFCI at the manufacturer/Code-recommended interval.
- + How the disconnect operates and why access must remain clear year-round.
- + What a GFCI or breaker trip means, and why repeated resetting is prohibited.
- + Which nearby receptacles, lights, metalwork, deck/patio or landscaping changes require electrical review.
- + How to shut down safely for a suspected shock, damaged cable, flooding, water entry or burning smell.
- + Where the permit, inspection, manual, circuit data, test record and service contact are stored.

OWNER MESSAGE

Never use extension cords, adapters, improvised generators or temporary wiring to supply a hot tub. Never defeat GFCI protection or bonding to avoid a trip.

9. Apprentice Worked Exercises

No.	Exercise
1	A tub nameplate is 9.6 kW at 240 V. Calculate operating current.
2	Explain why a 60 A breaker does not prove a No. 6 conductor is acceptable.
3	List five facts needed before quoting a hot-tub circuit.
4	State the difference between equipment bonding and grounding to earth.
5	What placement controls apply to a disconnect under Rule 68-072?
6	Why must a downstream neutral remain isolated from equipment bond through a GFCI?
7	Identify the special non-dwelling emergency shut-off features.
8	When do Rules 68-406 and 68-408 become central?
9	Give four inspection hold-point photographs.
10	Create a safe diagnostic plan for a GFCI trip when the heater starts.

9. Exercise Answers and Teaching Notes

No.	Answer
1	$9,600 / 240 = 40.0 \text{ A}$.
2	Ampacity also depends on terminal rating, conductor material/insulation, correction factors, current-carrying conductor count, equipment instructions and OCPD rules.
3	Exact model/nameplate, certification/instructions, service calculation/panel, route length/conditions and complete site/controlled-zone layout.
4	Bonding joins conductive parts into a low-impedance fault/equipotential network; grounding references a system to earth. Earth is not the equipment fault-return conductor.
5	Load-rated, at least 1.5 m unless behind a protective barrier, outside for outdoor dwelling equipment, readily accessible and lockable when not within sight.
6	A downstream connection can divide normal return current onto bonded metal and bypass the sensing path, causing hazard/nuisance operation.
7	Independent pump disconnect, user accessible, within sight and not over 15 m, permanent identification, immediate audible/visual trouble signal.
8	Field-assembled systems, their component suitability and leakage-current collector design.
9	Underground route/depth, perimeter ring/grid/steel, connection points, final equipment spacing/labels.
10	Remove from service; review fault history; isolate/de-energize; inspect moisture/wiring; test heater branch/component by approved method; correct; recommission all protection.

10. GoRight Hot Tub Pre-Evaluation Form

Customer / site / contact

Tub make / model / certification

Voltage / phase / nameplate input

Manufacturer circuit / OCPD / GFCI

Service / panel / calculated load

Route length / wiring conditions

Site plan / disconnect / controls

Nearby receptacles / lights / metal

Perimeter surface / bonding design

Permit / inspection hold points

Exclusions / assumptions / dealer coordination

10. Installation and Closeout Checklist

- ☐ Correct equipment classification, model, certification and instructions verified.
- ☐ Current NB legal/Code baseline, wiring permit and inspection stages confirmed.
- ☐ Service load, branch current, OCPD, conductor ampacity, voltage drop and fault ratings documented.
- ☐ Site plan records water boundary, controlled distances, barriers and nearby electrical/metal features.
- ☐ Underground wiring, physical protection and wet/corrosive wiring methods accepted.
- ☐ Class A GFCI, disconnect, controls, receptacles and lighting correctly arranged.
- ☐ Equipment bonding, perimeter bonding and water-contact provisions completed and tested.
- ☐ Field-assembled components and leakage-current collectors verified where applicable.
- ☐ Terminations torqued; covers, seals, labels and access complete.
- ☐ GFCI, disconnect, pumps, heater, controls and emergency shut-off/signal commissioned.
- ☐ Inspection deficiencies closed and final approval evidence retained.
- ☐ Owner trained; manuals, tests, circuit data and maintenance schedule delivered.

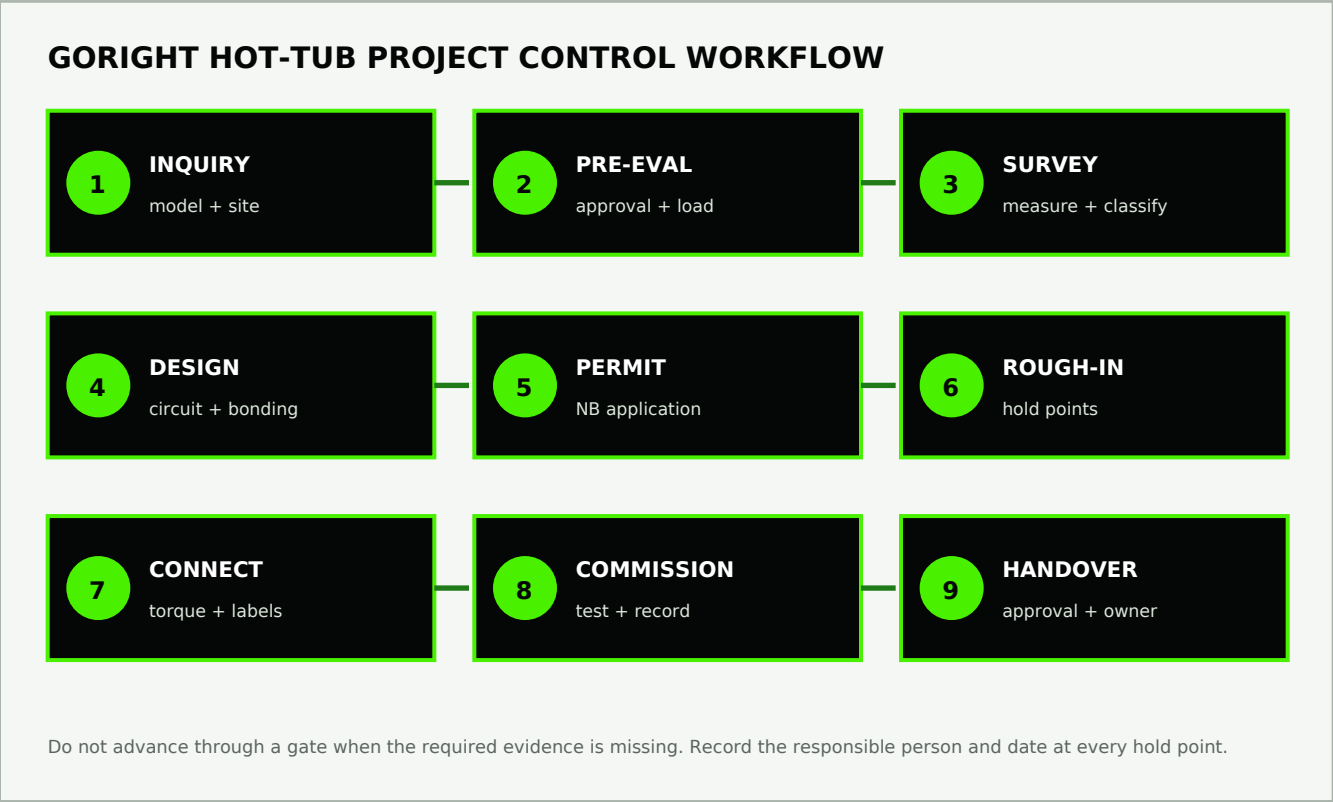
Electrician / licence / date

Inspector / approval reference

Customer acknowledgement

11. Complete GoRight Project Workflow

This controlled sequence converts a sales inquiry into inspection-ready evidence. A gate is complete only when its required inputs are recorded and the next activity can proceed without guessing.



Gate	Required evidence	Stop if
Inquiry	Customer, civic address, intended model, delivery date and proposed location.	Model or location is still provisional.
Pre-evaluation	Canadian approval evidence, nameplate, instructions, service/panel data and preliminary load review.	Approval, circuit rating or service capacity cannot be established.
Survey	Dimensioned site plan, access orientation, route, environment, nearby wiring/metal and perimeter construction.	Controlled-zone conflicts or concealed construction remain unknown.
Design/quote	Load, ampacity, OCPD/GFCI, voltage drop, wiring method, disconnect, bonding, civil scope and exclusions.	Any design assumption is presented as fact.
Permit/rough-in	Permit number, inspection stages, trench/deck/concrete hold points and photographic record.	Work requiring inspection will be concealed.
Connect/commission	Torque, conductor identity, neutral isolation, bonding, GFCI, disconnect, operating V/A and functional tests.	Protection fails, abnormal leakage exists or results are not repeatable.
Handover	Deficiencies closed, approval evidence, manual, test record, labels and customer demonstration.	The system is energized without a complete closeout record.

11. Authority and Evidence Hierarchy

A professional file separates law from design judgement. Use the highest applicable authority, record conflicts and obtain written direction rather than blending requirements into an unsupported “standard practice.”

Category	Meaning	Project example
Provincial law	The Act and Regulation 84-165 establish mandatory conformity, licensing, permits, inspection and enforcement.	Valid NB wiring permit and work by authorized persons.
Adopted CEC	C22.1-24 including NB modifications is the installation baseline.	Section 68 placement, GFCI, bonding and disconnect requirements.
Approved product	Certification and instructions define the evaluated equipment configuration.	Exact branch-circuit rating, terminal conditions and field-connection points.
Supply authority	Service and permit interface requirements applicable to the supply.	NB Power application and inspection-coordination process.
Inspector direction	Project interpretation, accepted construction detail or corrective order.	Concealed perimeter-bonding hold point or accepted barrier arrangement.
GoRight practice	A company control that improves quality but does not replace the above.	Photographing torque labels and measured clearances before handover.

CONFLICT CONTROL

When the Code, certified instructions, site design or inspector direction appear inconsistent, stop, document the issue and resolve it with the authority having jurisdiction and the equipment manufacturer before proceeding.

11. Detailed Site-Survey Worksheet

Survey the tub as an electrical environment, not as a single appliance. Record actual dimensions and construction before the tub, deck, patio or landscaping makes critical conditions inaccessible.

Survey zone	Record
Equipment	Make/model, certification, supply, nameplate, access-panel orientation, integral controls and external bond lug.
Supply	Service rating/type, calculated load, panel make/catalogue, spaces, breaker/GFCI compatibility and available fault rating information.
Route	Length by segment, indoor/outdoor, underground, exposed, thermal insulation, wet/corrosive areas, bends, pull points and physical protection.
Water boundary	Inside wall/maximum water boundary used by each applicable measurement and any accepted barrier path.
Nearby electrical	Receptacles, luminaires, switches, controls, disconnects, communications and overhead/underground conductors.
Conductive parts	Structural steel, reinforcing steel, rails, stairs, piping, fences, HVAC, covers and other accessible metal.
Perimeter	Concrete, pavers, soil, wood/composite deck, reinforcing, future landscaping and concealed access.
Climate/drainage	Snow storage, ice, roof runoff, grade, standing water, condensation, freeze-thaw and service accessibility.

Sketch reference / photo numbers

Measured disconnect route

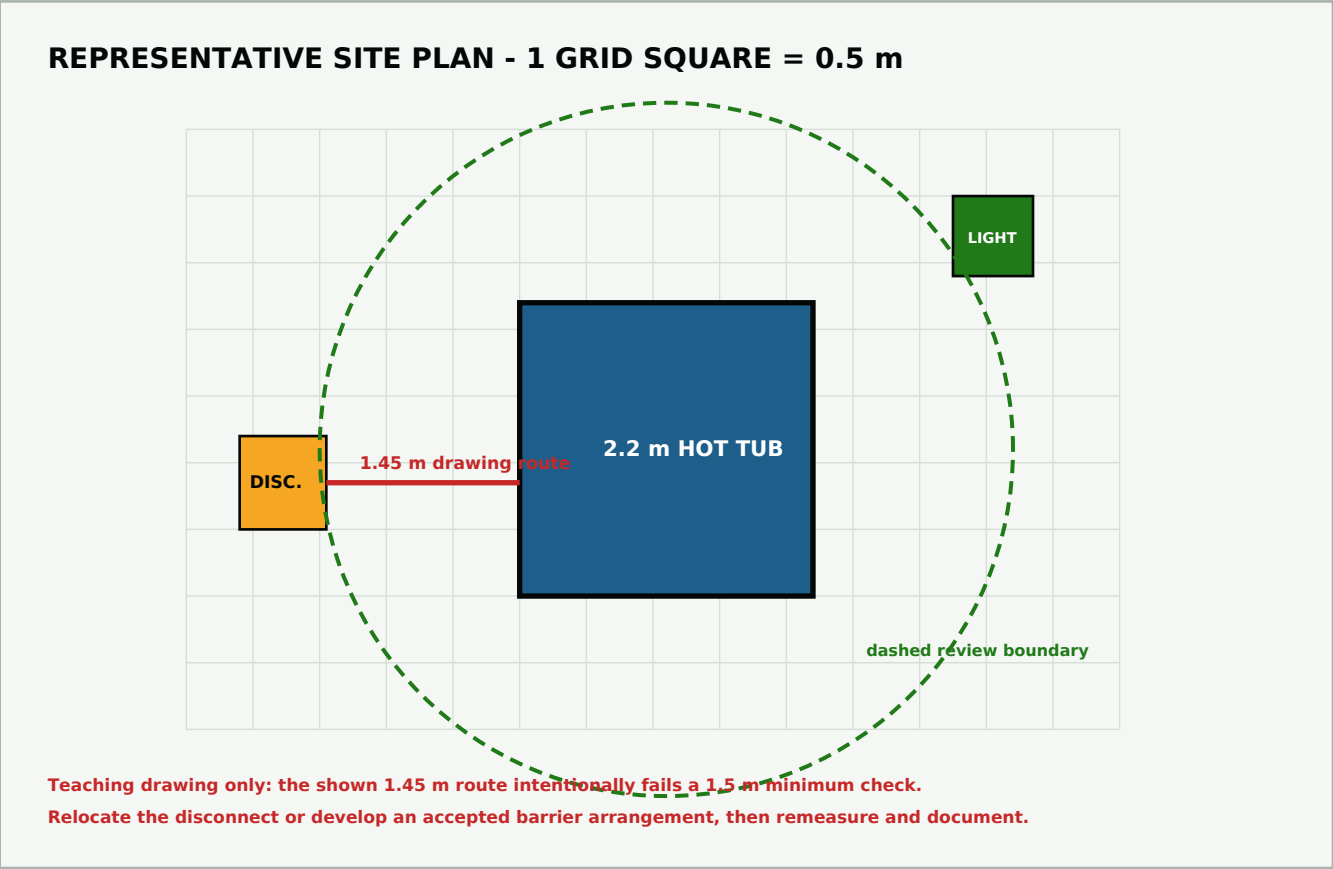
Nearest receptacle / luminaire / overhead wiring

Perimeter construction and proposed bonding

Unresolved conditions / responsible party / due date

11. Scaled Site-Plan Exercise

A scale drawing exposes conflicts that photographs alone can hide. This training plan intentionally contains a dimensional failure so the apprentice must identify and correct it before installation.



Review item	Finding / action
Disconnect	The drawn route is 1.45 m. It does not demonstrate a 1.5 m minimum. Relocate or develop an accepted barrier arrangement and remeasure.
Light	Determine the applicable horizontal/vertical zone, luminaire suitability and GFCI requirement from the complete current rule.
Perimeter	Identify actual surface construction and show the required bonding geometry/connections before concealment.
Access	Rotate the tub only if the final equipment door, disconnect and maintenance paths remain usable year-round.

FIELD RULE

Record the actual measurement path, not merely a straight-line estimate copied from a drawing. Barriers must be real, durable and accepted for the applicable rule.

11. Representative 200 A Dwelling Load Integration

This worked example demonstrates method, not a universal result. Reconstruct the existing dwelling calculation using the adopted Section 8 rules and actual connected loads; then apply the hot-tub load in the correct category without inventing demand factors.

Step	Representative evidence
1. Existing service	120/240 V, 1-phase, 3-wire, 200 A service. Panel and service equipment ratings verified.
2. Existing dwelling	General load, ranges, dryers, electric space/water heating, EVSE and other loads reconstructed from records/nameplates using the applicable Section 8 method.
3. Hot tub	Factory-built unit: 240 V, 48 A nameplate, manufacturer specifies a 60 A branch circuit and Class A GFCI.
4. Before/after	Document the calculated service demand before and after the new load. Do not compare simple nameplate sums with 200 A.
5. Capacity result	If the calculated load exceeds service capacity, redesign, manage approved loads where permitted, or upgrade the service. A breaker space is not capacity.

Illustrative arithmetic check

Quantity	Calculation	Result
Hot-tub apparent load	$240\text{ V} \times 48\text{ A}$	11.52 kVA
Current from input	$11,520\text{ VA} / 240\text{ V}$	48.0 A
Energy if full input for 2 h	$11.52\text{ kW} \times 2\text{ h}$	23.04 kWh (illustrative; controls cycle)

IMPORTANT

The manufacturer-specified 60 A circuit does not prove the service has capacity and does not by itself select the conductors. Complete all independent checks.

11. Branch-Circuit Selection - 40 A, 50 A and 60 A Cases

The table is a training comparison using representative copper conductors and 75 degree C terminations. It is not a replacement for the nameplate, instructions, Table 2, correction factors, terminal limitations, neutral treatment, raceway fill or the applicable OCPD rules.

Example equipment instruction	Illustrative base Cu check	Independent verification still required
40 A maximum branch circuit	No. 8 AWG Cu may be considered from the 75 degree C ampacity column.	Actual load, manufacturer minimum, terminal ratings, corrections, OCPD, wiring method and voltage drop.
50 A maximum branch circuit	No. 8 AWG Cu may be at its base ampacity limit; any correction can force a larger conductor.	All conditions above; do not assume a dwelling range/EVSE allowance applies.
60 A maximum branch circuit	No. 6 AWG Cu is a common base starting point at 75 degree C.	Actual instructions and every ampacity/termination/correction check.
Aluminum proposed	Use only where every terminal and instruction permits it; select from the applicable table and account for larger size/space.	Wet-location conductor suitability, oxide/termination practice, torque, bending space and manufacturer acceptance.

Selection chain

- + Determine actual current and the manufacturer-specified circuit/OCPD requirements.
- + Choose conductor material and insulation suitable for wet locations and the actual wiring method.
- + Apply allowable ampacity using the lowest equipment termination temperature limitation.
- + Apply ambient and conductor-count correction/adjustment, then verify the corrected allowable ampacity.
- + Coordinate OCPD, GFCI, disconnect, equipment terminals, panel compatibility, raceway fill and voltage drop.

11. Worked Conductor and Voltage-Drop Case

Representative case: 48 A, 240 V factory-built hot tub; 60 A circuit required by approved instructions; 38 m one-way route; No. 6 AWG copper proposed. Values below are teaching inputs and must be replaced with actual table/conductor data.

Check	Worked reasoning
Termination	Supply/GFCI/disconnect/tub terminals are verified for conductor material, size and 75 degree C use. The lowest applicable limitation controls.
Base ampacity	Verify No. 6 AWG Cu in the applicable CEC ampacity table. Do not use insulation temperature to exceed terminal limitations.
Correction	Count current-carrying conductors by the actual circuit and raceway; apply ambient and grouping corrections. Confirm the corrected value remains acceptable.
OCPD/GFCI	Use the approved 2-pole 60 A arrangement and compatible equipment. All intended current-carrying conductors pass through the GFCI sensing path.
Voltage drop	Using illustrative conductor resistance 0.00130 ohm/m: $V_d = 2 \times 38 \text{ m} \times 48 \text{ A} \times 0.00130 = 4.74 \text{ V}$; $4.74/240 \times 100 = 1.98\%$.
Operating test	After installation, measure voltage at supply and tub under representative load; compare with design and equipment limits.

Sensitivity check

One-way route	Illustrative drop	Percent at 240 V
20 m	$2 \times 20 \times 48 \times 0.00130 = 2.50 \text{ V}$	1.04%
38 m	4.74 V	1.98%
60 m	7.49 V	3.12% - review conductor upsizing and total feeder + branch drop

11. Bonding by Perimeter Construction

Bonding decisions begin before concrete, pavers or decking conceal the work. The exact current Rule 68-058, the tub construction and the accepted site design determine the final arrangement.

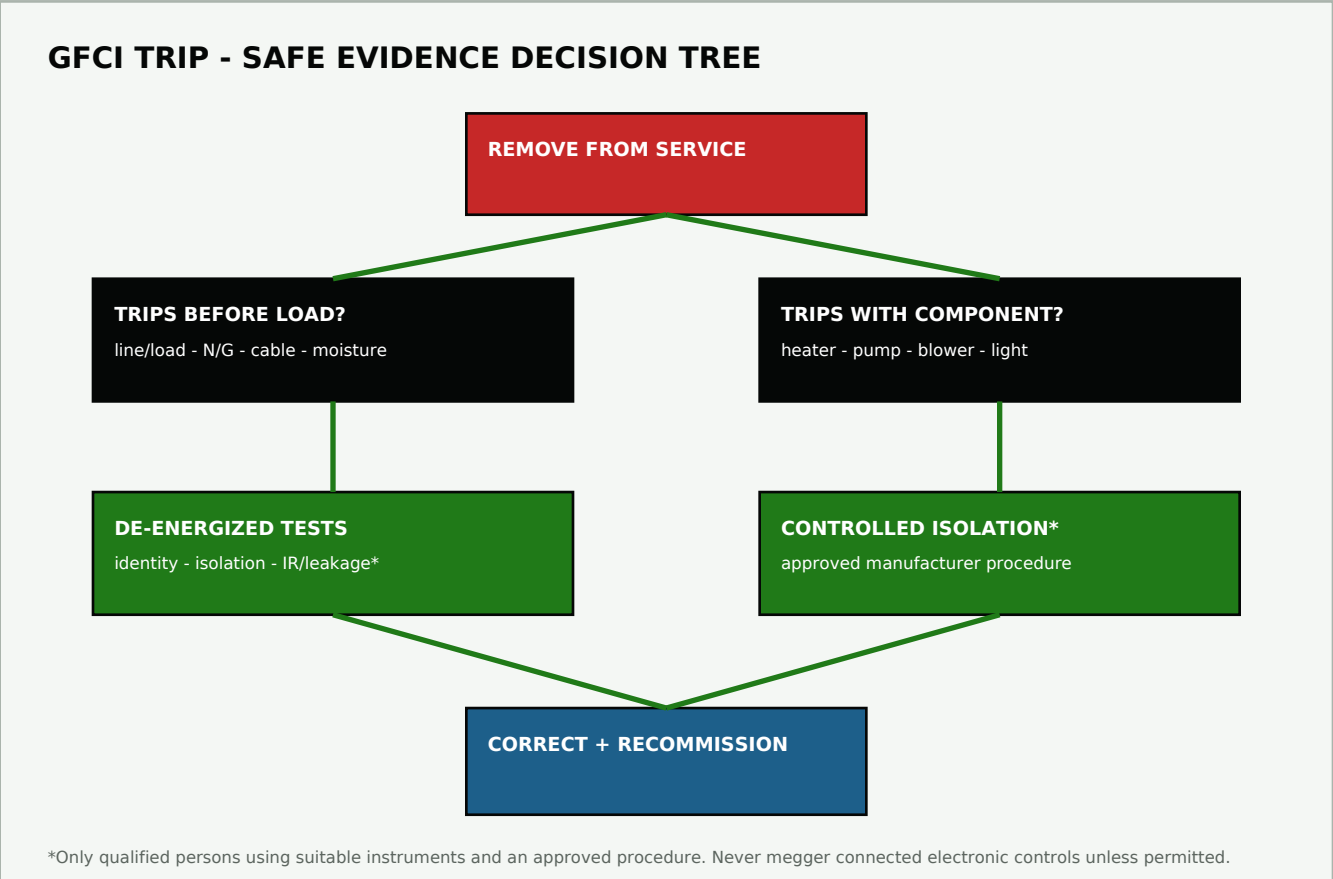
Perimeter construction	Coordination and inspection evidence
Reinforced concrete	Identify reinforcing steel/grid and required connections before pour. Photograph connection method, continuity path, dimensions and cover.
Pavers over granular base	Establish the required perimeter conductor/grid geometry, offset and depth before pavers. Protect and document transitions.
Wood/composite deck	Identify conductive framing, fasteners, rails, stairs and equipment. Determine whether perimeter-surface provisions invoke a conductor/grid or accepted alternative.
Structural steel deck	Bond accessible structural metal and coordinate corrosion-compatible listed connection means.
Existing patio/deck	Do not quote “connection only” until concealed reinforcement, prior bonding and access can be proven or an accepted retrofit is designed.
Added metal after inspection	Rails, fences, covers, HVAC or piping can change the conductive environment. Require electrical review before addition.

BONDING IS NOT GROUNDING

The equipment bonding conductor and equipotential network create a low-impedance fault/equalization path. A ground rod or contact with soil does not replace the required bonding connections.

11. GFCI Trip Diagnostic Workflow

Repeated resetting destroys evidence and can expose occupants to a dangerous condition. Record when the trip occurs, weather, water level, active component and any recent work before isolating the system.



Trip timing	Primary branches to test
Immediately at energization	Line/load reversal, downstream neutral-to-bond connection, damaged conductors, wet enclosure, failed control or incorrect device.
Heater demand	Element insulation leakage, moisture at terminals, contactor/control fault or damaged internal wiring.
Pump start/high speed	Motor winding leakage, wet motor/connector, cable damage, mechanical seizure causing a separate OCPD event.
Rain/thaw only	Water entry, failed seals, condensation, drainage, underground transition or damaged outdoor enclosure.
Random after service	Loose/misplaced neutral, altered bonding, replacement component outside approval, shared circuit or conductor damage.

11. Inspection Deficiency Recognition

Use photographs and measurements as evidence, but never label an image “compliant” without verifying the complete installation and adopted requirements.

Observed condition	Why it matters	Required response
Disconnect too close or path not documented	A visual estimate cannot establish the rule-specific minimum or accepted barrier.	Measure and record the actual path; relocate/redesign if not compliant.
Neutral and bond connected downstream of GFCI	Normal return current can flow on bonded metal or bypass the sensing architecture.	Remove connection, verify isolation and recommission.
Underground raceway open to water path	Underground raceways are wet locations; water can reach equipment/terminations.	Use suitable conductors, fittings, drainage/sealing strategy and physical protection.
Corrosion/green deposits/heat discoloration	Indicates moisture, chemical attack, loose/high-resistance connection or overheating.	De-energize, determine cause, replace damaged parts and correct environment/termination.
Missing perimeter-bond evidence	Finished surfaces may conceal a critical equipotential system.	Stop concealment; obtain inspection/evidence or develop an accepted corrective design.
Extension cord or temporary generator supply	Not an approved permanent hot-tub branch circuit and can defeat protection/bonding.	Remove from service and install the approved fixed supply.

11. Estimating and Material Takeoff Tool

Price the known scope and explicitly manage the unknowns. The quotation must identify the exact tub model and expire or require re-evaluation if equipment or site conditions change.

Cost group	Include
Engineering/pre-evaluation	Document review, site survey, service load, route/design, authority/manufacturer questions and quotation.
Permit/inspection	Permit administration, rough-in/bonding inspection attendance, final inspection and deficiency return allowance.
Distribution	Compatible breaker/GFCI, outdoor spa panel/disconnect, enclosure/accessories, labels and panel work.
Branch circuit	Conductors, raceway/cable, fittings, junction/pull points, supports, seals, physical protection and firestopping.
Bonding	Copper conductor, listed connectors, reinforcing/grid/steel coordination, corrosion protection and testing.
Civil/finish	Trenching, excavation, concrete/pavers/deck access, drilling, restoration, snow/landscape coordination and disposal.
Testing/closeout	Torque, measurements, functional testing, photographs, forms, labels, manual and customer orientation.
Risk/contingency	Unknown concealed conditions, panel capacity/compatibility, long route, rock, water, asbestos or dealer delay.

Labour hours / crew / rate

Materials / supplier quotation

Permit / inspection allowance

Civil / restoration allowance

Overhead / contingency / markup

HST / total

Exclusions and customer responsibilities

11. Scope, Exclusions and Change-Control Language

A fixed price remains reliable only when the equipment and site match the assumptions. Use plain language so the customer understands what is and is not included.

Quotation section	Minimum content
Included	Exact model, circuit rating, route length, wiring method, GFCI/disconnect, bonding, permit stages, testing and restoration level.
Customer/dealer	Equipment supply, final location/orientation, structural base/deck, water commissioning, access, delivery and manufacturer attendance where required.
Excluded	Service upgrade, hidden damage, non-approved equipment, structural/civil redesign, hazardous materials, utility work and work by other trades unless priced.
Assumptions	Accessible panel, compatible breaker, route condition, normal soil, approved tub, working equipment and no concealed conflicts.
Change triggers	Different model/location, added distance, failed service calculation, inaccessible bonding, rock/water, failed equipment or authority-directed changes.
Price basis	Starting price or fixed scope, taxes, deposit, expiry, schedule dependencies and change-order authorization.

CUSTOMER PROMISE

Clear pricing means documenting the basis—not pretending uncertainty does not exist. Stop and obtain written authorization before performing work outside the accepted scope.

11. Expanded Commissioning and Evidence Record

Project / civic address / permit / inspection

Tub make / model / serial / certification

Circuit / GFCI / disconnect / conductor / route

Torque values / tool ID / calibration status

Insulation-resistance or leakage method / limitations / result

Bond-continuity method / points / result

Supply voltage no-load / loaded

L1 / L2 / neutral current by operating mode

GFCI TEST and instrument test / time / result

Disconnect / controls / emergency stop / signal

Photos / drawings / deficiency closure references

Technician / licence / date / signature

Inspector acceptance reference

Owner demonstration / manuals / acknowledgement

11. Advanced Apprentice Problems

No.	Problem
A	A 50 A tub is proposed on a 35 m route with No. 8 Cu. List every check required before accepting the conductor; do not answer from ampacity alone.
B	A disconnect measures 1.45 m in a straight line from the tub. The salesperson says the cabinet counts as a barrier. State your stop-work and verification steps.
C	The GFCI trips only during snowmelt. Build a safe diagnostic plan that preserves evidence and separates cable, enclosure and equipment leakage.
D	Pavers were installed before the electrician arrived. No perimeter-bond photos exist. Develop three possible project paths without assuming compliance.
E	A used imported tub has individual component marks but no complete-system Canadian approval. Explain the pre-evaluation path and why connection is refused pending resolution.
F	A public spa has no independent emergency shutoff. Identify the information and rule path required before commissioning.

11. Advanced Apprentice Answers

No.	Teaching answer
A	Verify nameplate/instructions, load characterization, OCPD/GFCI, Table ampacity, terminal temperature/material, ambient and conductor-count corrections, wet-location suitability, raceway fill, voltage drop, panel/device terminals and actual route.
B	Do not energize. Establish the rule-specific water boundary and measurement path; verify whether a barrier is permanent and accepted; obtain inspector/manufacture direction if uncertain; relocate or redesign and document the final measurement.
C	Remove from service; record weather/timing; de-energize; inspect drainage, seals and wet transitions; isolate only under approved procedure; perform suitable IR/leakage tests without damaging electronics; correct and fully recommission.
D	Expose and verify if practical; design an accepted retrofit before disturbance; or relocate/rebuild the perimeter. Coordinate with the inspector before promising a solution and price restoration separately.
E	Component marks do not certify the assembled system. Obtain complete approval evidence or coordinate a recognized field-evaluation path before installation; do not treat evaluation as guaranteed approval.
F	Confirm dwelling/non-dwelling classification, Rule 68-404 requirements, independent pump disconnect, sight/distance, user accessibility, identification and immediate audible/visual trouble signal, plus health/building operational requirements.

12. Field Photography: Hot Tub Site



Figure 12-1 - Outdoor hot tub environment

Training reference for a site-layout review. The electrician must still measure the actual water boundary, equipment/access panels, disconnect, GFCI, controls, receptacles, lighting, overhead/underground wiring, metalwork and perimeter surfaces. This Canadian photograph is not represented as a GoRight installation or New Brunswick site.

Photo: Claire Rowland, Wikimedia Commons, CC BY 2.0.

12. Field Photography: Cabinet and Service Access



Figure 12-2 - Hot tub cabinet before installation

Training reference for cabinet construction and service-access coordination. Cabinet appearance does not establish electrical approval, bonding, component protection or required working access. Verify the certified complete package, instructions and final field connections.

Photo: Beequeeneth, Wikimedia Commons, public domain.

12. Field Photography: GFCI Concept



Figure 12-3 - Class A GFCI user interface concept

A receptacle-type GFCI illustrates TEST and RESET functions; it is not presented as the correct device for a high-current hot tub. The installed hot-tub GFCI must match the circuit voltage, poles, current, product instructions and approved equipment.

Photo: Tony Webster, Wikimedia Commons, CC BY 2.0.

12. Field Photography: Disconnecting Equipment



Figure 12-4 - Outdoor disconnect enclosure concept

Training reference showing a load disconnect. It is not a hot-tub-specific compliance example. Verify the actual device rating, poles, enclosure, GFCI arrangement, spacing/barrier, accessibility, sight/lockability, fault rating and labels.

Photo: Rsparks3, Wikimedia Commons, CC0 1.0.

13. One-Page Hot Tub Field Reference

Before work	Before energization	Before handover
Classify product/system. Verify model, approval and instructions. Permit and inspection plan. Service/load and branch design. Draw water zone and bonding.	Inspect concealed route/bonding. Verify GFCI, disconnect and distances. Check neutral isolation and bond continuity. Torque, seal and label. Confirm safe access/site.	Test GFCI and disconnect. Run pumps, heater and controls. Record V/A and protection results. Close inspection. Train owner and deliver records.

Stop-work triggers

- + Unknown certification, model or manufacturer circuit requirements.
- + Service capacity or panel/breaker compatibility cannot be established.
- + Water-zone distances, overhead/underground wiring or perimeter construction unresolved.
- + GFCI, neutral isolation, disconnect placement or bonding cannot be proven.
- + Concealed work missed required inspection or bonding evidence.
- + Shock report, water entry, damaged equipment or repeated protective operation.

GORIGHT FIELD PRINCIPLE

A hot tub that heats is not necessarily safe. Compliance is proven by classification, approved equipment, measured layout, complete bonding, functioning GFCI/disconnect and documented commissioning.

Photo Credits and Reuse Notices

Photographs are illustrative training references and are not represented as GoRight customer projects or New Brunswick installations.

Figure	Source page	Credit / licence
12-1	commons.wikimedia.org/wiki/File:Hot_tub.jpg	Claire Rowland; CC BY 2.0.
12-2	commons.wikimedia.org/wiki/File:Arctic_Spa_cabinetry.JPG	Beequeeneth; public domain.
12-3	commons.wikimedia.org/wiki/File:Ground_Fault_Circuit_Interrupter_(GFCI)_Electrical_Outlet_(29268945818).jpg	Tony Webster; CC BY 2.0.
12-4	commons.wikimedia.org/wiki/File:Utility_Disconnect_Switch.png	Rsparks3; CC0 1.0.

Licence note

Public-domain and CC0 images may be reused without restriction. CC BY 2.0 permits reuse with attribution subject to its terms. Cropping for page layout does not imply endorsement by the photographers.

Governing References and Revision Basis

This is a standalone GoRight New Brunswick training module. The following governing and official references establish the conformity framework; project-specific requirements and authority direction take precedence.

Reference	Application
New Brunswick Electrical Installation and Inspection Act	Provincial legal authority for electrical installations and inspection.
New Brunswick Regulation 84-165	Adopted CEC edition, NB amendments, licences, permits and inspection administration.
C22.1-24, Canadian Electrical Code, Part I, 26th Edition	Technical installation baseline, especially Section 68 and applicable general Sections.
CSA C22.2 No. 218.1:25	Product standard for spas, hot tubs, cold tubs and associated equipment; verify actual certification basis.
New Brunswick Regulation 91-191	Occupational health and safety, lockout and electrical safe-work duties.
NB Power electrical wiring permit process	Permit submission and inspection-coordination pathway.
GNB Technical Inspection Services bulletins/directions	Current provincial interpretations and inspection administration.
Approved equipment markings and instructions	Circuit, GFCI, OCPD, conductor, bonding, site, commissioning and maintenance conditions.

DOCUMENT CONTROL

Expanded Contractor & Apprentice Edition 2.0 - August 2026. Review after changes to NB legislation, adopted CEC/errata, inspection direction, product standards or manufacturer instructions.

GoRight Electric Inc.

New Brunswick Electrical Contractor | Group 3 Licence 908539 | Saint John Region | 506-223-0820

Right work. Right price. Right on time.