Reading High School – Reading School District

Summary Narrative:

Reading Senior High School (RHS), a 9–12 public high school in Reading, Pennsylvania, was established in 1927 with an enrollment of 4,796 students in 2023-24. The total minority enrollment is 96.2%; 86% of students are economically disadvantaged; 27.4% of these students are English-Language Learners; 18% of students are designated as special education learners; 95% of students are from low income families, and 8% are immigrants. All of these factors make RHS an extremely diverse learning environment.

RHS is continuously undergoing a variety of projects to improve the school's sustainability initiatives. RHS has reduced its GHG emissions and increased its energy efficiency by replacing boilers, added new doors and windows with improved insulation, and updated their HVAC system to increase energy efficiency from 60-70% to 90%. Additional cost-effective energy efficiency improvements include the replacement of incandescent and fluorescent bulbs with LEDs. To date, RHS has replaced 397 incandescent fixtures with LEDs in the hallways, gym, cafe, and exterior of RHS has reduced total wattage input by 49,557 Watts. RHS plans to install new electronic controls for each classroom in 2024-25.

RHS has improved its water quality, efficiency, and conservation by testing for lead, chlorine, and Legionella and has installed 6 water refill stations. RHS has approximately six water refill stations, some of which have been converted to drinking fountains. RHS is also in the process of replacing older toilets with water efficient flushing systems which have options for liquids or solids. The energy efficient fixtures will be replaced in the Spring of 2024.

RHS has reduced its solid food waste production by using a food pulper. The School recycles e-waste, batteries, lightbulbs, and scrap metal.

RHS has increased the educational and ecological uses of its grounds. Many students walk to school. RHS teachers and students transformed an interior courtyard into an outdoor classroom with pollinator gardens, raised beds, compost bin, pond, and art murals. RHS achieved two certifications (bronze and silver) as an Eco School. The School has hundreds of trees on the campus. In 2023, the School received status as a Level 1 Arboretum with a "Tree Tour" accessible to the public.

RHS offers health and wellness support to students and families by having certified school nurses, social workers, and guidance counselors on staff, and partnering with outside organizations for substance abuse, mental health, and reproductive health services. RHS provides free breakfast and lunch to all students, and partners with Helping Harvest to provide food for students in need on weekends. RHS partnered with a Health Resource Center to educate students about reproductive health, healthy relationships, and good decision-making. RHS supports students and their families through health and wellness

fairs, free vaccines, and vision programs. RHS encourages outdoor physical activity by holding physical education classes and a Marine-affiliated JROTC program outside, weather permitting.
RHS integrates environmental and sustainability education into its curriculum, projects, and activities. Students learn about environmental issues and solutions through various subjects, such as English, history, biology and environmental science. RHS also uses the outdoor classroom and the Arboretum as learning spaces for students to explore nature and ecology. Students participate in field trips to Nolde Forest. They germinate seeds in their greenhouse and nurture plants for sales through the Ecology Club. Students participate in STEM activities such as water quality testing using the courtyard's pond, Trout in the Classroom (where they raise and release trout in a nearby stream) and run the Greenhouse. Students designed outdoor furniture (which was then built by Reading's Career and Tech students for the courtyard). Students have opportunities to join clubs, go on field trips, and participate in internships related to sustainability (at Nolde Forest). RHS uses its courtyard as a classroom for environmental and sustainability learning across disciplines. These experiences develop in students the habit of caring for the earth and inculcate a curiosity that leads to environmental competence.

Pillar 1 Narrative:

Reading Senior High School (RHS), a 9–12 public high school in Reading, Pennsylvania, was established in 1927 with an enrollment of 4,796 students in 2023-24. The total minority enrollment is 96.2%; 86% of students are economically disadvantaged; 27.4% of these students are English-Language Learners; 18% of students are designated as special education learners; 95% of students are from low-income families, and 8% are immigrants. All of these factors make RHS an extremely diverse learning environment. The School is known as the "Castle on the Hill" due to its distinctive architecture. RHS has made strides in reducing its greenhouse gas emissions (GHG) and improving its buildings and grounds to accommodate a diverse student population.

Greenhouse Gasses and Energy

Reading High School (RHS) has implemented and increased the efficiency of various energy systems.For example, RHS has replaced boilers, added new doors and windows with improved insulation, and is updating their HVAC system to increase energy efficiency from 60-70% to 90%.

Additional cost-effective energy efficiency improvements include the replacement of incandescent and fluorescent bulbs with LEDs. To date, RHS has replaced 397 incandescent fixtures with LEDs in the hallways, gym, cafe, and exterior of RHS has reduced total wattage input by 49,557 Watts. This transition has provided numerous financial benefits including rebate opportunities. Each classroom also has occupied sensor lighting to reduce unnecessary energy usage. RHS conducted an energy audit more than 5 years ago and has an arrangement with MET-ED, a local electric company.

RHS is looking to replace its HVAC system in 2024-25. The HVAC and Controls Project will install new electronic controls for each classroom to become more energy efficient. In addition, all classrooms will have new LEDs in 2024-25. Energy savings for this lighting retrofit is estimated to be $20,914.00.

Water

RHS has worked to improve water quality, efficiency, and conservation. For example, water is tested by Element Environmental at
least once a year for lead, chlorine, and other chemicals. If lead is detected, water is replaced within a day.
Water treatment for the HVAC system is conducted by Water Treatment by Design, which tests for Legionella. If Legionella is found, the system is flushed with chlorine. The HVAC and Controls Project will increase isolation valves, reducing water wastage by discontinuing the process of draining the system with treatment chemicals.
In addition, RHS has approximately six water refill stations, some of which have been converted to drinking fountains. RHS is also in the process of replacing older toilets with water efficient flushing systems which have options for liquids or solids The energy efficient fixtures will be replaced in the Spring of 2024.

Waste

RHS is working to reduce its solid, food, and hazardous waste production. For example, food waste is collected in a food pulper (biodigester) which transforms the food waste into sludge.
RHS has processes that allow for safe disposal of solid and hazardous wastes. Element Environmental picks up and disposes of hazardous waste (i.e. asbestos). RHS uses Sycamore International for e-waste recycling, an environmentally-friendly Information Technology Asset Disposition company. RHS recycles used batteries and lightbulbs at Batteries Plus Bulbs and Interstate Battery. RHS also collects scrap metal and transports it to Laurel Recycling.

Also, cleaning chemicals, which are uniform in every building, reach Materials Safety Data Sheets (MSDS) standards and are monitored by Element Environmental. RHS uses LEED certified cleaning products distributed by Cintas for bathrooms including tile and floor cleaner, handsoap, floor finish, paper towels, disinfectant, and toilet paper.

Transportation

RHS has expanded use of alternative transportation and energy-efficient options. The majority of RHS students walk to school and some students take the bus to school (i.e. students who have special needs, reside over 2 miles away from school, or have to cross dangerous roadways).

RHS students have also been redistricted periodically, which often reduces the amount of buses in use as students change schools based on fluctuating class sizes. Some students

also take public buses and utilize a program through local bus company BARTA where students have access to free or discounted bus passes. The campus houses 2 bike racks to encourage students to bike instead of drive or bus to school.

Grounds

RHS has developed methods to increase the educational and ecological uses of its grounds. The school's 19+ acre property including Hampden Park has plenty of green space for teaching.

RHS has converted a formerly unused, vacant interior courtyard into an outdoor classroom surrounded by pollinator gardens, raised beds, compost bin, pond and art murals (see RHS's responses to Pillar 3 which discusses this in more detail). The furniture for the outdoor classroom was built by students from the Reading Muhlenberg Career and Tech Center. Discarded roof tiles from a nearby elementary school were "upcycled" to become the floor tiles for the outdoor classroom section. The transformation of the interior courtyard led to RHS achieving a bronze-level certification as an Eco School through the National Wildlife Foundation program.

The transformation of the courtyard inspired other teachers to continue to "green" the campus. In April 2023, students, faculty, administrators and community partners celebrated Arbor Day at RHS. Students had been studying the deciduous and coniferous mature trees on campus and they created a "Tree Tour" with tree signs and a map to provide background tree information focusing on 50 trees. The City of Reading and Tree City USA donated 28 new trees which were planted on campus. RHS has received accreditation as a Level 1 Arboretum through ArbNet (May 2023) and a Silver Award at an Eco School for their work.

Looking ahead (anticipated date: Fall 2025), RHS will be building a satellite campus 4 blocks from the main campus with opportunities to incorporate environmentally sustainable practices into the plans. Plans include a greenspace and a STEM-geared program.

Pillar 2 Narrative:

Environmental Health Program

Over the last few years, Reading High School (RHS) reimagined their interior courtyard to transform the formerly unused space into a viable outdoor classroom with plants, a pond, raised garden beds, and tables and chairs for students to have class outside. In the 2022-23 school year, 16 subjects used the outdoor classroom for a total of 190 hours and 30 minutes (254 periods).

Nutrition and Improved Access to Healthy Foods In and Out of Schools

RHS supports nutrition and food access both in and out of school through free meal programs. All students in the Reading School district are eligible for a free breakfast and lunch to improve nutrition and access to healthy food.
Helping Harvest, a non-profit food bank, provides kids in need with a bag or box of food to take home for the weekend. Approximately

6% of families at RHS receive food
through the Helping Harvest program.
Outdoor Physical Activity
Reading High School encourages outdoor physical activity through Physical
Education classes and a Marine affiliated JROTC program.
Weather permitting, all daily Physical Education classes occur outside on the school grounds. RHS uses the field hockey field, track area, soccer field, tennis courts, and the park area for outdoor student activities. Each student must reach 1.5 credits of physical education and 0.5 credits of health in order to graduate.
RHS's Marine affiliated JROTC promotes citizenship, fitness, discipline, and service to the community. Currently, 375 students at RHS actively participate in the JROTC program.

Health Services, Counseling, Psychological and Social Services

RHS has 3 full time certified school nurses as well as 10 social workers to support student mental/emotional health and well-being. In addition, 9 guidance counselors work closely with students to meet their academic and emotional needs, help students complete their graduation requirements, and support students with further education or job placements.
RHS also partners with outside organizations to provide students with extra support. The SAP (Substance Abuse Program) partners with the CARON foundation to complete SAP assessments and recommend areas of treatment to provide adequate support to the students and families. CARON offers classes on a variety of health and safety topics (ex: vaping). Outside counseling is provided by Malvern Therapy Associates by licensed therapists and is offered on the campus.
In addition, RHS hosts weekly, district wide vaccine programs that provide vaccines to all students in the school district through the age of 18.

Health Education

The Reading School District partners with co-county wellness to provide a Health Resource Center (HRC) for the students during the school day. During the school year, the HRC provides students with education about abstinence, reproductive health, healthy relationships, and good decision making. The program stresses abstinence as the only 100% effective way to prevent pregnancy, HIV,
and STDs.

The HRC also offers students the opportunity for individual level counseling to answer questions and provides tools to prevent negative health outcomes. For services that the HRC does not provide, such as pregnancy testing and STD testing and treatment, the HRC

refers students to other local agencies.

Family and Community Involvement

Reading High School supports students and their families through many services that other schools don't have, such as free vaccines and vision programs. RHS provides students with new glasses throughout the year through a partnership with New Eyes for the Needy. Each school year, RHS hosts two clinics where students are seen by an eye doctor.

The school offers health and wellness fairs that are open to the community and staff. For example, this Fall, a "Back to School Bash" provided community health and wellness agency information and free vaccine programs. Berks Community and Health started Wellness of Wheels, where they provide physicals for students.

In addition, the Reading School District participates in the Vision to Learn program where students can "Opt In" to have their vision checked.

The District also partners closely with Berks Community Health Center which meets the medical, social service, and dental needs of

patients of all ages. Berks Community Health Center includes 3 different doctors' offices which have all-inclusive services and work closely with RHS families. FAITHCARE Centers, which is hosted in a local church, provides free health services to all family members. FAITHCARE Center's free health care program is especially helpful to undocumented families. For dental health, 2 dental hygienists in the district see kids K-5 and grade 7 and are available to high school students if there is an issue. These dental hygienists are also a great resource for families.

For academic support, select RHS students provide after-school tutoring to students in elementary schools.

Staff Health

Staff at Reading High School are provided with weekly health and wellness updates. The staff also benefit from partnerships with local fitness centers that provide free or reduced rate fitness classes.

Reading High School supports its staff by providing information and screenings during free health fairs at the first 3 service days of the school year.

Healthy School Environment

RHS takes action to ensure students and faculty are in a healthy school environment. They have a contract with Ehrlich's Pest Control, a district-wide program that does monthly servicing of all district buildings. RHS also partners with Element Environmental to terminate and resolve mold when necessary. All cleaning supplies meet chemical safety regulations (refer to Pillar 1 for more information on their safety and sustainability). RHS's large windows and high ceilings improve ventilation and air quality, and all windows can be opened as necessary.

Pillar 3 Narrative:

Reading High School has woven sustainability into its academic fabric. Examples of interdisciplinary learning include:

Tim Redding's English class uses literature as a gateway to explore sustainability. Through works by Emerson, Thoreau, and contemporary books like "The Secret Life of Bees," students analyze themes of environmental stewardship, explore classic literature, and discuss ecological responsibility.

American History with teacher Andrew Cook includes a unit on how natural resources influenced the development of our country, and another on how industrialization has impacted the environment. Students explore the intricate connections between historical events and environmental consequences.

Elaine Cook's classes on Biology and Forensics introduce sustainability through hands-on experiential learning. Her Trout in the Classroom unit connects students to their Berks County watershed. They raise, test, measure and then release trout in a nearby stream.

Students in Megan Grandinetti's Environmental Science class take water samples from urban ponds and test for water quality. They learn about biodiversity, water purification, flow regulation, sediment trapping, and trophic levels. In addition to the classic science skills of sampling and testing, students develop their fine motor and art skills by drawing the aquatic organisms from their samples. For an example of this work, see this link.

In Laurie Kercher's American Literature class, students analyze climate change and renewable resources. Discussions on these topics, especially in relation to extreme weather events, empower students to understand the urgency of sustainable practices.

E-STEM Content, Knowledge and Thinking Skills

E-STEM content, knowledge and thinking skills are promoted throughout RHS's curriculum.

The following projects and activities demonstrate how students develop E-STEM qualitative and quantitative skills:

RHS renovated an interior courtyard and turned it into an outdoor learning lab. Before renovation, the courtyard was locked, littered, and overrun by invasive weeds. Teachers Jeannine Michel and Elaine Cook joined with students to form a Green Team that met monthly to discuss, plan and devise a new space. The students conceived of a welcoming, natural, and peaceful space.

On May 26, 2022, RHS celebrated a "grand opening" of the courtyard. The courtyard now boasts tables and stools built by students at a nearby vocational school called the Reading

Muhlenberg Career and Technology Center. RHS Art students designed and painted three vibrant murals of butterflies and flowers above pollinator gardens and two raised beds built by other RHS students. “Upcycled” pallets from a hardware store serve as permeable walls for a compost bin. The courtyard’s pond is home to turtles and fish. Discarded roof tiles were repurposed as ground tiles for a “hardscaped” surface for the tables and stools. Students in the RHS Vocal Company performed “Lovely Day” at the grand opening. The school received a bronze level award through National Wildlife Federation’s Eco- School program for these efforts.

In the school’s Greenhouse, students start plants from seeds and cuttings, and use them in biology, botany, ecology, and environmental science classes. The Greenhouse will be remodeled this spring to make room for classes of up to 30 students. Physical improvements include shelves for plants, climate controls, plumbing, storage for supplies, and updated workspace. Students will also have access to hydroponic and aquaponics kits for botany experiments. And, in keeping with past traditions, students will continue to start flower and vegetable gardens from seed.

Civic Knowledge and Skills

Civic knowledge and leadership skills are critical to RHS students as they prepare to meet the future. The following examples demonstrate how RHS fosters civic engagement:

RHS sits on 19 acres and its campus features hundreds of diverse, native, mature trees. This past Spring, RHS received a level 1 “Arboretum” certification from ArbNet. Teacher Kathy Manzella and students designed and created a campus “Tree Walk” with 50 numbered and labeled trees. Students and visitors can follow an arboretum map (see in photos) to learn about trees.

The School celebrated its green efforts on Arbor Day, April 28, 2023. Guests at the event included local civic leaders, Reading’s mayor, the school superintendent, and the school board president. The City of Reading and Tree City USA donated 28 trees now planted on RHS’s campus. Students shared their knowledge, drawings and tree facts with the audience. The event closed with music performed by the students in the school’s Vocal Company and its Instrumental Group. RHS received a silver award from the National Wildlife Federation’s Eco-School program for this work.

Environmental & Sustainability Learning

See above for a description of RHS’s outdoor learning lab (courtyard). Data about how RHS has used the courtyard provides the best metric of the environmental and sustainability learning at the School. Teachers across disciplines reserve space for classes. Data about the courtyard’s use between April and May 2023 (following the courtyard’s opening) shows:

- 16 different courses used the courtyard. The subjects included science, social science, business, language arts, math, ESL, autistic support, German, Law & Society, and Multiple Disabilities.
- 88% of the classes used the courtyard classroom for at least 3 periods
- More than 190 hours were spent in the courtyard classroom (254 periods) 41% of reservations ere for the science department
- 91% of reservations were for more than one period
- 26 teachers reserved the courtyard classroom for at least 1 period 39% of teachers reserved the space more than once

Teachers have continued to use the courtyard in the 2023-2024 academic year. Reading High School's interdisciplinary approach allows students to become responsible stewards of our planet.

Sustainability Literacy & Co-Curricular Opportunities, Clubs, Trips

Reading High School faculty teach environmental sustainability and awareness across disciplines. While many "core" science classes address environmental issues—the ecology unit in biology, for example-–RHS humanities classes also incorporate these themes. For example, students discuss climate change impacts and renewable resources in Unit Four 4 of the ELA classes. And traditional English
classes include STEM-related content during nonfiction units.

Outside the classroom, RHS offers a wide variety of extracurricular clubs that foster environmental learning and awareness. These clubs include the Key Club (service work), Aevidum (mental health–community welcoming to all), Ecology Club (sponsors school-wide clean up and sells plants grown from seed), Community Knights (this service club participated in the 275th anniversary of the City of Reading by planting daffodil bulbs with city officials), and The Career and Tech Center offers classes in horticulture and aquaponics.

Field trips to Nolde Forest Environmental Center are popular with students. This Spring, students will learn about biofuels and invasive species at Nolde and in the City of Reading. RHS students also participate in Nolde's summer internship program.

Hands-on, Place-Based, Project-Based, Authentic Learning

RHS offers hands-on, place-based learning opportunities for students to "think locally and understand globally." Examples include:

As was noted above in the E-STEM section, students from Reading Muhlenberg Career and Technology Center designed and built outdoor furniture for RHS's courtyard in 2021. Students engaged in STEM learning as they designed, measured, and built six student worktables, two standing tables, and 36 stools for the RHS outdoor learning space.

Students in the Summer Garden Club cultivate a vegetable garden. They learn through hands-on work about photosynthesis, solar energy, and the benefits of a low-impact diet. At the end of the summer, they make a salad from their harvest, a fun activity that underscores the connection between sustainable agricultural, healthy living, and their daily lives.

Biology students partner with the Berks County Conservation District on the Trout in the Classroom program (see above), which connects them with their watershed. The Conservation District delivers approximately 200 eggs to the School in early January. RHS students raise either rainbow or brook trout. Students prepare a tank, conduct daily water tests and make adjustments as needed, count eggs, tally survival rates, and feed the juveniles. By May, students release 40-60 fingerlings into the Tulpehocken Creek. Trout in the wild face daunting challenges even without climate change and human encroachment on their watersheds. Historically, only 1- 2% of spawned wild trout survive. The injected fingerlings into the stream teaches students how to help impacted species survive these challenges.

Reading High's Arboretum (see above) provides a vehicle for students to become "experts" on different tree species. The Reading High Arboretum (RHA) Intern Program trains students to teach other students. For example, in November 2023, student interns lead students in a Life Skills Support class. Students identified Norway Maple, Red Oak, White Oak, Sweet Gum, and Horse Chestnut trees by their leaves and seed pods, acorns, and samara. They learned of the special connection Pennsylvanians have with trees dating back to William Penn and the reflection of that early importance in the street names in Reading. More tours were given to special education students this Fall. In the Spring, student interns will give tours to Reading middle school students.

In sum, RHS students make biodiversity and watershed connections as they release trout in the Tulpehocken Creek through the Trout in the Classroom program. They explore native and invasive species in the Nolde Forest. And they learn to identify native tree species dating back to William Penn in the School's arboretum. These experiences teach RHS students about their community and provide them with a foundation for responsible citizenship. These experiences also develop in students the habit of caring for the earth and inculcate a curiosity that leads to environmental competence.