COM*check* Software Version 4.0.8.1

Mechanical Compliance Certificate

Section 1: Project Information

Energy Code: **2014 Oregon Energy Efficiency Specialty Code**
Project Title: Bridgeport Elemenatry School
Project Type: New Construction

Construction Site:
5505 SW Borland Road
Tualatin, OR 97062

Owner/Agent:

Designer/Contractor:
Takako Baker
MFIA
2003 SE Ash Street
Portland, OR 97213

Section 2: General Information

Building Location (for weather data): Tualatin, Oregon
Climate Zone: 4c

Section 3: Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Single Zone) : Heating: 1 each - Central Furnace, Gas, Capacity = 120 kBtu/h Proposed Efficiency = 80.00% Et, Required Efficiency = 80.00% Et Cooling: 1 each - Single Package DX Unit, Capacity = 60 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 18.00 SEER, Required Efficiency: 13.00 SEER Fan System: None
1	ACCU-2, 3, 4: Cooling: Condensing Unit, Capacity 186 kBtu/h, Condenser Air-Cooled Proposed Efficiency: 12.30 EER (Refer to mech. plans for proposed IPLV), Required Efficiency: 10.100 EER (11.20 IEER)
1	ACCU-5A/5B: Cooling: Condensing Unit, Capacity 245 kBtu/h, Condenser Air-Cooled Proposed Efficiency: 12.30 EER (Refer to mech. plans for proposed IPLV), Required Efficiency: 10.100 EER (11.20 IEER)
1	cu-6: Cooling: Condensing Unit, Capacity 74 kBtu/h, Condenser Air-Cooled No minimum efficiency requirement applies

Section 4: Requirements Checklist

In the following requirements, blank checkboxes identify requirements that the applicant has not acknowledged as being met. Checkmarks identify requirements that the applicant acknowledges are met or excepted from compliance. 'Plans reference page/section' identifies where in the plans/specs the requirement can be verified as being satisfied.

Requirements Specific To: RTU-1 :

✔ 1. Equipment meets minimum efficiency: Central Furnace (Gas): 80.00 % Et (or 78% AFUE)
✔ 2. Equipment meets minimum efficiency: Single Package Unit: 13.00 SEER
✔ 3. Energy recovery ventilation systems. Individual fan systems that have both a design supply air capacity of 5,000 cfm or greater and a minimum outside air supply of 70 percent or greater of the design supply air quantity have an energy recovery system.

Plans reference page/section: *NA*

✔ 4. Supply air economizers shall be provided on each cooling system and are capable of providing 100-percent outdoor air, even if additional mechanical cooling is required to meet the cooling load of the building. Systems provide a means to relieve excess outdoor air during economizer operation to prevent overpressurizing the building.

Plans reference page/section: *M600*

Requirements Specific To: ACCU-2, 3, 4 :

✔ 1. Equipment meets minimum efficiency: Condensing Unit: 10.100 EER (11.20 IEER)

✔ 2. Complex Systems. Mechanical systems not covered by section 503.3 comply to sections 503.4.1 - 503.4.6.

Plans reference page/section: *M600, specs*

✔ 3. Supply air economizers are provided on each cooling system and are capable of providing 100-percent outdoor air, even if additional mechanical cooling is required to meet the cooling load of the building.

Plans reference page/section: *Existing*

✔ 4. Variable air volume fan control. Individual VAV fans with motors of 10 hp or greater are driven/controlled in the manner specified by this section.

Plans reference page/section: *existing*

✔ 5. Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated are limited in accordance with Sections 503.4.3.1 through 503.4.3.3.

Plans reference page/section: *specs*

✔ 6. Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are not installed.

Plans reference page/section: *NA*

✔ 7. Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water are designed to allow a dead band between changeover from one mode to the other; are provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and are provided with controls that allow heating and cooling supply temperatures at the changeover point.

Plans reference page/section: *NA*

✔ 8. Hydronic (water loop) heat pump systems. Hydronic heat pump systems comply with Sections 503.4.3.3.1 through 503.4.3.3.3.

Plans reference page/section: *NA*

✔ 9. Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices.

Plans reference page/section: *NA*

✔ 10. Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp or larger has the capability to operate that fan at two-thirds of full speed or less, and has controls that automatically change the fan speed.

Plans reference page/section: *NA*

✔ 11. Requirements For Complex Mechanical Systems Serving Multiple Zones.

Complex systems serving multiple zones comply with Sections 503.4.5.1 through 503.4.5.4 Additionally, supply air systems serving multiple zones are VAV systems which are designed and capable of being controlled to reduce primary air supply to each zone, the volume of air that is reheated/recooled/mixed in peak heating demand, and modulate airflow between deadband and full heating/cooling.

Plans reference page/section: *Existing*

✔ 12. Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

Plans reference page/section: *M6.01*

✔ 13. Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct use terminal devices which reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

Plans reference page/section: *Existing*

✔ 14. Supply-air temperature reset controls. HVAC systems serving multiple zones, including Dedicated Outside Air Systems include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature.

Plans reference page/section: *Existing*

Requirements Specific To: ACCU-5A/5B :

✔ 1. Equipment meets minimum efficiency: Condensing Unit: 10.100 EER (11.20 IEER)

✔ 2. Complex Systems. Mechanical systems not covered by section 503.3 comply to sections 503.4.1 - 503.4.6.

Plans reference page/section: *M600, specs*

✔ 3. Supply air economizers are provided on each cooling system and are capable of providing 100-percent outdoor air, even if additional mechanical cooling is required to meet the cooling load of the building.

Plans reference page/section: *Existing*

✔ 4. Variable air volume fan control. Individual VAV fans with motors of 10 hp or greater are driven/controlled in the manner specified by this section.

Plans reference page/section: *Existing*

✔ 5. Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated are limited in accordance with Sections 503.4.3.1 through 503.4.3.3.

Plans reference page/section: *Existing*

✔ 6. Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are not installed.

Plans reference page/section: *NA*

✔ 7. Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water are designed to allow a dead band between changeover from one mode to the other; are provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and are provided with controls that allow heating and cooling supply temperatures at the changeover point.

Plans reference page/section: *NA*

✔ 8. Hydronic (water loop) heat pump systems. Hydronic heat pump systems comply with Sections 503.4.3.3.1 through 503.4.3.3.3.

Plans reference page/section: *NA*

✔ 9. Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices.

Plans reference page/section: *NA*

✔ 10.Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp or larger has the capability to operate that fan at two-thirds of full speed or less, and has controls that automatically change the fan speed.

Plans reference page/section: *NA*

✔ 11.Requirements For Complex Mechanical Systems Serving Multiple Zones.

Complex systems serving multiple zones comply with Sections 503.4.5.1 through 503.4.5.4 Additionally, supply air systems serving multiple zones are VAV systems which are designed and capable of being controlled to reduce primary air supply to each zone, the volume of air that is reheated/recooled/mixed in peak heating demand, and modulate airflow between deadband and full heating/cooling.

Plans reference page/section: *Existing*

✔ 12.Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

Plans reference page/section: *M600, specs*

✔ 13.Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct use terminal devices which reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

Plans reference page/section: *NA*

✔ 14.Supply-air temperature reset controls. HVAC systems serving multiple zones, including Dedicated Outside Air Systems include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature.

Plans reference page/section: *Existing*

Requirements Specific To: cu-6 :

✔ 1. Complex Systems. Mechanical systems not covered by section 503.3 comply to sections 503.4.1 - 503.4.6.

Plans reference page/section: *M600*

✔ 2. Supply air economizers are provided on each cooling system and are capable of providing 100-percent outdoor air, even if additional mechanical cooling is required to meet the cooling load of the building.

Plans reference page/section: *Existing*

✔ 3. Variable air volume fan control. Individual VAV fans with motors of 10 hp or greater are driven/controlled in the manner specified by this section.

Plans reference page/section: *NA*

✔ 4. Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated are limited in accordance with Sections 503.4.3.1 through 503.4.3.3.

Plans reference page/section: *NA*

✔ 5. Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are not installed.

Plans reference page/section: *NA*

✔ 6. Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water are designed to allow a dead band between changeover from one mode to the other; are provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and are provided with controls that allow heating and cooling supply temperatures at the changeover point.

Plans reference page/section: *NA*

✔ 7. Hydronic (water loop) heat pump systems. Hydronic heat pump systems comply with Sections 503.4.3.3.1 through 503.4.3.3.3.

Plans reference page/section: *NA*

✔ 8. Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F between initiation of heat rejection and heat addition by the central devices.

Plans reference page/section: *NA*

✔ 9. Heat rejection equipment fan speed control. Each fan powered by a motor of 7.5 hp or larger has the capability to operate that fan at two-thirds of full speed or less, and has controls that automatically change the fan speed.

Plans reference page/section: *NA*

✔ 10.Requirements For Complex Mechanical Systems Serving Multiple Zones.

Complex systems serving multiple zones comply with Sections 503.4.5.1 through 503.4.5.4 Additionally, supply air systems serving multiple zones are VAV systems which are designed and capable of being controlled to reduce primary air supply to each zone, the volume of air that is reheated/recooled/mixed in peak heating demand, and modulate airflow between deadband and full heating/cooling.

Plans reference page/section: *existing*

✔ 11.Single duct variable air volume (VAV) systems, terminal devices. Single duct VAV systems use terminal devices capable of reducing the supply of primary supply air before reheating or recooling takes place.

Plans reference page/section: *NA*

✔ 12.Dual duct and mixing VAV systems, terminal devices. Systems that have one warm air duct and one cool air duct use terminal devices which reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.

Plans reference page/section: *NA*

✔ 13.Supply-air temperature reset controls. HVAC systems serving multiple zones, including Dedicated Outside Air Systems include controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperature.

Plans reference page/section: *existing*

Generic Requirements: Must be met by all systems to which the requirement is applicable:

✔ 1. Calculation of heating and cooling loads. Design loads are determined in accordance with the procedures described in the ASHRAE/ACCA Standard 183. Alternatively, design loads have been determined by an approved equivalent computation procedure.

✔ 2. Packaged Electric Equipment. Specified packaged electrical equipment has a heat pump as the primary heating source.

Plans reference page/section: *NA*

✔ 3. Equipment and system sizing. Heating and cooling equipment and systems capacity do not exceed the loads calculated in accordance with Section 503.2.1.

Plans reference page/section: *specs, M600*

✔ 4. HVAC Equipment Performance Requirements. Reported efficiencies have been tested and rated in accordance with the applicable test procedure. The efficiency has been verified through certification under an approved certification program or, if no certification program exists, the equipment efficiency ratings are supported by data furnished by the manufacturer.

✔ 5. Thermostatic Controls. The supply of heating and cooling energy to each zone is controlled by individual thermostatic controls that respond to temperature within the zone.

Plans reference page/section: *Specs, M121*

✔ 6. Heat pump supplementary heat. Heat pumps having supplementary electric resistance heat have controls that, except during defrost, prevent supplementary heat operation when the heat pump can meet the heating load.

Plans reference page/section: *NA*

✔ 7. Set point overlap restriction. Where used to control both heating and cooling, zone thermostatic controls provide a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the zone is capable of being shut off or reduced to a minimum.

Plans reference page/section: *Specs*

✔ 8. Optimum Start Controls. Each HVAC system has controls that vary the start-up time of the system to just meet the temperature set point at time of occupancy.

Plans reference page/section: *yes, existing*

✔ 9. Off-hour controls. Each zone is provided with thermostatic setback controls that are controlled by either an automatic time clock or programmable control system.

Plans reference page/section: *existing*

✔ 10.Shutoff damper controls. Both outdoor air supply and exhaust are equipped with not less than Class I motorized dampers.

Plans reference page/section: *Specs*

✔ 11.Freeze Protection and Snow melt system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, include automatic controls capable of shutting off the systems when outdoor air temperatures meet code criteria.

Plans reference page/section: *NA*

✔ 12.Separate air distribution systems. Zones with special process temperature requirements and/or humidity requirements are served by separate air distribution systems from those serving zones requiring only comfort conditions; or shall include supplementary control provisions so that the primary systems may be specifically controlled for comfort purposes only.

Plans reference page/section: *NA*

✔ 13.Humidity control. If a system is equipped with a means to add or remove moisture to maintain specific humidity levels in a zone or zones, a humidity control device is provided.

Plans reference page/section: *NA*

✔ 14.Humidity control. Where a humidity control device exists it is set to prevent the use of fossil fuel or electricity to produce relative humidity in excess of 30 percent. Where a humidity control device is used for dehumidification, it is set to prevent the use of fossil fuel or electricity to reduce relative humidity below 60 percent.

Plans reference page/section: *NA*

✔ 15.Humidity control. Where a humidity control device exists it is set to maintain a deadband of at least 10% relative humidity where no active humidification or dehumidification takes place.

Plans reference page/section: *NA*

✔ 16.Ventilation. Ventilation, either natural or mechanical, is provided in accordance with Chapter 4 of the International Mechanical Code. Where mechanical ventilation is provided, the system has the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the International Mechanical Code.

Plans reference page/section: *M600m M601*

✔ 17.Demand controlled ventilation (DCV). DCV is required for spaces larger than 500 ft2 for simple systems and spaces larger than 150 ft2 for multiple zone systems.

Plans reference page/section: *M121*

✔ 18.Kitchen hoods. Kitchen makeup is provided as required by the Oregon Mechanical Specialty Code.

Plans reference page/section: *NA*

✔ 19.Enclosed parking garage ventilation controls. In Group S-2, enclosed parking garages used for storing or handling automobiles employs automatic carbon monoxide sensing devices.

Plans reference page/section: *NA*

✔ 20.Duct and plenum insulation and sealing. All supply and return air ducts and plenums are insulated with the specified insulation. When located within a building envelope assembly, the duct or plenum is separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation. All ducts, air handlers and filter boxes are sealed. Joints and seams comply with Section 603.9 of the International Mechanical Code.

✔ 21.Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of low-pressure supply and return ducts are securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions.

Plans reference page/section: *Specs*

✔ 22.Medium-pressure duct systems. All ducts and plenums designed to operate medium-pressure are insulated and sealed in accordance with Section 503.2.7. Pressure classifications specific to the duct system are clearly indicated on the construction documents.

Plans reference page/section: *specs*

✔ 23.High-pressure duct systems. Ducts designed to operate at high-pressure are insulated and sealed in accordance with Section 503.2.7. In addition, ducts and plenums are leak-tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual.

Plans reference page/section: *NA*

✔ 24.Air system balancing. Each supply air outlet and zone terminal device is equipped with means for air balancing in accordance with the requirements of IMC 603.17. Discharge dampers intended to modulate airflow are prohibited on constant volume fans and variable volume fans with motors 10 horsepower.

Plans reference page/section: *specs*

✔ 25.Manuals. The construction documents require that an operating and maintenance manual be provided to the building owner by the mechanical contractor. See long description for specifications.

Plans reference page/section: *specs*

✔ 26.Air System Design and Control. Each HVAC system having a total fan system motor nameplate hp exceeding 5 hp meets the provisions of Sections 503.2.10.1 through 503.2.10.2.

Plans reference page/section: *NA*

✔ 27.Allowable fan floor horsepower. Each HVAC system at fan system design conditions does not exceed the allowable fan system motor nameplate hp (Option 1) or fan system bhp (Option 2) as shown and calulated in requirement details.

Plans reference page/section: *NA*

✔ 28.Motor nameplate horsepower. For each fan, the selected fan motor is no larger than the first available motor size greater than the brake horsepower (bhp).

✓ **Exception applies:** For fans less than 6 bhp, where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.

Plans reference page/section: *M600*

✔ 29.Large Volume Fan Systems. Fan systems over 8,000 (7 m3/s) cfm without direct expansion cooling coils that serve single zones reduce airflow based on space thermostat heating and cooling demand. A two-speed motor or variable frequency drive reduces airflow to a maximum 60 percent of peak airflow or minimum ventilation air requirement as required by Chapter 4 of the International Mechanical Code, whichever is greater.

Plans reference page/section: *NA*

✔ 30.All air-conditioning equipment and air-handling units with direct expansion cooling and a cooling capacity at ARI conditions greater than or equal to 110,000 Btu/h that serve single zones have their supply fan operation controlled according to code specific requirements.

Plans reference page/section: *Existing*

✔ 31.Series fan-powered terminal unit fan motors. Fan motors for series fan-powered terminal units are electronically-commutated motors and have a minimum motor efficiency of 70 percent when rated in accordance with NEMA Standard MG 1-2006 at full load rating conditions.

Plans reference page/section: *NA*

✔ 32.Hot Gas Bypass Limitation. For cooling systems <= 240 kBtu/h, maximum hot gas bypass capacity is no more than 50% total cooling capacity.

Plans reference page/section: *NA*

Section 5: Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2014 Oregon Energy Efficiency Specialty Code requirements in COM*check* Version 4.0.8.1 and to comply with the mandatory requirements in the Requirements Checklist.

Takako Baker, Mechanical Engineer	Takako Baker	3/6/18
Name - Title	Signature	Date

Section 6: Post Construction Compliance Statement

- ❑ HVAC record drawings of the actual installation, system capacities, calibration information, and performance data for each equipment provided to the owner.
- ❑ HVAC O&M documents for all mechanical equipment and system provided to the owner by the mechanical contractor.
- ❑ Written HVAC balancing and operations report provided to the owner.

The above post construction requirements have been completed.

Principal Mechanical Designer-Name	Signature	Date