



**LEHIGH VALLEY CHAPTER**  
 PENNSYLVANIA SOCIETY OF  
 PROFESSIONAL ENGINEERS

**Lehigh, Northampton, Monroe, and Carbon Counties**  
**(Organized 1935)**

# Valley Engineer Newsletter

November-December 2020

## President's Message

Alex Dezubay, PE, President

Seasons Greetings to all. At the end of this very strange year, I would like to extend my wishes to all our members and their families for a Merry Christmas, Happy Hanukkah, and Happy New Year. We hope that you are safe and have not suffered during this COVID-19 pandemic.

As an organization, Lehigh Valley PSPE has had to curtail and modify our activities. Our usual monthly events with a tour and dinner were cancelled in the spring. We awarded our 2020 scholarships via a Zoom meeting instead of at a banquet.

In keeping with the times, Dr. Stephen Ressler presented **The Roman Aqueduct: An Integrated Engineered System** to a joint LVPSPE and ASCE Zoom meeting on December 9. We will have an upcoming Zoom event in January featuring John Wanner, who will present his legislative update in January.

In 2021 we still plan to award scholarships Engineer of the Year and Young Engineer of the Year. As with many things it is more difficult to solicit applications and contributions than in past years.

2021 is also an election year for LVPSPE; please consider serving as an officer or board member.

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One of the most important functions of the LVPSPE is to promote STEM education and encourage students to pursue careers in engineering. For many years, LVPSPE has

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 OF  
 PROFESSIONAL ENGINEERS**

**LEHIGH VALLEY CHAPTER  
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CARBON, LEHIGH, MONROE, & NORTHAMPTON COUNTIES

supported the MATHCOUNTS® competition and has provided scholarships to deserving Lehigh Valley area high school seniors who are pursuing an engineering degree at an accredited university. We trust that you agree this is a critical mission, and that we should continue our support of these students in spite of the COVID pandemic.

These activities have been funded by generous donations of the Lehigh Valley area businesses and individuals that you see as advertisers in this newsletter. For 2021 we need your help. We know that many of you and your businesses have been hit hard financially by the COVID pandemic, and we know that some businesses will not be able to support us this year, but the need remains. We are asking that those who are able give what they can. Any contributions, large or small, are welcome. You do not need to be a business to contribute, and individual donations can help us fill the gaps that will be left by the past sponsors who find themselves unable to support us this year.

Thank you in advance,  
Sincerely, LVPSPE Board of Directors

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\*It's a great challenge to be better than your opportunities."  
-Sarah Jessica Parker

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\*A lot of good things have come out of dreaming."  
-Arthur Miller in the New Yorker

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"Champions aren't made in gyms. Champions are made from something they have deep inside them: A desire, a dream, a vision. They have to have last-minute stamina, they have to be a little faster, they have to have the skill and the will. But the will must be stronger than the skill."  
-Muhammad Ali

-----  
Is it,  
"Time flies when you're having fun"  
Or is it . . .  
"Time is fun when you're having flies."  
-Kermit the Frog

-----  
"I've learned that courage is not the absence of fear, but the triumph over it. A brave man is not he who does not feel afraid, but he who conquers that fear."  
-Nelson Mandela

**THOMAS IRON COMPANY**

Mark Connar

David Thomas was a Welsh ironmaster who came to Biery's Bridge (now Catasauqua), Pennsylvania, in 1839. He was invited to come to America by Josiah White and Erskine Hazard, owners of the Lehigh Coal and Navigation Company, who had developed anthracite mines and built the Lehigh Canal to ship the coal to markets.

Thomas was the longtime superintendent at George Crane's ironworks in Wales, where hard coal had proved to be a superior fuel for smelting iron. Competition among American companies to develop the first successful anthracite-fueled furnace was at the time fierce. Confident that the British technology would be successful in Pennsylvania, White and Hazard paid the expenses for Thomas and his family to come to America to set up the ironworks using the new technique. They named the company in Catasauqua the Lehigh Crane Iron Company in honor of Crane, who held the British and U.S. patents for the smelting method.

The Crane Iron Company cast its first iron on July 4, 1840. The success of this first furnace changed the future for American ironmaking and America's industry, for iron now became plentiful and affordable. This and subsequent furnaces produced pig iron, which was sold to industries such as foundries and rail mills for further processing. The Crane Company prospered and by 1868 had six furnaces in Catasauqua. Other entrepreneurs adopted the same technology, and before long furnaces were built at many sites along the Lehigh River. Local limonite ores were used initially, with locally quarried limestone as flux, delivered by teamsters and wagons. The fuel, anthracite from mines in the hills of Carbon County, was supplied by canal boats until the 1850s, when railroads were constructed along both sides of the Lehigh River and also from the Schuylkill coalfields to cities and ports to the east.

In 1855, David Thomas left his post as superintendent of the Crane Iron Company to oversee the new Thomas Iron Company. His son, John Thomas, succeeded him at Crane Iron. In addition to David, his son Samuel was involved in this enterprise from the beginning and later became president. The previous year Thomas purchased 294 acres of farmland along the Lehigh River, a short distance upstream from Catasauqua on the opposite side of the river, where he would establish a company town that became known as Hokendauqua. It appears to be no coincidence that the Lehigh Valley Railroad was being built at the same time and would be shipping great volumes of anthracite when completed.

Continued on page 3

The first two furnaces were put into blast in 1855. The business was immediately successful, and Thomas Iron produced record quantities of iron and was looked upon as an exemplar of the iron industry. With business success came expansion. At the Hokendauqua works two more furnaces were built in 1862 and 1863 (furnaces No. 3 and No. 4), as was the short-line railroad that connected the plant with the Ironton Railroad in Coplay and with the Catasauqua and Fogelsville Railroad and Lehigh Valley Railroad at West Catasauqua, allowing the works to receive iron ore from the many local mines and to ship pig iron to markets.

In addition to the Hokendauqua works, Thomas Iron Company owned mines, one of them held jointly with Crane Iron, and leased many others. The Catasauqua and Fogelsville Railroad was a joint venture with Crane Iron. Construction started in 1856, and in 1864–65 its extension to the East Pennsylvania Railroad and the Rittenhouse Gap Mines was completed. This area had been known since Colonial times as holding rich reserves of magnetic iron. Thomas Iron acquired some of these mines and the railroad delivered ore to the furnaces in Hokendauqua and, later, to the Thomas-owned furnaces at Alburdis, PA. In the last decade of the 19th century these mines were one of the locations where Thomas Edison experimented in magnetic beneficiation of iron ore, by which he hoped to make iron mining in the northeastern United States cost-effective. The availability of less expensive and more extensive Lake Superior iron ores defeated his plans. The iron-ore business was a complete economic failure for Edison as he had financed the operation by selling his stock in General Electric. He had the added humiliation of watching GE stock skyrocket higher and higher. His stoic comment at the time was, "Well, it's all gone, but we had a hell of a good time spending it." Edison was later able to use the rock-crushing equipment he had invented in the cement industry, which proved more successful. The Rittenhouse Gap mines and the C&F trackage from the mines to Alburdis were abandoned by World War II.

Beyond the expansion at Hokendauqua, the Thomas Iron Company purchased and built furnaces elsewhere in the Lehigh Valley. The Lock Ridge Iron Company was chartered in 1866 and acquired by the Thomas Iron Company in 1868. It had two furnaces along the route of the East Penn Branch of the Philadelphia and Reading Railway (later the Reading Railroad) at what became Alburdis. The first furnace at Lock Ridge was placed in blast in 1868, the second in 1869. Initially numbered furnaces No. 5 and No. 6, they were renumbered 7 and 8 after two more furnaces were added in Hokendauqua in 1873–1874. In 1882 the company purchased the 1876 Keystone Furnace (founded in 1876) in Glendon, near Easton, and in 1884 it purchased the Saucon Iron Company (founded in 1866) in Hellertown.

All of the company's furnace properties included a superintendent's mansion and housing for employees. At Catasauqua, Hokendauqua, and Alburdis the Thomas family also made generous contributions toward schools and churches.

In an attempt to remain competitive, the Thomas Iron Company undertook extensive technical upgrades in the 1890s and early 20th century, shutting down some furnaces and upgrading others. They partially financed the improvements by selling off railroad interests. Thomas Iron struggled to adapt to economic changes in the 20th century. In addition to a shift from local ores to Lake Superior and foreign ores, coke had largely replaced anthracite as the principal furnace fuel. The Alburdis furnaces were converted to coke in 1914. Despite continuing upgrades in technology, the Lock Ridge furnaces made their last iron in 1921 and, in 1927, Hokendauqua closed. The physical plant at Hokendauqua was sold to Bethlehem Steel, which scrapped it in 1936. Thomas Iron Company surrendered its charter in June 1942.

The Lock Ridge furnace site in Alburdis is the only Thomas Iron furnace site to retain a number of recognizable elements of a 19th-century iron complex. It is now an interpretive museum within a Lehigh County park and is operated by the Lehigh County Historical Society. At Hokendauqua, foundation ruins and concrete walls, mostly related to the late 19th- and early 20th-century expansions, and the 1904 engine house ruins remain in an unrestored condition.

Source: written by Mark Connor with credits due to Thomas Iron Company, Rittenhouse Gap, Lehigh Crane Iron Company and Catasauqua and Fogelsville Railroad Wikipedia pages. Also ETHW.org article (2017) "Edison and Ore Refining." *The Morning Call* Sept 14, 2005 article "Thomas Iron burned bright for 88 years." The History of Catasauqua (catasauqua.org) "Thomas Iron Company"

05/06/2020

Notes, by the author.

I am now home and able to check my notes. On the concrete piers next to the Saucon Rail Trail. I found the following comment in Volume 93 (January 1st, 1914) of *The Iron Age* (a steel and iron trade magazine): "The Thomas Iron Co has completed two new trestles for unloading ore and other raw materials at its Saucon Furnaces, Hellertown Pa. The piers are concrete, and the stringers are steel I-beams. No. 10 Furnace at Hellertown was relined last year and ready to go in blast."

The Saucon/Hellertown plant has two furnaces (Thomas Iron numbered their furnaces sequentially starting with their home plant in Hokendauqua).

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## **SCHOLARSHIP SPONSORS**

A great way to be involved in the LVPSPE Chapter is to contribute to the **LVPSPE SCHOLARSHIP FUND**. Please Contact the Valley Engineer Editor to sponsor scholarships for the remainder of the calendar year.

If you would like to contribute any amount – please send your TAX-DEDUCTIBLE donation to PA ENGINEERING FUND. Donations should be mailed to:

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Please note “LVPSPE Scholarship Fund” on the comment line.

Or, you may also contribute via the LVPSPE website <http://www.lvpspe.org/Donations>.

Scholarship application is at <http://www.lvpspe.org/Scholarships>. Any questions regarding scholarships can be directed to

Alex Dezubay, PE  
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### **PSPE SCHOLARSHIPS**

The Pennsylvania Engineering Foundation currently administers the following scholarships for engineering students:

#### **Undergraduate**

- \$1,000 PEF Grant: (two awards)

#### **Upperclassman**

- \$2,000 Pennsylvania Engineering Foundation Grant

Applications and guidelines are on-line now at <http://www.pspe.org/scholarships>

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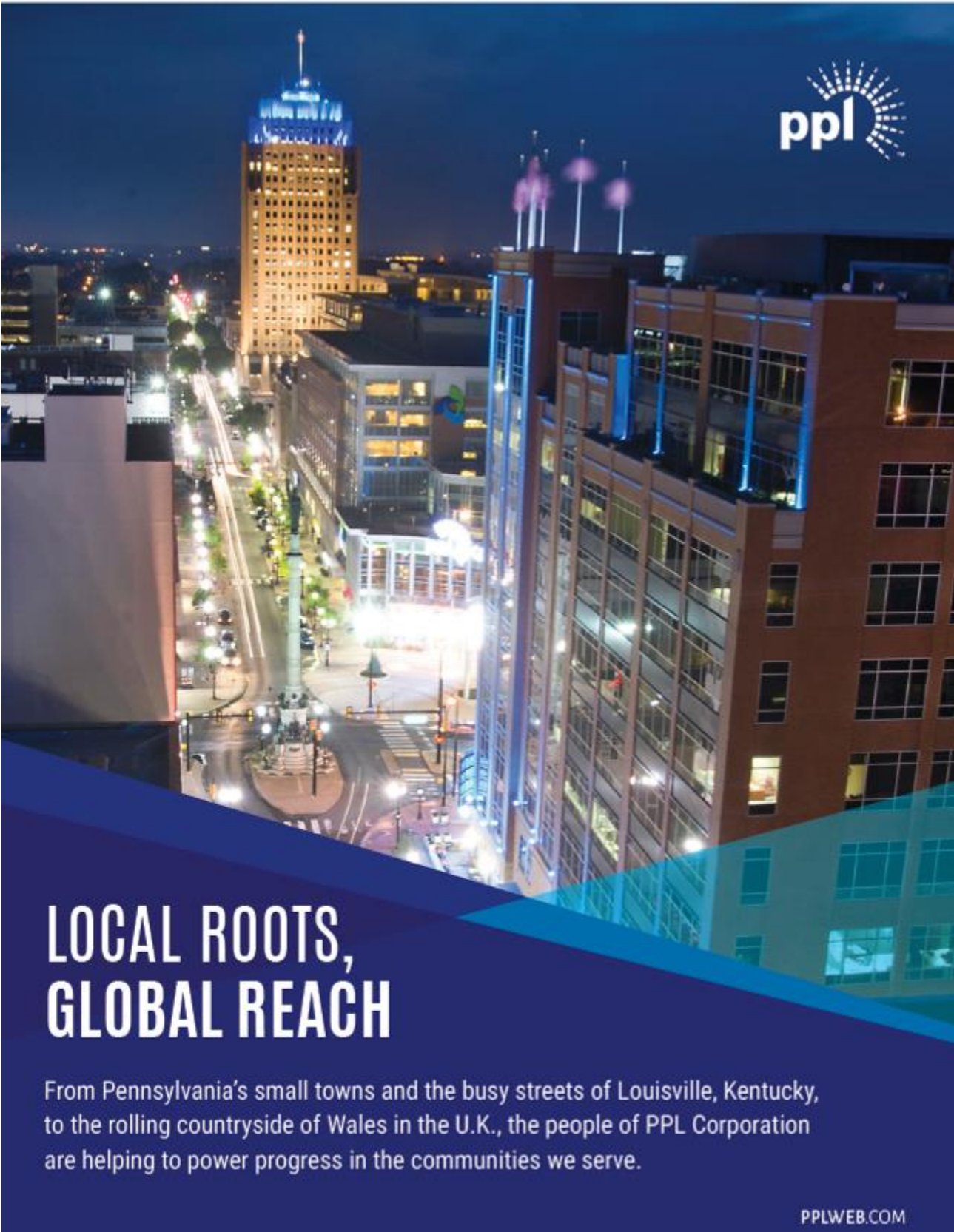


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## Board of Direction Meetings

The monthly Board of Direction meetings are 6:00 PM on the second (2<sup>nd</sup>) Monday of each month. Open to all members; they are held at the office of Liberty Property Trust, 74 W. Broad Street, Suite 240, Bethlehem, PA.

## 2020 – 2021 Chapter Officers

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**GRIST MILLS ALONG SAUCON CREEK**

Alfred Gruenke, PE

During the COVID-19 shutdown I hiked the Saucon Rail Trail from Coopersburg to Hellertown for exercise. Besides the natural beauty of the path, I was amazed at the industry that had been located along Saucon Creek, taking advantage of the water power and near-flat terrain adjacent to the creek.

Cereal grains have been a mainstay of human sustenance for thousands of years, but unless the shell is broken the nutrients cannot easily be digested by humans. Grist mills of one kind or another have performed this task for thousands of years. I suspect that some powered method of grinding grains into flour was developed when harvesting grains was beyond the hunter-gatherer phase.

I found a grain grinding apparatus in Avdad, Israel, at least 2,000 years old. Avdad was a mountain top city in the Negev desert that was under siege by the Egyptians for 28 years.



Grain grinding equipment in Avdad, Israel

Saucon Creek had numerous grist mills along the Saucon Rail Trail.

One of the more interesting stops is the Erhart Mill Historical District. This is a grist mill located at the end of Old Mill Road. The mill was located adjacent to a railroad line, and ground wheat into flour from local farmers and from as far away as the Midwest. It was built in in the 1820's and was operated by the Erhart family

Continued on page 13

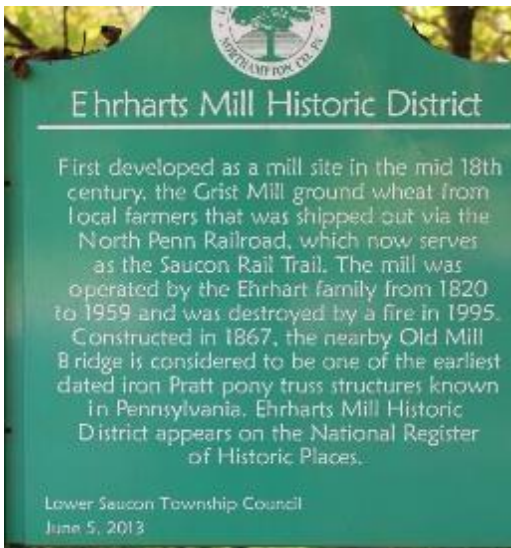
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I had planned a tour of all these locations for the 2020 SIA (Society for Industrial Archaeology) annual meeting scheduled for Bethlehem in May, but the C19 pandemic caused this meeting and tour to be rescheduled to 2021. We were planning to visit Hokendauqua (off the Ironton Trail), Lock Ridge Furnace in Alburts, Rittenhouse Gap Iron Mines and Friedensville Zinc Mines.

My main specialization is the history and preservation of the historic character and sites of the Friedensville Zinc Mines. I will send you a separate note on this subject.  
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until 1959. Various structures were destroyed, rebuilt, and added on since that time. The mill burned down in 1995. It was located on a bluff fifteen-twenty feet above Saucon Creek.

The mechanics of grist mills is interesting. A dam in the creek 3,000 feet upstream raised the water level to that of the head race. The slope of the race was less than the stream, creating a "head" downstream at the mill, which turned the mill wheels. Obviously, there was a tremendous amount of engineering involved! The size and slope of the head race, how much water was needed to turn the mill stone, how much water head was needed, plus surely a multitude of other issues. Originally it was powered by a water wheel, but around 1900 the wheel was replaced by a turbine. Bethlehem Steel bought the property in 1959 and promptly destroyed the dam so it wouldn't flood out a section of Saucon Valley Country Club golf course. Researching this mill, the head race, and other aspects involved was most interesting. It involved long internet searches, tramping through underbrush with map in hand, and challenges by property owners wary of strangers with no COVID masks. Very satisfying, on all levels!

It appears on the National Register of Historical Places.



Vestiges of the Erhart Grist Mill millrace. Note Saucon Creek on the right. This is on private property.

There is another grist mill in Hellertown, the Wagner grist mill, off Walnut Street. I toured the mill with Harry Boos of the Hellertown Historical Society. The buildings also house tools and farm equipment from a bygone era.

Harry explained the terminology to me. Head race is the water upstream of a mill. Tail race is the water downstream of a mill.

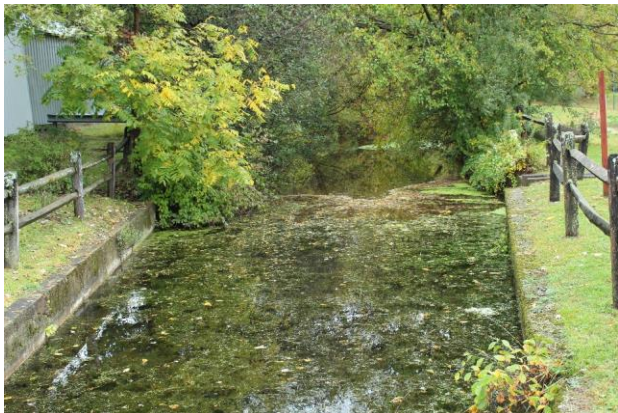
Most of the mill is still intact, including the structure and the millrace, though a lot of interior equipment has been removed. The mill was originally powered by an undershot water wheel, but two turbines replaced the wheel sometime in the past.



Mill building. Water enters the building on the left.

Continued on page 14





, Mill head race immediately upstream from the mill. The race is in obvious need of maintenance.

There are three parts of a grist mill; power transmission, material handling, and grinding.



The two turbines, in the basement of the building. Water flowed horizontal.



Wooden gear teeth. If there is a jam, the easily replaceable teeth will break.



Canvas belting for power transmission



Grain grinder



Mill stone at Wagner mill, about four feet diameter

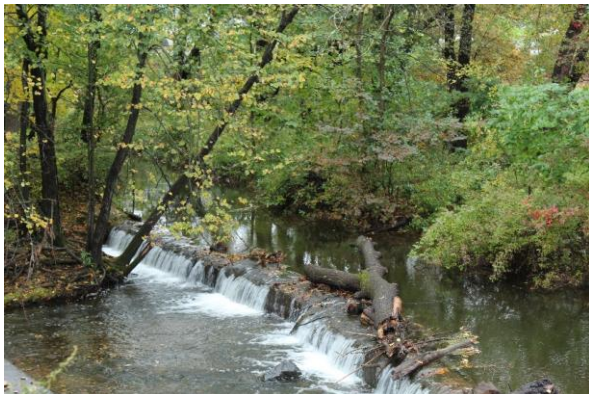
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Bucket elevator; the buckets are 4" wide attached to a canvas belt

The dam is 1,700 feet upstream, which diverts water into the millstream. There is a 200 foot culvert under the trail about half-way between the dam and the mill.



Head race dam, 1,700 feet upstream

Across the street from the grist mill is a cast iron bridge that has historical significance. Mark Connor sent me some interesting information on this bridge. The Walnut Street Bridge, also known as the Pony Bridge or Wagner's Bridge, is one of the rarest historic bridges in the United States. It is one of only a few through truss bridges with cast iron compression members. It was first installed in 1870. The bridge was designed and constructed by the Beckel Iron Foundry of Bethlehem, PA. It is also among the oldest all-metal bridges in the

United States. The bridge used to be installed a hundred yards west of its present location spanning Saucon Creek but was replaced and moved in 1970 because it could not support school buses. Presently it crosses the tail race from the Wagner mill. It is now the property of the Hellertown Historical Society.



The Wagner, or Pony Bridge, located across the street from the grist mill

What started out as an outlet for physical exercise because of the COVID-19 restrictions turned into a period of discovery of industries long demised and mostly forgotten. Not just a history lesson, but a lesson in ingenious innovations. They were the forerunners of many of the industries that have personified the Lehigh Valley, and the nation.

I thank Greg Stauffer, Dolores DiPaolo, and Harry Boos from the Hellertown Historical Society and Mark Connor for their contribution.

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 "As it draws to a close, this much can be said about 2020: The seasons changed on schedule and the Earth never once stopped spinning on its axis."  
 -Anonymous

-----  
 "A man should keep his friendship in constant repair."  
 -Samuel Johnson (1755)

-----  
 "If a wise man has an argument with a fool, the fool only rages and laughs, and there is no quiet."  
 -Proverbs 29:9

-----  
 "One of the deep secrets of life is that all that is really worth the doing is what we do for others."  
 -Lewis Carroll



The Lehigh Valley Chapter, Pennsylvania Society of Professional Engineers (LVPSPE) is a local organization affiliated with the State and National Professional Engineer organizations. Our purpose is to support and advance engineering at all levels, especially to young people who will someday replace us.

Our Chapter raises funds to support two very important initiatives: MATHCOUNTS® and the LVPSPE Scholarship Program. Our fundraising goal is \$15,000.00 to support both programs.

2020 has been a challenging year for all of us, including our region's many high school seniors who are interested in pursuing a career in engineering. Each year, our Chapter has provided scholarships to regional high school students that have been accepted to college and are pursuing engineering degrees. Last year we awarded five students scholarships totaling \$10,000 thanks to the generosity of our donors. It is our sincere hope that, if you are able, you will choose to support these gifted and deserving students with your contribution.

LVPSPE has supported MATHCOUNTS for 36 consecutive years, and while there will not be in-person MATHCOUNTS in 2021, we want to provide support to area students taking part in the virtual competition in any way possible. In past competitions, over 200 students from approximately 30 regional Middle Schools participated, with the top qualifiers moving on to the PA State competition and then possibly on to compete at the national level. Recently one of our regional winners went on to represent Pennsylvania at the 2017 Raytheon MATHCOUNTS National Championship held in Orlando, FL.

Donations of any size are welcome. All supporters will be acknowledged at MATHCOUNTS, and the Scholarship Awards dinner. They will also receive recognition in our monthly newsletter, Valley Engineer.

Donation Level	Amount	Valley Engineer Space
Graduate	>\$1,000	Full Page
Senior	\$1,000	Full Page
Junior	\$500	Half Page
Sophomore	\$250	Quarter Page
Freshman	\$150	Eighth Page (Business Card)
Contributor	<\$150	Line Item

Contributions may be tax deductible if made out to: **PA Engineering Foundation**, a 501(C)(3) organization. Please send your contribution to:

**PA Engineering Foundation % LVPSPE**  
**P.O. Box 195**  
**Northampton, PA 18067**

I want to acknowledge our 2019-2020 donors for their support:

ASCE • FLSmidth, Inc. • PPL • Victaulic Company • EnviroAce • Barry Isett & Associates • The Pidcock Company • Peak Technical Services • Bosch-Rexroth • Hanover Engineering Associates • Monarch Precast Concrete Corporation • Millenium Electro-Hydraulics Services • Smooth-On • Kohn Engineering • Deilen development • Alfred Gruenke, PE • R. Peruzzi, Inc. • Maser Consulting • Keystone Consulting Engineers • Michael F. Basta, PE • William Erdman, PE • Civil & Forensic Engineering

Thank you very much for your consideration and should you have questions about our program, please feel free to contact me; 484-934-2141, [Directors@lvpspe.org](mailto:Directors@lvpspe.org)

Sincerely,  
 Board of Directors - LVPSPE

*Lehigh Valley Chapter  
Pennsylvania Society of Professional Engineers  
Lehigh, Northampton, Monroe and Carbon Counties*

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Minutes for the November 9, 2020 BOARD OF DIRECTORS MEETING  
6:00 pm Zoom Meeting

Attendees: Chris Williams, Al Dezubay, Frank Walsh, Ray Szczucki, Jeff Kutz, Mary Rooney, Mike Basta, Peter Staffeld

**I. Call to Order:** Al Dezubay called the meeting to order at 6:03 PM

**II. Discussion:**

- Jeff started a LinkedIn page for the Chapter. This is different from the previous 'group' we had. This version will be more visible to people outside of the page/group.
- Al discussed still pursuing applicants for EOY/YEOY.
- Mary mentioned LVEC's offer of including EOY/YEOY as part of the LVEC event. Could give two sets of awards in 2022.
- Board discussed possible candidates.
- Al mentioned possibility of having Steve Ressler and/or John Wanner do online PDH presentations.
- Mary mentioned Steve recently did a presentation at Lafayette and may be available for a joint PSPE & ASCE event. Mary will request available dates from Steve.
- Ray discussed Chapter accounting updates:
  - Monthly charge for Wild Apricot.
  - Submitted dues disbursement form to Jen Summers.
  - Ray will follow up with a list of current members.
  - Checking 10/31/2020: \$2,178.54
  - Savings 10/31/2020: \$9,864.94
  - PayPal 10/31/2020: \$3,259.34.... Had moved some from PayPal recently to avoid banking fees
- Frank expects to make progress with fundraising in the coming weeks.
- Discussed meetings going forward. All agreed 6:00 pm on second Monday of the month is still good.
- Peter has been named President Elect of PEF – Pennsylvania Engineering Foundation. Once he becomes President, he would step down as the Chapter's State Director.

**III. Adjournment** at 6:31 on motion by Peter, seconded by Mike. All in favor.



*Lehigh Valley Chapter  
Pennsylvania Society of Professional Engineers  
Lehigh, Northampton, Monroe and Carbon Counties*

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Minutes for the December 14, 2020 BOARD OF DIRECTORS MEETING  
6:00 pm Zoom Meeting

Attendees: Chris Williams, Al Dezubay, Frank Walsh, Mary Rooney, Mike Basta, and Alexa Rooney.

**I. Call to Order:** Al Dezubay called the meeting to order at 6:00 PM

**II. Discussion:**

- Event in January – Legislative update with John Wanner.
- Al Gruenke is putting together December newsletter.
- MATHCOUNTS will be virtual. Chris will check in with Kevin Campbell on this year's format and if Countdown Round will be broadcast online.
- No February banquet. Still awarding EOY and YEOY. Possibly hand out awards later in year in person hopefully.
  - Mary suggested a recipient and will begin the application process.
  - Need to work on YEOY applicants.
- Fundraising:
  - Frank began soliciting donations. Received some commitments, will follow up others.
  - Will send solicitation letter to Al Gruenke for inclusion in upcoming newsletters for next few months.
  - Al Dezubay will follow up with Jeff Kutz on adding donation solicitation to LinkedIn page.
- Jeff to coordinate scholarships this year. Al Dezubay will work with Jeff early next year to get moving after the new year.
- Since Peter is moving into a new role with PSPE, we'll need our Alternate State Director (Angelika) to take his place.
- Al Dezubay will reach out to Brian Kutz (Past President) on coming up with a slate of officers for next year.
- Al discussed recent issue with meeting links showing a security issue. We'll need to reach out to Wild Apricot to rectify issue. Al will work on this.

**III. Adjournment at 6:30**