BUILDING BASIS OF DESIGN:

CMU BLOCK - INSIDE WALL HEIGHT 8'
STANDING SEAM METAL ROOF
FLOOR TO BE SLAB ON GRADE OVER 2' OF ENGINEERED FILL

1 - DOUBLE DOOR ENTRY
1 - 125 AMP POWER SERVICE

SEE BASIS OF DESIGN DOCUMENTS FOR DETAILS OF PROCESS INSTALLATION
1. **General Description**

The purpose of this technical memorandum is to present the electrical basis of design for the Rancheria Spring Inline UV Treatment System building in Medford, Oregon.

2. **System Description**

The Rancheria Spring UV building will receive power from an existing 120/240v single phase power panel located in the Pump Station Building. A new electrical 120/240v single phase power panel will be located inside of the UV building. This panel will provide power for the UV System, HVAC system, I&C panels and associated valves, and interior and exterior lighting and receptacles.

3. **Interior and Exterior Lighting**

All interior lighting will be enclosed and gasketed linear LED-type. Exterior lighting will be a single LED-type full cutoff to limit light pollution and glare, mounted on the building above the door. Control of the exterior light shall be motion-activated, with a photocell to limit light from coming on during the day.

4. **Standby and UPS Power Systems**

Although Rancheria Spring is used to supplement production from the other Big Butte Spring supplies, when it is being used, it is important that it used continuously. MWC has indicated that an interruption to the Rancheria Spring production for longer than 10 minutes results in open channel flow in some sections of the BBS #2 transmission pipeline, which causes air problems. Therefore, the system should be capable of operating with backup power to limit failures to less than 10 minutes. Failures can occur from interruptions to line electrical power or faults with the UV system, among other causes.

A new UPS system will be installed in the UV Building to power the UV system and the I&C control panels. The UV Building will also have standby power provided from an existing 25kW generator located in the Pump Station Building. Additional work is needed to determine if the existing generator will be sufficient for running both pumps in the Pump Station and all components in the UV Building in a loss of power. Running a single pump during power loss is not acceptable because it would still result in air problems in the BBS #2 transmission pipeline.

5. **Fire Alarm System**

No fire alarm system is planned, subject to MWC’s approval and the Type 2 building permit process.
6. **Security and Surveillance Systems**

As MWC owns and controls the BBS property, no security or surveillance systems are planned. It should be confirmed with MWC whether a door entry alarm is desired.

7. **Lightning Protection**

Lightning protection is not required for this facility.

**Environmental Conditions**

All areas will be unclassified and non-corrosive. All instrumentation, enclosures, and panel components will be rated for such.

**Equipment Enclosures**

All interior enclosures will be NEMA Type 12 gasketed unless otherwise noted. Depending on the UV supplier’s standard enclosure, a different enclosure type may be used for the UV control panel.
1. **General Description**

This technical memorandum describes the design basis for the instrumentation and control (I&C) system for the Rancheria Spring Inline UV Treatment System in Medford, Oregon.

The memorandum presents the following information:

- Numbering system for equipment, valves, and instruments
- Control System description
- Instrumentation design criteria

2. **Codes, Standards, and Regulations**

The following organizations have generated standards that will be used as guides in assuring quality and reliability of components and systems, govern nomenclature, and define parameters of configuration and construction:

- Instrumentation, Systems and Automation Society (ISA)
- National Institute of Standards and Technology (NIST)
- Underwriters Laboratory, Inc. (UL)
- American Water Works Association (AWWA)
- National Electrical Manufacturer’s Association (NEMA)
- Occupational Safety and Health Administration (OSHA)
- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)
- Scientific Apparatus Manufacturer’s Association (SAMA)
- NFPA 79, Annex “D” Standards
- Institute of Electrical and Electronic Engineers (IEEE)
- National Electrical Code (NEC)

3. **Numbering System**

The tag numbering system will be discussed with MWC. Table 1-1 is provided as a means to list the approach for equipment, valves, instruments, panels, programmable logic controllers (PLCs), and motor control centers (MCCs).
### Table 1. Tag Numbering System

<table>
<thead>
<tr>
<th>Format</th>
<th>Tag Numbering</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment/Valve/Gate/Inline Flow Elements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UV reactor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actuated control valve on outlet line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buried manual isolation valve on inlet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed manual isolation valve on inlet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow meter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instruments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turbidimeter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLC Input/Output (I/O)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facility PLC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UV System PLC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Panels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allen-Bradley Control Logix or Compact Logix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UV System Control Panel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Control System

The I&C system will include the necessary process monitoring and control functions to create a robust and reliable system. It will consist of field-mounted instruments, local equipment, control panels, programmable logic controllers (PLCs), and communication networks. The I&C system at Rancheria Spring will be connected to the existing MWC SCADA system at the Chlorination Building via a fiber optic connection to be installed by MWC.

There will be sufficient local manual control, indication, and alarming to allow safe operation of the equipment and the Facility if there is a PLC or SCADA system failure. The I&C system will be configured to allow equipment and processes to be operated automatically or manually through the existing MWC SCADA system as selected by the operator.

5. Instrumentation and Controls Design

Motor Starters

No new motor starters will be installed as part of this project, and existing local motor starter control will not be modified. The existing motor starters have HAND/OFF/AUTO switches. These will be wired to the facility PLC and UV System PLC. When in HAND, the PLC will have no control over the pumps and operators will be able to start them using the START pushbutton on the motor starter. When in AUTO, the facility PLC or UV System PLC will be able to start or stop the pumps as required for the UV system.
PLCs and Locations

There will be a facility PLC located in the UV Treatment Building that will allow communication to the existing SCADA system located in the Chlorination Building. The PLC will be an Allen-Bradley ControlLogix or CompactLogix. The PLCs will use 120V discrete signals.

The UV package system will be provided with a microprocessor-based controller that will utilize 120V discrete signals. The UV System Control Panel will be located in the UV Treatment Building.

Uninterruptible Power Supply
A UPS will be provided to continue supplying the Facility PLC and UV PLC for up to 10 minutes during an interruption in power.

Environmental Conditions

All areas will be unclassified and non-corrosive, all instrumentation, enclosures, and panel components will be rated for such.

Equipment Enclosures

All enclosures will be NEMA 4.
1. **Purpose**

This section presents the mechanical basis of design and criteria associated with the UV facility at Rancheria Springs.

2. **Piping and Accessories**

All pipe, valves, and other components that come in contact with the process water shall be NSF 61 compliant for drinking water.

2.1 **Piping**

Process piping will be ductile iron using flanged fittings for the indoor section. The pipe string near the wall at the UV facility will have at least 3 feet of clearance to allow for maintenance.

The inlet, outlet, and piping within the building have been sized at 12-inches diameter. For the current maximum flow rate of 1400 gpm (2 mgd), this results in a velocity of 4 feet per second (fps). It is possible that MWC will replace the pumps in the future to increase production from Rancheria Spring, with a possible buildout flow rate of 2800 gpm (4 mgd). This would result in a velocity of approximately 8 fps, which is still acceptable, though at the high range. A more likely scenario, based on discussions with MWC, is an expansion to 2100 gpm (3 mgd), resulting in a velocity of 6 fps.

Sample lines will be PVC using solvent socket welds except where connection to threaded or flanged valves and equipment may require future disassembly. Samples will be analyzed for turbidity using an online analyzer, and grab samples will be collected for measurement of UV transmittance. The sample flow stream to the turbidimeter will be approximately 120 mL per minute. The plan is to route this waste flow to an outdoor gravel sump for dispersion into the soil.

2.2 **Pipe Supports**

Exposed piping will be supported using floor supports. The UV reactor may be supplied with the manufacturer’s standard support. Other needed pipe supports will be shown in standard details.

2.3 **Valves**

AWWA C504 type butterfly valves will be selected. We need to confirm with MWC regarding their preference for the valve and actuator type (make and model). An actuator that operates using single-phase power will be selected.
1. **Introduction and Purpose**

The purpose of this design report is to present the civil and yard piping basis of design for the proposed Rancheria Springs Improvements project.

2. **Applicable Codes, Standards, Regulations**

   - Oregon DEQ Construction Stormwater Erosion and Sediment Control Manual
   - Oregon Standard Specifications for Construction
   - 1200-CN NPDES Construction Stormwater General Permit
   - American Society for Testing and Materials

3. **Existing Topography and Survey**

The existing topography shown on the drawings was collected by Neathamer Surveying, Inc., and provided by the Medford Water Commission. The base map was produced with 1-foot contour intervals and identifies all above and below ground features found at the site. The available survey data is marginally sufficient for the project, as it extends only to near the fence on the north side, and the concept is to place the building in this area and relocate the fence farther north. However, in discussions with MWC, it was decided that proceeding without additional survey was an acceptable risk. MWC will locate trees not shown on the survey that may need removal. The base map uses the datums listed in Table 1.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Control Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Datum</td>
<td>National American Datum of 1983 (NAD 83)</td>
</tr>
<tr>
<td>Vertical Datum</td>
<td>National American Vertical Datum of 1988 (NAVD 88)</td>
</tr>
<tr>
<td>Grid System</td>
<td>Oregon State Plane Coordinate System, South Zone 3602</td>
</tr>
<tr>
<td>Units</td>
<td>Horizontal Units: International Feet</td>
</tr>
<tr>
<td></td>
<td>Vertical Units: U.S. Survey Feet</td>
</tr>
</tbody>
</table>
4. **Proposed Site Developments**

The proposed facility will be located north east of the existing pump station and the existing gravel driveway will be modified to include access to the facility from the entrance. Additionally, the perimeter chain link fence and propane tank will be relocated to accommodate for the proposed facility.

5. **Proposed Yard Piping Developments**

The proposed piping for the new UV Facility will connect to the existing 12-inch ductile iron pipe downstream of the existing pump station and upstream of the existing 30-inch transmission line. An isolation valve will be provided on the proposed inlet line to allow for pressure testing and ease of construction. A second isolation valve will be added to the above-ground pipe just prior to entry into the building, to allow for more convenient draining of the UV reactor for maintenance.

See the Process Mechanical BDR for discussion of pipeline velocities.

The buried pipe will be restrained joint, cement-lined ductile iron, 250 psi minimum working pressure. It shall be NSF 61 compliant for drinking water use.

The 2-inch pipe between the existing pump station and the existing propane tank will be rerouted to the proposed tank location. The location for this 2-inch pipe needs confirmation. It is our understanding that the material is Schedule 40 carbon steel.

6. **Staging**

Drawings will indicate that contractor cannot stage or conduct any activities east of the gravel access road in the vicinity of Rancheria Spring to protect the existing spring collection area.

7. **Erosion and Sedimentation Control**

Stormwater best management practices (BMPs) may include:

- Protecting existing vegetated buffers where possible
- Installing silt fencing along down slope perimeter of work limits
Architecture

Project Name: Rancheria Spring Improvements
Project No.: D31563004
Prepared For: Medford Water Commission
Prepared By: Erin Gray
Date: December 18, 2019

1. Codes, Standards and Regulations

All facilities will be designed to conform to the following architectural design-related codes, standards and regulations, as required by the local authority:

- Building Code: 2019 Oregon Structural Specialty Code (OSSC)
- Fire / Life Safety: 2019 Oregon Fire Code (OFC)
- Energy Code: 2016 ASHRAE
- Accessibility: 2019 Oregon Structural Specialty Code, Chapter 11 – Accessibility (OSSC) and in accordance with ICC A117.1

2. Code Compliance

2.1 Building Code Data

Table 1. Allowable Building Code Criteria for Height, Number of Stories and Area

<table>
<thead>
<tr>
<th>Building Criteria</th>
<th>Allowable for each Occupancy Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (OSSC Table 504.3)</td>
<td>F: 55 ft</td>
</tr>
<tr>
<td>Number of Stories (OSSC Table 504.4)</td>
<td>F-1: 2 stories</td>
</tr>
<tr>
<td>Allowable Building Area (OSSC Table 506.2)</td>
<td>15,500 sf</td>
</tr>
</tbody>
</table>

2.2 Fire Suppression Provisions:

No automatic fire suppression system is required (per OSSC 903.2.4). A fire extinguisher will be mounted near the building door.

2.3 Sanitary and Safety Provisions

If the selected UV system requires the use of cleaning chemicals, the need for a safety eyewash will be addressed by providing a portable unit. The building will not include a fixed safety eyewash/shower. This approach is recommended because the chemical amount, if one is used, is very small; however, the approach is subject to MWC’s review and approval.

The required plumbing fixtures (sink, toilet) are provided at the existing Disinfection Building. This building is located more than 500 feet from the planned UV Treatment Building. The distance can exceed 500 feet.
if approved through an exception to the Type 2 permitting process. MWC to obtain an approval for Exception 2902.3.3.

2.4 Energy Code Data

The energy code analysis will be updated throughout the design process and essential code data will be included for the building. Basic applicable data for building envelope requirements are provided in Table 2.

Table 2. Building Envelope Requirements

<table>
<thead>
<tr>
<th>Building Envelope Element</th>
<th>Required for Climate Zone 4C</th>
<th>Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roofs, Insulation Entirely Above Deck</td>
<td>R-30, CI</td>
<td>R-30</td>
</tr>
<tr>
<td>Walls, Mass</td>
<td>R-9.5 CI</td>
<td>R-11.4 CI</td>
</tr>
<tr>
<td>Slab-on-Grade Floors, Unheated</td>
<td>R-15 for 24 inches.</td>
<td>R-15</td>
</tr>
<tr>
<td>Doors, Swinging</td>
<td>U-0.370</td>
<td>R-7</td>
</tr>
<tr>
<td>Fenestration (Vertical – Fixed)</td>
<td>U-0.38</td>
<td>U-0.38</td>
</tr>
<tr>
<td>Fenestration Solar Heat Gain Coefficient</td>
<td>.36</td>
<td>.36</td>
</tr>
<tr>
<td>Air Barrier</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Notes:
1. Source: 2016 ASHRAE, Table 5.5.4
2. Project is in Medford, Oregon.
3. CI= Continuous Insulation

2.4.1 Energy Code Follow-Up Discussion

At the December 11th workshop conference call, the requirements for insulation of CMU construction was briefly discussed. In summary, previous editions of the Oregon Building Code allowed exception to ASHRAE energy requirements requiring continuous insulation in the building walls. For CMU buildings, this could be achieved by partially grouting and insulating all the open cells. This was in effect when the Rancheria Pump Station was constructed. Unfortunately, the most current code cycle eliminated this exception. The Oregon Building Code now defaults to ASHRAE 2016 requirements. This means that continuous insulation must be provided by use of a two-wall system with insulation between walls, externally applied insulation system, or an internal panel wall with insulation. Changing the CMU size from 8” block to 12” insulated block will not meet the 2016 ASHRAE Requirements.

Based on the workshop discussions and desire to keep the external appearance similar to the Pump Station, our recommendation is to provide an internal insulated wall system just inside the CMU wall. As we develop the design, we will consider durability and constructability as additional requirements for the wall system. In past projects, we have used panel wall systems which have been simple to install and maintain.

2.5 Accessibility

Process buildings are not required to be accessible (see OSSC Chapter 11, Section 1103.2.9). It has been assumed that MWC will not conduct public tours through the building; otherwise, additional accessibility requirements would need to be met.

3. Design Criteria

The UV Treatment Building will be designed to provide functional space appropriate for the processes and the equipment being housed. Space size will be determined by the process function, equipment size, and operator needs for access, egress, and ease of equipment maintenance.
3.1 Building Architectural Design

The building will be designed with forms, details, materials and colors consistent with the existing Pump Station. Response to climate and local environment will be met by conformance to ASHRAE requirements. The new UV Treatment Building will have the following characteristics:

3.2 Exterior Systems

Generally, exterior materials and finishes will be selected for low maintenance and corrosion resistance. Additionally, exterior envelope components will be evaluated and selected for energy performance. Major components will be as follows:

- Roofs: Sloped steel roof framing with sheet metal roofing.
- Exterior Walls: 8-inch load bearing concrete masonry units (CMU), integrally colored with clear sealer.
- Doors and Frames: Steel hollow metal with galvanized coating, factory primer, and field painted.
- Door Hardware: Heavy-duty mortise type; stainless steel.
- Signage: Safety, informational, and hazardous material signs will be provided as required by code, safety standards, and MWC standards.
- Colors: Will be selected to match the existing pump station building.

3.2 Interior Systems

Interior surfaces and finishes will be selected for appropriateness to the individual space. Consideration will be given to the need for washdown, corrosion resistance, slip resistance, light reflectance, comfort and maintenance. Major components will be as follows:

- Interior Walls: CMU, painted for light reflectance.
- Ceilings: Exposed roof framing and decking, painted for light reflectance.
- Floors: Concrete with clear sealer.
- Signage: Safety, informational, and hazardous material signs will be provided as required by code, safety standards and MWC standards.
- Colors: Painted white for light reflectance.
1. **Introduction**

This Basis of Design report outlines the codes and design criteria to be used for structural design of the Medford Water Commission (MWC) Rancheria Springs UV treatment facility.

2. **Codes, Standards, Regulations, and References**

The following codes, standards, regulations, and references will be considered as part of the design development. The latest edition of each code will be used unless a specific year is listed.

2.1 **General**

- Snow Load Analysis for Oregon, 4th Ed., November 2013, Structural Engineers Association of Oregon and the PRISM Climate Group of Oregon State University.

2.2 **Reinforced Concrete**

- American Concrete Institute (ACI) 318-14, *Building Code Requirements for Reinforced Concrete*.

2.3 **Masonry**


2.4 **Steel**


3. **Design Criteria**

The loading criteria are presented in Table 1.
### Table 1. Loading Criteria

<table>
<thead>
<tr>
<th>Loading</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dead Loads (D)</strong></td>
<td></td>
</tr>
<tr>
<td>Weight of Structure</td>
<td>Actual</td>
</tr>
<tr>
<td>Equipment</td>
<td>Actual</td>
</tr>
<tr>
<td><strong>Live Loads (L)</strong></td>
<td></td>
</tr>
<tr>
<td>Roof</td>
<td>20 psf Uniform/300-pound Point Load</td>
</tr>
<tr>
<td>Process Areas</td>
<td>200 psf</td>
</tr>
<tr>
<td><strong>Snow Load (S)</strong></td>
<td></td>
</tr>
<tr>
<td>Ground Snow Load</td>
<td>25 psf</td>
</tr>
<tr>
<td>Frost Depth</td>
<td>12 inches</td>
</tr>
<tr>
<td><strong>Seismic Lateral Loads (E)</strong></td>
<td></td>
</tr>
<tr>
<td>Site Class</td>
<td>Site Class D</td>
</tr>
<tr>
<td>Ss, Spectral Response Acceleration at Short Period</td>
<td>0.601 g</td>
</tr>
<tr>
<td>S1, Spectral Response Acceleration for 1-Second Period</td>
<td>0.308 g</td>
</tr>
<tr>
<td>R = Structural Response Coefficient</td>
<td>In accordance with ASCE 7, Table 12.2-1. R varies, see facility structural drawings</td>
</tr>
<tr>
<td>W = Total Seismic Dead Loads</td>
<td>Calculated per IBC methods</td>
</tr>
<tr>
<td>Seismic Importance Factor, Ie</td>
<td>1.25 Risk Category III</td>
</tr>
<tr>
<td><strong>Wind Load (W)</strong></td>
<td></td>
</tr>
<tr>
<td>Basic Wind Speed (3-second gust)</td>
<td>102 mph – Risk Category III</td>
</tr>
<tr>
<td>Wind Exposure</td>
<td>C</td>
</tr>
<tr>
<td>Risk Category</td>
<td>III</td>
</tr>
</tbody>
</table>

mph = miles per hour; NAVFAC DM = Naval Facilities Design Manual; psf = pounds per square foot.

### 3.1 Effective Seismic Weight

Effective seismic weight shall consist of structure self-weight, known equipment weights, and deadloads. For process areas, electrical rooms, and storage areas the effective seismic weight shall also include 25 percent of the live load.

### 3.2 Roof Live Loads

Minimum roof live load shall be 20 psf. Increase loads as required assuming primary drains plugged and water at the overflow elevation.

### 3.3 Roof Collateral Loads

The roof collateral load shall be 10 psf plus operating weight from any roof-mounted equipment. In process buildings, use a collateral load of 25 psf, unless there is a crane bay beneath the structure that would prohibit large amounts of process piping from being attached to roof members.

### 4. Material Design Standards

- **Concrete Design.** Concrete design for all structures will be designed in accordance with the ACI codes. Type II cement will be used to provide moderate sulfate resistance with a 28-day compressive strength of 4000 psi. Reinforcing steel will be ASTM 615 Grade 60.
• **Masonry Design.** Masonry will be designed in accordance with the TMS code. Concrete masonry with 2000 psi assembly strength shall be used.

• **Structural Steel Design.** Structural and miscellaneous steel members will be designed in accordance with the AISC *Steel Construction Manual*, 15th Edition. Unless shown otherwise, all framing connections will be bolted connections with high-strength bolts. W-sections shall be ASTM A992, while plates and other shapes shall be ASTM A36.

• **Metal Decking.** Metal decking will be International-Code-Council-approved.

5. **Facility Description**

5.1 **UV Treatment Facility**

The UV treatment facility is approximately 16’x27’ reinforced masonry building with a gabled roof. It houses an UV treatment process required for the potability of the water claimed from the springs. The lateral load resisting system consists of a steel roof deck diaphragm distributing seismic and wind forces to CMU shear walls, supported by a reinforced concrete slab on grade.

6. **Structural Observations**

*Structural observation*, defined as the visual observation of the structural system by a registered design professional for general conformance to the approved construction documents, shall be performed in accordance with the requirements of the 2019 Oregon Structural Specialty Code. The owner shall employ a registered design professional to perform structural observations and at the conclusion of the work included in the permit, the structural observer shall submit a written statement that identifies any reported deficiencies that have not been resolved.

7. **Special Inspection Requirements**

An owner-furnished special inspection shall be provided per the Oregon Structural Specialty Code. The registered design professional in responsible charge shall prepare a statement of special inspection as part of the contract documents that will be submitted with final design documents.
Building Mechanical

Project Name: Rancheria Springs Improvements
Project No.: D31563004
Prepared For: Medford Water Commission
Prepared By: Mike Dragon, Jacobs
Date: December 17, 2019

1. Purpose

This section of the Rancheria Springs Improvements Basis of Design Report (BDR) documents the applicable codes and standards and the building mechanical design criteria for the project’s new ultraviolet (UV) building.

2. Codes and Standards

The building mechanical design will conform to currently adopted codes and the latest editions of applicable standards. The following are the codes and standards applicable to the project:

- Oregon Mechanical Specialty Code
- Oregon Plumbing Specialty Code
- Oregon Zero Energy Ready Commercial Code
- Air Conditioning, Heating, and Refrigeration Institute (AHRI)
- Air Moving and Conditioning Association (AMCA)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) Handbooks
- ASHRAE 90.1 Energy Standard for Buildings except Low-Rise Residential Buildings
- National Fire Protection Association (NFPA)
- Occupational Safety and Health Administration (OSHA)
- Sheet Metal and Air Conditioning Contractor’s National Association (SMACNA)
- Underwriters Laboratories (UL)

3. Design Criteria

Outdoor Design Conditions

Weather data for the project is referenced from the 2017 ASHRAE Fundamentals Handbook. The closest weather station to Rancheria Springs is Rogue Valley International Airport. While the airport is at a lower elevation than the project site, this elevation difference is not considered sufficient to affect the design weather data. The following table summarizes the weather data for the airport and what will be used for this project. These temperatures will be used for sizing the heating, ventilating, and air-conditioning (HVAC) equipment.
### Project Weather Data

<table>
<thead>
<tr>
<th>Weather Data Location(a)</th>
<th>Rogue Valley International Airport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather Data Location Elevation</td>
<td>1,297 feet above mean sea level</td>
</tr>
<tr>
<td>ASHRAE Climate Zone</td>
<td>4C</td>
</tr>
<tr>
<td>Winter Design Temperature(b)</td>
<td>22.8°F dry bulb</td>
</tr>
<tr>
<td>Summer Design Temperature(c)</td>
<td>99.0°F dry bulb/67.1°F wet bulb</td>
</tr>
<tr>
<td>ASHRAE Mean of Extreme Annual Dry Bulb and Wet Bulb Temperatures</td>
<td>104.8°F dry bulb/72.1°F wet bulb maximum 17.5°F dry bulb/16.7°F wet bulb minimum</td>
</tr>
</tbody>
</table>

\(a\) Closest weather station to project site.
\(b\) ASHRAE 99.6% annual cumulative frequency of occurrence.
\(c\) ASHRAE 0.4% annual cumulative frequency of occurrence.

### 4. Building Mechanical Systems

There are two HVAC system approaches being considered for the project. The first would use a ventilation fan, discharge louver with a damper, intake louver with a damper, an electric unit heater, and mini-air-conditioning units in the UV control panel and the I&C panel. This approach leverages outdoor air for removing heat from within the UV building during the summer, similar to the system in the existing pump house. The ventilation fan would be sized to achieve a ten degree difference between the outdoor air temperature and the UV room temperature. For example, on a summer design day with an outdoor temperature of 99 degrees F, the UV room temperature would be approximately 109 degrees F. The electric unit heater provides freeze protection to the room, and it would be sized to maintain a minimum room temperature of 45 degrees F. The ventilation fan, discharge damper, and intake damper would be controlled by a wall mounted thermostat, and the electric unit heater would be controlled by its own wall mounted thermostat. Electronics can be sensitive to temperatures above 104 degrees F, and with the potential of the UV room temperature getting above this threshold, mini-air-conditioning units would be provided on the UV control panel and the I&C panel.

The second HVAC approach would be to use a ductless, split-system heat pump. This system consists of a wall mounted indoor unit, a grade mounted outdoor unit, refrigerant piping, and a condensate drain. This system would be sized to keep the UV room temperature at 85 degrees F in the summer and 45 degrees in the winter. With a summer room temperature of 85 degrees, the need for mini-air-conditioning units on the on the UV control panel and I&C panel would be eliminated. A wall mounted system controller would control the indoor unit’s operation. The indoor unit is equipped with a washable filter that would need routine maintenance.

The decision on HVAC approach will be driven by instantaneous power draw and MWC’s preference. The site has limited power supply, so the instantaneous power draw is an important factor.

There will be no plumbing systems such as potable water, non-potable water, floor drains, hose stations, eyewash, or backflow preventers for this project. There will be a turbidity analyzer in the UV room, and its sampling flow will require a drainage point. A dry well will be located along the exterior of the building where the turbidity analyzer flow will be routed to and drained. The condensate drain from the indoor unit of the heat pump system will also be routed to the dry well and drained.

No fire protection for the building is planned. MWC should confirm that this acceptable to the county through the Type 2 permit process.