

Hot Work

Procedure

Office of Emergency Management

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EXCLUSION: This procedure does not apply to workshop areas, which are designed for this type of work.

PURPOSE

The University of Ottawa has established a Hot Work Procedure to minimize the potential risk for injuries and loss of property due to fire or explosion as a result of hot work.

SCOPE

This document outlines the applicable procedures for hot work projects or maintenance work, and it applies to any employee, including University of Ottawa employees, trade workers, or contractors who will be performing hot work on uOttawa property.

DEFINITIONS

“Authority Having Jurisdiction” (AHJ) – An organization, office or individual responsible for the enforcement of codes and standards, approval of equipment, materials, installation, or procedure.

“Contractor”- A person or organization providing services to another organization in accordance with agreed-upon specification, terms, and conditions.

“Designated Areas”- A location designed and approved for hot work operations that is maintained fire-safe, such as a maintenance shop. For a room to be identified as a designated hot work area, it must:

- Be of non-combustible or fire-resistant construction
- Be free of combustible and flammable content
- Be suitably segregated from adjacent areas
- Be equipped with at least 1 fire extinguisher
- Contain necessary PPE for the intended hot work
- Be permanently equipped with the appropriate design elements for hot work:
 - Curtains
 - Steel table
 - Canopy hood

“Fire Watch” A person or persons knowledgeable about fire reporting and emergency procedures. A fire watch is assigned to work with an operator to watch for fires resulting from hot work operations. They are normally assigned to areas not readily observed by the operator.

“Hot work” – Temporary operation involving open flames, or which produces heat and/or sparks and/or slag. This includes, but is not limited to; Brazing, Cutting, Grinding, Soldering, Thawing Pipe, and welding.

“Hot Work Area”- The area exposed to the sparks, heat, or flame generated by the hot work operations taking place. This includes the immediate work area as well as areas adjacent to and above and/or below the work area.

“Operator” – The person performing the hot work operation and the person primarily responsible for the safety of the hot work. The operator can be a University of Ottawa employee, trade worker, or contractor.

“Permit Authorizing Individual” (PAI) – The Office or individual responsible for issuing hot work permits and enforcing the present procedure.

“Shielded” – Items or material must be protected by an approved welding pad, welding blanket or equivalent protection.

ROLES AND RESPONSIBILITIES

Authority Having Jurisdiction (AHJ)

University of Ottawa

For the purposes of this procedure, the ‘Authority Having Jurisdiction’ is the University of Ottawa. The University is responsible for:

- the enforcement of codes and standards.
- The approval of equipment, materials, installation, and procedures

Permit Authorizing Individual (PAI)

Fire Safety Program (FSP)

For the purposes of this procedure, the FSP has oversight and is the primary PAI. The FSP shall:

- review and update the Hot Work Procedure as needed.
- review and authorize hot work permits received by the Department Supervisor and Project Management Office (PMO) for all hot work operations on campus.
- stop hot work operations that have not been authorized or have a proper permit on display.
- obtain additional specific information about hot work operations from the operator, supervisor, Facility Manager and/or the Project Manager, or visit the hot work site, as deemed necessary.
- conduct periodic inspections of hot work sites, as deemed necessary, and provide advice whenever a fire safety issue exists.

Facilities Health & Safety

The Facilities Health & Safety shall:

- participate in the review and update of the Hot Work Procedure.
- when needed, support the Fire Safety Program in the review and authorization of hot work permits.
- ensure that the proper personal protection equipment (PPE) and fire protection equipment are available to uOttawa operators.
- stop hot work operations that have not been authorized or have a proper permit on display.

Planners

uOttawa Department Supervisor, Facility Managers and Project Managers

The Department Supervisor, Facility Manager and Project Manager shall:

- ensure compliance of employees and contractors to the current procedure and any applicable laws, codes, standards, and regulations.
- ensure the operators are trained and are aware of the applicable procedures.
- when equipment is found incapable of reliable safe operations, ensure equipment is repaired by qualified personnel prior to its next use or be withdrawn from service and its use prohibited.
- submit the reviewed, completed, and signed permit to the PAI for approval.
- submit hot work permits to the PAI for approval in the time window of no less than 24 hours of the hot work operations.

Workers

Hot Work Operator

The Hot Work Operator shall:

- read, understand, and perform hot work operations in respect to the current Hot Work Procedure and all applicable laws, codes, standards, and regulations.
- verify that equipment is in good working order.
- report any abnormality with the hot work equipment to their supervisor and stop any operation until the equipment is inspected, repaired if necessary and deemed safe.
- prior to the start of any hot work operations:
 - inspect the area where the hot work will occur
 - confirm that a fire extinguisher and PPE is readily available
 - ensure signs and the hot work permit are posted at the designated hot work area.
- ensure all combustibles are relocated at least 35 feet (11 m) in all direction of the work site. If relocation is impractical, combustibles shall be protected by a welding curtain, welding blanket, welding pad, or equivalent.
- request a fire alarm bypass through the Facilities Electrical Department and confirm the bypass was completed prior to starting any hot work. The operator must provide the Electrical Department the following:
 - 48-hour notice
 - Work Order (ARCHIBUS) and Work Order number
 - location of the hot work
 - contact information for the person in charge (Contractor or Department Supervisor)
 - their cellphone number
- notify Facilities Electrical Department when the hot work is finished and prior to leaving the work site, to reactivate the fire detection systems (if applicable).

Fire Watch

The Fire Watch shall:

- maintain constant surveillance of the hot work site as requested by the PAI. This task is to be done exclusively.
- maintain the surveillance of the immediate site of adjacent areas; these include areas above and below if there are openings present.

- ensure that the safe conditions are maintained during hot work operations.
- stop the hot work operations if unsafe conditions develop.
- maintain a fire watch for at least 1 hour after completion of the hot work operations in order to detect and extinguish smoldering fires.
- in case of a fire, raise the general alarm and follow established emergency procedures, call Protection Services at 613-562-5411.
- ensure the presence of a functional and certified 4A:40B:C fire extinguisher within 6 m of the hot work operation and uses it, if it is safe to do so, to extinguish a fire.
- advise the operator on changing conditions such as excessive smoke, combustibles in the area which were not present previously or any deficiency in the hot work conditions established by the permit.
- verify that the permit is posted at the entrance of the work site and that appropriate signage and barriers are being used.
- once surveillance is completed, sign off on the permit and bring it back to Protection Services' office at 141 Louis-Pasteur Private.

Contractor

The Contractor shall:

- read and understand the Hot Work Procedure and all applicable laws, codes, standards, and regulations prior to any hot work operations.
- ensure hot work operator has read and understands the Hot Work Procedure and all applicable laws, codes, standards, and regulations prior to performing any hot work operations.
- advise the uOttawa contact of any planned hot work operations to ensure that the proper permits are requested within the appropriate time frame.
- only allow hot work operations in the area identified on the hot work permit and approved by the PAI.
- prior to the start of any hot work operations:
 - inspect the area where the hot work will occur
 - ensure a fire watch is present
 - confirm that a fire extinguisher and PPE is readily available
 - ensure signs and the hot work permit are posted at the designated hot work area.
 - ensure emergency procedures are established.
- ensure all combustibles are relocated at least 35 feet (11 m) in all direction of the work site. If relocation is impractical, combustibles shall be protected by a welding curtain, welding blanket, welding pad, or equivalent.

PROCEDURES

All work must be done in accordance with applicable laws, codes, standards, and regulations. At all times during hot work operations, the hot work permit shall be clearly posted at the entrance of the work site to prevent anyone from accidentally entering the area.

Worker-Enabled Precautions for Non-Designated Areas

General fire precautions to follow:

- The hot work equipment to be used shall be in satisfactory operating condition and in good repair.
- When work is done near combustible construction material (walls, partitions, ceiling, etc.), the material must be shielded.
- Ducts and conveyor systems that might carry sparks must be shielded and/or shut down.
- Combustibles shall be relocated at least 35 ft (11 m) in all directions from the work site.
- Fully charged and operable fire extinguishers that are appropriate for the type of possible fire shall be immediately available at the work area.
- The operator and nearby personnel shall be suitably protected against dangers such as heat, sparks, and slag.

If hot work is done on one side of a wall, partition, ceiling, or roof:

- Relocate combustible materials on the other side to a safe distance.
- If it is impractical to relocate the combustible material, the material will have to be shielded.
- Special precautions must be taken when work is being done on metal partitions or metal pipes to shield any material that is likely to ignite by conduction or radiation.
- At least one (1) fire extinguisher must be available in the immediate work area. The extinguisher must be in good working condition and fully charged.

Safe work area:

- A safe work area must be established around the work site. The standard safe area is 35 ft (11 m) from the work site.
- Within the work area:
 - All combustible materials on the floor must be swept or removed, such materials include but is not limited to wood shavings, paper clippings or textile materials.
 - All combustibles must be relocated outside the safe area. If it is impractical to relocate them, the combustibles must be shielded.
 - All openings or cracks in walls, floors, ducts, open doorways, or windows must be covered or sealed with non-combustible materials to prevent the passage of sparks to adjacent areas.
 - The work area may be expanded or reduced at the sole discretion of the PAI based on the risks that are present.

If hot work is done in proximity to a sprinkler head:

- A wet rag must be laid over the sprinkler head and then removed after the hot work has been completed.
- During hot work operations, precautions must be taken to avoid accidental activation of the automatic fire suppression system.
- The operator and nearby personnel must be suitably protected against dangers such as heat, sparks, and slag.

Buildings with a sprinkler system:

- In a building protected by a sprinkler system, the sprinkler system shall remain operable throughout the hot work operations.

- If a sprinkler system must be impaired, the impairment protocol shall be followed (See Impairment Protocol)
- During an emergency impairment of the sprinkler system due to unforeseen circumstances, hot work permits in that building are suspended until the impairment level can be determined and appropriate precautions put in place.
- All requests for impairments of the fire detection or suppression systems shall be made to the Facilities Electrical Department 48-hour in advance as per the impairment protocol.

If hot work is done in a confined space:

- The space should be ventilated or purged to reduce the combustible dust or mist airborne concentration to a level below that which may create a hazard of explosion.
- The space must be rendered inert by adding an inert gas and be continuously monitored to ensure the atmosphere remains inert, if ventilation or purging cannot reduce the combustible dust or mist airborne concentration to a level below that which may create a hazard of explosion.
- Workers must wear adequate respiratory protective equipment and adequate equipment to allow persons outside the confined space to locate and rescue them, if necessary.
- The following precautions must be taken in the presence of an explosive or flammable gas or vapour:
 - a. Purge and continuously ventilate the space to maintain an atmosphere of less than 5% of the LEL;
 - b. Purge and continuously ventilate the space to maintain an oxygen concentration of less than 23%;
 - c. Continuously monitor the atmosphere in the confined space;
 - d. The entry permit includes adequate provisions for hot work and details the appropriate measures to be taken; and
 - e. An adequate warning system and exit procedure are in place to provide adequate warning and allow safe escape if the levels in a) or b) above are exceeded. It is good practice to incorporate a safety factor that provides for adequate warning should the levels be approached.

If work is done on a container:

- Hot work shall not be performed on containers, equipment, or piping containing flammable liquids, combustible liquids or flammable gases unless, they must have been cleaned and tested with a listed gas detector to ascertain that they are free of explosive vapours, or safety measures are taken in conformance with good engineering practice.

Hot Work Permit

- All hot work performed outside of a designated area shall require a hot work permit, signed, and approved by the PAI.
- A hot work permit is not required for the following activities:
 - Bunsen Burners in laboratories
 - Fixed grinding wheels

- Electric Soldering Iron
- Hot work being done in a designated hot work area
- Steps to obtaining a permit:
 - The operator (uOttawa trade workers only), Facility Manager or Project Manager must complete the hot work permit request form at least 24 hours in advance and submit it via email. **(electronic form in development)**
 - Note - Contractors cannot fill out a permit themselves. The project manager or Facility Manager must complete the permit request on their behalf.
 - Once submitted, the operator must wait for the signed approval from the PAI before starting any hot work operations and the permit must be kept on site for the duration of the work.
 - It is the responsibility of the operator to ensure that the area and equipment is in conformity with the present procedure in order for the permit to be approved.
 - The permit will be approved or denied based on the specifics of the request and the risks involved.
- The Fire Safety Program, and/ or the Facilities Health & Safety Office reserves the right to revoke a hot work permit at any time for any violation of the procedure or any applicable laws, codes, standards, and regulations.

Fire Watch

- A fire watch is required for any hot work being done outside of a designated area.
- A fire watch must be constantly maintained for at least 1 hour after the completion of hot work operations. The PAI may decide, at its sole discretion, to extend the duration of the fire watch if it is determined the fire hazards warrant the extension.
- Once the minimum 1 hour fire watch is completed, fire monitoring can begin for a period of up to an additional 3 hours as determined by the PAI. Monitoring shall be defined as the periodic verification of the hot work area and the adjacent areas that are at risk.

Personal Protective Equipment (PPE)

- Clothing must be selected to minimize the potential for ignition, burning, trapping hot sparks, and electric shock.
- The operator must use the proper personal protective equipment for the hazards identified while doing any hot work, this includes:
 - Welding helmet or hand shield. The helmet or hand shield must protect the face, forehead, neck, and ears from direct radiant energy from the arc or direct weld spatter. During arc welding or cutting, the operator must also use filter lenses and cover lenses.
 - Gloves. The gloves must be flame resistant, be in good repair, dry and capable of providing protection from electric shock by the welding equipment.
 - If working with metals (e.g., Chromium), respirator protection that possesses local filtration shall be mandatory. Refer to [respiratory protection program](#) (uOttawa workers).
 - During overhead hot work operation, the operator must wear flame-resistant cape sleeves, shoulder covers or equivalent.
 - During heavy work and when necessary, flame-resistant leggings may be used by

- the operator.
- During operations that create a hazard to the ear canals, the operator shall use flame-resistant earplugs.
- When necessary, the operator may wear a cap made from flame resistant material under the helmet to prevent head burns.
- All persons in the immediate vicinity of hot work operations must be similarly protected.

Impairment Protocol

The PAI has the authority to determine the level of impairment that is authorized for each permit issued and the precautions that must be taken.

Impairment requirements can only be lifted once all the affected systems are verified and confirmed to be back in service and fully operational by the Facilities Electrical Department.

The impairment classification is divided in 3 levels:

Levels of Impairment	Description	Contact Person	Protocol and Timeline
Level 1 impairment	A component of the fire detection or suppression system is found to be defective during routine maintenance and needs to be replaced or deactivated to allow hot work to be completed.	<ul style="list-style-type: none"> ● Fire Safety Program ● Protection Services 	<ul style="list-style-type: none"> ● Notify contact persons ● No other precautions or notifications are necessary.
Level 2 impairment	A shutdown of a portion of the fire detection system leaving multiple rooms without coverage due to hot work or defective equipment. Any shutdown of the fire suppression system is considered to be at least a level 2 impairment.	<ul style="list-style-type: none"> ● Facilities Electrical Department ● Fire Safety Program ● Protection Services ● Project Manager 	<ul style="list-style-type: none"> ● Notify contact person ● Hot work permit required (24-hour notice). ● Fire watch required. Work Order (Archibus) request must be sent (48- hour notice).

Level 3 impairment	A shut down of an entire or major portion of a fire detection or fire suppression system, the interruption of the water supply to the fire suppression systems, a fire detection system disruption that affects a building, or there is a loss of connection of the fire alarm system with the Central Power Plant.	<ul style="list-style-type: none"> • Fire Safety Program • Protection Services • Facilities Electrical Department • Project manager 	<ul style="list-style-type: none"> • Notify contact persons • Hot work permit required. • Work Order (Archibus) request must be sent (48-hour notice). • Fire watch is mandatory. • Non-critical hot work is suspended.
Emergency Impairment	A partial or complete shutdown of fire detection or suppression systems due to unforeseen consequences.	<ul style="list-style-type: none"> • Fire Safety Program • Protection Services • Facilities Electrical Department • Office of Emergency Management • Office of Risk Management 	<ul style="list-style-type: none"> • Notify contact persons immediately. • All hot work operations are suspended until a proper assessment of the risk and of the extent of the impairment is determined. • An emergency hot work permit can be issued by the PAI.

Emergency Hot Work Permit

For situations that could result in the failure of the University’s critical infrastructure causing immediate and catastrophic consequences to the University, repairs are required in the shortest delay. In such cases, an emergency hot work permit can be issued by the Project Manager, Facility Manager or Department Supervisor without following the standard process and work site inspections, but simultaneously ensuring precautions and prevention measures are followed by the hot work operator. The Project Manager, Facility Manager or Department Supervisor must, at minimum, advise the Fire Safety Manager of such circumstances via email or Protection Dispatch after-hours at 613-562-5499 and whenever possible, a hot work permit request should be submitted for approval.

An emergency hot work permit will only be issued if the following conditions are met:

- The equipment is considered critical to university operations.
- Failure to immediately repair the equipment will adversely affect university operations.
- No alternative methods are found to maintain the equipment until a standard hot work permit can be issued (shutoff, alternative work methods, etc.)

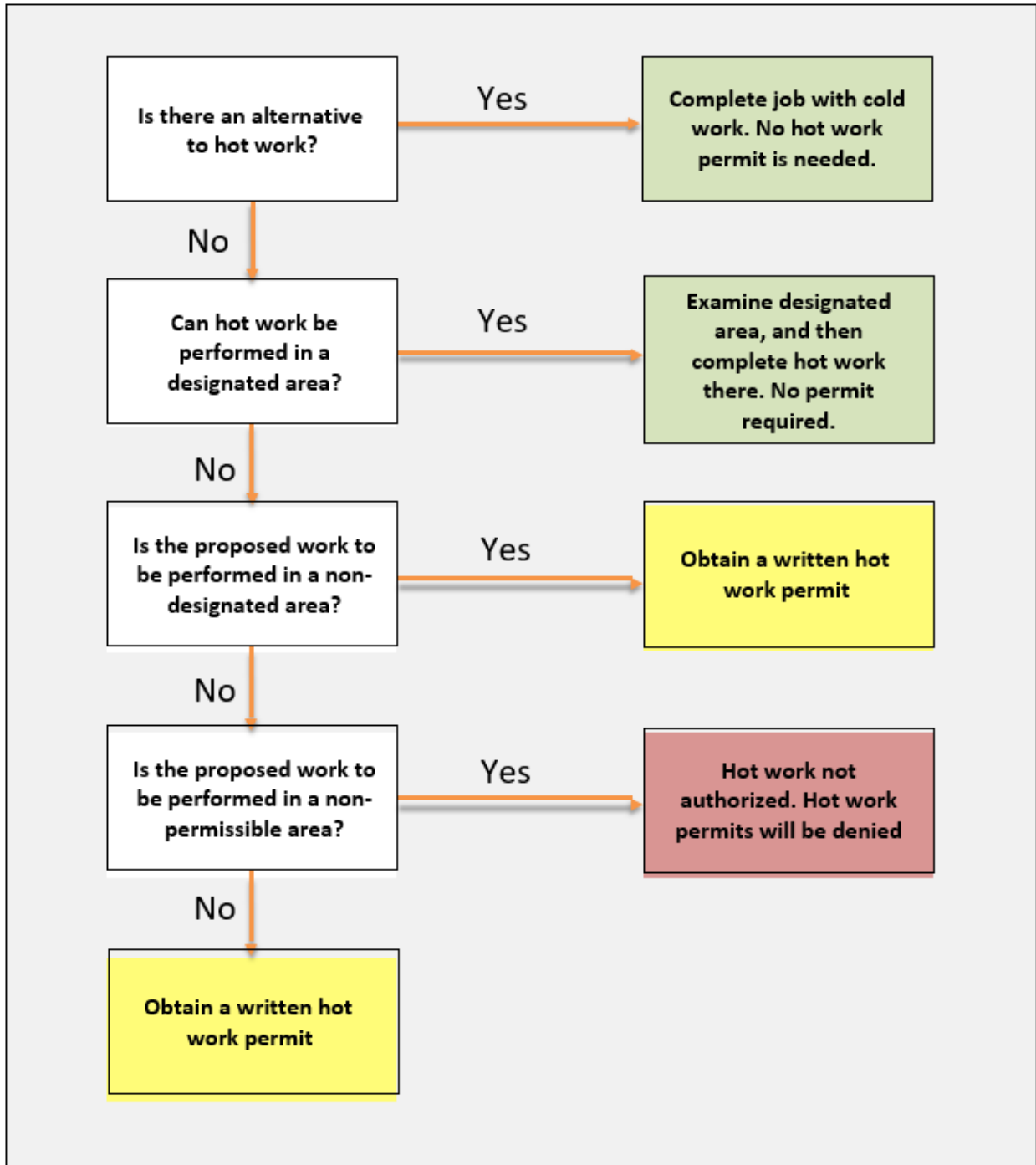
REFERENCES

- National Fire Protection Association, 51B “Standard for Fire Prevention During Welding, Cutting and Other Hot Work”.
- Canadian Standards Association, W117.2 – 12 Safety in Welding, Cutting and Allied Processes.
- Ontario Fire Code, Regulation 213/07

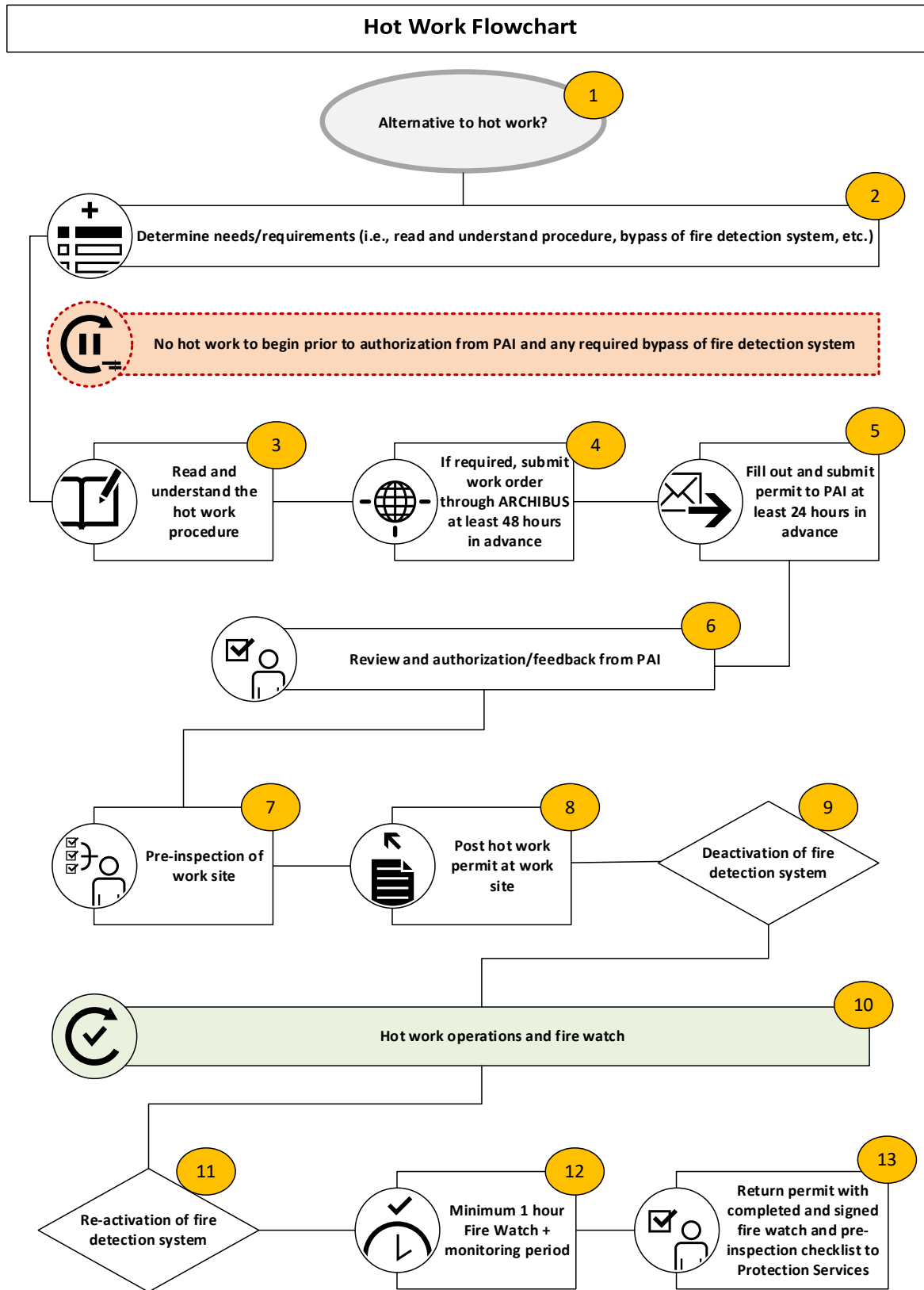
APPENDIX A - HOT WORK PERMIT

UNIVERSITY OF OTTAWA HOT WORK PERMIT	
<i>Disclaimer: This permit is being authorized as per the conditions detailed in the hot work request. If conditions change, this authorization becomes null and void.</i>	
THIS PERMIT IS VALID FOR 24 HOURS ONLY	
Date of Hot Work: _____ Location of Hot Work: Building _____ Floor: _____ Room: _____ Other information on location: _____ The Hot Work is being conducted on: Roof <input type="checkbox"/> Yes <input type="checkbox"/> No Tunnel <input type="checkbox"/> Yes <input type="checkbox"/> No Name of persons performing the Hot Work, Company, and emergency contact information (print): Name: _____ Company: _____ Phone: _____ Name: _____ Company: _____ Phone: _____ Type of Hot Work being performed: <input type="checkbox"/> Grinding <input type="checkbox"/> Welding <input type="checkbox"/> Soldering <input type="checkbox"/> Brazing <input type="checkbox"/> Cutting <input type="checkbox"/> Heat treating <input type="checkbox"/> Hot riveting <input type="checkbox"/> Thawing pipe <input type="checkbox"/> Drilling and tapping <input type="checkbox"/> Powder-driven fasteners <input type="checkbox"/> Torch-applied roofing If other, specify: _____	
Department/Person requesting the Hot Work Permit: Name (print): _____ Phone: _____ <input type="checkbox"/> Facilities/Project Manager <input type="checkbox"/> Other University Department Specify: _____ The Hot Work area has sprinkler protection? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Deactivated The Hot Work area has smoke detection? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Deactivated <div style="border: 1px solid black; padding: 2px; background-color: #f0f0f0;"> Fire Watch Required: <input type="checkbox"/> 1 hour <input type="checkbox"/> 2 hours <input type="checkbox"/> 3 hours <input type="checkbox"/> 4 hours </div> Special precautions/instruction: _____ _____ I, _____ verify I have reviewed the Hot Work procedures and requirements with the person performing the Hot Work. Signature and date of person requesting the Hot Work Permit: X _____ Date _____ Person Authorizing the Hot Work: Name (print): _____ Phone: _____ Signature and Date of Person Authorizing the Hot Work: X _____ Date _____	On site Pre-Hot Work Safety Inspection Checklist: Performed by persons doing the Hot Work <input type="checkbox"/> Cutting and/or welding equipment has been inspected and found to be good repair: free of damage or defects <input type="checkbox"/> A multi-class (ABC) portable fire extinguisher of adequate size and fully charged is immediately available <input type="checkbox"/> All flammable and combustible liquids have been removed from the area (at least 12 meters from the work area) <input type="checkbox"/> All wall, floor, duct, and ceiling penetrations, where sparks may travel, have been located and sealed/covered <input type="checkbox"/> All combustible materials (wood, paper, cardboard) have been moved (12 meters away) or covered with fire retardant tarps <input type="checkbox"/> Fire alarms pull box, telephone, or cell phone is immediately available to summon fire department in case of fire <input type="checkbox"/> Combustible flooring/walls (whenever sparks or slag may fall) have been covered with fire retardant tarp <input type="checkbox"/> Area has been cleaned/swept to remove any other combustible material (lint, sawdust, dust, oily residues) <input type="checkbox"/> Any potential for a flammable atmosphere has been eliminated <input type="checkbox"/> Furniture, computers, equipment, and/or other furnishings have been protected from damage <input type="checkbox"/> Fire watch duration and duties are understood Person conducting the safety inspection: Name (print): _____ Phone: _____ Date: _____ Time: _____ Signature of person performing the safety inspection: X _____ <div style="border: 1px solid black; background-color: #ffe0b2; padding: 5px; text-align: center;"> When the Fire Watch has ended, return this form to Protection Services Office to close out the form. </div>
<div style="background-color: #ffc107; padding: 5px;"> Fire Watch: Date and time Fire Watch started: Date: _____ Time: _____ AM/PM (circle) Date and time Fire Watch ended: Date: _____ Time: _____ AM/PM (circle) Person conducting Fire Watch: _____ I verified the dates and times are correct. Signature of Fire watch: _____ </div>	

APPENDIX B – HOT WORK PERMIT DECISION TREE



APPENDIX C – HOT WORK FLOWCHART



APPENDIX D – RACI MATRIX

- Responsible (R)** Person who actually carries out the process or task assignment. Responsible to get the job done.
- Accountable (A)** Person who is ultimately accountable for process or task being completed appropriately. Responsible person(s) are accountable to this person.
- Consulted (C)** Person who are not directly involved in carrying out the task but who are consulted. May be stakeholder or subject matter expert.
- Informed (I)** Person who receive output from the process or task, or who have a need to stay informed.

Steps	Main Tasks	Fire Safety Program (PAI)	Facilities Health & Safety	University Representative	Contractor / uOttawa workers	Hot Work Operator	Fire Watch	Facilities Electrical Department
		<i>Primary Permit Authorizing Individual (PAI)</i>	<i>As needed, acts as Permit Authorizing Individual (PAI)</i>	<i>Person requesting the permit</i>	<i>Person doing the hot work</i>	<i>Person doing the hot work</i>	<i>Person assigned to work with the operator to watch for fires resulting from hot work operations.</i>	<i>Persons responsible for bypassing the fire detection system</i>
1	Find alternative to hot work operations			R	R			
2	If no alternative, determine needs/requirements to conduct hot work operations			R	R (uOttawa workers only)			
3	Read and understand the Hot Work Procedure			A	R	R	R	
4	If required, submit work order (ARCHIBUS) for deactivation/bypass of fire detection system	I	I	A	R	R		I
5	Fill out and submit permit to the PAI	C	C/I	R	R (uOttawa workers only)			
6	Review and authorize the hot work operation	R	R	I	I	I		I
7	Pre-hot work inspection checklist	I	I	I	A	R		
8	Post hot work permit at work site				A	R		
9	Deactivation/bypass of fire detection system			A	I	I		R
10	Hot Work and Fire Watch				A	R	R	
11	Reactivation of fire detection system			A		R		R
12	Minimum 1 hour Fire Watch + monitoring period			I	A		R	
13	Return permit to Protection	I		A	R	R	R	