



**VICE PRESIDENT FOR
UNIVERSITY OPERATIONS**
COLORADO STATE UNIVERSITY

Office of the Vice President for University Operations
318 Administration Building
6001 Campus Delivery Fort Collins, Colorado 80523-6001
(970) 491-5258
FAX: (970) 491-2254
<https://operations.colostate.edu>

DATE: February 19, 2026

TO: Members of the Colorado General Assembly Capital Development Committee

FROM: Brendan Hanlon, Vice President for University Operations & CSU System CFO

SUBJECT: CSU Laurel Village HVAC Replacement - Rationale and Institutional Safeguards

PURPOSE: To provide the Colorado General Assembly Capital Development Committee with a comprehensive rationale for the replacement of the Laurel Village HVAC system after approximately 12 years of service and to outline the institutional changes Colorado State University (CSU) has implemented to prevent similar failures in the future.

DISCUSSION

1. Existing System Issues, Root Causes and Remedies Sought: The Laurel Village HVAC system, comprised of Variable Refrigerant Flow (VRF) units installed during construction in 2013-2014, has proven to be unsafe, inefficient, and unreliable. Although originally designed by Cator Ruma & Associates around Mitsubishi VRF equipment, the substitution of a Samsung VRF system was accepted as a value engineering proposal after the bid in exchange for a savings to the project's HVAC system budget. This substitution was approved contingent upon the system functioning within the building's physical limitations, particularly the rooftop "sheds" where compressors are housed. However, major operational issues emerged as early as 2016. By 2017, 16 compressors had already been replaced - a staggering failure rate for a system with an expected 20-30 year lifespan. Subsequent investigations and a third-party study completed by Affiliated Engineers, Inc. revealed several critical deficiencies:

- **Residential Grade Equipment:** The installed equipment was residential grade, carrying a true-life expectancy of only 10-15 years rather than the 20-30 years verbally promised by manufacturers.
- **System Under Sizing:** The head-end equipment was found to be 20-30% undersized due to an assumed diversity factor (concurrent heating and cooling demand) that did not exist in practice. When combined with undersized terminal devices, the system was over 50% undersized for optimal design conditions.
- **Installation and Design Flaws:** Issues included poor refrigerant pipe routing, incorrect refrigerant/oil charges, and condensate leaks above ceilings.

In 2017, CSU sought formal resolution with the design engineer, general contractor, and manufacturer. However, the multifaceted nature of the failure - spanning design constraints, equipment substitution, and installation errors - created an accountability vacuum. Because each party attributed the system's failure to the others' specific scope of work, no clear line of liability could be established, leaving the University with no legal or financial recourse.

2. Remediation and Resiliency Efforts to Date: CSU has undertaken multiple efforts to stabilize the system and extend its utility. A Samsung technical team conducted a 2.5-day on-site inspection, confirming numerous installation and design issues. In 2018, CSU secured an extended warranty on compressors from Samsung, which provided a temporary measure of protection until its expiration in 2023.

Despite these efforts, the system has struggled to operate as maintenance teams manage widespread component malfunctions. The current strategy of reactive repairs is no longer sustainable, as the imminent failure of the VRF system will render the Laurel Village complex unoccupiable. Consequently, CSU is now pursuing replacement of the VRF system with a traditional 4-pipe fan coil system designed for a 60+ year life cycle that has been proven to provide long-term stability and excellent student comfort.

3. Institutional Changes and Future Safeguards: To ensure that such a failure does not recur, Colorado State University has enacted significant policy and procedural changes:

- **Prohibition of VRF Systems:** CSU has updated its Facilities Design and Construction Standards to explicitly ban the use of VRF HVAC systems on all future projects, based on their poor performance and questionable long-term reliability in campus applications.
- **Enhanced Value Engineering Proposal Scrutiny:** The Facilities Management department has refined a formal, rigorous process to scrutinize value engineering proposals. This process ensures that short-term credits or cost savings do not compromise the long-term integrity, maintenance, or safety of critical building systems.
- **Strategic Alignment:** Future systems must now strictly adhere to parameters for safety, reliability, and ease of maintenance while aligning with university energy and emissions goals. The proposed replacement plan utilizes a phased bond approach to maintain financial stability and housing affordability for students.

CONCLUSION: While the early failure of the Laurel Village HVAC system resulted from a combination of poor equipment selection, design errors, and sub-par installation, CSU has leveraged this experience to harden its standards. The transition to a robust 4-pipe hydronic system will provide a reliable, 60+ year, proven solution that protects the university's assets and its commitment to the student experience.