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Engineering Design with a Playful Purpose

Sam and Grace, two 12th grade students in the *Project Lead the Way* Engineering Design and Development course at Chaminade Julienne Catholic High School in Dayton, Ohio, applied and strengthened their success skills as they designed an instrument by which preschool children and families can playfully learn and build their own skills for years to come. A three-month project engaged local individuals and employers who mentored and assisted in the design, fabrication, and installation of a "Soar with Music Chimes" set at the Levitt Pavilion in Dayton.

A Play on Purpose (POP) Playbook from Dayton-based partner Preschool Promise, Inc. provided criteria for the POPSpot to be designed: Collaboration, Content, Communication, Creative Innovation, Confidence, and Critical Thinking. The student team brainstormed ideas, evaluated four alternative designs against criteria and feasibility, met with partners and management of Preschool Promise and the Levitt Pavilion, learned a whole lot about the realities of engineering design, concrete specification and installation, and the implications of designing for a public outdoor space, and successfully completed the project.

In choosing this project, students set out to foster education of children, and create a lasting impact in their local community. Their research revealed the benefits of music and outdoor engagement in a child's brain development. The Chimes allow outdoor entertainment and learning for children in an accessible urban public park and entertainment venue, and additionally reinforce educational facts about the Wright Brothers' history in the Dayton area which is complemented by the physical structure of the Levitt Pavilion and adjacent "Flyover" flight path monument along Main Street.

The students created detailed engineering drawings in Autodesk Fusion 360 that were used by fabricator Accro-Cast Corp., Sam and Grace helped weld the aluminum instrument frame at Arctech Fabricating, the color palette of existing Pavilion signage was matched for the powder coating, and a few peer student laborers helped dig and prepare the site for the concrete placement and instrument installation. Installation was complete for the instrument's unveiling at the Pavilion the evening of the school's annual Performing Arts department's concert.
Both students reflected on lessons learned in the project: the amount of time required to hone in on a final design, the reality of an iterative design revision process, how to communicate with manufacturers, clients, and professionals in multiple fields, through in-person and virtual meetings, and the technical details of welding and concrete work. Both students are enrolled in university engineering degree programs to begin in August 2022, and look forward to visiting the park and playing a tune on the chimes whenever they're home on future school breaks.

References:

Chaminade Julienne Catholic High School - https://www.cjeagles.org/

Project Lead the Way - https://www.pltw.org/

Levitt Pavilion Dayton - https://levittdayton.org/

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"Flyover" flight path monument - https://www.daytonlocal.com/blog/history/the-flyover-downtown-dayton.asp

City of Dayton Civil Engineering - https://www.daytonohio.gov/357/Civil-Engineering

Accro-Cast Corp. - http://www.accrocast.com/

Shook Construction - https://www.shookconstruction.com/

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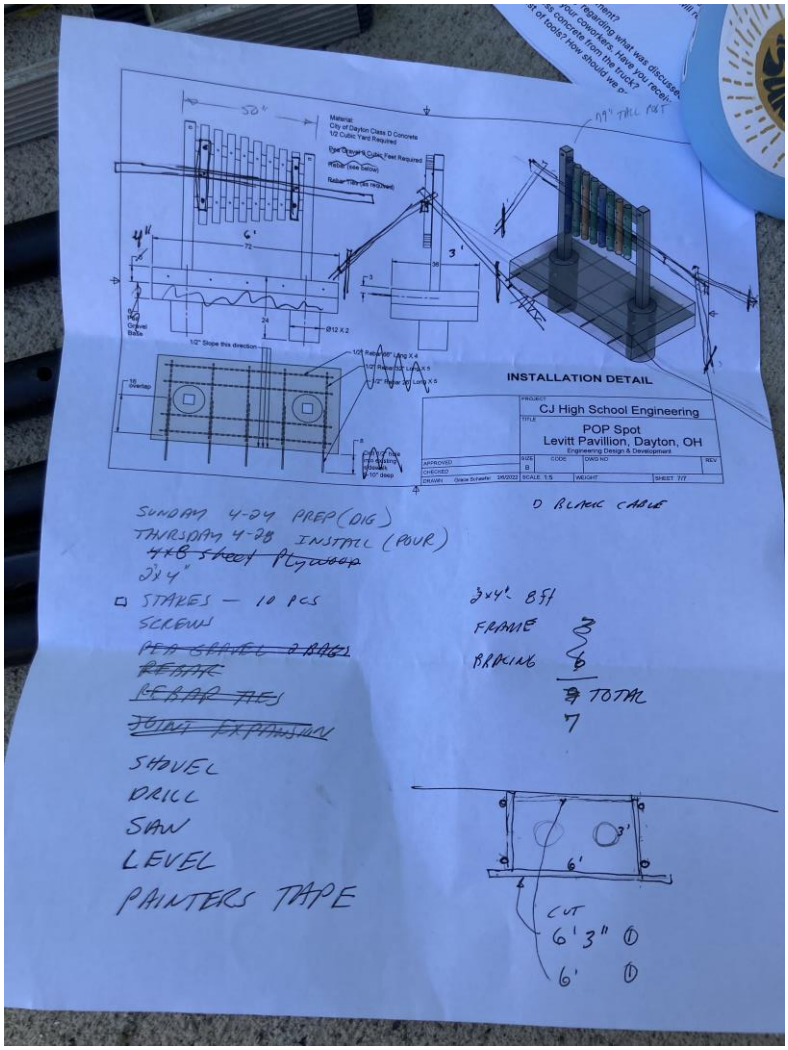
Ernst Concrete - https://www.ernstconcrete.com/




Good vibrations
Touch the chime to feel the sound
Let's get loud
Use the mallets to make sounds
Higher and higher
Find the chime with the highest pitch


HARMONY
LIGHT BLENDS INTO
EVENING SKYLINES