# Hassen Memorial Arena

## Armstrong, B.C

# Mechanical Assessment Report

**11 November 2024**
**PERMIT TO PRACTICE NO. 1001295**


## 1.0 Executive Summary

- Scope of Work to assess existing HVAC system and provide recommendations for improvements.
- The facility appears to be in relatively good condition.
- The existing mechanical systems are in **FAIR** condition.
- Existing Make-Up Air Unit is nearing the end of its service life and will become increasingly unreliable. This added maintenance burden will draw resources away from other critical periodic maintenance tasks.
- The existing mechanical system is not **CONFIGURED** to good engineering practice.

## 2.0 Description of Existing Building

- 2 story building sports arena with Washrooms, Changerooms and Amenities in the lower level with Gym and Office Room at the upper level.

## 3.0 Discussions of Existing Mechanical Systems

<table>
<tr><td rowspan="2">  </td><td>Observations:<br>♦ Existing gas fired Make-Up Air unit tagged AMU-1 provides heating and ventilation to the lower floor level Washrooms, Change Rooms and Snack/Storage Room. No cooling or additional back-up heat has been observed.<br>♦ Remote programmable thermostat located in the Women Washroom. Currently set to 14.5 Deg C room temperature but user adjustable.</td></tr>
<tr><td>Recommendations:<br>♦ Unit is approaching its end-of-life service and recommend sourcing replacement soon.<br>♦ Option 1: Replace as per original unit specifications if future maintenance parts availability is generally not an issue. Energy consumption would remain the same at roughly 80% efficiency.<br>♦ Option 2: Replace with condensing type at least 90% high efficiency unit for energy use reduction. Modifications to the common breeching vent maybe required as this unit would be vented separately.</td></tr>
<tr><td rowspan="2">  </td><td>Observations:<br>♦ Existing Exhaust Fan appears to be in good condition although controlled with a manual timer switch in the Mechanical Room. No outdoor air ventilation to the space unless manually activated.</td></tr>
<tr><td>Recommendations:<br>♦ Convert to automated control function to cycle dampers with make-up air unit.</td></tr>
<tr><td></td><td>Existing control system overview:<br>♦ Based on air balancing report submitted by Inland Technical Services, AMU-1 control dampers remained open and did not change positions when exhaust fan was manually activated during balancing. This would indicate AMU-1 is constantly on full recirculation mode even with the Exhaust Fan operational.</td></tr>
</table>


Recommendations:

- Employ a controls contractor to investigate control damper issues for a priority fix.
- Automate outdoor ventilation control sequence of operations with the following options.
    - Option 1: AMU-1 blower and Exhaust Fan to operate continuously based on building occupancy schedule.
    - Option 2: Activate AMU-1 blower and Exhaust Fan based on room occupancy sensors complete with time delay shut-off.
- AMU-1 to enable based on space heating demand from thermostat and Exhaust Fan activation. Modulate control dampers to set positions as required. Controls contractor to work with balancing agent to finalize damper settings. Mark for maintenance staff.
- Perform final airflow balancing with both systems operational and rooms at neutral or slightly negative. Fans should operate at constant volume for simplicity.

## 4.0 Other Considerations

Observations:

- Existing domestic water heaters are atmospheric type with a common breeching vent with AMU-1. These were manufactured in 2014 with a life span up to 15 years depending on maintenance and water quality.
- Missing domestic hot water piping insulation.

Recommendations:

- If the AMU should be replaced with a high efficiency unit, then consider replacing these as well to improve energy consumption in the long run. Remove common breeching vent and install sealed combustion PVC vents for each equipment.
- Complete thermal pipe insulation to minimize heat losses to the system.

Observations:

- Grille penetrations from Mechanical Room to adjacent Washrooms does not appear to be provided with fire damper separation and duct branch shrouded with drywall flush to duct main. The room is fire rated with fire dampers observed in other penetrations through wall.

| | |
|---|---|
|  | Recommendations:<br>♦ Site verify and confirm behind the grilles presence of a fire damper. Otherwise, replace grilles complete with combination balancing and fire damper for code compliance. Verify all duct penetrations fire damper are in good condition and tested. |

## 5.0 Next Steps

Ownership to employ controls contractor and work with a balancing agent to investigate priority issues such as inoperable control dampers and automation of the exhaust fan. Confirm and rectify life safety deficiencies then replace equipment where budget allows.

## 6.0 Considerations for Mechanical System Upgrade

Caveat. This review is intended to provide an external review of the conditions and configuration of the existing mechanical systems where they are apparent. The inside condition of many systems (hydronic, gas heating, or refrigerant systems for example) will affect the longevity of the equipment, and that assessment can only be achieved by qualified technicians performing an invasive inspection of the equipment.

Ariel Lingbawan, P.L Eng.

# AIR SYSTEMS BALANCE REPORT

# FOR

# ARMSTRONG ARENA MUA SURVEY
# ARMSTRONG, BC


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# AIR BALANCE REPORT GENERAL COMMENTS

## ARMSTRONG ARENA MUA SURVEY

| SYSTEM | COMMENTS |
|---|---|
| General comments | - The air system was tested using recently calibrated instruments including a Balometer hood and a Rotating Vane Anemometer(RVA).<br>- The measurements and readings were recorded with the available airflows in the system, in it's current operational state. |
| Make-up Air unit | - The AMU-1 unit was tested running on it's own, without the exhaust fan running. It was cycled a few times prior to testing to confirm sequence of operations, the outdoor air damper stayed shut and the return/exhaust air damper remained open in a call for heating. The Exhaust fan was cycled on while the AMU-1 was running, the dampers did not cycle or change positions.<br>- The above indicates that the air from the locker rooms/bathrooms was in full recirculation while the AMU-1 was in a call for heating.<br>- All of the supply outlets/terminals were tested and measured using an RVA with standard factors for the applicable grilles/diffusers.<br>- The return/exhaust terminals were tested and measured using a Balometer hood. |
| Exhaust Fan | - The EF-1 Unit was tested while running on it's own, it was controlled by a manual wall timer. It was cycled multiple times to confirm sequence of operations, the exhaust dampers to the outdoor termination would open, but no other dampers would cycle. The building operations contact confirmed with the servicing mechanical contractor, that the fan was not controlled by anything other than the wall timer. This indicates that unless the fan was manually cycled no air would be exhausted to the outdoors.<br>- The exhaust terminals were tested and measured using a Balometer hood. |

# AIR MOVING EQUIPMENT TEST SHEET
## ARMSTRONG ARENA MUA SURVEY

### AMU-1

**Location:** Mechanical room

**Service:** Washrooms, changerooms and Concession

**Make:** Keep-Rite

**Model:** PB-8A

**Serial #:** 885117

**AIR VOLUME**

| | Design | Actual |
|---|---|---|
| **Terminals:** | -- | S:2026/R:1646 |
| **Unit Total:** | -- | -- |
| **O/A:** | -- | Zero |
| **R/A:** | -- | Zero |

**SYSTEM PRESSURE DATA**

| | Design | Actual |
|---|---|---|
| **Suction:** | | -0.338" w.c. |
| **Discharge:** | | 0.230" w.c. |
| **Diff:** | -- | 0.568" w.c. |

**DRIVE DATA INITIAL**

| | |
|---|---|
| **Driven Sheave:** | BK80H - H X 1" |
| **Motor Sheave:** | VL44-5/8" |
| **Belt(s):** | (1) B45 |
| **VP Position:** | -- |
| **C - to - C:** | -- |

**DRIVE DATA FINAL**

| | |
|---|---|
| **Driven Sheave:** | Same |
| **Motor Sheave:** | Same |
| **Belt(s):** | Same |
| **VP Position:** | Mid |
| **Center to Center:** | -- |

**FAN PERFORMANCE DATA**

| RPM Design | Initial | Final |
|---|---|---|
| -- | -- | 836 |
| **AMPS:** | **Initial** | **Final** |
| (Running) | -- | 6.95 |

**MOTOR DATA**

**Make:** Leeson

**HP:** 1.5 Hp

**FLA:** 8.6

| | Nameplate | Actual |
|---|---|---|
| **Volt/Ph:** | 240/1 | 240 |
| **RPM:** | 1760 | 1781 |

**FILTERS (Number/Type/Size)**

(4) Washable 20" X 20" X 2"

**NOTES**

Tested running on it's own, EF-1 was not running while tested. Outdoor air dampers were not cycling open during testing, all of the indooor air was recirculating through the unit.

### EF-1

**Location:** Mechanical room

**Service:** Washrooms, changerooms and Concession

**Make:** Woods

**Model:** 15JR

**Serial #:** 7683636/EF1NH

**AIR VOLUME**

| | Design | Actual |
|---|---|---|
| **Terminals:** | -- | 920 cfm |
| **Unit Total:** | -- | -- |
| **O/A:** | -- | -- |
| **R/A:** | -- | -- |

**SYSTEM PRESSURE DATA**

| | Design | Actual |
|---|---|---|
| **Suction:** | | -0.267" w.c. |
| **Discharge:** | | 0.191" w.c. |
| **Diff:** | -- | 0.458" |

**DRIVE DATA INITIAL**

| | |
|---|---|
| **Driven Sheave:** | None |
| **Motor Sheave:** | None |
| **Belt(s):** | None |
| **VP Position:** | -- |
| **C - to - C:** | -- |

**DRIVE DATA FINAL**

| | |
|---|---|
| **Driven Sheave:** | -- |
| **Motor Sheave:** | -- |
| **Belt(s):** | -- |
| **VP Position:** | -- |
| **Center to Center:** | -- |

**FAN PERFORMANCE DATA**

| RPM Design | Initial | Final |
|---|---|---|
| -- | -- | Tag |
| **AMPS:** | **Initial** | **Final** |
| (Running) | -- | 6.58 |

**MOTOR DATA**

**Make:** OEM

**HP:** 0.35 Hp

**FLA:** 7.0

| | Nameplate | Actual |
|---|---|---|
| **Volt/Ph:** | 120/1 | 122 |
| **RPM:** | 1700 | Tag |

**FILTERS (Number/Type/Size)**

None

**NOTES**

Tested while running on it's own from wall timer control, without AMU-1 running. Only discharge damper was opening during testing. Negative pressure measured in AMU-1 blower cabinet.

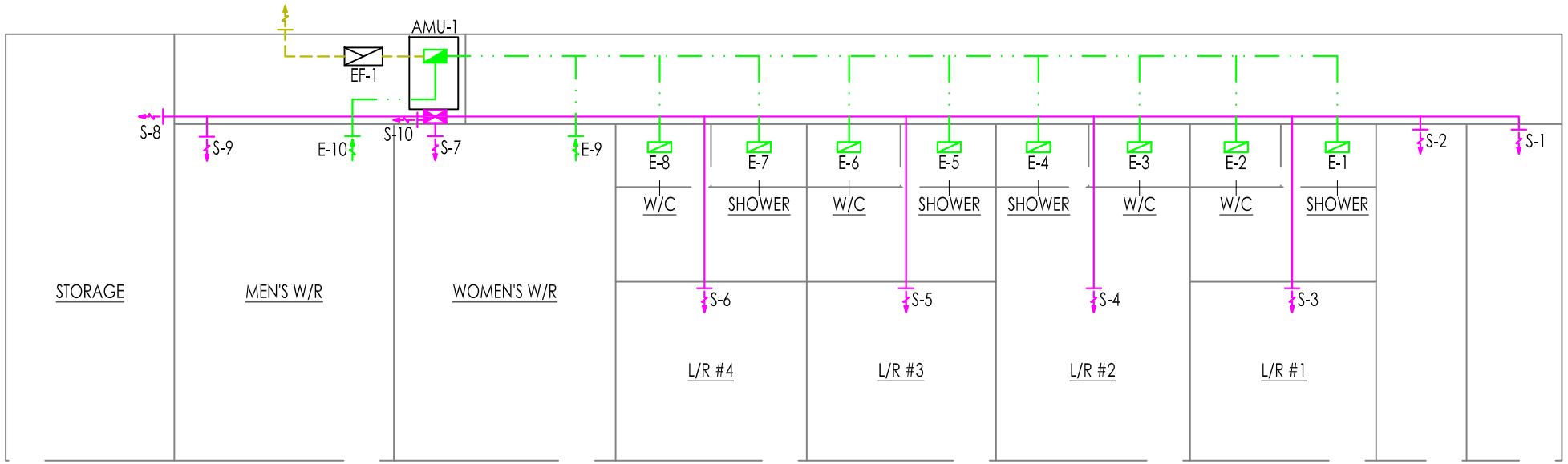
# AIR TERMINAL REPORT SHEET

Job Name: **Hassan Arena - Armstrong, BC** Job #:

| Unit or Service | Terminal Designation | Ak Factor | Design Volume | Initial Volume | Final Volume | % of Design | Remarks |
|---|---|---|---|---|---|---|---|
| | | | cfm | cfm | cfm | | |
| **Make-Up Air Unit** | | | | | | | |
| **AMU-1** | S-1 | 0.80 | | | 69 | | |
| | S-2 | 0.80 | | | 54 | | |
| | S-3 | 0.90 | | | 300 | | |
| | S-4 | 0.90 | | | 270 | | |
| | S-5 | 0.90 | | | 310 | | |
| | S-6 | 0.90 | | | 275 | | |
| | S-7 | 0.80 | | | 262 | | |
| | S-8 | 0.85 | | | 45 | | |
| | S-9 | 0.80 | | | 264 | | |
| | S-10 | 0.80 | | | 178 | | |
| | **Total** | | | | **2026** | | |
| | | | | | | | |
| **AMU-1 Exhaust/Return** | | | | | | | |
| | E-1 | Hood | | | 125 | | |
| | E-2 | Hood | | | 143 | | |
| | E-3 | Hood | | | 191 | | |
| | E-4 | Hood | | | 89 | | |
| | E-5 | Hood | | | 114 | | |
| | E-6 | Hood | | | 199 | | |
| | E-7 | Hood | | | 162 | | |
| | E-8 | Hood | | | 110 | | |
| | E-9 | Hood | | | 231 | | |
| | E-10 | Hood | | | 282 | | |
| | **Total** | | | | **1646** | | |
| | | | | | | | |
| **Exhaust Fan** | | | | | | | |
| EF-1 | E-1 | Hood | | | 72 | | |
| | E-2 | Hood | | | 83 | | |
| | E-3 | Hood | | | 90 | | |
| | E-4 | Hood | | | 43 | | |
| | E-5 | Hood | | | 60 | | |
| | E-6 | Hood | | | 110 | | |
| | E-7 | Hood | | | 88 | | |
| | E-8 | Hood | | | 58 | | |
| | E-9 | Hood | | | 152 | | |
| | E-10 | Hood | | | 164 | | |
| | **Total** | | | | **920** | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

**Remarks Legend:**

1 - Damper fully closed
2 - Damper fully open
3 - See comments
4 - Noisy diffuser/grille




| REVISION: | DATE: | DRAWN BY: | REFERENCE DRAWING : | TITLE: |
|---|---|---|---|---|
| - | 23/10/2024 | DAS | HASSAN FIELD MARK-UP DRAWING | ARMSTRONG ARENA MUA SURVEY<br>BALANCE SCHEMATIC (NTS) |

RETURN AIR
SUPPLY AIR
EXHAUST AIR
OUTDOOR AIR
HOT WATER SUPPLY
HOT WATER RETURN
DOMESTIC HOT WATER SUPPLY
DOMESTIC HOT WATER RETURN

A = ACTUAL VOLUME, CFM
D = DESIGN VOLUME, CFM

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