

Please remember to sign the Visitor's Register – Thank you.

**Facilities Meeting
Tuesday, February 21, 2017**

7:00 PM – ROOM 200 - TEAO

AGENDA

- I. Public Comment**
- II. Approval of Minutes - January 10, 2017**
- III. Construction Report**
- IV. Discussion and Update Items**
 - a. Committee Goals**
 - b. ES and MS Air Conditioning Study – Dan Jalboot, DJA and Rich Delp, Schiller/Hersh**
 - c. Capital Sources and Uses**
 - d. Other**
 - e. Recap of Action Items**
- V. Future Facilities Committee Meetings to be held 7:00 p.m. at the TEAO in Room 200**
 - a. Tuesday, March 21 , 2017**
 - b. Tuesday, April 18 , 2017**
 - c. Wednesday, May 17 , 2017**
 - d. Wednesday, June 7 , 2017**
- VI. Adjournment**

2017 Committee Goals - DRAFT

1. Monitor student enrollment, township reports, District programs and existing school facilities.
2. Review and update the District Infrastructure Report.
3. Use Goals #1 and #2 to ensure District facilities meet the needs of students, staff and Administration.
4. Develop, review, and prioritize the facilities projects for summer 2017.
5. Monitor, review and determine impact of District-wide parking and traffic study for CHS, TEMS, VFMS and VFES.
6. Monitor, review and determine impact of District-wide Security Engineering Study.
7. Monitor, review and determine impact of Air Conditioning Study at Elementary and Middle Schools.
8. Work in conjunction with the Finance Committee to maintain funding of the capital improvement plan.

Facilities Committee Meeting Minutes
January 10, 2017
Room 200 – Tredyffrin/Easttown Administration Office
7:00 p.m.

Attending all or part of the meeting:

- | | |
|--------------------------------------|--|
| Board Committee Members: | Michele Burger, Chair, Kevin Buraks, Todd Kantorczyk, Edward Sweeney |
| Other Board Members: | Douglas Carlson, Virginia Lastner, Roberta Hotinski, Rev. Scott Dorsey |
| T/E School District Representatives: | Dr. Richard Gusick, Art McDonnell, Colm Kelly, David Francella, Dave Walker |
| Other: | Tom Daley, Dan Jalboot, and Mort Isaacson from Daley + Jalboot Architects
Peter Heverin from TeraNet
Keith McCall from Kteck |
| Community Members: | Cindy Verguldi, Doug Anestad, Jerry Henige, Ray Clarke, Peg Layden, Liz Mercogliano, Kathleen Keohane |

Public Comment:

- Cindy Verguldi commented on parking at TEMS rental events.
- Liz Mercogliano commented on parking at TEMS rental events.

Approval of the Minutes:

- The Committee approved the minutes from the November 17, 2016 meeting.

Construction Report:

- Mr. Daley reviewed two change orders for the Renovations, Replacements & Upgrades at TEMS and the Maintenance & Storage Building projects. The change orders were for work transferred between contractors and resulted in zero net costs. The Committee recommended the change orders be placed on the next Board meeting consent agenda.

Locker Replacements at Valley Forge Middle School Bid Results:

- Mr. Daley reviewed the bid results for the Locker Replacements at Valley Forge Middle School recommending WB Mason at \$83,800 which was \$18,800 over the construction estimate. The Facilities Committee approved the Locker Replacements at Valley Forge Middle School bid as presented and directed it be placed on the next Board meeting consent agenda.

Doors and Door Hardware at New Eagle Elementary School Bid Results:

- Mr. Daley reviewed the bid results for the Doors and Door Hardware at New Eagle Elementary School recommending Unified Door at \$141,000, which was \$21,588 under the construction estimate. The Facilities Committee approved the Doors and Door Hardware at New Eagle Elementary School bid as presented and directed it be placed on the next Board meeting consent agenda.

CCTV Security Engineering Study:

- Mr. McDonnell summarized the work on the project to date and the need for the study to upgrade the existing system which is at the end of its useful life.
- Peter Heverin from TeraNet and Keith McCall from Kteck answered questions from their executive summary of the final report and reviewed the Phase I proposal to prepare the design to build a bid document, bid review and recommendation and management of the project.
- The Committee reviewed the consultant's Phase I cost estimates for the project in CHS to achieve the stated goal of the security system.
- The Committee recommended the project not move forward with a bidding document at this time.
- The Committee asked Mr. Heverin and Mr. McCall to estimate the project cost of a system that only replaced the existing cameras in the CHS.

Committee Goals:

- Mrs. Burger reviewed the 2017 Committee goals and the Committee made several revisions. The revised goals will be reviewed at the next month's Committee meeting.

Other:

- Mr. Daley reviewed a project scope change for the Boiler Replacement at Valley Forge Elementary School. The change would allow for a similar boiler arrangement that was installed during the New Eagle Elementary School project in 2014. This change in scope would increase the construction cost by an estimated \$100,000 and professional fees by \$7,400. The Committee recommended this project change be placed on the next Board meeting consent agenda.

Draft

- Mr. Daley stated that an update to the Air Conditioning Study for the Elementary and Middle Schools will be presented at the next Facilities meeting.
- Mr. Daley stated that an update to the Parking Study will be reported at a future Facilities meeting. Mr. McDonnell stated the traffic study field work will begin sometime this week.

Public Comment:

- Doug Anestad commented on the CCTV Security System.
- Ray Clarke commented on the CCTV Security System.
- Jerry Henige commented on the CCTV Security System.

Future Meeting Dates:

- Tuesday, February 21, 2017 at 7:00 PM at the TEAO

Adjournment:

- The meeting adjourned at approximately 10:14 p.m.

Facilities Committee Meeting
Construction Report
February 21, 2017

2017 Construction Projects:

1. Project #1485 – Locker Replacements at Valley Forge MS
 - Issued for Bid November 30, 2016
 - Bids Received December 21, 2016
 - Committee Review January 10, 2017
 - Board Approved January 23, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: July 14, 2017

2. Project #1488 – Doors & Door Hardware at New Eagle ES
 - Issued for Bid November 30, 2016
 - Bids Received December 21, 2016
 - Committee Review January 10, 2017
 - Board Approved January 23, 2017
 - Scheduled Construction Start: February 8, 2017
 - Scheduled Completion: June 19, 2017

3. Project #1492 – Turf Replacement at Teamer Field
 - Issued for Bid February 7, 2017
 - Bids Due March 7, 2017
 - Committee Review March 21, 2017
 - Board Approved March 27, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

4. Project #1490 – Renovations, Replacements & Upgrades at Conestoga HS & Hillside ES
 - Issued for Bid February 7, 2017
 - Bids Due March 7, 2017
 - Committee Review March 21, 2017
 - Board Approved March 27, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

5. Project #1484 – Replacements & Upgrades at Beaumont ES, Valley Forge ES & Valley Forge MS
 - Issued for Bid February 7, 2017
 - Bids Due March 7, 2017
 - Committee Review March 21, 2017
 - Board Approved March 27, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

6. Project #1487 – Renovations, Replacements & Upgrades at New Eagle ES
 - Issued for Bid February 7, 2017
 - Bids Due March 7, 2017
 - Committee Review March 21, 2017
 - Board Approved March 27, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

- 7. Project #1489 – Replacements & Upgrades at Tredyffrin/Easttown MS
 - Issued for Bid March 14, 2017
 - Bids Due April 11, 2017
 - Committee Review April 18, 2017
 - Board Approved April 24, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

- 8. Project #1486 – Site Paving Repairs and Replacements at Devon ES & Valley Forge MS
 - Issued for Bid March 14, 2017
 - Bids Due April 11, 2017
 - Committee Review April 18, 2017
 - Board Approved April 24, 2017
 - Scheduled Construction Start: June 19, 2017
 - Scheduled Completion: August 18, 2017

- 9. Project #1491 – Replacements & Upgrades at Tredyffrin/Easttown Administration Office
 - Issued for Bid April 26, 2017
 - Bids Due May 24, 2017
 - Committee Review June 7, 2017
 - Board Approved June 12, 2017
 - Scheduled Construction Start: September 1, 2017
 - Scheduled Completion: October 31, 2017



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Tredyffrin-Easttown School District
HVAC Study for the Elementary and Middle Schools
Schiller and Hersh Project #1676A
February 2017
Presented to TESD Facilities Committee

Background Information:

Schiller and Hersh (S&H) was hired by Daley + Jalboot Architects (D+J) to perform a study determine how to provide air conditioning to the elementary and middle schools in those spaces not yet served by AC at the Tredyffrin-Easttown School District (TE).

An original HVAC study for the District was completed about 9 years ago in 2008. The intent of this study is to update the 2008 study. After consideration of the 2008 study, the Board determined to not air condition the elementary schools in-whole. Since that time, most of the buildings have received boiler and unit ventilator (UV) upgrades, so consideration of alternate HVAC systems are no longer considered financially sound options. Therefore, this study focuses on the following information:

1. Outline the requirements to add in air conditioning to the existing buildings via a combination of adding in outdoor condensing units for the existing UVs and providing new RTUs for the larger public spaces and corridors.
2. Outline the existing electrical service capacities of the buildings vs. the peak demand vs. the projected building loads. A number of the buildings will require electrical service upgrades to accommodate the increased electrical loads imposed by the modified AC systems.
3. Provide order-of-magnitude estimates for the total annual electrical utility cost for each building based on the existing yearly cost plus a factor-multiplier as determined based on the Federal Government Commercial Buildings Energy Consumption Survey (CBECS) building survey data for 2016, Table E6.
4. Provide probable construction costs of the work outlined for each building; the costs will be broken down separately by academic spaces and gyms/locker rooms. Often gyms and locker rooms in ES and MS buildings are not air conditioned in major renovations.

This study will not update the following relative to the 2008 report:

1. Estimated annual electricity costs based on energy modeling (a more accurate calculation for determining estimated utility costs).
2. Options analysis, including simple payback & life cycle cost analysis, for alternate HVAC systems.

3. Estimates of maintenance costs.

Mechanical Solutions – General Overview:

Since most of the schools have experienced upgraded UVs and some have upgraded boilers in the past 5 years, the targeted HVAC solution is to add in outside condensing units for all the classrooms with UVs and roof top units for the corridors and larger public spaces such as gyms, libraries and locker rooms. The UVs that have been replaced at the ES's and TEMS in the past 5 years all have DX coils built-in along with Tri-M DDC controllers that are capable of adding in the cooling function (by adding outdoor condensing units) without replacing the UVs and without control upgrades (only programming changes are needed). It should be noted that the DX coils that are integral to the replaced UVs were done at no additional cost to the UV, as these are standard factory-supplied integral items in the equipment.

The main decision that impacts the budget for the new HVAC systems is whether the outside condensing units will be located on the ground, immediately outside the classroom/UV, or whether they will be located on the roof. After some discussions with the District's maintenance department, their preference is for installing the condensing units on the ground as opposed to the roof due to the increased risk of leaks due to roof penetrations and also basic maintenance access for replacing heavy parts, such as compressors, which need a crane or lull to rig to the roof.

Overall it was determine that the decision of ground vs. roof mounted condensing units will be a case-by-case basis per building, the cost estimates included for each building assume roof mounting for now, since it is more expensive.

The basis of design for the roof top units is Aaon, as per the District-preferred standard over the last several years of projects.

Tri-M has reviewed the proposed HVAC upgrades and found their existing UV DDC controllers to be able to handle the proposed two-stage condensing units with head pressure control, therefore upgraded controllers will not be required.

Spaces not included with air conditioning in each building for this study:

- Toilet rooms will be air conditioned via transfer air from the corridor, so they will not be directly air conditioned.
- Kitchens & associated spaces such as dry storage, storage, etc.
- Storage rooms.
- Mechanical rooms.
- Electrical rooms.
- Closets.
- Janitor closets.

Beaumont ES:

The existing building is a total of 75,740 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 27.
2. RTUs for corridors: Total of 5.
3. RTU for gym: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an indoor 300kVA transformer and a 1200A, 3-phase, 4-wire main distribution panel with a 1200A main breaker.

The existing peak demand of the existing building was 211.2kW during the period of 07/2016 to 08/2016. Using an assumed 90% power factor, this translates to a load of 234.67kVA or 651.9A at 208V, 3-phase.

Given the 80% main breaker rating and the 300kVA transformer size, the electrical capacity limit of the building is about 834A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 182.1A at 208V, 3-phase.

Given the above, the electrical service would need to be upgraded as follows:

Existing Peak Demand:	652A
125% NEC Demand Rule:	163A
Added Classroom Condensing Units:	437A
Added Corridor RTUs:	110A
Added Gym RTU:	<u>89A</u>
Total:	1,451A
Service Size Required:	1,600A
Transformer Size:	500kVA outdoor pad mount

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$70,869 and 643,360 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 25% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 56,805 SF. Assuming cooling is used during the months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$70,869
Added AC Electrical Utility Cost:	<u>\$15,764</u> (142,012 kWh @ \$0.111)
Total Projected Yearly Utility Cost:	\$86,633 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars:

Classroom condensing units:	\$405,000
Corridor RTUs:	\$200,000
Gym RTU:	\$225,000
Electrical service upgrade:	\$200,000
Added power distribution for AC loads:	<u>\$60,000</u>
Sub-total probable construction costs:	\$1,090,000
Preliminary design contingency (15%):	<u>\$163,500</u>
Total probable construction cost:	\$1,253,500

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Devon ES:

The existing building is a total of 65,110 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 31.
2. RTUs for corridors: Total of 5.
3. RTU for gym: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an outdoor pad mounted PECO transformer and a 1200A, 3-phase, 4-wire main distribution panel with a 1200A main breaker.

The existing peak demand of the existing building was 184.8kW. Using an assumed 90% power factor, this translates to a load of 205.33kVA or 570.4A at 208V, 3-phase.

Given the 80% main breaker rating, the electrical capacity limit of the building is about 960A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 389.6A at 208V, 3-phase.

Given the above, the electrical service would need to be upgraded as follows:

Existing Peak Demand:	571A
125% NEC Demand Rule:	143A
Added Classroom Condensing Units:	502A
Added Corridor RTUs:	110A
Added Gym RTU:	<u>89A</u>
 Total:	 1,415A
Service Size Required:	1,600A
Transformer Size:	500kVA outdoor pad mount

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$54,726 and 568,480 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 25% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 48,833 SF. Assuming cooling is used during the months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$54,726
Added AC Electrical Utility Cost:	<u>\$12,453</u> (122,082 kWh @ \$0.102)
Total Projected Yearly Utility Cost:	\$67,179 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars.

Classroom condensing units:	\$465,000
Corridor RTUs:	\$200,000
Gym RTU:	\$225,000
Electrical service upgrade:	\$160,000
Added power distribution for AC loads:	<u>\$60,000</u>
Sub-total probable construction costs:	\$1,110,000
Preliminary design contingency (15%):	<u>\$166,500</u>
Total probable construction cost:	\$1,276,500

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Hillside ES:

The existing building is a total of 70,960 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 32.
2. RTUs for corridors: Total of 4.
3. Other units for corridors & lobby: Total of 4
4. RTU for gym: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an outdoor 300kVA pad mounted PECO transformer and a 1200A, 3-phase, 4-wire main distribution panel with a 1200A main breaker.

The existing peak demand of the existing building was 166.4kW. Using an assumed 90% power factor, this translates to a load of 208kVA or 578A at 208V, 3-phase.

Given the 80% main breaker rating, the electrical capacity limit of the building is about 960A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 382A at 208V, 3-phase.

Given the above, the electrical service would need to be upgraded as follows:

Existing Peak Demand:	578A
125% NEC Demand Rule:	146A
Added Classroom Condensing Units:	518A
Added Corridor RTUs:	88A
Other Corridor / Lobby Units:	88A
Added Gym RTU:	<u>89A</u>
Total:	1,507A
Service Size Required:	1,600A
Transformer Size:	500kVA outdoor pad mount

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$53,826 and 532,320 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 25% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 53,220 SF. Assuming cooling is used during the

months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$53,826
Added AC Electrical Utility Cost:	<u>\$13,439</u> (133,050 kWh @ \$0.101)
Total Projected Yearly Utility Cost:	\$67,265 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars.

Classroom condensing units:	\$480,000
Corridor RTUs:	\$160,000
Other Corridor Units:	\$120,000
Gym RTU:	\$225,000
Electrical service upgrade:	\$160,000
Added power distribution for AC loads:	<u>\$80,000</u>
Sub-total probable construction costs:	\$1,225,000
Preliminary design contingency (15%):	<u>\$183,750</u>
Total probable construction cost:	\$1,408,750

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

New Eagle ES:

The existing building is a total of 68,915 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 31.
2. RTUs for corridors: Total of 5.
3. RTU for gym: Total of 1.
4. RTU for library to replace mini-splits: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an outdoor pad mounted PECO transformer and an indoor dual main setup with one at 600A and the other at 800A for a total of 1400A, 3-phase, 4-wire. The MDP in the basement garage area is rated at 1,600A and the MDP in the boiler room is rated at 800A.

The existing peak demand of the existing building was 186kW. Using an assumed 90% power factor, this translates to a load of 206.7kVA or 575 at 208V, 3-phase.

Given the 80% main breaker ratings, the electrical capacity limit of the building is about 1120A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 545A at 208V, 3-phase.

Given the above, the electrical MDP would need to be upgraded as follows:

Existing Peak Demand:	575A
125% NEC Demand Rule:	144A
Added Classroom Condensing Units:	502A
Added Corridor RTUs:	110A
Added Gym RTU:	<u>89A</u>
Total:	1,420A
Service Size Required:	1,600A

Even though the existing MDP is rated at 1600A, it needs to be replaced due to the dual main configuration and the lack of distribution space available.

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$60,502.12 and 502,200 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 25% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 51,686 SF. Assuming cooling is used during the months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$60,502
Added AC Electrical Utility Cost:	<u>\$18,439</u> (129,216 kWh @ \$0.142)
Total Projected Yearly Utility Cost:	\$78,851 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars.

Classroom condensing units:	\$465,000
Corridor RTUs:	\$200,000
Gym RTU:	\$225,000
Library RTU:	\$225,000
Electrical MDP replacement:	\$75,000
Added power distribution for AC loads:	<u>\$60,000</u>
Sub-total probable construction costs:	\$1,250,000
Preliminary design contingency (15%):	<u>\$187,500</u>
Total probable construction cost:	\$1,437,500

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Valley Forge ES:

The existing building is a total of 73,480 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 20.
2. RTUs for corridors: Total of 4.
3. RTU for gym: Total of 1.
4. RTU music area: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an outdoor pad mounted PECO transformer and an indoor 1200A MDP setup with a 1200A main breaker rated at 208V, 3 phase, 4-wire.

The existing peak demand of the existing building was 236.8kW. Using an assumed 90% power factor, this translates to a load of 263.1kVA or 731A at 208V, 3-phase.

Given the 80% main breaker rating, the electrical capacity limit of the building is about 960A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 229A at 208V, 3-phase.

Given the above, the electrical service would need to be upgraded as follows:

Existing Peak Demand:	731A
125% NEC Demand Rule:	183A
Added Classroom Condensing Units:	324A
Added Corridor RTUs:	88A
Added Music Suite RTU:	44A
Added Gym RTU:	<u>89A</u>
Total:	1,459A
Service Size Required:	1,600A

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$78,116.71 and 722,080 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 33% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 48,497 SF. Assuming cooling is used during the

months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$78,117
Added AC Electrical Utility Cost:	<u>\$13,216</u> (121,242 kWh @ \$0.109)
Total Projected Yearly Utility Cost:	\$91,333 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars.

Classroom condensing units:	\$300,000
Corridor RTUs:	\$160,000
Gym RTU:	\$225,000
Music RTU:	\$80,000
Electrical service upgrade:	\$160,000
Added power distribution for AC loads:	<u>\$60,000</u>
Sub-total probable construction costs:	\$985,000
Preliminary design contingency (15%):	<u>\$147,750</u>
Total probable construction cost:	\$1,132,750

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

TE Middle School:

The existing building is a total of 156,820 SF.

Proposed New HVAC Equipment:

1. Condensing units for classrooms/support spaces: Total of 51.
2. RTUs for corridors (2nd floor only): Total of 3.
3. RTUs for gyms: Total of 3.
4. RTUs for locker rooms: Total of 2.
5. RTU classroom 131: Total of 1.

Electrical Service Analysis:

The existing electrical service consists of an outdoor 1,000kVA pad mounted transformer owned by TE and an indoor 3,000A MDP setup with a 3,000A main breaker rated at 208V, 3 phase, 4-wire.

The existing peak demand of the existing building was 530kW. Using an assumed 90% power factor, this translates to a load of 589kVA or 1,636A at 208V, 3-phase.

Given the 100% main breaker rating, the electrical capacity limit of the building is 3,000A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 1,364A at 208V, 3-phase.

Given the above, the electrical service should be sufficient, given the fact that the existing building has pseudo air conditioning via the dedicated outside air delivery units on the roof. Therefore, the actual diversity of the classroom air conditioning will be significant due to the need to only temper the air in classrooms about 12 to 15 degrees lower and with no outside air component required for the unit ventilators.

Existing Peak Demand:	1,636A
125% NEC Demand Rule:	409A
Added Classroom Condensing Units:	378A
Added Corridor RTUs:	66A
Added Gym RTUs:	312A
Added Locker Room RTUs:	90A
Added Classroom RTU:	<u>10A</u>
Total:	2,901A
Service Size Required:	3,000A

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$162,045.74 and 1,674,941 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

Approximately 30% of the building is currently air conditioned, therefore the applicable SF for the additional air conditioning is 109,774 SF. Assuming cooling is used during the months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$162,046
Added AC Electrical Utility Cost:	<u>\$26,621</u> (274,435 kWh @ \$0.097)
Total Projected Yearly Utility Cost:	\$188,667 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars.

Classroom condensing units:	\$612,000
Corridor RTUs:	\$120,000
Gym RTUs:	\$775,000
Locker Room RTUs:	\$350,000
Classroom RTU:	\$30,000
Added power distribution for AC loads:	<u>\$120,000</u>
Sub-total probable construction costs:	\$2,007,000
Preliminary design contingency (15%):	<u>\$301,050</u>
Total probable construction cost:	\$2,308,050

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Valley Forge Middle School:

The existing building is a total of 149,992 SF.

Proposed New HVAC Equipment:

1. UV replacements and outdoor condensing units: Total of 40.
2. RTU for classroom: Total of 1.
3. RTUs for gyms: Total of 3.
4. Split AHUs for locker rooms: Total of 2.
5. Mini-split units: Total of 3.

Electrical Service Analysis:

The existing electrical service consists of an outdoor 1,000kVA pad mounted transformer owned by TE and an indoor 3,000A MDP setup with a 3,000A main breaker rated at 208V, 3 phase, 4-wire.

The existing peak demand of the existing building was 567kW. Using an assumed 90% power factor, this translates to a load of 630kVA or 1,750A at 208V, 3-phase.

Given the 100% main breaker rating, the electrical capacity limit of the building is 3,000A at 208V, 3-phase. Therefore, the spare capacity of the building is approximately 1,250A at 208V, 3-phase.

The majority of the existing building is already air conditioned or pseudo-air conditioned (via the dedicated outside air units), therefore 40 unit ventilators, one classroom, the gyms and the locker rooms require the addition of air conditioning. The 40 unit ventilators have not been replaced during the past 19 years of infrastructure projects and therefore they do not have cooling coil, so they are required to be replaced & upgraded. The actual diversity of the classroom air conditioning will be significant due to the need to only temper the air in classrooms about 12 to 15 degrees lower and with no outside air component required for the unit ventilators. Given the above and the calculation below, the existing electrical service should be sufficient to handle the new AC loads:

Existing Peak Demand:	1,750A
125% NEC Demand Rule:	438A
Added UV condensing units:	297A
Added Gym RTUs:	312A
Added Locker Room Split AHUs:	90A
Added Mini-Splits:	30A
Added Classroom RTU:	<u>20A</u>
 Total:	 2,937A
Service Size Required:	3,000A

Electrical Utility Estimated Costs:

The existing yearly electrical cost for this building was \$139,504.13 and 1,413,907 kWh for the period of 10/2015 to 10/2016.

Given CBECS Table E6 (release date of May 2016), the average educational facility uses 2.5 kWh/SF/yr for the air conditioning load, depending on the building type and region of the country.

A majority of the building is already air conditioned or has pseudo-air conditioning, therefore we are assuming about a 50% SF impact given the proposed, new HVAC equipment. Assuming cooling is used during the months of May, June, and September, this will add the following to the total yearly electrical utility bills:

Existing Yearly Electrical Utility Cost:	\$139,505
Added AC Electrical Utility Cost:	<u>\$18,652</u> (187,490 kWh @ \$0.099)
Total Projected Yearly Utility Cost:	\$158,157 (2016 dollars)

Probable Construction Costs:

The following are the probable construction costs in 2016 dollars. There are already infrastructure projects that are approved and scheduled for 2018. These infrastructure upgrades should be integrated with a potential AC project in order to realize economies of scale and to prevent re-work if the projects are split.

2018 Infrastructure Upgrades:

VFMS128 (M1), Replace Unit Ventilators (40):	\$648,000
VFMS120 (M2), HVAC DDC System Upgrade:	<u>\$324,000</u>
Sub-Total infrastructure costs:	\$972,000
Preliminary design contingency (15%):	<u>\$145,800</u>
Sub-Total 2018 Infrastructure Project:	\$1,117,800

AC Project Costs:

Outdoor Condensing Units for UVs:	\$752,000
Gym RTUs:	\$775,000
Locker Room Split AHUs:	\$350,000
Classroom RTU:	\$30,000
Mini-Splits:	\$45,000
Added power distribution for AC loads:	<u>\$80,000</u>
Sub-total AC costs:	\$2,032,000
Preliminary design contingency (15%):	<u>\$304,800</u>
Sub-total AC Project:	<u>\$2,336,800</u>

Total Combined Project Costs: \$3,454,600

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Summary of the Utility and Construction Costs:

The following is a table summary of the estimated utility and construction costs for adding in air conditioning at each building.

Note: the estimated construction costs for VFMS include \$1,117,800 in costs from the infrastructure report, which are required for air conditioning of the building.

Name of School	Estimated Construction Cost	Estimated Additional Yearly Utility Costs
Beaumont ES	\$1,253,500	\$15,764
Devon ES	\$1,276,500	\$12,453
Hillside ES	\$1,408,750	\$13,439
New Eagle ES	\$1,437,500	\$18,439
Valley Forge ES	\$1,132,750	\$13,216
Elementary School Sub-Total	\$6,509,000	\$73,311
TE Middle School	\$2,308,050	\$26,621
Valley Forge MS	\$3,454,600	\$18,652
Totals:	\$12,271,650	\$118,584

The costs exclude the following:

1. Construction contingency.
2. Architectural / engineering fees.
3. Legal fees.
4. Permit costs.
5. Hazardous materials remediation.
6. Indexing of construction costs per year until the mid-point of construction.
Suggest to use 3% / yr.

Capital Sources & Uses (10 -Yr Plan)

	A	B	C	D	E	F	G	H	I
	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	Total Projected
	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projected	Projects
Sources									
1 General Fund Transfer to Capital Project	10,423,524	10,423,524	10,423,524	10,423,524	2,904,206	(3,883,240)	(11,049,780)	(15,879,189)	
2 Proceeds from Bond Issue	20,534,310	13,874,789	6,592,163	1,259,171	0	0	0	0	
3 Assigned Athletic Fund Balance	0	0	678,500	0	0	0	0	0	
4 Total Sources	30,957,834	24,298,313	17,694,187	11,682,695	2,904,206	(3,883,240)	(11,049,780)	(15,879,189)	
Uses									
5 Capital Improvement	859,669	429,497	1,709,478	698,980	714,452	1,863,214	238,660	1,621,756	8,135,706
6 Deferred Maintenance	2,224,125	3,392,968	2,653,167	5,967,430	3,886,508	3,075,730	3,739,396	2,896,926	27,836,250
7 Roofing	0	0	0	0	0	0	0	0	0
8 Regulatory/Safety	0	0	30,000	100,800	672,914	444,021	221,430	13,600	1,482,765
9 CCTV Security System	0	0	0	866,259	722,491	976,130	0	0	2,564,880
10 Vehicle Replacement	0	0	50,000	0	0	0	0	0	50,000
11 Teamer Field Turf	0	0	640,000	0	0	0	0	0	640,000
12 NEES Classroom Addition	1,617,864	0	0	0	0	0	0	0	1,617,864
13 Maintenance/Storage Building	1,231,224	2,590,073	0	0	0	0	0	0	3,821,297
14 Retrofit Lighting Projects	0	0	100,000	0	0	0	0	0	100,000
15 Prof Fees, District Costs, Contingencies	726,639	870,088	828,847	1,145,020	791,081	807,445	629,923	679,842	6,478,885
16 Total Uses	6,659,521	7,282,626	6,011,492	8,778,489	6,787,446	7,166,540	4,829,409	5,212,124	52,727,647
17 Balance of Sources over Uses	24,298,313	17,015,687	11,682,695	2,904,206	(3,883,240)	(11,049,780)	(15,879,189)	(21,091,313)	

Source: October 11 2016 Infrastructure Report