



Infrastructure



What **IS** Infrastructure....and what is **NOT**

IS Infrastructure...

- Building Restoration
- System Replacements
- Plumbing
- Electrical
- HVAC (air conditioning and heating)
- Roofing

Is **NOT** Infrastructure...

- Filters
- Individual component replacement
- Oil changes
- Service



Air Conditioning Is All About Absorbing and Rejecting Heat

No matter the type of air conditioner... it's all about absorbing and rejecting heat



Residential Window Unit



Residential Unit

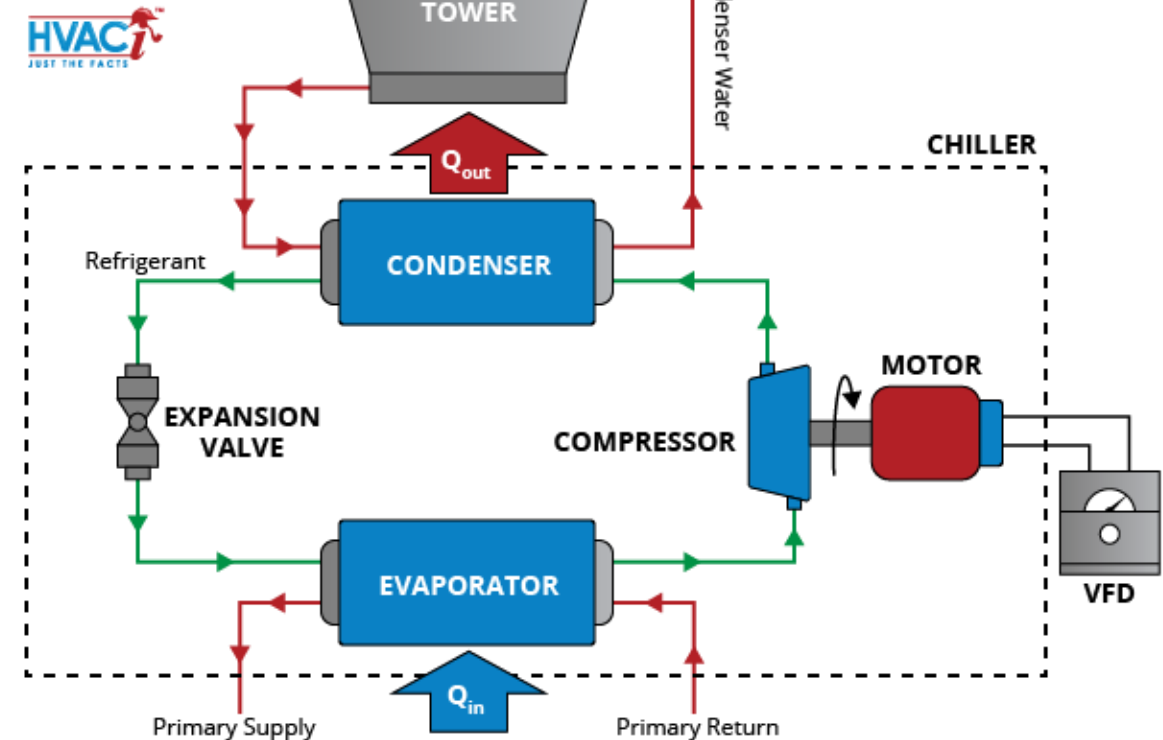


Ford Elementary

Chillers 101

- A chiller is refrigeration equipment that produces chilled water to cool inside spaces for a commercial air conditioning system.
- Chillers do this by absorbing and rejecting heat.
- Chillers absorb the heat from the water that is circulated to cool down the spaces in the evaporator.
- The heat generated by the compressor is absorbed and rejected in the condenser.
- There are two types of chillers:
 - Air Cooled
 - Water Cooled

**WATER-COOLED
CHILLER
DIAGRAM**



Water Cooled Chiller

- Water cooled chillers produce chilled water in the evaporator that is pumped to the air handlers to provide cooling.
- The heat produced by these machines is rejected through condenser water that is pumped to the cooling tower to reject the heat.



Grand Oaks HS



Ford Elementary

Water Cooled Chiller - Cooling Tower

Cooling towers reject the heat produced by the refrigeration cycle to produce chilled water for cooling.



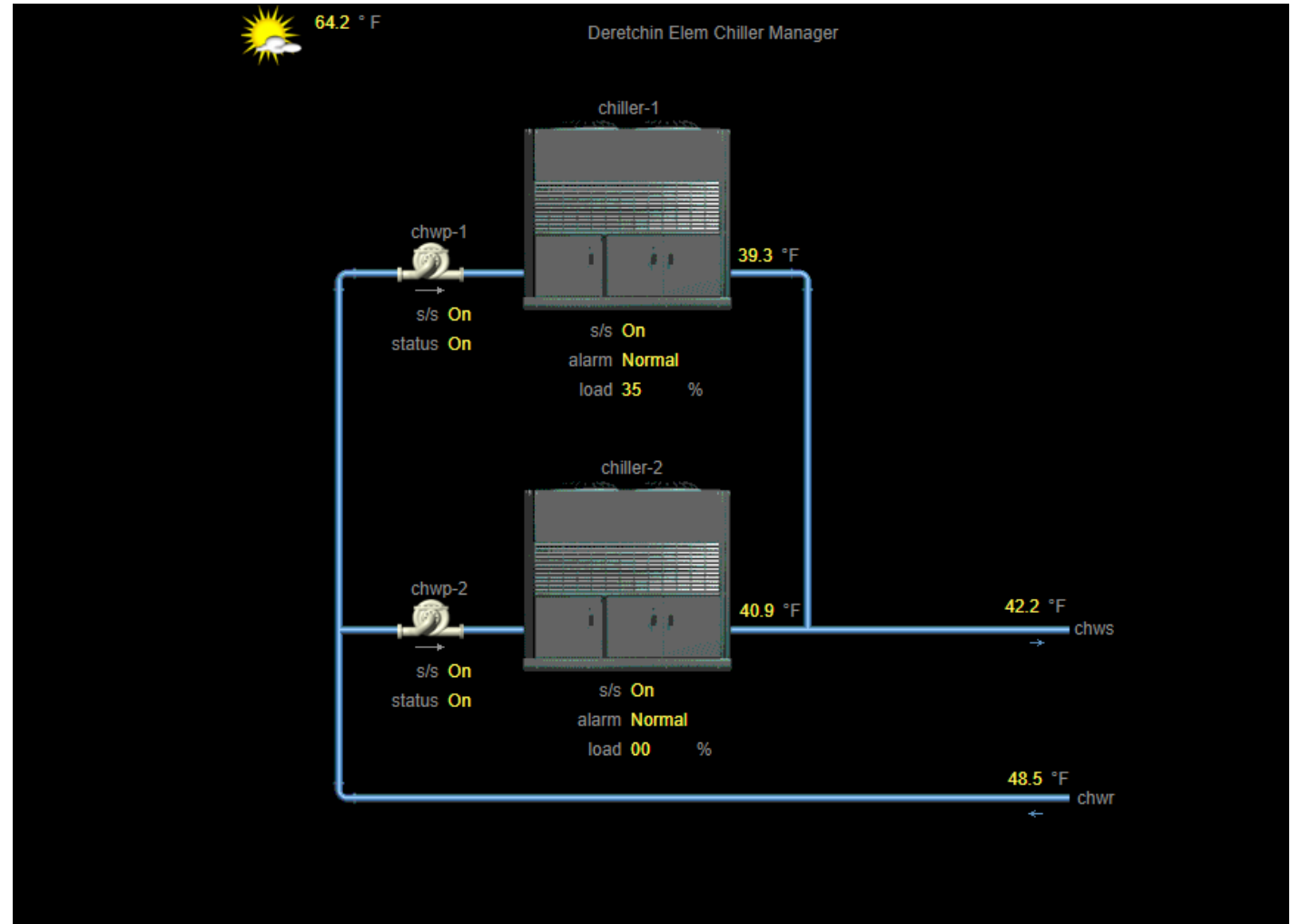
Grand Oaks HS



Hope Elementary

Air cooled chillers use the refrigeration cycle to produce chilled water that is circulated throughout the building to provide cooling. The heat of compression is rejected using the fans on the chiller. The outside unit at your home rejects the heat the same way.

Air Cooled Chiller



Air Cooled Chiller

The picture on the left is Grangerland Intermediate that you have heard mentioned previously. This is where we have ordered a chiller that will take nearly a year to get. The lighter colored chiller is a rental chiller. The one on the right is the oldest air-cooled chiller located at Ford Elementary. It was installed in 1998



Grangerland Intermediate



Ford Elementary

CISD has **184** chillers

- **24.46%** of CISD chillers are operating beyond their life expectancy



Life Expectancy of Chillers

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	45	24.46%
2024	60	32.61%
2025	78	42.39%
2026	90	48.91%
2027	97	52.72%

Boilers

Hydronic boilers function like your hot water heater at your house to heat water. But, instead of it providing water to your dishwasher, sink and bathtub the water is circulated to the air handlers to provide heat to instructional space.



Grangerland Intermediate



Ford Elementary

CISD has **154** boilers

- **45.45%** of CISD boilers are operating beyond their life expectancy



Life Expectancy of Boilers

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	70	45.45%
2024	78	50.65%
2025	83	53.90%
2026	96	62.34%
2027	106	68.83%

Air Handlers

An Air Handler Unit, or AHU, is an essential component of a commercial heating, ventilating, and air-conditioning (HVAC) system. It is used to regulate and circulate air in order to heat and cool the spaces in a building.



Oak Ridge HS original



Oak Ridge HS newly renovated

CISD has **76** facilities with air handlers.

- **24%** of CISD air handlers are operating beyond their life expectancy



Life Expectancy of Air Handlers

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	18	23.68%
2024	18	23.68%
2025	22	28.95%
2026	23	30.26%
2027	28	36.84%

Kitchen Cooler/Freezers

Walk-in coolers and freezers are very large, insulated, enclosed spaces used to store and/or display refrigerated or frozen food or other perishable goods. They are used primarily in the food service and food sales industry.



Hailey Elementary



Hailey Elementary



Cryar Intermediate

- **55%** of CISD kitchen coolers are operating beyond their life expectancy



Life Expectancy of Kitchen Coolers

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	33	52.38%
2024	35	55.56%
2025	38	60.32%
2026	40	63.49%
2027	43	68.25%

- **53%** of CISD kitchen freezers are operating beyond their life expectancy



Life Expectancy of Kitchen Freezers

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	33	53.13%
2024	39	60.94%
2025	40	62.50%
2026	41	64.06%
2027	42	73.44%

Roofing

The primary goal of a roofing system is to get the water off the roof as quickly as possible. The difference between the two is not only the color of the roof but the condition of the roof is obvious.



Hope Elementary that was completed in 2022



Lamar Elementary
The roof was last replaced in 1991

CISD has **198** building roof sections

- **24%** of CISD roofs are operating beyond their life expectancy



Life Expectancy of Roofs

Current Unit's Year of Expiration	# Beyond Life Expectancy	% Beyond Life Expectancy
2013 and 2023	48	24.24%
2024	57	28.79%
2025	67	33.84%
2026	74	37.37%
2027	81	40.91%

District Infrastructure Total Need

Chillers	Boilers	Air Handlers (campuses)	Kitchen Coolers	Kitchen Freezers	Roof (sections)
97	106	28	43	43	81
Total Cost \$222,000,000 (January 2023 pricing)					

