



Anoka-Hennepin Independent School District



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Company Background

Anoka Hennepin Independent School District was founded in 1952 and served around 4,000 students at that time. Through the years, the district has expanded to encompass 172 square miles. Home to 24 elementary schools, 6 middle schools, and 5 high schools, the Anoka-Hennepin district is now the state's largest school district and provides a quality education to roughly 38,000 students.



**ANOKA-HENNEPIN
SCHOOLS**
A future without limit

"Engineering is the tool that allows me to pursue my life-long passion of leaving the world better than how I found it. My future will benefit greatly from having learned how to develop, perform, and analyze logistically and financially efficient experiments and solutions that promote environmental health and conservation." ~ TG

football, baseball, lacrosse, and soccer, along with many other events. The district has dramatically reduced its water usage over the past several years through the implementation of rain and soil moisture sensors; however, there are opportunities for further reduction. The majority of turf watering is done between May and September, and roughly 21 inches of water is required to supply an average of one inch per week to the turf over this time frame. With an average of about nine inches of rain during the growing season, the district currently has to add about one foot of water to all of their fields to meet their average benchmark of one inch of water per week.

Project Background

Anoka-Hennepin's 35 school properties use a combination of municipal and well supply water to irrigate approximately 243 acres of landscape (as of 2015), including 125 athletic fields. Athletic fields are spray irrigated by a variety of condition-controlled systems using rotary spray heads configured in zones. Different soil conditions affect the effectiveness of the watering plan.

The goal of the project was to analyze and prioritize water conservation opportunities at school properties and fields, collect data, conduct turf grass health assessments, develop watering protocols, and generate recommendations to improve turf safety while also reducing water use. Another aim was to help with mapping and documenting irrigation locations.

Incentives to Change

Anoka-Hennepin has an irrigation conservation goal of reducing irrigation water by 20% over five years. Currently, the district uses over 106 million gallons of water annually to irrigate 23 schools and maintain healthy turf at its athletic fields used for sports such as softball,



SOLUTIONS

Reduce Watering of General Use Areas by Half

The district has 352,380 square feet of irrigated turf that has been identified as general use turf. The use of each field varies from site to site. On some sites, there is turf that is irrigated, but is never used for high-profile events such as sporting competitions. Some examples include fields at elementary schools or green spaces that are out of public view. There are also many sites in the district that sustain green turf all summer long without being irrigated at all. By comparing the hydraulic conductivity (how easily water passes through the soil) of sites that are not irrigated to that of general use areas of irrigated sites, areas with potential for improvement were identified. These are areas that could sustain turf with less water. By reducing the water to these areas by half, there would be an average reduction of 1,318,000 gallons of water per year which translates to \$23 in cost savings per year.

Eliminate Water Added to General Use Areas

This is a tentative recommendation contingent on the results of the initial recommendation to reduce watering of general use areas by half. After the initial 50% reduction has been implemented and its impact has been observed and analyzed, the district could then decide to eliminate watering of the general use sites entirely. Since the soil conditions of the selected areas are comparable to those of sites that are not irrigated, this change is thought to be feasible. Eliminating watering of these areas would save an additional 1,318,000 gallons of water per year, resulting in \$45 saved annually.

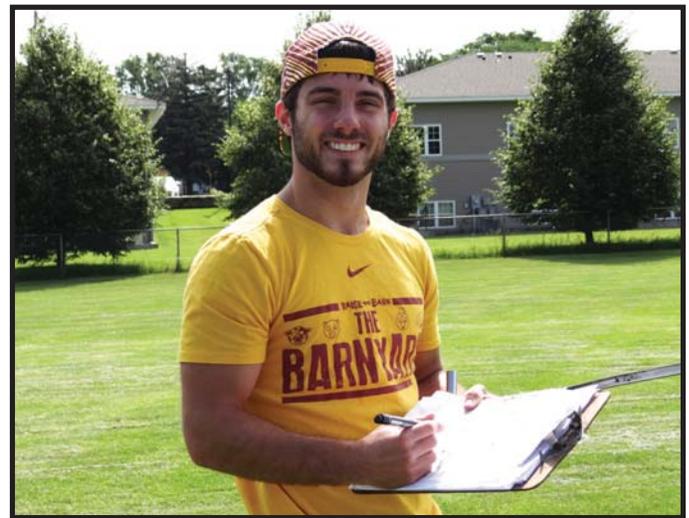
Reduce Water to Over-Watered Areas

In total, 414,720 square feet of turf has been identified as over-watered. This is because the soil drains water slowly and the roots of the turf have not needed to expand deep into the soil due to the abundance of water. It is recommended that the district reduce the amount of water supplied to these fields so that the turf can establish deeper roots and water usage can be optimized. Due to time and material limitations, the exact water demand of

the turf was not determined, but recommendations and corresponding savings were provided in increments. The most conservative change is a 5% water reduction, which results in a savings of 155,000 gallons per year.

Aerate Champlin Park Baseball Field/Install Moisture Sensor

Champlin Park High School's baseball field is about 142,540 square feet. The field was determined to be over-watered because it has very low water infiltration and shallow turf roots. The Champlin Park football field, which is directly next to the baseball field, has been deep-aerated, and its infiltration rate is now over forty times better than that of the baseball field. It is recommended that the district aerate the baseball field so that it drains water similarly to the football field. After aeration, it is



recommended that moisture sensors be installed in the baseball and football fields, so that watering will stop once fields receive the proper amount of water. Research done by the manufacturer shows an average water savings of 40%, which equates to 745,000 gallons and \$13 saved annually.

Recommendation	Annual Reduction (Gal)	Annual Savings*	Status
Reduce watering of general use areas by half	1,318,000	\$23	Recommended
Eliminate watering of general use areas	2,636,000	\$45	Tentatively recommended
Reduce water to over-watered areas (5% reduction)	155,000	\$3	Recommended
Aerate champlin park baseball field/install moisture sensor	745,000	\$13	Planned/recommended

*Annual savings come from avoided water costs from Anoka-Hennepin's well-water sources. Does not include potential electric savings from water pumping.