

STEM INNOVATION CENTER



September
2019

Broken Arrow Public Schools

In 2015 the patrons of BA passed a 12 year, four phase bond issue that included a High School STEM Facility and a new Vocational Agricultural Facility. We are in Phase two of that bond issue.

STEM INNOVATION CENTER

BROKEN ARROW PUBLIC SCHOOLS

STEM

Construction will begin this spring on our STEM Innovation Center and Vocational Agriculture Center. After the High School Configuration Study came back overwhelmingly to stay one high school and institute pathways for students, we have spent the last year meeting with a programming group of students and staff members to make sure we are meeting their needs. The marriage of the STEM facility with our Vocational Agriculture Center provides many opportunities to align the curriculum in all areas of STEM. We are designing the facility to be its own teaching tool and will include signage and “cut away” sections of the building to show students various systems.

The 80-acre site is perfect for a campus of this nature. It is located less than ¼ mile from our high school campus, has its own pond and pasture area. The facility will be embedded into the hillside and will contain a storm shelter, a green roof, an outdoor promenade, makerspace, workshop, build shop and 4 learning communities that will each have a wet lab, dry lab, offices and storage.

VOCATIONAL AGRICULTURE

Currently the District does not have their own facility for their vocational agriculture program. The current barns are owned and operated by the alumni group. The bond issue included money to build a facility for this program. They will have two show/practice arenas, pens for sheep, pigs and cows and greenhouses to support their agricultural units. They will also be able to park their trailers and equipment on the site and if they choose to, will have room to pasture their animals.





SUSTAINABILITY

The facility is being designed with Low Impact Development strategies in mind. We will be applying for The City of Broken Arrow’s certification for this type of development. It is similar to a LEED certification, but without the costs associated with it. Attached to this report is an example of signage and symbols that we will locate throughout the facility to show the sustainable items that were designed into the facility.


Funding is always tight on any project, especially when we pass bonds but build several years later and then experience tariffs and fluctuation in interest rates and raw materials. We are designing with a master plan in mind and are applying for grants and seeking donations to add outdoor classroom amenities, a fishing dock, cistern, and solar energy. It is our dream to fully power the barns with solar energy. We have approached PSO/AEP and they are working with us to see if we can find a way to fund such an endeavor.

Sustainable Awareness and Education in Architecture

The built environment has a profound impact on our natural environment, economy, health, and productivity. This building was designed using STEM processes and concepts to insure sustainability. This building is also designed to be a teaching tool of these sustainable concepts.

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Sustainable Sites
 - Protect environmental elements of the site, such as ponds, creeks, pastures, and wooded areas, and use as teaching stations
 - Reduce the heat island effect by limiting impermeable paving and providing shaded paving.
 - Designate areas on the site to be used as joint-use public outdoor spaces
 - Designate an area in the facility to be used as joint-use community space
 - Reduce the footprint by building multi-story maximizing space for water absorption
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Water Efficiency
 - Low flow water fixtures
 - Rainwater and gray water reuse for non-potable water uses
 - Irrigation sourced for existing pond
 - Reduce the footprint by building multi-story maximizing space for water absorption
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Indoor Environmental Quality
 - Daylighting
 - View windows with direct line of site from all occupied spaces
 - Use high quality and flexible artificial lighting
 - Use low emitting materials
 - Control dust and segregate pollutant sources, utilize high quality filters on the HVAC system
 - Use all ducted returns
 - High level acoustical performance in all learning and office spaces
 - Thermal comfort enhanced by operable windows or separate controls for each learning space
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Materials and Resources
 - Storage and collection of recyclables
 - Construction site waste management by recycling, composting, and salvaging non-hazardous construction and demolition debris.
 - Selecting high recycled content or rapidly renewable materials
 - Use of organically grown materials
 - Wood from certified growth forests
 - Utilizing salvaged materials
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Energy and Atmosphere
 - Using high efficiency HVAC systems
 - Using natural ventilation
 - Use and energy management system
 - Consider use of renewable energy, solar, wind, geothermal
 - Take advantage of passive energy reductions such as solar orientation or earth berming
 - Fundamental building systems testing and training
 - Enhanced commissioning on the building systems
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Innovation and Design
 - Combining Agriculture with Science, Technology, Engineering and Math to have Synergistic Learning
 - Combining the natural and built environments to triple the learning space
 - Combining Maker Space with Commons, Drop-walk, Robotics Arena, E-Sports Stadium, Cafe
 - Taking advantage of the existing slope of the site for thermal comfort and to minimize storm shelter initial costs
 - Take advantage of roof adjacent to grade for rooftop learning such as HVAC engineering and solar demonstration
 - Exposing building systems with graphic explanation for the building to be a learning tool
 - Dashboards for monitoring savings of energy and water
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Awareness and Education
 - Graphic signs that are strategically placed around the campus to educate users and visitors on sustainability

In the United States alone, buildings account for:
 72% of electricity consumption,
 39% of energy use,
 38% of all carbon dioxide (CO2) emissions,
 40% of raw materials use,
 30% of waste output (136 million tons a year),
 14% of potable water consumption.




Awareness and Education

By designing a multi-story building with the opportunity of a green roof the architecture of this building contributes to a sustainable site by allowing more surface area for water to be absorbed on the site. This minimizes the potable water used for irrigation and reduces run-off from leaving the site, reducing erosion down stream.

The existing pond on the site helps maintain a sustainable site by maximizing storm water run-off on the site and being used as a teaching station and outdoor lab for the STEM programs.

It also contributes to water efficiency by being a source for a portion of the sites irrigation.



Sample Sustainable Awareness and Education Plaques located around this facility