

# Thornton Benchmarking Analysis

## Commercial, Industrial, and Institutional Indoor Water Use

### CASE STUDY: ADAMS 12 FIVE STAR SCHOOLS



**Category:**  
School District



**Location:**  
Thornton, CO



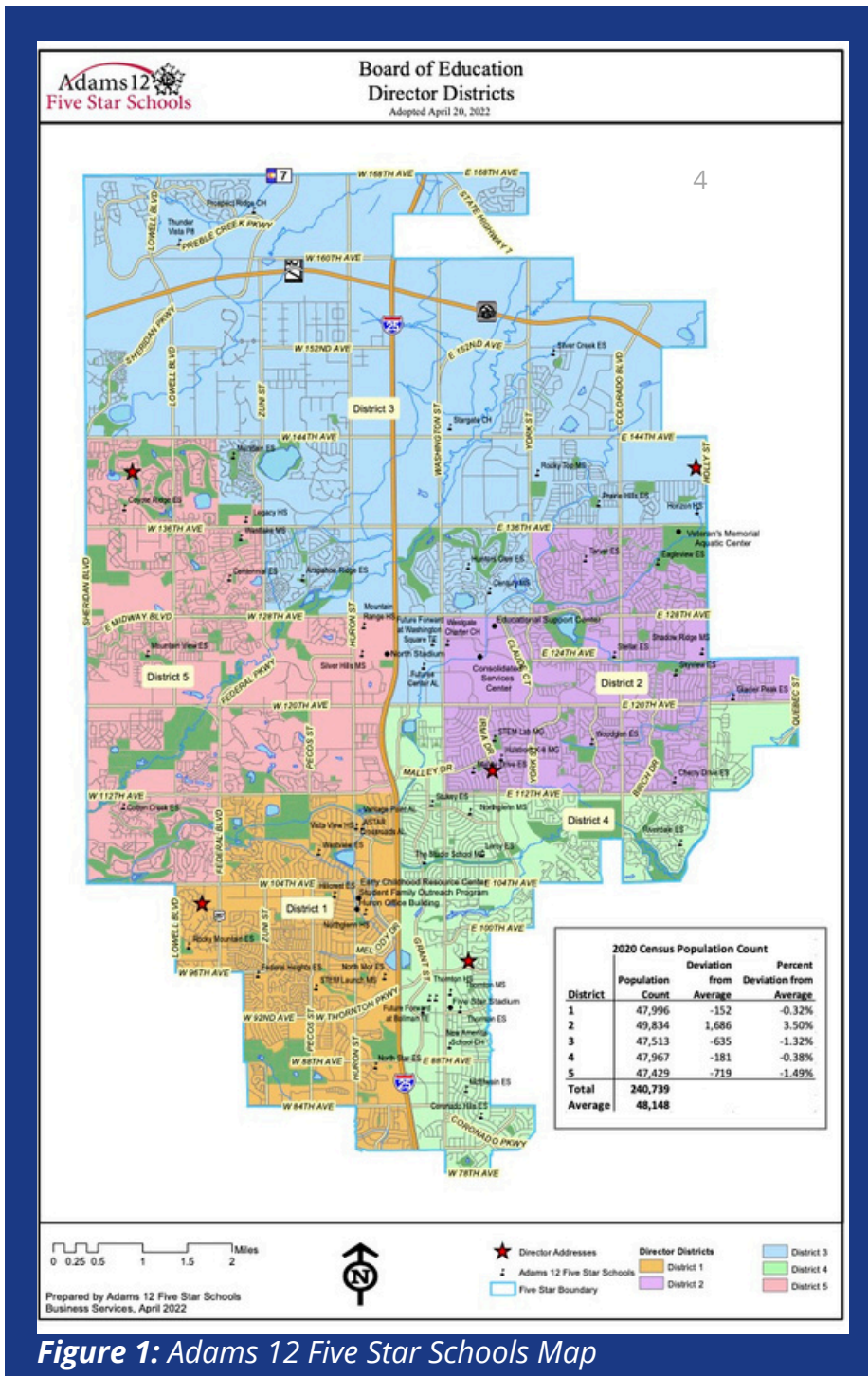
**School Building Size Range:**  
Approximately 25,000 to 310,000 square feet



**Indoor Water Use Range:**  
Approximately 48,000 to 1.2 million gallons per year  
1.3 to 20 gallons per square foot annually (indoors)



## BACKGROUND



**Figure 1: Adams 12 Five Star Schools Map**

Adams 12 Five Star Schools is located on the northern tier of the Denver metropolitan area, the district serves five cities: Broomfield, Federal Heights, Northglenn, Thornton and Westminster. In addition, the Five Star District boundaries include portions of two counties - Adams and Broomfield. With approximately 60 buildings covering 5 million square feet, the district accommodates around 35,000 students and employs 4,000 staff members. The City of Thornton hosts the highest concentration of district facilities, with 20 schools: 12 elementary schools, 5 middle schools, and 3 high schools spread across Director Districts 1, 2, 3, and 4 (**Figure 1**).

## WATER USE PROFILE

- Schools were the 18th most intensive indoor water users of the 22 Thornton commercial water use categories considered, with a median use rate of 6.8 gallons per square foot annually.
- It is estimated that only 12% of water use at schools is indoor use, suggesting that improving outdoor water conservation practices may result in the greatest returns.

## WATER CONSERVATION AND SUSTAINABILITY EFFORTS

Adams 12 Five Star Schools is dedicated to sustainable practices, particularly in conserving water and energy both indoors and outdoors. This commitment is evident through various district-wide initiatives aimed at reducing water usage. For instance, they have installed EPA WaterSense fixtures, including low-flow toilets, sink aerators, and bottle fillers, to replace leaky bubblers in most buildings. Additionally, the district is upgrading outdated irrigation systems with more efficient alternatives and replacing high-water-use turfgrass with low-water native grass and artificial turf in sports fields (**Figure 2**).

Another example of water efficiency success is the car wash efficiency team that has been in place since 2021 to improve water and energy efficiency at the school district and city combined vehicle wash. Efforts have included replacement of old spray nozzles, seasonal changes to car wash operations, monthly data analysis, and the addition of a variable frequency drive (VFD) water pump. These efforts have reduced water usage by 26% in 2023 from 2021 water usage.



**Figure 2:** Adams 12 Five Star School District Building with Native Grass

A significant part of the district's strategy involves engaging the community in these efforts. Many schools participate in water festivals and host educational events to promote water conservation. The district has also made strides in monitoring water usage more effectively by collaborating with the City of Thornton to upgrade equipment, apply for water rebates and grants, and integrate real-time water tracking data systems. These combined efforts underscore the district's commitment to sustainability and resource conservation, and the position of K-12 schools and colleges as the fifth least intensive water use category among commercial, industrial, institutional and multifamily users reflects this as well. However, this study is limited to indoor use. Because schools typically maintain large sports fields and outdoor areas, a relatively low proportion of their total water use is indoors – only about 12%. When accounting for both outdoor and indoor water use, schools are one of the higher water use categories in Thornton.

## CHALLENGES AND OPPORTUNITIES

Adams 12 Five Star Schools faces several water usage challenges, primarily due to its aging infrastructure. Old irrigation systems and outdated buildings contribute to inefficiencies and higher water consumption, with incidents like frozen and burst pipes during cold weather events causing significant water loss and damage. Currently, water usage data is collected monthly, and can result in leaks going undetected for extended periods. Additionally, some schools use significantly more water than others, highlighting opportunities for targeted water efficiency improvements, such as [EPA WaterSense products](#).

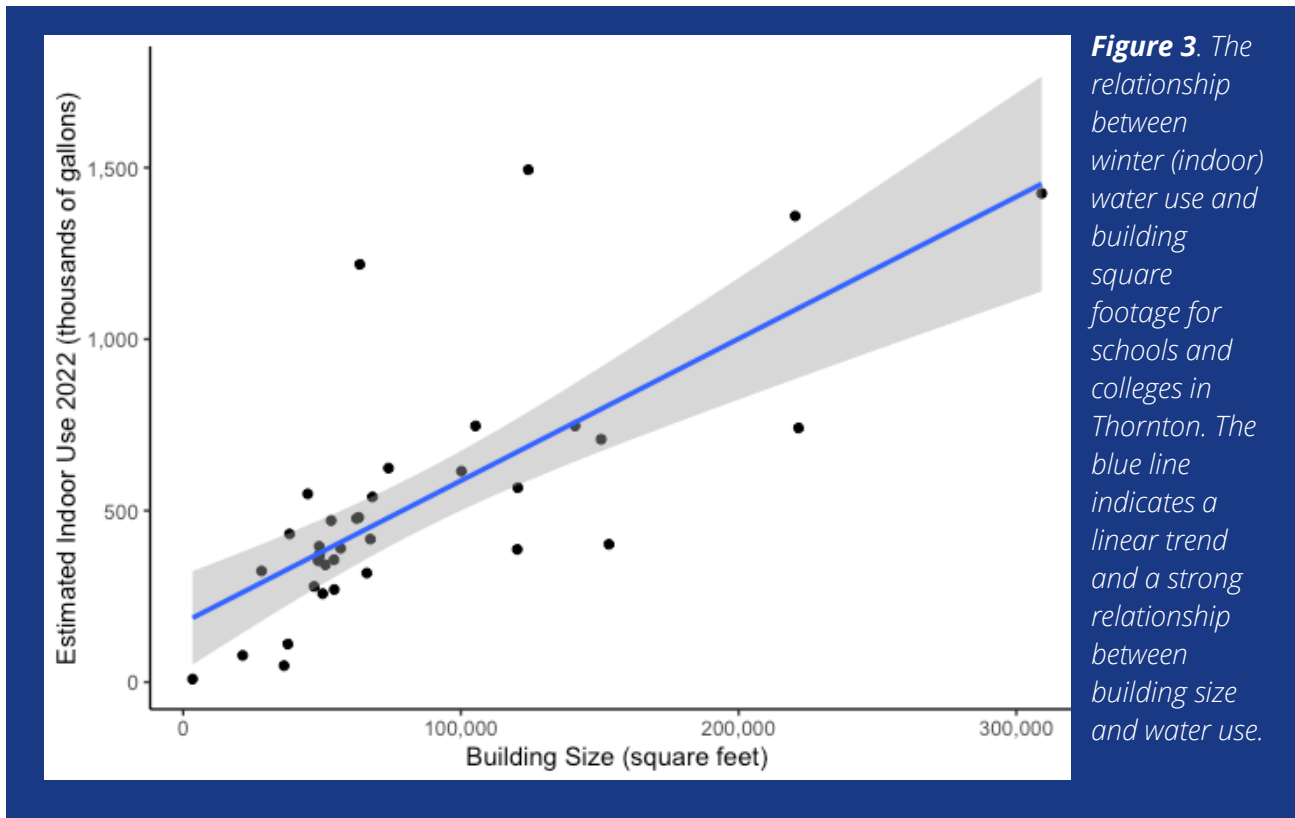


Despite these challenges, the district has numerous opportunities to enhance its water management. In November 2024, voters approved to pass an \$830 million bond which allows an opportunity to upgrade aging infrastructure as well as adding artificial turf on sports fields. The district is also working with the Colorado Water Conservation Board to identify opportunities for master planning of its water conservation efforts. Moreover, the City of Thornton is upgrading and installing advanced metering infrastructure (AMI) meters across its customer base, including the district. This technology will provide real-time water use data, enabling better management and reducing water loss due to inefficiencies and leaks.



## BENCHMARKS

Benchmarks were developed for schools in Thornton using indoor water use estimates based on 2022 City of Thornton billing data. While a single year of data means that this benchmark is best viewed as a starting place, the data allows for the comparison of schools in Thornton, including both Adams 12 Five Star Schools and those of other school districts. Linear regression revealed a strong relationship between yearly indoor use and building size ( $p < 0.001$ ,  $R^2 = 0.60$ ) for K-12 schools and colleges in 2022, suggesting that finished square footage is a good predictor of water use for these users. A majority of the representatives in the benchmark were Adams 12 Five Star Schools.



The median K-12 school or college building in Thornton used an estimated 6.78 gallons of water indoors per square foot annually. High users (above the 75th percentile) used 8.0 or more gallons per square foot indoors annually, while low users (below the 25th percentile) used 5.0 or fewer gallons per square foot indoors annually. Note that these estimates were obtained using winter use only, and as a result may not be completely accurate due to schools' typical pattern of lower indoor water use during the summer, when students are not present. However, because a consistent method of estimation was used across all schools, the values obtained can be compared against one another.

## RECOMMENDATIONS AND NEXT STEPS

To further improve water conservation efforts of Adams 12 Five Star Schools, several recommendations and actionable next steps are proposed. First, the district could prioritize participation in Thornton’s water rebate and grant programs, which provide financial and practical support for upgrading toilets, installing irrigation controllers and rain sensors, and replacing non-functional turf with water-wise plants – especially at facilities that have not yet implemented these upgrades. In addition, the city is working with Adams 12 Five Star Schools and other commercial customers on customized water rebate programs for specialized water efficiency projects, for example hydrometers and master meters on irrigation systems to reduce water lost to sprinkler main line breaks. These initiatives can significantly reduce water consumption and costs, thereby optimizing water efficiency.

Additionally, continuing to expand educational initiatives around sustainability can further engage students, staff, and the community. By aligning curriculum standards with sustainability goals and increasing participation in water conservation related initiatives, the district can foster a culture of environmental stewardship among the students and staff. For example, with real-time water tracking data in the future through an AMI system, Adams 12 Five Star Schools could create visuals and tailor educational initiatives to be easily digestible for students and staff (e.g., gallons of water use per student per day).

Collaborating with external partners, including the City of Thornton, NGOs, and other organizations, will provide additional resources and expertise to support these initiatives. Additionally, continuing to explore energy performance contracts, as a means to pay for combined energy and water focused projects, can offer both financial savings and environmental benefits. This type of financing mechanism can help the district achieve its sustainability goals in holistic and effective way. By implementing these steps, Adams 12 Five Star Schools can make substantial progress in their water conservation efforts, promoting a more sustainable future for the entire community.

