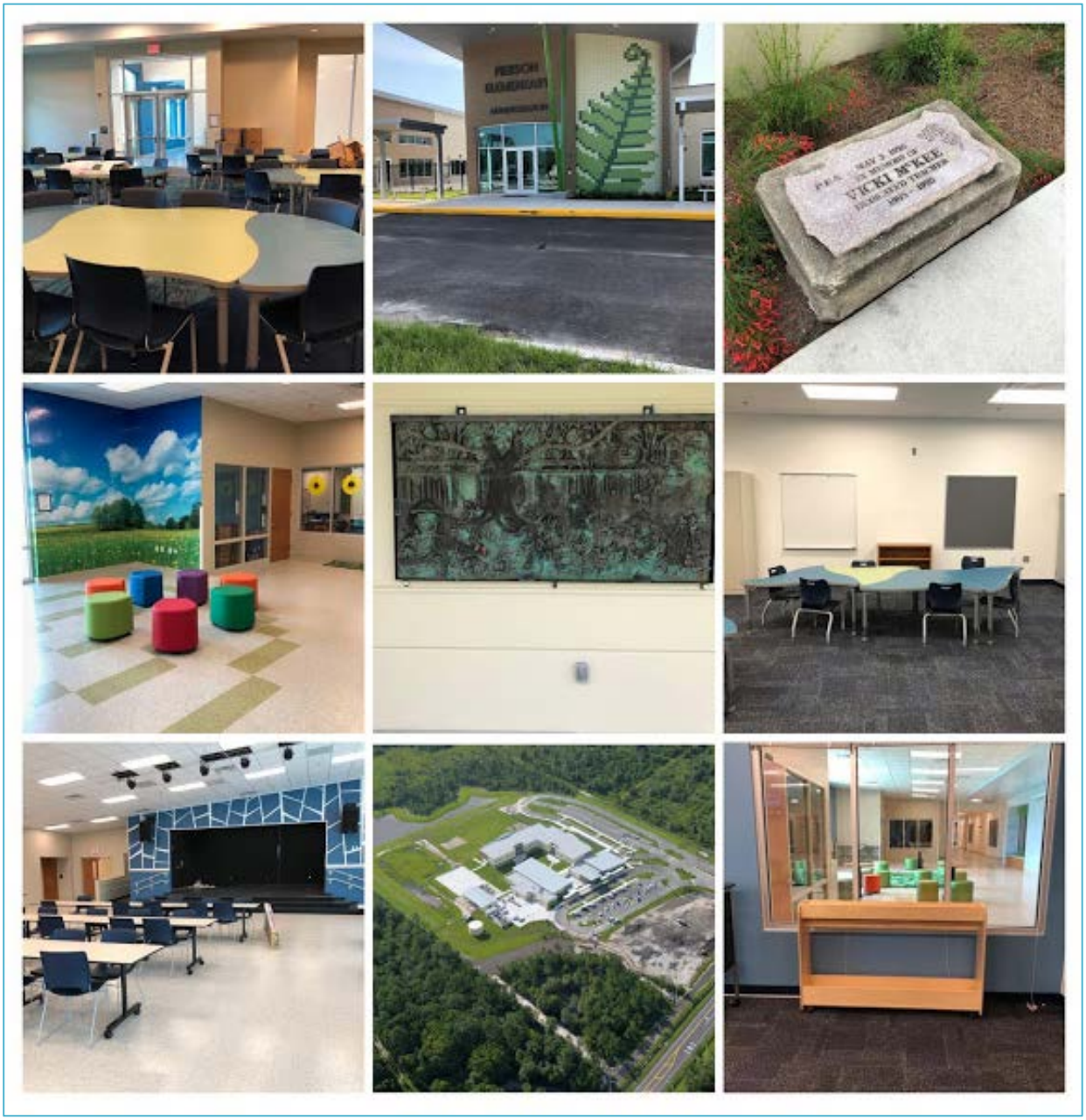
PROJECT OVERSIGHT COMMITTEE

2nd Annual Report

July 1, 2017 TO June 30, 2018



Photos: Pierson Elementary School

Opened: August 2018

Funded by: Half Cent Sales Tax

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Project Oversight Committee Meeting Schedule

The Committee presented their first annual report to the School Board on October 10, 2017. Hurricane Irma arrived in September and Volusia County School District was required to open 22 schools as shelters. Schools were closed for several days. The Committee's intended schedule to present the report to the Board on September 26 as required by the adopted resolution was impacted by Hurricane Irma.

Meeting and Other Dates

- **November 9, 2017 -** Third Chisholm Elementary Community Meeting
- **December 19, 2017 -** Regular Monthly Meeting
- **January 24, 2018 -** Kickoff George Marks Elementary Community Meeting
- **March 8, 2018 -** Regular Monthly Meeting
- **March 22, 2018 -** Regular Monthly Meeting
- **April 19, 2018 -** Regular Monthly Meeting
- **May 29, 2018 -** Chisholm Elementary Groundbreaking
- **June 28, 2018 -** Tour of New Pierson Elementary

Introduction

This is the School Board's appointed Citizens' Project Oversight Committee's second annual report, covering the fiscal year beginning July 1, 2017 and ending June 30, 2018. This is the first fiscal year in which the half cent approved by voters on August 26, 2014 was collected for the entire fiscal year. Collections began on January 1, 2017. Official enrollment for SY 17-18 was 62,948; however, school enrollment continued to increase during the year and was 63,204 by winter break, surpassing the 16-17 school year official count by 161 students. By the end of the school year, 275 students who had been impacted by either Hurricane Harvey, Irma or Maria, had enrolled in Volusia County Schools.

In addition to attending various events associated with new school construction, the Committee spent much of this year's meeting time working with the staff to analyze construction costs and comparing current practices vs. best practices. Due to the state legislation that mandates a construction cost cap, regardless of geographic area, market conditions, local funding, or program, there is concern that the schools constructed after Pierson and Chisholm will not meet the cap unless the School Board changes its priorities to emphasize cost over quality materials, equipment life cycle benefits, and/or educational programs.

With the assistance of the design and construction team associated with the new Pierson Elementary, a report was completed entitled Capital Systems Cost Benefit Analysis (see ***Attachment 1***), that documents the basis for choosing better materials and equipment. The Committee supports the priority placed on the educational program, quality materials and life cycle benefits. The Committee also supports continual review of practices and modifying them as appropriate.

Revenues and Expenditures

Half Cent Sales Tax 2017-2031

Revenues from sales tax receipts, bond issues, project expenditures and debt service are shown on Table 1, Table 2, and Chart 1. Other funds that were used to

supplement sales tax revenues included Local Capital Improvement Fund (LCIF) and Impact Fees for a total FY18 Adopted Capital budget of $208.7 million.

Sales tax revenues, distributed monthly by the state, came in at $42.9M, which is $6M (+16%) greater than the FY18 budget estimate of $36.9M (Chart 2). As reported in the FY 2016-17 Annual Report, the School Board issued $40 million in sales tax revenue bonds on November 17, 2016 (See Table 2). Proceeds of these bonds were used to jumpstart large projects, such as the Pierson Elementary Replacement School.

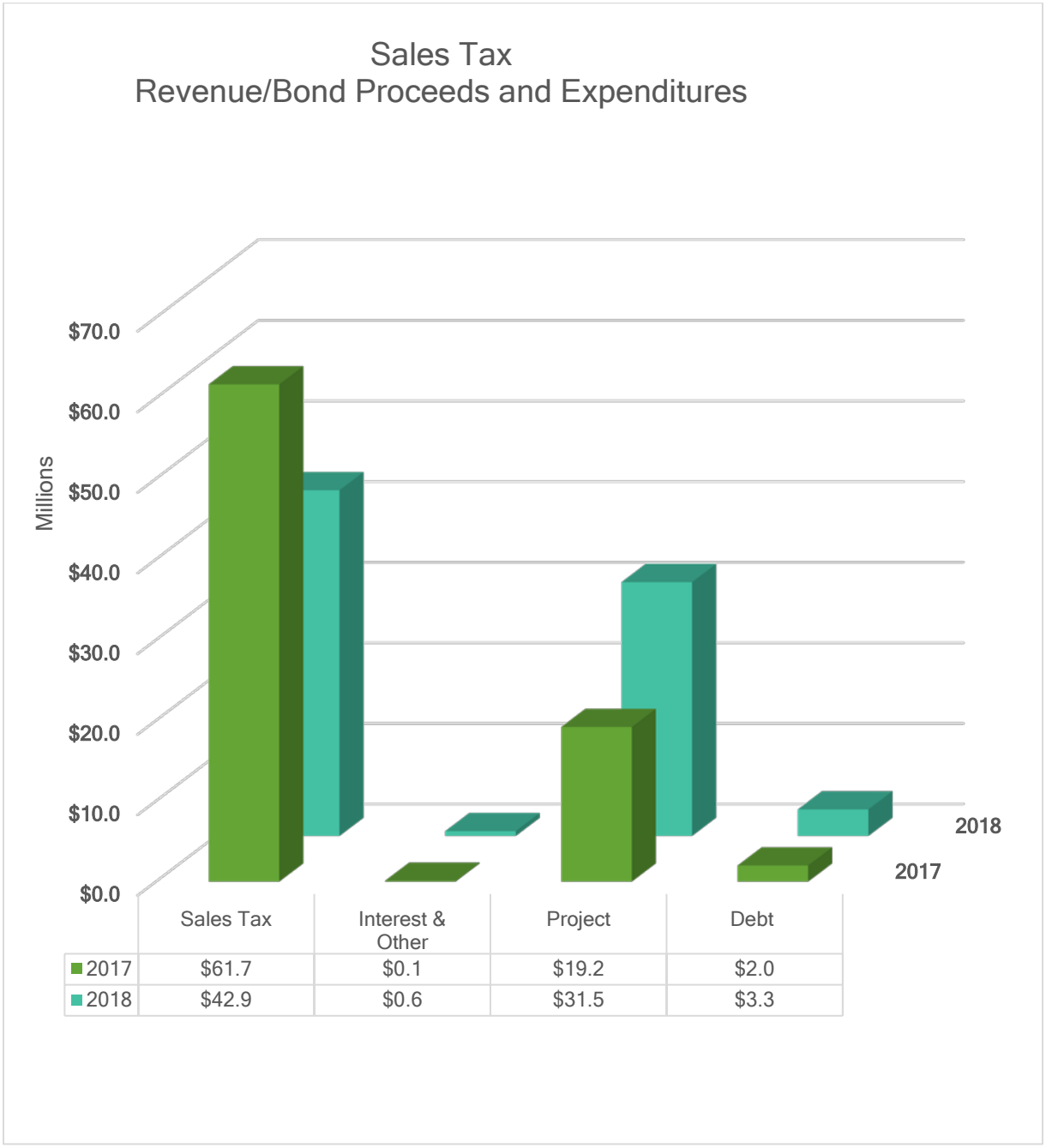
TABLE 1
Sales Tax Revenues, Expenditures and Funds Remaining (Fund 39I)

Fiscal Year	Sales Tax Revenue	Interest Earnings	Debt Service	Expenditures - Projects	Funds Remaining
2017	$ 21,462,837	$ 14,915	$ 1,953,004	$ 597,595	
2018	$ 42,941,909	$ 396,263	$ 3,328,348	$ 15,896,985	
Total	**$ 64,404,746**	**$ 411,178**	**$ 5,281,352**	**$ 16,494,580**	**$ 43,039,991**

TABLE 2
Sales Tax Bonds, Series 2016 Rev., Exp. and Funds Remaining (Fund 39N)

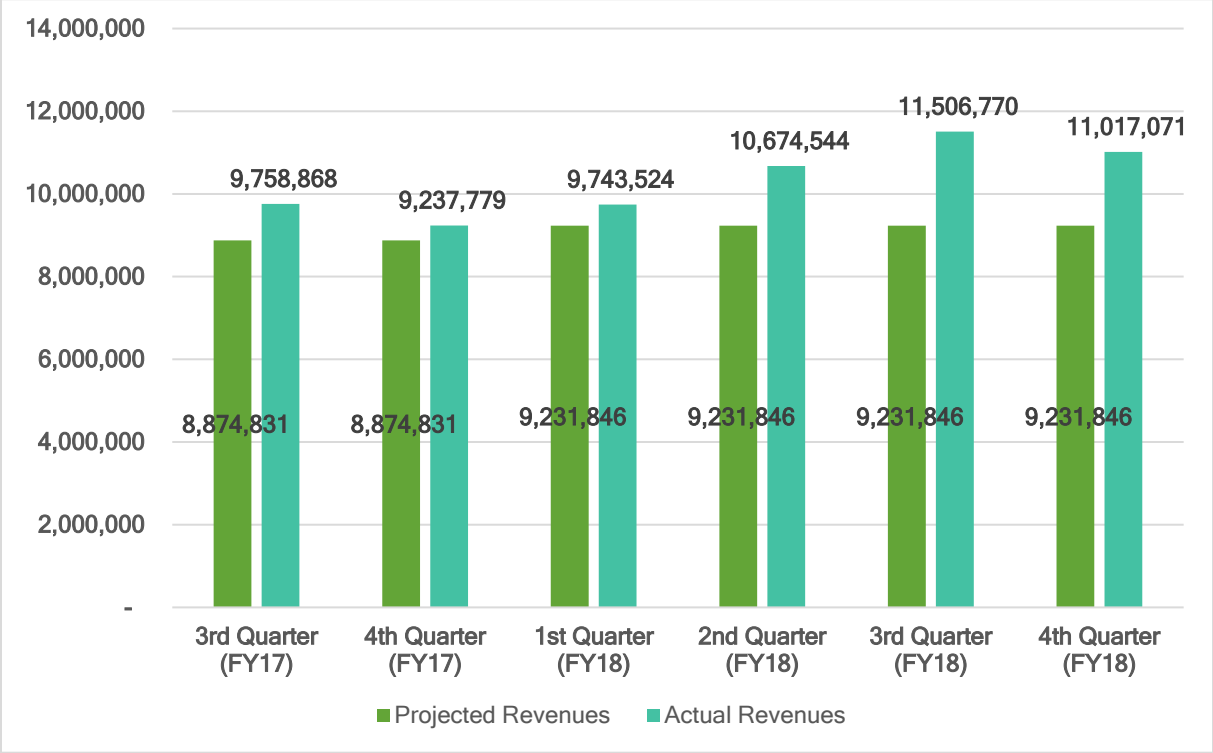
Fiscal Year	Bond Proceeds	Interest Earnings & Misc.	Expenditures - Projects	Funds Remaining
2017	$ 40,246,896	$ 132,458	$ 18,591,628	
2018		$ 205,517	$ 15,631,433	
Total	**$ 40,246,896**	**$ 337,974**	**$ 34,223,061**	**$ 6,361,809**
Total Project Expenditures/Total Funds Remaining			**$ 50,717,641**	**$ 48,401,800**

CHART 1



	Sales Tax	Interest & Other	Project	Debt
2017	$61.7	$0.1	$19.2	$2.0
2018	$42.9	$0.6	$31.5	$3.3

CHART 2
Sales Tax Revenues



Project Status Summary

All projects are sales tax funded unless otherwise noted. Specific project budgets and expenditures are provided in ***Attachment 2***.

Replacement Schools

With the exception of Pierson and Chisholm Elementary Replacements, the projects below were renamed to Master Plans in order to recognize that some buildings may remain due to state DOE requirements and that the school may not be a full replacement.

Schools	Description
Pierson Elem	Construction of off-site infrastructure and school. School will open on schedule in August 2018. Design: BRPH Construction: Welbro Building Corporation, Inc.
Chisholm Elem	Design continued, permitting, installation of 12-portable village, and demolition of some buildings occurred. Phase I construction started June 2018. Design: Rhodes & Brito Construction: H.J. High Construction, Inc.
George Marks Elem	Planning & Design phase initiated. Design: Harvard Jolly Architecture Construction: Wharton Smith, Inc.
Deltona Middle	Planning phase initiated. Design: CT Hsu Architects Construction: Core Construction

Renovations

Schools	Description
Atlantic High	Renovated building 5 HVAC. Began HVAC renovations for buildings 3 and 4 and chiller replacement for building 5.
Pine Ridge High	Upgraded chiller plant and Building 5 HVAC. Began second phase of replacing chillers and renovating HVAC for buildings 2, 3, 4. Began design for total roof replacement.
Seabreeze High	Began window and door replacement in buildings 7-11.
Spruce Creek High	Installation of 35 Ton A/C Unit on Cafeteria, Controls, & Roof Curb
Deland Middle	This campus-wide HVAC, Ceiling, and Lighting renovation project is funded with $2,030,132 in sales tax funds representing 16% of the total project budget. The remaining funds are from LCIF. Project began design and started construction.
Westside Elem	This project is funded with $1,000,000 in sales tax funds representing six percent of the total project budget. The other project funds are from school impact fees and LCIF. This is a multi-phased project that encompasses a new classroom/administrative building, expanded parent pick up loop, a new cafeteria, and remodeling of the existing cafeteria and administrative spaces. Construction began on the new classroom/administrative building.
Media Center Retrofits	Completed Atlantic and Pine Ridge High Schools. Began Deltona and Seabreeze High Schools.
High School Athletics	Track replacements and field lighting came in overbudget. Track replacement budgets are being revised and rebid as a package in FY 19. Athletic lighting budgets also being revised due to additional costs associated with LED lights and extension of electrical power. University HS athletic lighting project was initiated. Others will be rebid in future year(s). Spruce Creek HS softball dugout and backstop renovation complete. Seabreeze HS field renovation began design. Taylor MHS - outdoor restroom installed University HS - outdoor restroom installed.

Technology

To illustrate the impacted categories funded with the $9M allocated through Half Cent Sales Tax (HCST), the following table is provided:

Category	Percentage of Spending
Student Computers	54.52%
Teacher Computers	20.00%
Network Expansion & Enhancement	16.05%
Projectors/Display Panels	3.20%
Administrator Computers	2.20%
Update telephones (Cisco)	2.00%
Multimedia & Audio Enhancement	0.60%
CTE Student Computers	0.44%
Reserves	0.40%
Increased server storage in Data Center	0.08%
Printers	0.03%

Major items of focus are summarized as:

- More than 1,800 teacher laptops were deployed to provide instructional staff with hardware to maximize the use of digital resources for academic and productivity needs.
- Nearly 7,000 student laptops offering touch screen and tablet/laptop functionality to assist high school students with computer based testing and academic needs.
- Working through the Federal eRate process, we have begun moving toward updating 44 of 46 elementary schools' core networking equipment. This was done intentionally to assist with another eRate approved wide area network provider and connection speed. Elementary sites will be moving from 1Gb to a 10Gb connection and Middle/High schools will be moving from 10Gb to 40Gb over the next years. Replacement of this equipment is essential to maximizing the new connection speeds. The older equipment only supported 1 Gb.
- Technology was provided to support the facility projects such as the media center retrofits and Pierson Replacement. New devices include projectors,

flat-panel monitors, wireless enabled devices to allow for streaming of content from staff/student Windows devices.

- TS&I was involved in expanding the districts Bus WiFi pilot from 5 to 35.

Enterprise Resource Planning (ERP) System / Student Information System (SIS)

Funds for technology have been allocated from the Half-Cent for both new ERP and SIS systems with a combined budget for FY18 of $11M with an additional $0.97M budgeted annually for FY19-FY22. FY18 costs include software subscriptions plus the cost for implementation.

The district's goal is to replace antiquated financial, human capital management and student information system legacy software with modern, more efficient, cloud-based technology. Oracle Fusion was selected for the district's ERP system and FOCUS was selected for SIS.

Oracle's state of the art infrastructure will provide storage, processing, scaling, security and integration capabilities. The district hopes to expand as many business operations into a single system over time to increase efficiency, provide seamless integration and security.

FOCUS is a Florida-based cloud system that will seamlessly integrate all of our student data including scheduling, grade book, registration, attendance and parent portal and will "allow administrators, teachers, parents, and students to focus on what matters… a quality education that prepares students to excel in today's competitive global community."

With cloud-based systems we will need less on-site support from our technology team, and that will insure employees will be working on the most current software with constantly improved functionality.

Security

During planning for FY 18, the Half Cent Sales Tax funded project list included a list of schools that were scheduled to receive projects for new security fencing, electronic locks, and camera systems with a total budget of $2M. After the tragic

shooting at Marjory Stoneman Douglas High School on February 14th, the Volusia County School Board declared an emergency district-wide security fencing project at their March 27, 2018 board meeting. With this declaration, the school board directed that the remaining security project funds in the FY 18 budget be directed towards security fencing for all district schools. Since the camera and lock projects were only in the planning phase, work on those projects was delayed and the funds were shifted to the new priority of security fencing.

The security fencing projects are intended to make use of the existing campus layout and fence lines and by adding additional fencing and gates, create a single point of entry that will restrict visitor access to the reception office in the administration building. Since every campus has a slightly different fence and building layout, the solution necessary to accomplish the task is unique to each campus. The ultimate design for each solution resulted from collaboration between the principal, security professionals, and the project manager. As of June 30, 2018, 27 campuses have completed projects and another 21 are either in design or under construction.

External Influences

The Committee recognizes that there are issues that extend beyond the district's control yet impact the capital program.

2017 Hurricane Season

During the second year of this sales tax program, Hurricane Irma descended upon Florida and directly affected Volusia County. In addition to again providing its schools as shelters to the general Volusia County population, the district experienced building damages. While these damages do qualify for FEMA reimbursement, the district must expend its own capital funds and wait for reimbursement. FEMA reimbursement is known to take many years, as evidenced by previous storm damage and reimbursement. The district has received $254,428 from FEMA during FY18 for the $1,472,061 for hurricane Matthew claims (Category E). Hurricane Irma claims have not been completed but are estimated at $517,992.

Major storms such as Hurricane Mathew and Irma, often adversely impacts facilities construction project costs. The increased demand for specific materials and trades, such as roofing, strains the available supply. Costs for materials and labor tend to rise with the increased demand.

February 14, 2018 – Parkland Shooting

On February 14, 2018, another school shooting occurred that resulted in the deaths of 15 high schoolers and two teachers. This school shooting occurred in Parkland, Florida at Marjorie Stoneman Douglas High School and forever changed the landscape of Florida's public schools.

State Legislation

During the 2018 Legislative session Senate Bill 7026 was approved, which imposed additional mandates on school districts for the hardening of their schools. It required a school vulnerability survey be completed for each school building and submitted to the Florida Department of Education by August 1, 2018. Each district was also required to identify a school administrator as the School Safety Specialist and identify on each campus their school-level threat assessment team members. These tasks were expected to be completed in time for the start of the 2018-19 school year.

An aspect of the legislation that directly impacts facility projects is that two percent of total school construction cost can be spent on security measures and deducted from the cost per student station cap. While this is helpful towards addressing an unrealistic construction cost cap, it does not address the total amount of money that is being spent on security measures.

SB 7026 also appropriated $98.96 million in nonrecurring funds to implement a grant program for schools which would fund fixed capital outlay costs associated with improving the physical security of school buildings. These improvements would address some, but not all, of the necessary improvements identified in the security risk assessments required by the legislation. The FDOE will submit grant application guidelines to schools by August 31, 2018 and districts will have until

December 1, 2018 to submit their application, with grants being awarded no later than January 15, 2019.

Cost of Construction

Already mentioned is the impact of storms on construction costs. The current Florida economy, and more specifically the central Florida economy, continues to experience growth, low unemployment, and more demand than supply for skilled labor. In early spring an unexpected tariff measure imposed by President Trump on imported steel and aluminum created great uncertainty and affected material costs. Much of school construction materials have steel and aluminum. One supplier called after receipt of pricing and said that if the contract was not executed within several days, he would pull out of the project. Generally, bids are binding for 60 days from bid opening.

Rarely does the school district facilities department experience bid openings where there are no bidders. During FY 18, two projects actually had no bidders in attendance. Additionally, there were seven projects where the bids received were so much over project estimates that the bids were rejected. Some of these projects will be rebid, while others' scope will be revisited before bidding. Many hard-bid projects came in over project estimates and budgets. Bids ranged from 2% to 50% over project estimates.

After value engineering and scrubbing of bids, the construction cost for Chisholm Elementary Replacement came in ten percent over project budget.

Charter School Applications

The school district received six new charter school applications during FY 18. While none of these applications received approval from the School Board, it is anticipated that several will resubmit their applications during FY 19 and others will submit new applications. New charter schools opening in Volusia County, without a considerable increase in student population, will result in less operational efficiencies and impact the need for some schools to remain open and/or receive considerable capital improvements. Additional charter schools and/or growth in charter school enrollment will also impact the available capital dollars for existing schools since the district is required to share its LCIF monies with charter schools.

Committee's Recommendations/Conclusions

We remain diligent in our mission of representing the citizens of Volusia County as we provide oversight of the spending of the Half Cent Sales Tax funds. School District staff maintain a high level of transparency, and information continues to flow freely when requested. During the second year of meeting as an oversight committee, on behalf of the taxpayers in our County, we reaffirm our confidence that our tax dollars are being utilized in a responsible manner.

As noted in our 2016 Annual Report, the Project Oversight Committee continues to observe and acknowledge that external factors remain as the primary catalyst of increased costs in the key areas of facilities, technology, and security. While this continues to prove challenging, the School District has responded sensibly. At an April School Board workshop, it was requested that the staff review potential efficiencies available by school consolidations. After reviewing the documentation in ***Attachment 3.a. and 3.b.*** and discussing opportunities for consolidations, the Project Oversight Committee agreed that if consolidations could be addressed by serving more students in state of the art 21st century facilities, this would achieve the Board's mission statement while also saving capital and operational dollars. The Committee believes this is a worthwhile endeavor that should be explored, particularly considering the minimal increase in student population and the increasing interest in charter schools and new charter school applications.

Focusing on the areas of facilities, technology, and security, the Committee supports a holistic approach which includes placing priority on the educational program, while also providing quality materials ensuring that our capital assets endure the test of time. Remaining agile and adaptive to the external influences, is paramount for the continued success of the School District. To that end, the Committee also supports continual review of practice and processes, while making improvements to those as appropriate.

Attachment 1

Capital Systems Cost Benefits Analysis

CAPITAL SYSTEMS
COST BENEFIT ANALYSIS

SCHOOL BOARD OF VOLUSIA COUNTY, FL
DeLand, Florida
May 1, 2018

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EXECUTIVE SUMMARY

In January of 2018, BRPH Architects-Engineers was contracted by the Volusia County School District to provide a Capital Systems Cost Benefit Analysis report. The purpose of this report is to investigate the large line item components of a typical school construction project and the different options for each of these components. Initial costs, system efficiency, maintenance, and life expectancy are all considered when providing system recommendations for construction projects. This report is specifically prepared as a tool for understanding project construction costs and subsequent decisions on school construction projects.

Considering the state's recently mandated maximum construction cost per student station as found in Florida Statutes 1013.64, the high demand and continuing escalation in construction costs, and the expectation in Volusia County for schools to provide a sustainable, safe, secure and 21st century learning environment, it is incumbent on the school district to consciously evaluate whether meeting the state's construction cost per student station compromises the quality of construction, maintenance or operational costs. BRPH, in conjunction with WELBRO Building Corporation, have authored this report.

CAPITAL, MAINTENANCE AND SYSTEMS SELECTION

Typical construction projects are planned and constructed with numerous items in mind. For many years Volusia County Schools has had the foresight to construct facilities that are built to last for many decades, endure coastal environmental conditions, in addition to the occasional hurricanes and storm weather events, and endure high levels of usage typical of a PreK-12 school facility. In addition to heavy use, schools often operate throughout the year for summer school and community use. Schools are used for emergency shelters and, for hurricane events, require a higher standard for the structure and systems. In all cases, there is a decision to be made between first time capital costs, long term operating costs, dependability, and long-term value. This report investigates four major components of construction: The Building Envelope, Roofing Systems, Flooring Systems, Mechanical/HVAC Systems. Given the recent increased focus on safety and security, a brief discussion of Security Systems is also included.

Construction costs are dependent on many factors. Terms like life cycle cost, initial cost, or deferred maintenance all have different meanings to different people. It is ultimately up to each district to determine how capital is spent on the various building components which support the educational mission of the district. Volusia County Schools has adopted three guiding principles for achieving quality student services:

1. Dedication to Increased Student Achievement
2. Commitment to Finding Solutions to Problems
3. Mutual Respect and Positive Relationships with All Stakeholders

The built environment has a direct impact on student achievement in addition to safety and security. District policies and priorities for student achievement are integral to the design and selection of building systems and components of an educational facility. A district's priority to save on maintenance and utility costs enables more money to be allocated to the classroom. Systems that frequently fail create learning environments that do not support student achievement. The five system choices as described above were selected for study because these areas have more of an effect on initial costs, efficiency, life expectancy, and the long-term maintenance of a facility.

Costs associated with sitework are typically mandated by regulatory and permitting requirements and can vary widely based on a site's location, availability of utilities, access and environmental conditions. The overall square footage of a facility also has an impact on the overall cost of a facility. Reducing square footage can decrease first time capital costs

but is not a focus of this report due to its relationship with curriculum and instructional delivery. Neither is the provision of technology as it relates to instructional delivery or curriculum a focus of this report. Technology now is necessary to be considered with mechanical and communication systems, but its integral relationship with 21st century instruction causes it to be eliminated from consideration in this report.

Initial capital costs are what most districts scrutinize at the start of any construction project. Items that affect the initial costs of projects are typically related to the quality of materials or systems, their life expectancy and maintenance requirements. The lower cost is generally associated with a lower life expectancy and/or higher operating/maintenance cost. Given the reduction in maintenance staff and privatization of custodial services that occurred during the recession, Volusia County School District facilities staff has become more cognizant of material choices that are associated with higher levels of maintenance and/or cleaning. However, higher or the highest cost systems are not always associated with the best system. Generally, each project has distinct requirements based on its geographical location, a design of a single story or multi story building, whether it is an addition or completely new project or a renovation. For example, the life expectancy of equipment and materials are typically shorter when located near the beachside environment as opposed to a location in Deland or Deltona.

MAIN SYSTEM TYPES

As mentioned, this report focuses specifically on the primary systems used for building envelope, roofing, HVAC and flooring. These systems account for swings in project costs which will be discussed in each section. Advantages of each system's options are discussed and summarized with lifetime expectancy, maintenance initial and lifetime costs. These can be used as guides to support the district preference in the use of these materials/systems.

BUILDING ENVELOPE SYSTEMS

Structural systems used in school construction influence the type of exterior walls that a building utilizes. The Florida Building Code does not prohibit wood structural systems in schools for smaller buildings, but the State Requirements for Educational Facilities (SREF) do require that all components of a public school structure are non-combustible. Therefore, the main structural types for public educational buildings are either steel, masonry or reinforced concrete for walls, floors and roofing systems. For this section of the report, we will focus on the exterior vertical walls of a typical school facility and the various openings in the wall such as windows and doors. FDOE mandates that a school facility should have a useful life of fifty years before it can be considered for demolition. Because of this, the type of core structure of the building needs to be substantial to ensure for this longevity.

In 1992, Hurricane Andrew struck the Bahamas and Florida and is on record as being the most destructive hurricane in history. Because of its effects on coastal construction, the state of Florida revamped all the code requirements to help mitigate against these catastrophic storms. Building structures and their exterior components and cladding are now required to be engineered to withstand minimum wind speeds depending upon project locations. Below is the map that depicts the minimum wind speeds for Category III structures which encompasses educational projects.

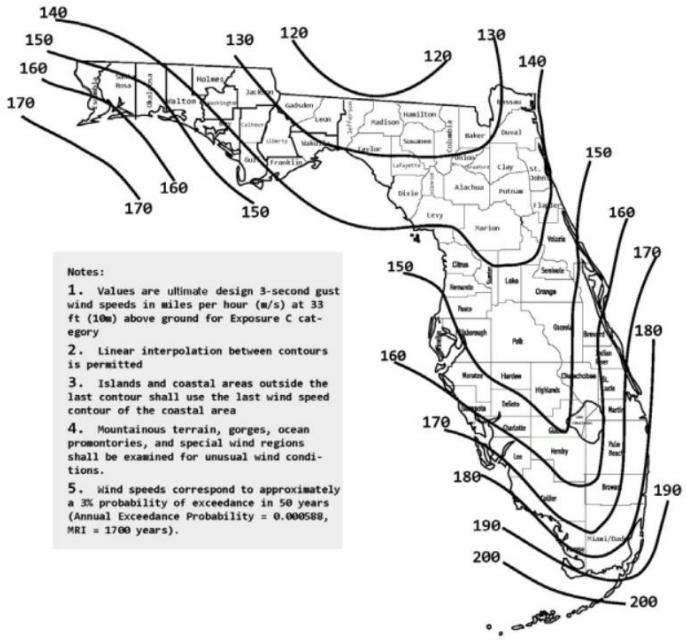

FIGURE 1609.3(2)
ULTIMATE DESIGN WIND SPEEDS, V_{ULT}, FOR RISK CATEGORY III AND IV BUILDINGS AND OTHER STRUCTURES

Volusia County is both a coastal county and partially inland. Per the FBC wind speed chart, Volusia County spans three different wind speeds, 160mph, 150mph, and 140mph. The Building Department of Volusia County Schools utilizes the most stringent as the basis for design for all educational projects. This position ensures a consistency amongst the structures and helps mitigate against damage which would have to be repaired in a quick manner. The district also is required to provide shelters where deemed necessary by the Volusia County Emergency Management Department. Enhanced hurricane protection areas (EHPA) require even more stringent structural requirements above the standard code minimums.

System	First Cost	O&M Cost	Life Cycl	Repl/Refurb	50 Yr Cost	Notes
Metal Building System	$44.71	$ 0.05	40	$ 69.47	$ 117.66	Refurbish taken at 1/2 installation cost
Tilt-wall	$48.15	$ 0.25	50	$ -	$ 66.57	
Masonry with Stucco	$49.06	$ 0.20	50	$ -	$ 63.80	
Masonry with Brick	$53.01	$ 0.10	50	$ -	$ 60.38	

First Costs = initial cost of the system, including purchase price and cost of installation, per square foot based on a 90,000 sf project in 2017
O&M Cost = also on a per SF basis as provided by VCS, on a per year basis.
Life Cycle Cost = calculation of total cost over a 50 year life span, including first costs, O&M costs and replacement costs, to create an objective comparison

Metal Building Systems:

Metal building components are manufactured off-site which frees up the construction site for other activities. When the structural components arrive on site, the building can be assembled quickly. The cost savings for less construction time on site is attractive as well as the lower cost of the building structural frame. The most economical components of this system utilize insulated metal panels at the exterior walls of the building. Sometimes, the exterior walls are constructed of metal studs with drywall, insulation and an exterior sheathing of some kind. This building system tends to be the most economical; however, this building system tends to have more movement in the building even when designed to meet the wind speeds. Over time, the building can crack caulk joints, and provide small openings between the metal panel systems. Thermal bridging from the exterior metal to the interior metal components also allows for heat transfer which makes the building less efficient from an energy perspective. Volusia County Schools uses metal building systems for warehouse and storage uses.

Tilt-wall Systems:

A very popular method of construction is to utilize an interior steel frame for roof and floor framing. The exterior walls are made of concrete and steel reinforcing that is cast on a floor slab. Openings are blocked out along with any decorative reveals prior to the pouring of the concrete. After the concrete is poured and the panel has achieved its concrete strength, the

panels are lifted off the slab and positioned into place where planned. They are temporarily held up with braces until the panels are fully attached to the structural system. This method of construction is an economical construction method because the building is erected quickly after the panels have been poured and ready for lifting. Many of the new commercial, warehouses, and retail buildings are built with this method, as well as educational facilities. The system is most advantageous on multi-story buildings and should typically be larger than 50,000 square feet. The Facilities Services Building on Olson Drive and Pierson Elementary Replacement School are examples of this construction method. This system requires scheduled maintenance for two major items. The exterior side of tilt wall is typically covered with a textured finish with paint. Painted systems should be refreshed on a ten-year cycle to provide additional protection to the concrete panel and to upkeep the general aesthetic appearance of the building. The thickness of the solid concrete panel can serve as a water barrier by itself without worry of water leaking into the building. The second maintenance item is that caulk joints between the panels need to be removed and replaced on a regular cycle also. This is important as the panel joints which are usually between 1" to 1-1/2" wide can allow water and moisture intrusion into a building if damaged. Quality joint material should last from ten to fifteen years.

Masonry with Stucco Finish:

A basic method of building is to utilize Concrete Unity Masonry (CMU) for exterior and interior walls. This system is very similar to standard residential construction except that there is typically more steel reinforcing in the masonry walls. Given the size of the facility, and for structural reasons, masonry would be used for the interior and the exterior walls. This system is a cost-effective way to build single story structures. The only major flaw of this system is the potential for moisture intrusion. Masonry systems are typically porous by nature and can tend to wick moisture into the building. Although a painted stucco finish on the exterior of the building can be a weather barrier, over time, this system can develop cracks and allow moisture intrusion into a building as the system is considered a single wythe wall. Special care needs to be used to ensure that there is no water intrusion into the building. This wall system will require maintenance in that it will need to be painted over time. A regular painting schedule is very important with stucco and masonry wall systems as masonry is a very porous material unlike tilt wall. Water can easily wick between the mortar joints and block cavities to create moisture issues within the building.

Masonry with Brick Veneer Finish:

Brick exteriors on CMU walls has been a long standard of Volusia County Schools along with many other school districts. This system provides excellent weather resistance for many reasons. The masonry walls provide the structural strength for the building system which is still an economical system. This system is considered a multi-wythe wall system because there is a space between the masonry wall and the exterior brick veneer. The exterior side of the masonry wall is coated with a waterproof coating to prevent water from going into the building. Insulation is collocated in the cavity along with an air space. This is purposefully done to allow any moisture from the brick veneer to drain down through the cavity and out through weep holes at the base of the wall. The insulative qualities of the air space, insulation and the mass of the brick and masonry materials gives this wall system thermal properties. This wall system is labor intensive because it requires different mobilizations of different masons for construction. It also adds difficulties when scaffolding for tall one-story structures or two-story construction projects is required. The materials tend to be economical, but the labor is an additional cost and it typically requires a longer amount of time for construction. This type of wall construction has proven to be an excellent long-term exterior system that has little to no maintenance over its life span. The recent shortage of skilled construction labor has exacerbated the issues associated with cost for this system.

Additional Envelope Considerations:

Window Glazing Efficiency

Window glass or glazing has become an important design element. Energy efficiency has become a stringent design requirement through the Florida Energy Code. The materials and construction of the glass incorporates specific properties to reflect heat while transmitting light into the space. The term for this glazing is spectrally selective glazing and has many different options for thermal and visual performance. The balance between keeping the heat out and allowing the light in is looked at carefully on each project. This comes at a cost higher than a standard sheet of glass with window tint used in the past. Additional energy savings strategy is to use a second pane of glass and create an air space between and is called insulated glazing. This glazing offers very good energy savings for the life of the window but does come with an additional cost. Glass properties such as Winter U-Factor, Solar Heat Gain Coefficient, Light Transmittance, and Reflectance have major impacts to both the interior lighting and mechanical systems design.

Impact vs. Non-Impact Ratings

Initially, most glazing consisted of a single sheet of glass for exterior windows and doors. Most of Volusia County requires the use of impact rated glazing because of the Florida Building Code. The impact rating is achieved by providing two pieces of glass that sandwiches an interlayer material that prevents glass from falling out of the frame when broken in a storm event. It is important to note that impact glass does not mean glass will not break in the event of an impact. The laminated glazing is designed to stay within the window frame, if impacted, to maintain the building envelope and weathertightness of the facility. The cost of the impact window is more than a standard window however it does comply with the FBC and also provides a year-round security deterrent. The more inland portions of Volusia County do not require the impact rated windows as they are considered far enough away from the coastal impact. The district prefers the use of the laminated windows to provide a higher level of hurricane hardening for its facilities and also for crime prevention purposes.

ROOFING SYSTEMS

The Florida environment is very harsh on roofing systems. The bright sun and hot temperatures are brutal on a roofing system. The temperature of a roof's surface can be up to 160 degrees. Florida's rain showers also cause great stress on a roofing system because of the thermal shock created when the rain hits a hot roof and cools it down. The change of temperature can go from 160 degrees to 85 degrees simply by a short Florida rain shower. This shock in temperature influences the expansion and contraction of the roofing material. The different roofing systems discussed have their own methods of dealing with this constant expansion and contraction. In all cases, VCS has minimum warranty standards for labor and materials for any roofing system. All roofs installed for VCS must carry a Florida Product Approval per the Florida Building Code for roof assemblies to ensure that the roofing system being installed meets the minimum uplift requirements. These are both best practices.

System	First Cost	O&M Cost	Life	Repl Cost	50 Yr Cost	Notes
SBS Modified Bitumen	$12.12	$ 0.10	25 years	$ 41.99	$ 68.96	
TPO Membrane, Single-Ply	$10.03	$ 0.05	20 years	$ 31.07	$ 45.42	
Standing Seam Metal Roof	$13.45	$ 0.05	30 years	$ 21.02	$ 38.16	
Asphalt Shingles	$14.00	$ 0.10	20 years	$ 44.26	$ 65.62	

First Costs = initial cost of the system, including purchase price and cost of installation, per square foot
O&M Cost = as provided by VCS on a per year basis.
Life Cycle Cost = calculation of total cost over a 50 year life span, including first costs, O&M costs and replacement costs, to create an objective comparison

SBS Modified Bitumen

A common Florida roofing system is known as SBS Modified Bitumen or built-up roofing. This system is used on very low slope roofing applications commonly called flat roofs. There is a minimum of one-quarter inch slope in twelve inches to ensure that water moves towards a drain or gutter. This system is usually built up in three layers and can be attached to either a lightweight insulating concrete or polyisocyanurate insulation. There is a thick base sheet, which is adhered to the substrate below, intermediate sheet, and then a thick cap sheet with a granular surface is usually torched down to the base sheet. The sheets are made with oil based materials and the cap sheet has granules on it to protect the sheet from the sun so it doesn't affect the cap sheet material. This roofing system is a proven system in Florida and can last for up to thirty years if properly maintained. An example of this roofing system is at the main administration building at T.D. Taylor MS/HS. Advantages of SBS Modified is that the thickness of the roofing assembly gives it high durability. The surface is quick to install and is easy to clean. Volusia County Schools' maintenance can easily make repairs to this system. The roof has minimal maintenance costs for the first ten years. Cap sheet lap joints, flashing connections, sealants at parapet

cap flashing, scuppers, curb flashings all need to be carefully examined and repaired after ten years where issues arise. After 20 years, the roof can be recoated or have an additional cap sheet added to extend the roof's life for another ten years. After thirty years, the roofing system should be replaced.

Single Ply TPO Roofing

There have been a few single ply roofing membranes proposed in the past thirty years, but the best one for the Florida climate is a TPO. Thermoplastic Polyolefin (TPO) is a single-ply reflective roofing membrane made from polyprophylene and ethylene-propylene rubber polymerized together. The membrane thickness is typically between forty-five to sixty mils thick. It is typically installed either fully adhered or mechanically attached, allowing the white membrane to remain exposed throughout the life of the roof. This roofing type is a single ply membrane so there is always a concern about the material being ripped or punctured by either maintenance or items from a storm event. The material is usually reinforced with a fiberglass type mesh within the membrane to resist these types of hazards. This roofing system can be applied on low-slope applications or on moderate pitches. The exterior color of the membrane is available in many different types of colors which is a bonus if visible from other areas of the project. Typically, facilities use white or light roof colors to reflect the sun's rays away from the roof so it does not absorb heat during the day. Because the roof is heat welded, it is easily repaired and also can have accessories and flashings of similar material welded to it to create watertight joints. Typical service life's for this system is fifteen to twenty-five years. VCS calls for a minimum of a fifteen-year warranty on parts and labor for this type of roofing. Advantages of TPO roofing is that there is little maintenance over the life of the roof. They are quick to install and very easy to maintain. The obvious disadvantage is that if a lap seam fails or it is damaged, water can easily enter the rest of the roofing system and sustain moisture damage.

Metal Roofing

A visually common roofing system for Volusia County Schools is a seamed metal roofing system. The base metal used can either be galvanized steel or an aluminum sheet. With the coastal environment, it is preferred to use the aluminum sheet to minimize any corrosion or rusting. Steel is stronger than aluminum so a comparative aluminum sheet will be thicker in its gage or thickness. Both types of materials are typically installed over polyisocyanurate board insulation with a high temperature peel and stick membrane between the metal panel and insulation. Metal clips are fastened to the roof deck below and

extend up to the metal panels. The panels, after set in place, are then mechanically seamed to provide strength and cohesion across the entire roof. The clips allow for movement of the panels during a daily cycle. Movement is expected because of the large temperature swing and the coefficient of expansion of metal materials. This is why a popping sound is heard when the metal roofs are heating up or cooling down. Metal roofs are usually installed on roof slopes of three in twelve or higher. On metal building systems, metal roofs can be designed and installed as low as a one in twelve slope. Because of the slope, metal roofed buildings tend to have attic spaces in them.

The metal panels in Volusia County Schools sometimes have color for accent but the more recent roofs are a dull silvery color called Galvalume. This color has the least amount of fading than others. Typically, the darker reds and blues are most prone to fading. Browns and tans tend to hold up better with lighter colors holding the best. Metal roofing systems can last from thirty to forty years. Usually, the colors of the roof tend to start fading before the roof has reached the end of its useful life. The other issue to be aware of with metal roofs is the accessory pieces and fasteners. Sometimes these tend to rust because they may be made of steel which can cause staining on the building and metal panels. VCS requires a 20-year leak free system warranty on metal roofs. Advantages are that metal roofing has excellent impact resistance during storm events and have minimal maintenance costs for the first twenty years. Disadvantages are that the painted surface of a roof will have to be repainted after twenty years. Accessories, such as vent boots, will need replacement after twenty years. Exposed fastener systems show evidence of failure after twenty to twenty-five years. Maintenance costs increase substantially for the last half of a metal roof's life expectancy.

Asphalt Shingles

Generally, asphalt shingle roofing is the lowest cost roofing you can install. Because of the requirement of SREF, public school facilities cannot use wood for structural components. The added complexity to a public school project is that a gypsum based roofing system has to be utilized and is generally proprietary and called a Loadmaster System. This requirement generally makes the roofing system higher in price than standard residential systems. VCS standards require a thirty-year fungus resistant asphalt shingle to be used on school projects. The standard service life for a three-tab or architectural shingle system is between eighteen to twenty-three years. The maintenance cost is low for the first ten years and then starts to rise. A shingle system only carries a pro-rated material warranty and does not cover labor. After fifteen years, a shingled roof is more susceptible to wind damage.

MECHANICAL / HVAC SYSTEMS

Maintenance or operational costs are the other main factor for considering initial construction materials and systems. The cost of labor and time maintaining equipment or facilities has always been a challenge for most school districts. Complex systems, such as chilled water, require experienced labor which demands a higher labor rate than most districts can afford. The simpler systems, such as DX systems are much easier to work on and can be supported by district maintenance staff.

Simple DX systems are usually associated with one classroom or small number of rooms. If on DX unit fails or needs servicing, it effects only a few students or faculty at a time. The larger systems cover more spaces and, in some cases, entire campuses. System failures on these larger systems can result in an entire campus to be without cooling. The larger systems are designed to account for this by using two or three cooling units or chillers to allow for the occasional maintenance or failure of one component to not affect the entire system. This is called a systems' redundancy.

Packaged HVAC Units

A packaged air conditioning system is generally mounted on an exterior wall of the room which it serves and can either be located outside or inside the building envelope. This type of unit contains all the necessary chiller equipment, fans and controls in one unit. The system will ventilate through openings in the unit or very short ducts to deliver the treated air to the occupants. Generally, the initial cost on each unit is low. One unit for each space will be required and larger spaces will need more than one. These systems are easy to maintain, and most issues can be handled directly by district personnel. The service life of at pre-package unit is generally ten to fifteen years depending on its location. Regular maintenance includes filter changes, coil cleaning and clearing condensate drains. The disadvantages of a prepacked system are that they are not as efficient to operate as other system choices and have minimal controls from a district energy management perspective. The advantages are that they are easy to work on and parts are readily available. Exterior units do not take up classroom square footage but can effectively be only used on one-story buildings. These systems also tend to have the highest noise levels of any air conditioning system which affects the classroom learning environment. The space which it serves can also expect to have higher humidity and temperature swings than other systems because the system is basically running in an on or off mode.

DX Systems

DX or split systems are very common especially in residential applications. This system requires a condenser unit to be placed outside with refrigerant piping to an interior mechanical room or closet that houses the air handler. This system also tends to provide dedicated service to one space. A small closet is needed for a typical classroom system to house the machinery. The system can provide better humidity control and can be quieter than a pre-packaged unit but can still be heard. Advantages are that the system is easy to maintain by district personnel and that parts are readily available. Energy management can have more control on this system to allow for humidity control and with variable speed units, the temperature can be better maintained. Because of the ratio of one unit per classroom, there is a requirement for many units for a school. The units need to be located within fifty feet of the exterior for effectiveness of the refrigerant piping. Split systems have lower costs than most other HVAC system aside from pre-packaged units. Life expectancy should be fifteen years but can get stretched out further if maintained well. Replacement costs on this system is relatively inexpensive as it is a common type of unit.

Chilled Water Systems with VAVs

A chilled water system is very complex when compared to a pre-packaged or split system. The system utilizes a large chiller to cool water with chemicals to very low temperatures. Pumps will move this liquid through insulated pipes generally located underground until they stub up to mechanical rooms which house large air handlers. The AHUs move cool the air and then distribute it through large ducts throughout the facility. The air is then passes through a VAV (variable air volume) box that regulates specific air flow and can also add heat if necessary. This type of system is used large facilities where the cost of the equipment can be spread over larger square footage project. This type of system is the most economical in energy use and air quality even though it is a complicated system. The chillers and pump portions of the system is noisy but can be mitigated by placing it away from student occupied spaces. The air handlers are quieter and are usually located in spaces away from surrounding educational spaces also. The VAVs and final air distribution is very quiet which is excellent for educational spaces. First costs on these systems are higher because of the equipment costs. The operational costs are less as the system is more efficient to operate. Air quality, temperature and humidity are very controlled and offer the highest quality of ventilation to a facility. A disadvantage is that maintenance tends to be performed by a mechanical contractor due to the complexity. Parts and maintenance are not as easy for district staff to handle as the split or packaged systems. Life expectancy for the air handlers can go twenty-five to thirty years if maintained well. The outside chiller

units should be replaced around fifteen years because of the harsh environment of the Florida coast. Volusia Schools' now has a standard requirement for a ten year parts and labor warranty to be provided with every new system installed to ensure preventive maintenance occurs and to mitigate downtime and expense of any failure of this system.

Additional HVAC Related Options

There are some other items are to be considered when specifying mechanical systems. Different options can realize cost savings over the life of the system but may require some upfront cost. They are important considerations that effect on the economics and serviceability of systems over the life of an educational facility.

HVAC Controls

Direct Digital Control (DDC) controls allows the building operator to have a high-tech advantage in overall control, maintenance and energy savings for the facility. The DDC control system provides a means to monitor and control the space temperature/humidity set points as well as trend control points such as outside air flow, leaving air temperature or capacity of chilled water system being utilized. The DDC system can also alarm the building operator when a system component has failed reducing downtime and confusion. Most school districts have a central location in the district where all mechanical systems in the district can not only be monitored but also programmed and controlled. By having the alarms, central controllability and ability to trend data. The district is able to forecast energy usage and maintenance needs much easier than having maintenance workers travel to individual school sites to check status of equipment.

Single path vs. dual path units

With air handler unit design, there are two directions to consider. The outside air coming into a system is important as it has the potential to introduce a lot of humidity and heat to a space. In a single path system, the outside air is introduced or mixed with the return air from a space before it is treated in the unit. This system is more common and less costly to install. It also takes up less space in a facility's mechanical room. This system will utilize more electricity to dry and cool the incoming outside air while also treating the return air. Humidity control is more challenging in this system.

A Dual Path system provides for a separate AHU to specifically treat the outside air before introducing it to the existing return air. The dual path system is more costly to install and takes up more space but does achieve better humidity control and can also yield some energy savings when the outside air is not needed.

Bi-Polar Ionization

Current ASHRAE codes require a minimum Cubic Feet per Minute (CFM) of outside air to be introduced per occupant in most building types. Educational facilities, especially assembly occupancies, require large amounts of fresh air per this requirement. The cost of treating the hot and humid outside air to remove the humidity and cool it down can be excessive during most of the year in Florida. A cost saving strategy that is relatively new is based on the cleanliness of the air as it leaves the air handling unit (AHU). Bi-Polar Ionization is a relatively inexpensive system that can be retrofitted or specified in new AHUs that cleans the air stream. Bipolar ionization requires no chemicals or harmful substances to purify the air. Instead, it uses an electronic device to supply voltage to a two-electrode tube, which produces an ionization field. The ions that are produced naturally break down unhealthy bacteria and mold, and they even neutralize odors. Bipolar ionization also removes airborne particulate matter, such as dust particles which aggravate allergy and asthma symptoms. The reduction of treating outside air creates a savings on mechanical equipment and operating costs. Because this is relatively new, the overall engineering field would like to see more definitive data regarding the effectiveness of this before it is used widespread.

Ten Year Parts and Labor Warranties

Volusia County Schools has made the requirement on new mechanical specifications for the contractor to provide ten-year parts and labor warranties. This has been an effective tool for VCS because it locks in the cost of the larger chiller systems to a known amount. Chiller parts whether big or small can carry a large price because they are of proprietary systems. Additionally, they can be costly to ship or be made available when needed quickly. The labor associated with the chiller systems is also higher based on the level of technical experience for the complex systems. The stance of VCS Facilities and Maintenance on this issue has been very helpful to the school district.

FLOORING FINISHES

School flooring is the most used and abused component of any school aside from entrance doors. Flooring systems account for every square foot of an occupied space for educational use. Abuse resistance is key for any flooring system in an educational environment to handle the volume of traffic between class changes in corridors, movement of desks and chairs in classrooms, food and drink in cafeteria spaces, etc. There are many types of flooring for specific spaces and include VCT/LVT (Vinyl Composition Tile & Luxury Vinyl Tile) in hallways, carpet in media centers and lower grade classrooms, porcelain tiles in restrooms, wood flooring at auditorium stages and gymnasiums, and specialty flooring in kitchens. This report focuses on two major types of flooring that are found throughout a typical school facility. VCT or LVT is a smooth flooring surface and accounts for the largest amount of covering in a school. Carpeting is the next largest square footage material in a school facility. In either case, Florida has a high abuse factor on the floors because of our sandy environment. Sand and dirt is carried into the schools through the entrances and into the classrooms, cafeteria and media centers. Entrance mats are typically used outside the entry doors and inside the doors to help control contaminants coming into the building, but do not catch all of it. Maintenance on the floors is more intensive to keep the floors clean and to prevent further wear and tear on the material. Maintenance is an important consideration for long term costs.

System	First Cost	O&M Cost	Life	Repl/Refurb	20 Yr Cost	Notes
VCT	$2.55	$ 0.30	20	$ -	$ 9.49	
LVT	$3.67	$ 0.05	15	$ 4.52	$ 9.41	
Sheet Carpet	$2.11	$ 0.20	5	$ 7.36	$ 11.82	
Carpet Tiles	$3.28	$ 0.20	10	$ 3.81	$ 14.02	
Polished/Stained Conc.	$5.25	$ 0.05	7	$ 18.03	$ 24.48	
Terrazzo	$20.00	$ 0.05	7	$ 18.03	$ 73.77	

First Costs = initial cost of the system, including purchase price and cost of installation, per square foot
O&M Cost = as provided by VCS on a per year basis.
Life Cycle Cost = calculation of total cost over a 50 year life span, including first costs, O&M costs and replacement costs, to create an objective comparison

Vinyl Composition Tile Flooring

Vinyl Composition Tile (VCT) has been the most commonly used flooring in educational spaces for the last 25 years. This product is low cost for the initial installation. There are many different types of colors and patterns within each tile that allow for aesthetic expression and vibrancy to be brought into classrooms, hallways, and cafeteria spaces. Installation is relatively easy for the square tiles. VCT does require a high build of wax for the initial installation which consists of between four to five applications for the initial installation. Damp mopping on a regular basis tends to dull the floor over time. Along with

high student traffic and moving furniture such as desks and chairs, the VCT flooring system requires systemic maintenance every year to bring back the floors shine and beauty. The maintenance process involves stripping the floor of its old wax and then applying new wax coats and then buffing the shine on the top outer layer. This process is very labor intensive to perform and limits this to the summer periods or school break periods to perform. Chemicals used for this process are also costly. The initial costs for the VCT flooring system is attractive, but the long-term maintenance costs make this flooring system very expensive.

Luxury Vinyl Tile Flooring

Today's luxury vinyl tile (LVT) features some of the most innovative, versatile, and high-performing flooring available. It offers the richness and texture of more expensive natural materials, such as hardwood, ceramic tile, and stone, without the same costs. Offered in tile, plank, and sheet formats, vinyl flooring boasts realistic visuals, easy installation, and a high level of comfort. The materials and manufacturing process are more intensive to provide a highly durable product to withstand high traffic and student use. Initial costs on the LVT flooring is almost one and half times the cost of the VCT floor previously discussed. The primary benefit associated with LVT flooring is the reduction in floor care and maintenance. The only care for an LVT flooring system is to damp mop it on a regular basis. Volusia County Schools recently installed LVT as part of its renovation project at Pine Trail Elementary. There has not been sufficient time to determine if LVT will hold up to the impacts associated with students. LVT and VCT both provide a greater resistance to areas where there is food and drink like cafeteria seating.

Sheet Carpet

Sheet carpet is one of the lowest cost materials for flooring installation. It is an industry standard and has been utilized on many facilities in the district. The advantages of sheet carpet is that it is quick and easy to install. Many colors and patterns are provided at competitive pricing for educational facilities use. Durability of carpet has improved in the last ten years so it can be a cost-effective flooring choice. There are a few disadvantages of carpet use. It requires maintenance to vacuum properly and get all the dirt, sand and other contaminants out of the carpet piles. Carpet sheets are usually made twelve feet wide. Carpet seams are sometimes noticeable if not installed correctly. A large complaint of sheet carpet is if a stain accident occurs on the carpet it is difficult to address. Sheet carpeting is usually glued down onto a prepped surface which is typically concrete. A patch replacement where the stain is will often stand out after installed.

Carpet Tiles/Squares

Carpet squares are like the sheet good carpets except that they are cut into specific and exact sizes. This allows for easy shipping, stocking of material and installation. The advantages of the carpet squares allow for combinations of different colors and the rotation of patterns and replacement for single areas due to stain or tears are simple and less expensive than full carpet replacement. Similar to VCT and LVT, accents and wide expanses of flooring can be broken up into interesting and aesthetic patterns. The tiles contain an adhesive on the backing from the factory which ensures installation quality and uniformity. This unique system allows for tiles damaged from stains or cuts to be simply pulled up and replaced without any major effort, cutting or patching. There is a premium for this ability, but does allow an educational facility to maintain a clean and consistent appearance for years to come. Maintenance of a sheet carpet floor would be similar to carpet tile flooring system. The main reason that carpet systems are not widely used throughout schools or limited in use is that they tend to hold more dirt and could retain allergens that may affect student health in a classroom. Rooms that are subject to food and drink do not typically use carpeting either.

Polished/Stained Concrete

Concrete is a durable surface but not always attractive to look at in its natural state. Polished concrete systems can be an alternate to having an actual floor finish in order to reduce costs of flooring installation. VCS has experimented with some of these applications in the district. The polished system can incorporate different types of aggregates to give the exposed concrete some interest. Steps for this system include casting the aggregate in the floor, grinding the floor with various abrasion and then final polishing the floor. The result can be a beautiful flooring system that only needs mopping for regular maintenance. The floor will need to be finely ground or polished depending upon the amount of wear that they receive. Stained concrete floors utilize a penetrating stain on the concrete surface to give the floor some interest. This system can combine different colors and patterns to achieve a floor with interest. Both polished and stained floors are very dependent upon the initial concrete installation labor and subsequent polishing/staining for the aesthetic appearance. Visual consistency of the flooring finish can vary greatly when compared to factory manufactured systems like carpet or tile. The success of the floor is strongly dependent upon the initial installation.

Terrazzo

The original terrazzo systems of Florida consisted of an actual 1” to 1-1/2” layer of a special concrete mixture topping with aggregate directly on the concrete slab. The floor would be

ground down smooth for a polished appearance. This system is extremely labor intensive in today's market. The current version of terrazzo now consists of a synthetic mixture with colored aggregates and is only ¼" to 3/8" thick. This system offers a greater level of consistency and is widely used in many retail and commercial markets. The finished product offers a very nice finish with simple care. The floor can be maintained easily by sweeping and mopping. An occasional buffing will be needed depending on the level of use. This system is one of the more expensive flooring options and is generally used for high traffic areas where aesthetics is important.

SECURITY SYSTEMS

NOTE from VCS Staff: Given the current discussion occurring since the February 14th tragedy in Parkland, this section requires more thorough expertise, report and analysis. It is noted that the 2018 legislative session, SB 7026 requires that 2% of school construction is to be used for school security infrastructure and is not to be held against the cost per student station.

It is important to note in this section that there are items and strategies that are usually coordinated by district staff and the architects to provide safe school design. The following lists are summaries of most of the strategies that are typically used. The second list are additional safety measures that were specifically added to the Pierson Elementary School project.

Typical Strategies Utilized for School Security Measures

The following items are typical of most new school designs. These items listed below have been incorporated in the Pierson ES project but may have been upgraded specifically for the project.

1. Single point of vehicular entry onto the site with fences are located at edges of the school property
2. A second set of fences and gates are located to prevent people from entering the courtyards. The exterior walls of school buildings are also used to effectively secure the perimeter.
3. Classroom locksets are keyed from outside to prevent people from entering the classroom when locked by teacher (Policy driven initiative)
4. Intercom devices are located at the entry to every classroom for quick communication
5. Cameras located at all entrances and hallways to record/watch all entry spaces

Pierson Elementary Strategies

The following security items have been incorporated in the Pierson ES project in addition to the ones listed above:

1. Lockdown / panic button called Code Yellow. This button closes all hallway doors on electronic hold-open devices. The main hallway doors connecting the media center hallway to the two story classroom wing automatically shut and lock to prevent unauthorized entry into the classroom spaces.

2. Card reader are located at the main entry door to the office and to the cafeteria to prevent lost keys from being used. The card reader also tracks who enters the school by time and name/employee number.
3. All other entry doors have been called out to have intelligent locksets that can be accessed with proximity cards which also can track who enters the school by time and name/employee number. This includes exterior corridor entry doors as well as the Art, Music and Skills Lab exterior doors.
4. All classroom locksets are keyed from both sides of the door. This allows the school staff to lock the door from inside the classroom without having to go out into the corridor to lock the door.
5. The Pierson ES prototype utilizes a single point of entry for visitors during the school day. This is not a new concept and is being utilized in most, if not all, new school construction. The challenge for school districts, such as VCS, is to incorporate a single point of entry in existing school campuses where the office may be located interior to the school campus.
6. Every classroom has corridor windows to the hallway that allow passive surveillance so school staff can detect unauthorized persons easier. Blinds are also installed at these windows so views can be blocked if needed.
7. Windows from public spaces occupied by staff are located so that views to the courtyard, parking and exterior play areas are always in view for surveillance.

COST STUDY MODEL ANALYSIS

Pierson Elementary School is the first replacement school in this ½ cent sales tax program. It has been designed, bid through a construction manager, and is under construction and will serve as a baseline for the report as an example of the differences in costs based on material/system choices. This cost study analysis will highlight three different scenarios based on the summary of the construction practices previously mentioned in this report.

A) Pierson Elementary School – Current Project Systems

The cost model utilizes Pierson Elementary School as is for the control cost of the new Pierson Elementary School which has a published GMP (Guaranteed Maximum Price) and is currently under construction. It is important to note in this section what choices were made for building systems and why they were used for this particular project as it differs from some of the VCS building practices utilized in the past. During the design of this project, the facilities, the architect, and the construction manager collaboratively looked to incorporate some cost effective building practices utilized in surrounding school districts.

System Option Selections:

A) Exterior Wall System – The concrete tilt wall system is utilized for the new Pierson ES project. This system was chosen as a way for the district could explore this structural system. It has been used widely by other school districts as a standard for some prototype elementary schools. The aesthetics of the tilt panel construction were also considered as a departure from the standard use of brick.

B) Window Glazing System – Laminated-insulated aluminum window systems, impact rated. The district has always required windows to meet the impact rating throughout the county which includes the laminated glazing. Insulated glazing which includes an air space between two sets of glazing was utilized to provide better thermal properties of the window system to reduce heat loads on the building for better energy efficiency.

C) Roofing System – SBS Modified Bitumen roofing was utilized for a majority of the roof on the two-story classroom wing. This system has been utilized for many past projects in the district and was a good choice for the low slope roofs over the classroom wings. This allowed for minimal structure blended with a tried and true system for facilities and maintenance. A standing seam metal roofing system was used for accents at the main entrance and as the main roof over the cafeteria.

D) HVAC System – Air cooled chillers with AHUs and VAVs for a majority of the school which is a usual system for new school prototypes.

E) Flooring Systems – LVT Flooring throughout with carpet tiles in media and lower grade classroom areas. The Luxury Vinyl Tile system has been used recently by the district for an alternative flooring system to VCT. The LVT requires little maintenance which is attractive for VCS Maintenance for long term savings.

Project Cost: $18,531,090 at 90,791 sf amounts to $204.11/sf

B) Pierson Elementary School – Lowest Initial Cost Systems Model

This cost model utilizes the Pierson ES project and apply the systems that have the lowest initial costs that have been identified in this report. This building cost model represents the lowest cost/sf project of the three cost studies. As a reminder, this looks only at the initial installation and does not account for long term efficiencies or life-cycle costs.

System Option Selections:

A) Exterior Wall System - Use a metal building system with pre-finished panels on girts for exterior wall system. This system allows for an economical structure and exterior finish. Prefabrication of building components allow for schedule savings and can shorten general conditions some. The system does utilize steel columns at the exterior of the building along with bracing that can interfere with glazing and openings.

B) Window Glazing System – Use single pane window with field applied manual metal hurricane panels to provide lowest cost installation. This system will result in higher heat loads in glazed areas and will also require VCS personnel to prepare for storm events.

C) Roofing System – Provide low slope TPO membrane on R-30 polyisocyanurate insulation on metal deck attached to purlins and the metal building system. All drainage to the exterior (no internal roof drains). Rainwater would be picked up in gutters, downspouts and sent to splash blocks which would surface drain to stormwater retention ponds.

D) HVAC System – Provide a single unit ventilator unit or residential sized DX unit for each classroom space throughout the facility. All spaces would be served by DX systems.

E) Flooring Systems - VCT Flooring throughout with sheet carpet in media and lower grade classroom areas

Project Cost: $17,894,069 at 90,791 sf amounts to $197.09/sf

C) Pierson Elementary School – Best Long-Term Systems Model

This cost model utilizes the Pierson ES project and apply the systems that have the best long-term or life cycle benefits that have been identified in this report. This building cost model represents the lowest long-term costs for both energy usage and maintenance.

System Option Selections:

A) Exterior Wall System – the exterior wall system utilizes masonry as a bearing wall, rigid insulation and brick or decorative CMU on the exterior. This system has been utilized by Volusia County Schools for many years and offers the best mitigation against water intrusion and has the lowest requirements for exterior maintenance.
B) Window Glazing System – Laminated-insulated aluminum window systems, impact rated. The district has always required windows to meet the impact rating throughout the county which includes the laminated glazing. Insulated glazing which includes an air space between two sets of glazing was utilized to provide better thermal properties of the window system to reduce heat loads on the building for better energy efficiency.
C) Roofing System – Metal roofing system on steel structure or pre-engineered metal truss systems to roof edge. All rainwater would be picked up in gutters, downspouts and sent to ponds via underground storm piping
D) HVAC System – Air cooled chillers with AHUs and VAVs for a majority of the school which is a usual system for new school prototypes and should provide the lowest energy costs.
E) Flooring Systems – LVT Flooring throughout with carpet tiles in media and lower grade classroom areas. The Luxury Vinyl Tile system has been used recently by the district for an alternative flooring system to VCT. The LVT requires little maintenance which is attractive for VCS Maintenance for long term savings.

Project Cost: $19,199,435 at 90,791 sf amounts to $211.47/sf

Cost Study Analysis Comments

It is important to note that the educational model of the three systems does not change the educational model of the facility. Program, spatial allocations, adjacencies or technology was not changed. If the district wants to reduce costs further, then reviewing square footage, types of spaces, technology, kitchen equipment, etc. would be the next step in cost reduction of school construction. This type of exercise was not a focus of this report's analysis.

APPENDIX

Building Systems

System	First Cost	O&M Cost	Life	Repl/Refurb	50 Yr Cost	Notes
Metal Building System	$44.71	$ 0.05	40	$ 69.47	$ 117.66	Refurbish taken at 1/2 installation cost
Tilt-wall	$48.15	$ 0.25	50	$ -	$ 66.57	
Masonry with Stucco	$49.06	$ 0.20	50	$ -	$ 63.80	
Masonry with Brick	$53.01	$ 0.10	50	$ -	$ 60.38	

Roofing Systems

System	First Cost	O&M Cos	Life	Repl Cost	50 Yr Cost	Notes
SBS Modified Bitumen	$12.12	$ 0.10	25 years	$ 41.99	$ 68.96	
TPO Membrane, Single-Ply	$10.03	$ 0.05	20 years	$ 31.07	$ 45.42	
Standing Seam Metal Roof	$13.45	$ 0.05	30 years	$ 21.02	$ 38.16	
Asphalt Shingles	$14.00	$ 0.10	20 years	$ 44.26	$ 65.62	

Mechanical Systems

System	First Cost	O&M Cost	Life Expectancy	Life Cycle Cost	Notes
Packaged HVAC					
DX System					
Chilled water with VAVs					

Flooring Systems

System	First Cost	O&M Cost	Life	Repl/Refurb	20 Yr Cost	Notes
VCT	$2.55	$ 0.30	20	$ -	$ 9.49	
LVT	$3.67	$ 0.05	15	$ 4.52	$ 9.41	
Sheet Carpet	$2.11	$ 0.20	5	$ 7.36	$ 11.82	
Carpet Tiles	$3.28	$ 0.20	10	$ 3.81	$ 14.02	
Polished/Stained Conc.	$5.25	$ 0.05	7	$ 18.03	$ 24.48	
Terrazzo	$20.00	$ 0.05	7	$ 18.03	$ 73.77	

Building Systems Comparison

* Note, these are not total costs. Items that are the same for all systems are not included in the comparison

		Tilt-Wall Structure				CMU w/ Brick Cavity Wall System				CMU w/ Stucco				Metal Building			
Item	Description	Qty	U/M	U/$	Total	Qty	U/M	U/$	Total	Qty	U/M	U/$	Total	Qty	U/M	U/$	Total
3.00	Tilt-Wall concrete structure complete	90,791	gsf	16.66	1,512,600				NA				NA				NA
3.10	Formliner				in above				NA				NA				NA
3.20	Casting slabs				in above				NA				NA				NA
3.30	Foundations				in above	540	cy	515.20	278,208	540	cy	515.20	278,208	540	cy	515.20	278,208
3.40	Soil treatment				in above	62,571	sf	0.12	7,509	62,571	sf	0.12	7,509	62,571	sf	0.12	7,509
3.50	SOG				in above	62,571	sf	4.59	287,326	62,571	sf	4.59	287,326	62,571	sf	4.59	287,326
3.60	Concrete at composite floor deck				in above	25,973	sf	4.86	126,250	25,973	sf	4.86	126,250	25,973	sf	4.86	126,250
4.00	8" CMU exterior walls				NA	42,427	sf	11.00	466,697	42,427	sf	11.00	466,697				NA
4.10	1-1/2" rigid insulation in brick cavity				NA	42,427	sf	2.50	106,068				NA				NA
4.20	Brick				NA	42,427	sf	16.00	678,832				NA				NA
4.30	Dampproofing				NA	42,427	sf	2.50	106,068	42,427	sf	2.50	106,068				NA
5.00	Structural steel frame	90,791	gsf	10.48	951,700	90,791	gsf	10.48	951,700	90,791	gsf	10.48	951,700				NA
7.00	Roofing	90,791	gsf	8.97	814,580	90,791	gsf	8.97	814,580	90,791	gsf	8.97	814,580				in above
9.00	Framing/drywall/insul complete	90,791	gsf	11.46	1,040,088	90,791	gsf	11.46	1,040,088	90,791	gsf	11.46	1,040,088	90,791	gsf	11.46	1,040,088
9.10	Add framing/drywall/insul interior partitions				in above				in above				in above	15,041	sf	7.00	105,287
9.20	Deduct framing/drywall/insul int face of perim walls				NA	(42,427)	sf	6.00	(254,562)	(42,427)	sf	6.00	(254,562)				NA
9.30	Stucco				NA				NA	42,427	sf	10.00	424,270				NA
9.40	Tex-Cote paint exterior walls	42,427	sf	1.25	53,034				NA	42,427	sf	1.25	53,034				NA
13.00	Metal building frame				NA				NA				NA	90,791	gsf	18.50	1,679,634
13.10	Metal building insulated metal wall panels				NA				NA				NA	42,427	sf	15.00	636,405
0.00	Add/Deduct time to build				NA	2	mo	101,833	203,667	1.5	mo	101,833	152,750	(1)	mo	101,833	(101,833)
				*Approx. Total:	4,372,002			*Approx. Total:	4,812,429			*Approx. Total:	4,453,916			*Approx. Total:	4,058,872
				*Approx. $/GSF:	48.15			*Approx. $/GSF:	53.01			*Approx. $/GSF:	49.06			*Approx. $/GSF:	44.71

* Note, these are not total costs. Items that are the same for all systems are not included in the comparison

THREE MODEL COST STUDY – PAGE 1

COST STUDY ANALYSIS

DIV. NO.	PKG. NO.	WORK ITEM DESCRIPTION	PIERSON ELEMENTARY SCHOOL BLDGS A, B, C	SITE	TOTAL	HIGHEST INITIAL $	LOWEST INITIAL $
1		**GENERAL REQUIREMENTS**					
	1A	Stormwater control		6,950	**6,950**	6,950	6,950
	1B	Final cleaning	in GC's		**in GC's**	in GC's	in GC's
2		**EXISTING CONDITIONS**					
	2A	Demolition			**0**	0	0
3		**CONCRETE**					
	3A	Concrete	1,538,200	52,500	**1,590,700**	777,392	777,392
	3A	SOG thickened edge ILO pour backs	(9,600)		**(9,600)**	0	0
4		**MASONRY**					
	4A	CMU	62,812		**62,812**	1,420,476	62,812
5		**METALS**					
	5A	Structural steel and miscellaneous metals	951,700		**951,700**	951,700	45,396
6		**WOOD & PLASTICS**					
	6A	Architectural cabinets	199,652		**199,652**	199,652	199,652
	6A	Satin metal pulls ILO stainless steel	(2,280)		**(2,280)**	(2,280)	(2,280)
	6A	Fabric seat cushions at benches	8,483		**8,483**	8,483	8,483
7		**THERMAL AND MOISTURE PROTECTION**					
	7A	Metal roofing	378,805		**378,805**	1,047,899	0
	7A	Modified bit roofing and LWIC	481,300		**481,300**	0	0
	7A	TPO roof			**0**	0	660,352
	7B	Waterproofing and joint sealants	48,000		**48,000**	48,000	48,000
	7C	Spray fireproofing			**0**	0	0
8		**DOORS AND WINDOWS**					
	8A	Doors, frames and hardware - material	260,997		**260,997**	260,997	260,997
	8B	Doors, frames and hardware - installation	35,650		**35,650**	35,650	35,650
	8C	Windows and glazing	497,000		**497,000**	497,000	429,104
	8C	Auto operator at 1 leaf ILO both leaves	(6,489)		**(6,489)**	(6,489)	(6,489)
9		**FINISHES**					
	9A	Gypsum board assemblies	1,091,685		**1,091,685**	837,123	1,196,972
	9A	Stucco & DEFS	in 9A above		**in 9A above**	in 9A above	in 9A above
		Open-cell insulation	7,445		**7,445**	7,445	7,445
	9B	Painting and concrete floor sealer	205,800		**205,800**	152,766	152,766
	9C	Ceramic tile and window sills	180,074		**180,074**	180,074	180,074
	9C	Add epoxy grout at restrooms floor tile	12,468		**12,468**	12,468	0
	9C	Add epoxy grout at restrooms wall tile	22,095		**22,095**	22,095	0
	9D	Acoustical ceilings and wall panels	150,650		**150,650**	150,650	150,650
	9D	AVL 1" Acoustical wall panels	(1,500)		**(1,500)**	(1,500)	(1,500)
	9E	Resilient flooring and carpet	320,080		**320,080**	320,080	241,367
10		**SPECIALTIES**					
	10A	Visual display surfaces	48,900		**48,900**	48,900	48,900
	10B	Signage	72,500		**72,500**	72,500	72,500
	10B	Alum letters with painted bronze finish ILO cast bronze	(10,820)		**(10,820)**	(10,820)	(10,820)
	10C	Toilet compartments & accessories	56,400		**56,400**	56,400	56,400
	10D	Misc specialties	in 10C above		**in 10C above**	in 10C above	in 10C above
	10D	Corner guards	in 10C above		**in 10C above**	in 10C above	in 10C above
	10D	Flagpoles		in 10C above	**in 10C above**	in 10C above	in 10C above
	10D	Fire extinguishers	in 10C above		**in 10C above**	in 10C above	in 10C above
	10D	Lockers	in 10C above		**in 10C above**	in 10C above	in 10C above
	10D	Metal shelving	in 10C above		**in 10C above**	in 10C above	in 10C above
	10E	Aluminum walkway canopies		249,005	**249,005**	249,005	249,005
	10E	Wall hung aluminum sunshades & canopies	in 10E above		**in 10E above**	in 10E above	in 10E above
11		**EQUIPMENT**					
	11A	Residential equipment	5,401		**5,401**	5,401	5,401
	11B	Foodservice equipment	318,948		**318,948**	318,948	318,948
	11C	Projection screens ALLOWANCE (no spec)	15,975		**15,975**	15,975	15,975
	11C	Projectors (by VCS)	by VCS		**by VCS**	by VCS	by VCS
	11C	TV's & interactive boards (by VCS)	by VCS		**by VCS**	by VCS	by VCS
	11D	Stage curtains	6,733		**6,733**	6,733	6,733
	11E	Playground equipment & surfacing		by VCS	**by VCS**	by VCS	by VCS
	11F	Athletic equipment (b-ball)		16,225	**16,225**	16,225	16,225
	11G	Kiln	4,200		**4,200**	4,200	4,200
	11H	Cubicle curtains			**0**	0	0

THREE MODEL COST STUDY – PAGE 2

COST STUDY ANALYSIS

DIV. NO.	PKG. NO.	WORK ITEM DESCRIPTION	PIERSON ELEMENTARY SCHOOL BLDGS A, B, C	SITE	TOTAL	HIGHEST INITIAL $	LOWEST INITIAL $
	11H	Install dumpsters (not req'd)			**0**	0	0
	11H	Install safe OF-CI (not shown)	455		**455**	455	455
12		**FURNISHINGS**					
	12C	Blinds	12,780		**12,780**	12,780	12,780
		FF&E (by VCS)	by VCS		**by VCS**	by VCS	by VCS
		Site furnishings (by VCS)	by VCS		**by VCS**	by VCS	by VCS
13		**SPECIAL CONSTRUCTION**					
	13A	Pre-eng metal building @ PE/Covered Play		69,414	**69,414**	69,414	69,414
		Pre-eng metal building system for campus			**0**	0	2,043,666
14		**CONVEYING SYSTEMS**					
	14A	Elevator	75,885		**75,885**	75,885	75,885
	14A	Elevator pit depth	(4,400)		**(4,400)**	(4,400)	(4,400)
	14A	Alt elevator cab finishes and height	(4,845)		**(4,845)**	(4,845)	(4,845)
21		**MECHANICAL**					
	21A	Fire protection	220,300	52,500	**272,800**	272,800	272,800
	21A	Fire water storage tank		242,564	**242,564**	242,564	242,564
	21A	Paint exterior of fire water storage tank		8,000	**8,000**	8,000	8,000
	22A	Plumbing systems	848,070		**848,070**	848,070	848,070
	23A	HVAC	2,063,197		**2,063,197**	2,063,197	1,547,398
	23A	1.5" CHW insulation ILO 2"	(4,500)		**(4,500)**	(4,500)	(4,500)
	23A	AHU's delete tread plate flooring from access sections	(2,600)		**(2,600)**	(2,600)	(2,600)
	23A	AHU's delete filter DP gauge	(1,375)		**(1,375)**	(1,375)	(1,375)
	23A	AHU's delete window in fan access door	(1,600)		**(1,600)**	(1,600)	(1,600)
	23A	AHU's delete perforated liner in fan section	(2,500)		**(2,500)**	(2,500)	(2,500)
	23A	AHU's side load filter rack ILO face load	(3,000)		**(3,000)**	(3,000)	(3,000)
	23A	Controls delete 3rd party commissioning requirement	(5,800)		**(5,800)**	(5,800)	(5,800)
	23A	Onicon insertion dual turbine flow meters in lieu of in-line electromagnetic	(3,500)		**(3,500)**	(3,500)	(3,500)
	23A	Delete controls from fire pump room	(2,500)		**(2,500)**	(2,500)	(2,500)
	23B	Test & balance	by VCS		**by VCS**	by VCS	by VCS
26		**ELECTRICAL**					
	26A	Electrical	2,482,736	in buildings	**2,482,736**	2,482,736	2,482,736
	26A	RFI #E-39 add data from MDF to curb		16,500	**16,500**	16,500	16,500
	26A	(6) recessed lensed LED fixtures at entry canopy	7,500		**7,500**	7,500	7,500
31		**SITE CONSTRUCTION**					
	31B	Sitework		2,754,868	**2,754,868**	2,754,868	2,754,868
	32A	Sidewalks		193,100	**193,100**	193,100	193,100
	32B	Fencing		98,237	**98,237**	98,237	98,237
	32B	Standard concrete footings for chain link fencing		(5,133)	**(5,133)**	(5,133)	(5,133)
	32B	Standard temporary fence		(13,282)	**(13,282)**	(13,282)	(13,282)
	32C	Landscape, sod & irrigation		210,204	**210,204**	210,204	210,204
		TOTAL COST OF WORK	12,625,566	3,951,651	**16,577,218**	**17,011,372**	**16,066,399**
		General Conditions (Lump Sum)			1,120,167	1,323,834	1,018,334
		Subguard (does not incl GC's)		0.013340	218,059	226,932	214,326
		Permits and Fees			by VCS	by VCS	by VCS
		Temporary & Permanent Power & Water Fees			by VCS	by VCS	by VCS
		Material testing			by VCS	by VCS	by VCS
		SUBTOTAL			17,915,443	18,562,137	17,299,058
		General Liability Insurance		0.004244	76,033	78,778	73,417
		Umbrella Insurance		0.001934	34,796	36,052	33,598
		Equipment Insurance		0.000064	1,154	1,195	1,114
		Builders Risk Insurance ($5,000 deductible)			15,540	15,540	15,540
		Contingency		2.00%	360,859	373,874	348,455
		CM Fee			Separate PO	Separate PO	Separate PO
		P & P BOND			127,265	131,859	122,887
		TOTAL			**18,531,090**	**19,199,435**	**17,894,069**

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Attachment 2

Project Expenditures

Fiscal Year 2018 Expenditures

Expenditure Processing Year	Project Number	Organization Name	Project Type	Project Name	FY18 Budget	Debt Service	Expenditure Amount
2018	4495	Deland Middle School	Equipment Replacement	Replace Fire Alarm & Intercom	$ 21,689		$ 322
			Equipment Replacement Total		**$ 21,689**		**$ 322**
2018	4585	Spruce Creek High School	HS Athletics	Softball Dugout & Backstop Renovations	$ 120,791		$ 120,791
2018	4586	T. Dewitt Taylor Middle-High School	HS Athletics	Outdoor Restroom for Athletics	$ 123,594		$ 123,594
2018	4587	University High School	HS Athletics	Outdoor Restroom for Athletics	$ 10,012		$ 10,012
2018	4683	Atlantic High School	HS Athletics	Athletic Field Lighting	$ 305,487		$ 22,030
2018	4684	Deland High School	HS Athletics	Renovate Track	$ 223,315		$ 15,775
2018	4685	Mainland High School	HS Athletics	Athletic Field Lighting	$ 36,898		$ 18,037
2018	4686	Pine Ridge High School	HS Athletics	Renovate Track	$ 246,352		$ 22,854
2018	4687	Seabreeze High School	HS Athletics	Athletic Field Renovation	$ 203,013		$ 14,492
2018	4688	University High School	HS Athletics	Athletic Field Lighting	$ 571,175		$ 87,732
			HS Athletics Total		**$ 1,840,637**		**$ 435,319**
2018	4541	Atlantic High School	HVAC	HVAC Renovation Bldg 5	$ 661,266		$ 661,266
2018	4567	Pine Ridge High School	HVAC	Upgrade Chiller Plant & Bldg 5 HVAC	$ 1,545,540		$ 1,545,540
2018	4622	Atlantic High School	HVAC	Upgrade Chillers 4 and 5, HVAC Bldg 3	$ 1,829,256		$ 603,989
2018	4624	Deland Middle School	HVAC	Campus Wide HVAC, Ceiling and Lighting	$ 2,030,133		$ 651,066
2018	4629	Pine Ridge High School	HVAC	Replace Chillers 3 and 4, HVAC Bldg 2	$ 1,806,985		$ 445,339
2018	4630	Seabreeze High School	HVAC	Upgrade Chiller Water Plant	$ 190,985		$ 23,899
			HVAC Total		**$ 8,064,165**		**$ 3,931,099**
2018	4517	Atlantic High School	Infrastructure for Technology	Install Network Jack and 4 Charging Stations	$ 588		$ 588
2018	4517	Atlantic High School	Infrastructure for Technology	Install Network Jack and 4 Charging Stations	$ 104		$ 104
2018	4517	Campbell Middle School	Infrastructure for Technology	Mount Bracket and TV in Buildings 4 and 7.	$ 754		$ 754
2018	4517	Champion Elementary School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 218		$ 218
2018	4517	Chisholm Elementary School	Infrastructure for Technology	Install 6 Charging Station Cubes	$ 389		$ 389
2018	4517	Citrus Grove Elementary School	Infrastructure for Technology	Install 13 Charging Station Cube	$ 1,072		$ 1,072
2018	4517	Cypress Creek Elementary School	Infrastructure for Technology	Install 3 Charging Station Cubes	$ 564		$ 564
2018	4517	Debary Elementary School	Infrastructure for Technology	Install 12 Charging Station Cubes	$ 1,033		$ 1,033
2018	4517	Deland High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 676		$ 676
2018	4517	Deltona High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 206		$ 206
2018	4517	Deltona Lakes Elementary School	Infrastructure for Technology	Install 10 Charging Station Cubes	$ 736		$ 736
2018	4517	Discovery Elementary School	Infrastructure for Technology	Install 7 Charging Station Cubes	$ 818		$ 818
2018	4517	Edgewater Public Elementary School	Infrastructure for Technology	Install 2 Charging Station Cubes	$ 364		$ 364
2018	4517	Edith I. Starke Elementary School	Infrastructure for Technology	Install 1 Charging Station Cube	$ 39		$ 39
2018	4517	Enterprise Elementary School	Infrastructure for Technology	Install 7 Charging Station Cubes	$ 736		$ 736

Fiscal Year 2018 Expenditures

Expenditure Processing Year	Project Number	Organization Name	Project Type	Project Name	FY18 Budget	Debt Service	Expenditure Amount
2018	4517	Forest Lake Elementary School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 654		$ 654
2018	4517	Former CLCE (Herbert Street Site) Fac Only	Infrastructure for Technology	Install Ports on East Wall below White Board and in Small Hallway	$ 708		$ 708
2018	4517	Freedom Elementary School	Infrastructure for Technology	Install 5 Charging Station Cubes	$ 204		$ 204
2018	4517	Friendship Elementary School	Infrastructure for Technology	Install 8 Charging Station Cubes	$ 654		$ 654
2018	4517	George Marks Elementary School	Infrastructure for Technology	Install 8 Charging Station Cubes	$ 1,022		$ 1,022
2018	4517	Holly Hill School (K-8)	Infrastructure for Technology	Install 13 Charging Cube Stations	$ 709		$ 709
2018	4517	Horizon Elementary School	Infrastructure for Technology	Install 8 Charging Station Cubes	$ 436		$ 436
2018	4517	Mainland High School	Infrastructure for Technology	Relocate 2 Network Ports and Install 4 Charging Station Cubes	$ 424		$ 424
2018	4517	Mainland High School	Infrastructure for Technology	Relocate 2 Network Ports and Install 4 Charging Station Cubes	$ 272		$ 272
2018	4517	New Smyrna Beach High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 496		$ 496
2018	4517	Orange City Elementary School	Infrastructure for Technology	Install 7 Charging Station Cubes	$ 654		$ 654
2018	4517	Ormond Beach Elementary School	Infrastructure for Technology	Install 6 Charging Station Cubes and Network Jack for Jar Cubes and Carts.	$ 781		$ 781
2018	4517	Ortona Elementary School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 346		$ 346
2018	4517	Osceola Elementary School	Infrastructure for Technology	Install 5 Charging Station Cubes	$ 532		$ 532
2018	4517	Osteen Elementary School	Infrastructure for Technology	Install 2 Charging Station Cubes	$ 104		$ 104
2018	4517	Pathways Elementary School	Infrastructure for Technology	Install 3 Charging Station Cubes and 20 Amp Outlet	$ 683		$ 401
2018	4517	Pine Ridge High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 569		$ 569
2018	4517	Pine Trail Elementary School	Infrastructure for Technology	Install 2 Computer Cubes and 6 Charging Station Cubes	$ 709		$ 709
2018	4517	Pine Trail Elementary School	Infrastructure for Technology	Install 6 Charging Station Cubes	$ 431		$ 431
2018	4517	Port Orange Elementary School	Infrastructure for Technology	Install 3 Charging Station Cubes, Mount Bracket and TV	$ 1,382		$ 1,382
2018	4517	Portables - Fac Only	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 427		$ 427
2018	4517	Pride Elementary School	Infrastructure for Technology	Install 10 Charging Station Cubes	$ 818		$ 818
2018	4517	R.J. Longstreet Elementary School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 395		$ 395
2018	4517	Seabreeze High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 555		$ 555
2018	4517	South Daytona Elementary School	Infrastructure for Technology	Install 9 Charging Station Cubes	$ 545		$ 545
2018	4517	Spirit Elementary School	Infrastructure for Technology	Install 10 Charging Station Cubes	$ 736		$ 736
2018	4517	Spruce Creek Elementary School	Infrastructure for Technology	Install 6 Charging Station Cubes and Run Wire from IDF to Ceiling for Access Point	$ 754		$ 754
2018	4517	Spruce Creek High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 2		$ (149)
2018	4517	Sugar Mill Elementary School	Infrastructure for Technology	Install 5 Charging Station Cubes	$ 659		$ 659
2018	4517	Sunrise Elementary School	Infrastructure for Technology	Install 10 Charging Station Cubes	$ 1,265		$ 1,265
2018	4517	Sweetwater Elementary School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 136		$ 136
2018	4517	T. Dewitt Taylor Middle-High School	Infrastructure for Technology	Install Network Drop on North and South Walls of the Gym	$ 1,494		$ 1,468

Fiscal Year 2018 Expenditures

Expenditure Processing Year	Project Number	Organization Name	Project Type	Project Name	FY18 Budget	Debt Service	Expenditure Amount
2018	4517	Technology Services	Infrastructure for Technology	Technology Services Labor (Service Tickets) and Minor Projects	$ 334,714		$ 324,534
2018	4517	Tomoka Elementary School	Infrastructure for Technology	Install 10 Charging Station Cubes	$ 1,066		$ 1,066
2018	4517	Turie T. Small Elementary School	Infrastructure for Technology	Install Charging Cube Stations and Network Jacks.	$ 2,439		$ 2,439
2018	4517	University High School	Infrastructure for Technology	Install 4 Charging Station Cubes	$ 441		$ 441
2018	4517	Volusia Pines Elementary School	Infrastructure for Technology	Install 8 Charging Station Cubes	$ 1,324		$ 1,324
2018	4517	Westside Elementary School	Infrastructure for Technology	Install Jar Cubicle in Portable	$ 586		$ 586
2018	4517	Woodward Avenue Elementary School	Infrastructure for Technology	Install 6 Charging Station Cubes and Network Jack for Printer	$ 409		$ 409
			Infrastructure for Technology Total		**$ 368,834**		**$ 358,194**
2018	4620	Deltona Middle School	Master Plan	Master Plan	$ 2,030,133		$ 190,185
2018	4621	George Marks Elementary School	Master Plan	Master Plan	$ 2,030,133		$ 220,471
2018	4631	Spruce Creek High School	Master Plan	Master Plan	$ 1,015,066		$ 114,967
			Master Plan Total		**$ 5,075,332**		**$ 525,622**
2018	4588	Pine Ridge High School	Renovations and Additions	Media Center Retrofit	$ 158,134		$ 158,134
2018	4702	Deltona High School	Renovations and Additions	Media Center Retrofit	$ 353,857		$ 129,112
2018	4703	Seabreeze High School	Renovations and Additions	Media Center Retrofit	$ 278,328		$ 122,794
2018	4674	Seabreeze High School	Renovations and Additions	Window and Door Replacement Bldgs 7 - 11	$ 659,793		$ 49,981
2018	4582	Westside Elementary School	Renovations and Additions	Renovations & Addition	$ 1,015,066		$ 15,066
			Renovations and Additions Total		**$ 2,465,179**		**$ 475,088**
2018	4519	Pierson Elementary School	Replacement School	Replacement School	$ 20,614,764		$ 16,894,662
2018	4540	Chisholm Elementary School	Replacement School	Replacement School	$ 18,958,473		$ 2,047,144
			Replacement School Total		**$ 39,573,237**		**$ 18,941,806**
2018	4603	Spruce Creek High School	Roofing	35 Ton A/C Unit on Cafeteria, Controls, & Roof Curb	$ 146,748		$ 113,487
2018	4628	Pine Ridge High School	Roofing	Campus Wide Reroof	$ 263,863		$ 50,843
			Roofing Total		**$ 410,611**		**$ 164,330**
2018	4518	Transportation Services	Security	School Bus Communications	$ 56,580		$ 56,580
2018	4518	Deltona Middle School	Security	Upgrade Intercom	$ 35,376		$ 35,376
2018	4518	Deltona Lakes Elementary School	Security	Upgrade Intercom	$ 33,894		$ 33,894
2018	4518	Woodward Avenue Elementary School	Security	Upgrade Intercom	$ 32,988		$ 32,988
2018	4518	New Maint - Daytona - Fac Only	Security	Reconfigure Front Lobby Entrance	$ 19,184		$ 19,184
2018	4518	Deland Adm/Brewster Ctr - Fac Only	Security	Upgrade Door Locks and CMC Monitoring	$ 10,498		$ 10,498
2018	4518	River Springs Middle School	Security	CMC Monitoring	$ 9,791		$ 9,791

Fiscal Year 2018 Expenditures

Expenditure Processing Year	Project Number	Organization Name	Project Type	Project Name	FY18 Budget	Debt Service	Expenditure Amount
2018	4518	Pine Ridge High School	Security	CMC Monitoring	$ 5,959		$ 5,959
2018	4518	Palm Terrace Elementary School	Security	Upgrade Intercom	$ 5,840		$ 5,840
2018	4518	Sunrise Elementary School	Security	Upgrade Intercom	$ 5,597		$ 5,597
2018	4518	Sweetwater Elementary School	Security	Upgrade Intercom	$ 5,597		$ 5,597
2018	4518	Atlantic High School	Security	CMC Monitoring	$ 5,565		$ 5,565
2018	4518	Osteen Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	Manatee Cove Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	Sugar Mill Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	Discovery Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	George Marks Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	Spruce Creek Elementary School	Security	Upgrade Intercom	$ 5,353		$ 5,353
2018	4518	Pride Elementary School	Security	CMC Monitoring	$ 5,108		$ 5,108
2018	4518	Enterprise Elementary School	Security	Purchase and installation of repeater.	$ 3,574		$ 3,574
2018	4518	Deltona High School	Security	Install Bar Gate	$ 2,416		$ 2,416
2018	4518	Pathways Elementary School	Security	Fencing	$ 43,846		$ 781
2018	4518	Woodward Avenue Elementary School	Security	Fencing	$ 9,557		$ 729
2018	4518	T. Dewitt Taylor Middle-High School	Security	Fencing	$ 48,050		$ 713
2018	4518	Southwestern Middle School	Security	Fencing	$ 21,792		$ 682
2018	4518	Pine Trail Elementary School	Security	Fencing	$ 42,222		$ 679
2018	4518	Ortona Elementary School	Security	Fencing	$ 20,453		$ 512
2018	4518	Palm Terrace Elementary School	Security	Fencing	$ 17,208		$ 437
2018	4518	Tomoka Elementary School	Security	Fencing	$ 26,921		$ 400
2018	4518	Louise S. McInnis Elementary	Security	Fencing	$ 13,823		$ 360
2018	4595	Ormond Beach Middle School	Security	Upgrade Security Gates	$ 1,508		$ 1,508
2018	4614	Deltona High School	Security	Upgrade Security Cameras	$ 32,820		$ 32,820
2018	4615	Deland Adm/Brewster Ctr - Fac Only	Security	Upgrade Security Systems	$ 35,226		$ 35,226
2018	4690	Deltona High School	Security	Fencing	$ 104		$ 104
2018	4691	Mainland High School	Security	Fencing	$ 14,941		$ 534
2018	4692	New Smyrna Beach High School	Security	Fencing	$ 52		$ 52
2018	4693	Pine Ridge High School	Security	Fencing	$ 104		$ 104
2018	4694	Deland Middle School	Security	Fencing	$ 22,500		$ 937
2018	4695	Holly Hill School (K-8)	Security	Fencing	$ 27,607		$ 2,440
2018	4696	Blue Lake Elementary School	Security	Fencing	$ 53,254		$ 14,942
2018	4699	Indian River Elementary School	Security	Fencing	$ 62,271		$ 62,271
2018	4700	Edith I. Starke Elementary School	Security	Fencing	$ 18,516		$ 18,516
2018	4701	Turie T. Small Elementary School	Security	Fencing	$ 33,564		$ 33,564
			Security Total		**$ 816,424**		**$ 478,395**

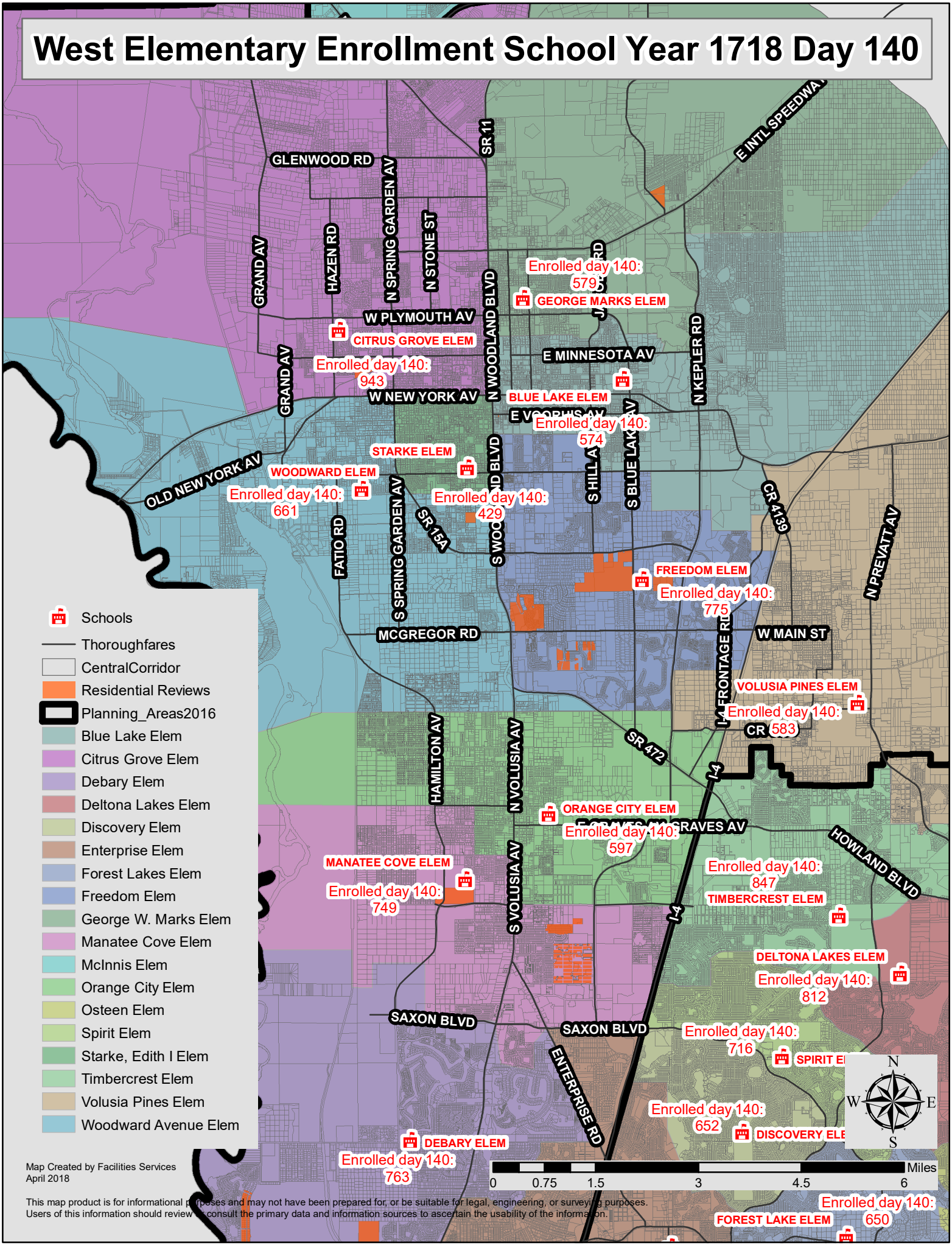
Fiscal Year 2018 Expenditures

Expenditure Processing Year	Project Number	Organization Name	Project Type	Project Name	FY18 Budget	Debt Service	Expenditure Amount
2018	6933	Technology Services	Technology	District Wide Technology Equipment (Computers, Hardware, Printers, TV Monitors, Projectors,Telephones, Multi-Media, and Audio Enhancement)	$ 4,636,081		$ 3,202,197
2018	6933	Pine Ridge High School	Technology	Various Schools & Depts - District Wide Technology Equipment	$ 7,200		$ 7,200
2018	6933	Enterprise Elementary School	Technology	Various Schools & Depts - District Wide Technology Equipment	$ 3,141		$ 3,141
2018	6971	Technology Services	Technology	ERP Software - Enterprise Resource Planning	$ 7,048,993		$ 2,896,079
2018	6972	Technology Services	Technology	SIS Software - New District Student Information System	$ 4,000,000		$ 109,626
			Technology Total		**$ 15,695,415**		**$ 6,218,243**
2018	6990	Financial Services Administration	Transfers - Capital	Transfers - Capital	$ 14,554,506	$ 14,554,506	
2018	6990	Financial Services Administration	Transfers - Capital	Transfers - Capital	$ 3,328,348	$ 3,328,348	
			Transfers - Capital Total		**$ 17,882,854**	**$ 17,882,854**	**$ -**
			Grand Total		**$ 92,214,376**	**$ 17,882,854**	**$ 31,528,417**

Attachment 3.a.

Maps with 140-day Enrollment

West Elementary Enrollment School Year 1718 Day 140



Map Created by Facilities Services
April 2018

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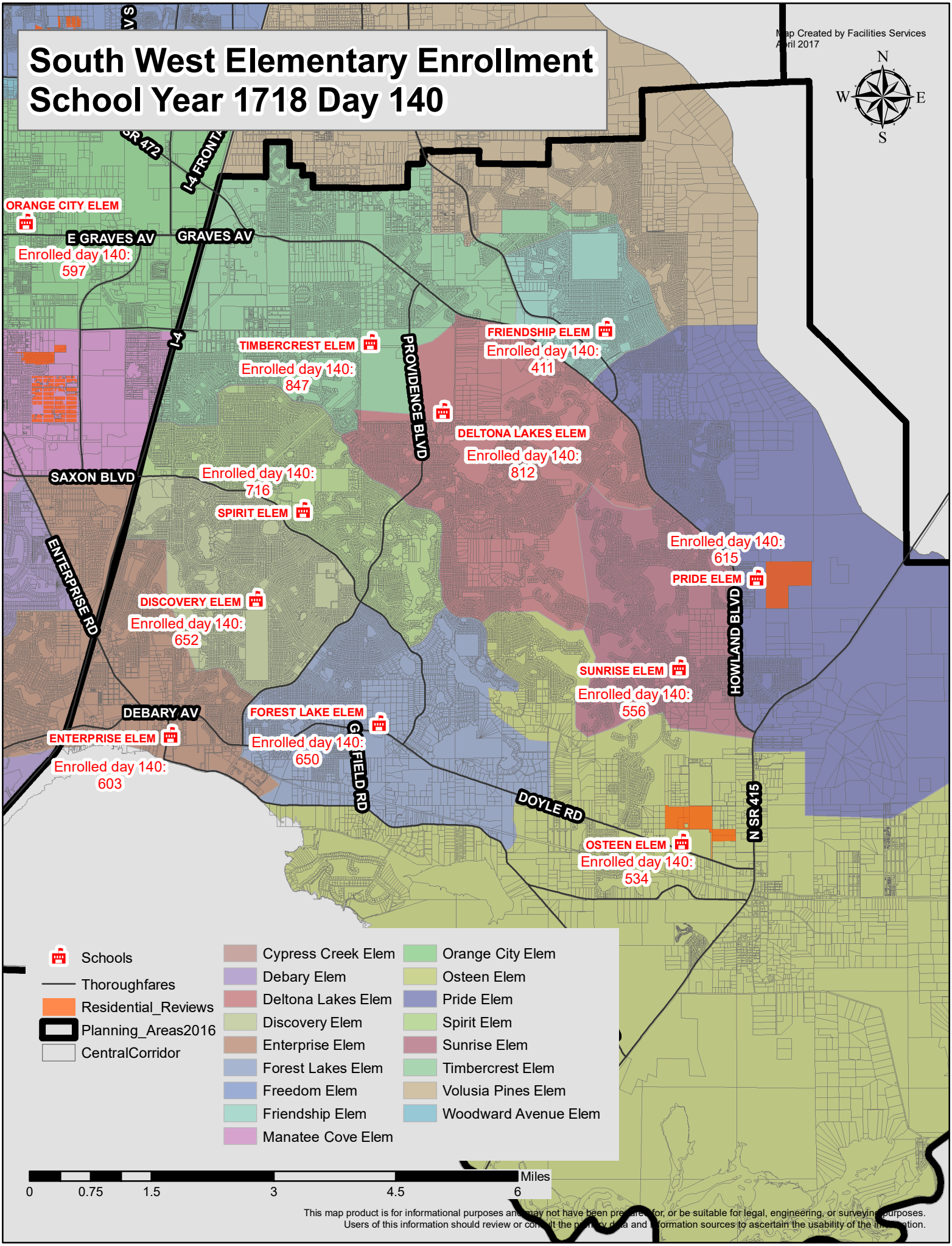
South West Elementary Enrollment
School Year 1718 Day 140
Map Created by Facilities Services
April 2017
N
W
E
S
SR 472
I-4 FRONTA
ORANGE CITY ELEM
E GRAVES AV
GRAVES AV
Enrolled day 140:
597
I-4
TIMBERCREST ELEM
Enrolled day 140:
847
PROVIDENCE BLVD
FRIENDSHIP ELEM
Enrolled day 140:
411
DELTONA LAKES ELEM
Enrolled day 140:
812
SAXON BLVD
Enrolled day 140:
716
SPIRIT ELEM
ENTERPRISE RD
Enrolled day 140:
615
PRIDE ELEM
HOWLAND BLVD
DISCOVERY ELEM
Enrolled day 140:
652
SUNRISE ELEM
Enrolled day 140:
556
DEBARY AV
FORREST LAKE ELEM
Enrolled day 140:
650
ENTERPRISE ELEM
Enrolled day 140:
603
GARFIELD RD
DOYLE RD
N SR 415
OSTEEN ELEM
Enrolled day 140:
534
Schools
Thoroughfares
Residential_Reviews
Planning_Areas2016
CentralCorridor
Cypress Creek Elem
Debary Elem
Deltona Lakes Elem
Discovery Elem
Enterprise Elem
Forest Lakes Elem
Freedom Elem
Friendship Elem
Manatee Cove Elem
Orange City Elem
Osteen Elem
Pride Elem
Spirit Elem
Sunrise Elem
Timbercrest Elem
Volusia Pines Elem
Woodward Avenue Elem
Miles
0
0.75
1.5
3
4.5
6
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South Halifax Elementary Enrollment School Year 1718 Day 140

Map Created by Facilities Services
April 2018

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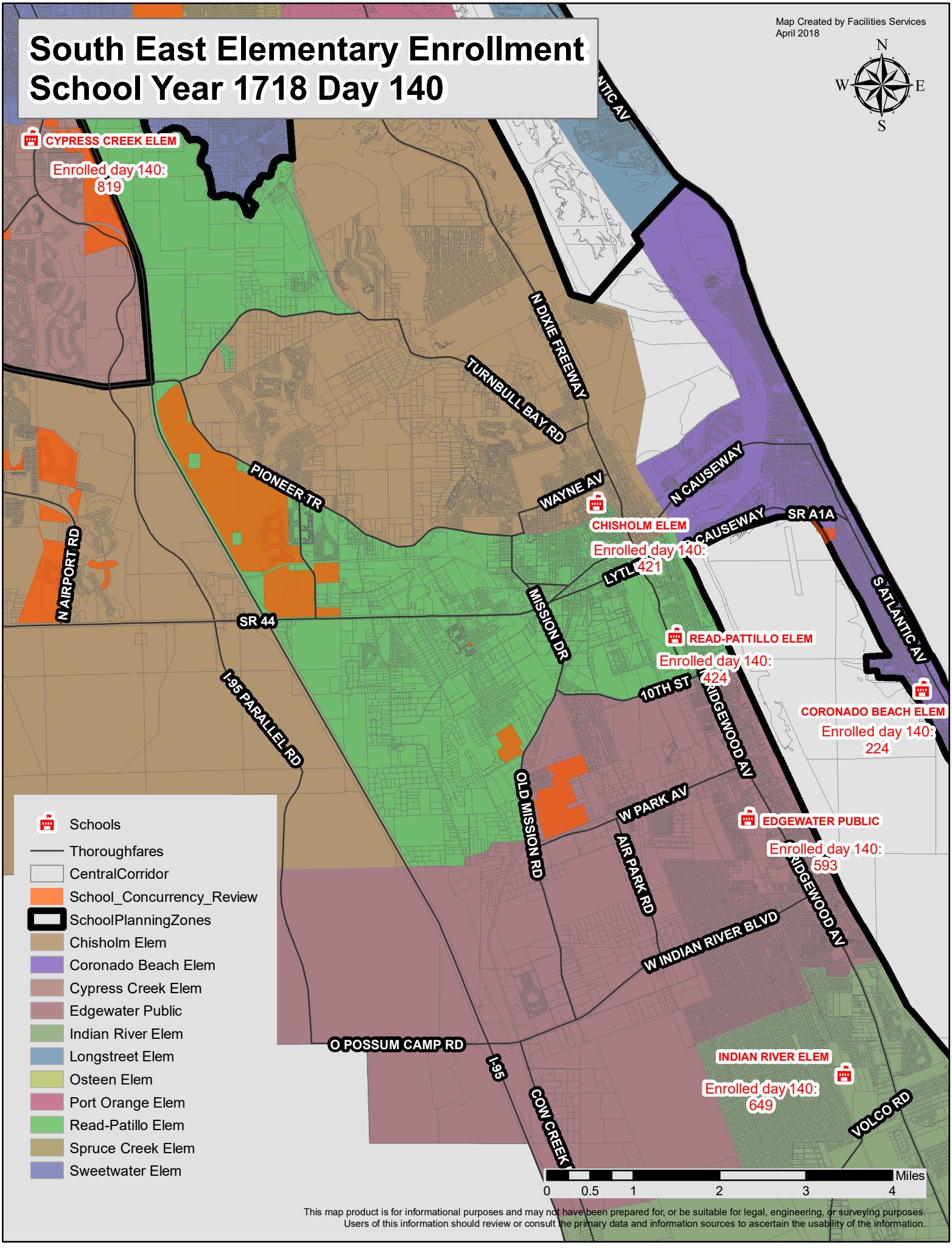

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North West Elementary Enrollment School Year 1718 Day 140

Map Created by Facilities Services
April 2018

NEW PIERSON ELEMENTARY

PIERSON ELEM
Enrolled day 140:
544

McINNIS ELEM
Enrolled day 140:
404

N US 17
S CENTER ST
S US 17
N US 17
SR 11
W SR 40
E SR 40
LAKE WINONA RD
EMPORIA RD
W SR 40
SR 40
W SR 40
REYNOLDS RD
GRAND AV
MARSH RD
11

- New_Pierson_Elementary
- Schools
- Thoroughfares
- SchoolPlanningZones
- CentralCorridor
- Champion Elem
- Citrus Grove Elem
- George W. Marks Elem
- McInnis Elem
- Pathways Elem
- Pierson Elem

Miles
0 1.25 2.5 5 7.5 10

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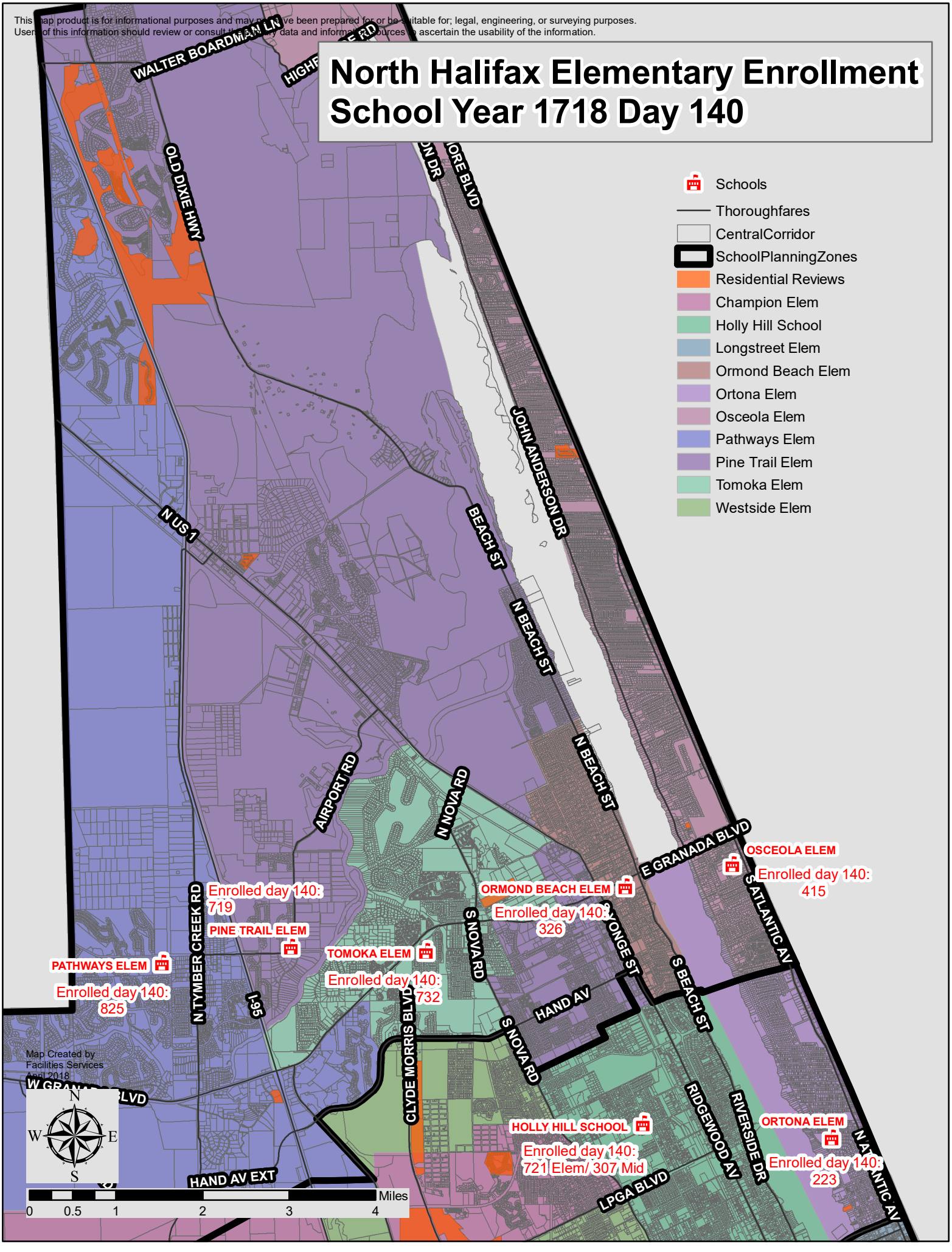
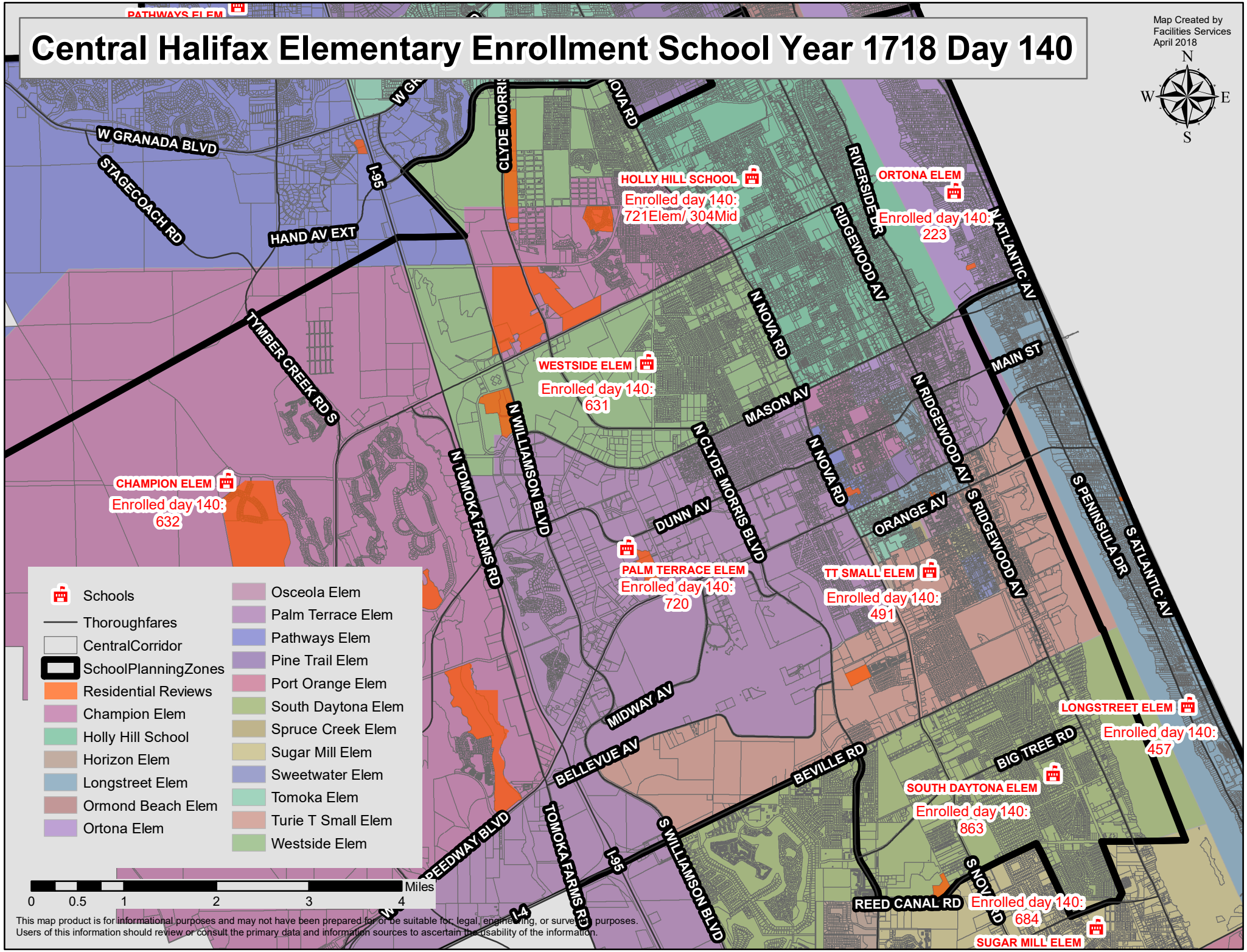
North Halifax Elementary Enrollment
School Year 1718 Day 140



Central Halifax Elementary Enrollment School Year 1718 Day 140



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Attachment 3.b.

Small Schools' Analysis

Read-Pattillo Elementary
(General Fund Analysis)

2018-19 Enrollment - 20th Day - 413

	FTE		Total	FTE		Potential Savings
Salaries & Benefits						
Teachers	31.3	$	1,259,418		$	-
Administrator - Principal	1	$	85,680		$	85,680
Administrator - Assistant Principal	1	$	71,198		$	71,198
Instr. Support (Guidance/TOA/Media)	2	$	124,816		$	124,816
Paraprofessionals	1.5	$	18,031		$	-
Office Specialist I	2.1	$	39,481	2.94	$	(15,234)
Office Specialist II	1	$	22,800	2	$	(22,800)
Office Specialist III	1	$	30,580	1	$	30,580
Nurse	0.75	$	13,878		$	13,878
Substitutes		$	10,235		$	-
Supplements		$	11,025		$	-
Benefits		$	499,522		$	290,328
Total Salaries & Benefits		$	2,186,664		$	578,446
Non-salary		$	14,403		$	-
Utilities*		$	72,157		$	50,510
Custodial**		$	86,997		$	31,585
Grounds		$	8,202		$	-
Total General Fund Savings		$	2,360,221		$	660,540

*Prior Year Utilities includes Energy Services, telephone, water & sewer - Calculated at 70% savings

**Will remain open as Professional Development Center & Custodial cost at Chisholm will increase

Ortona Elementary
(General Fund Analysis)

Enrollment - 20th Day - 231

	FTE		Total	FTE		Potential Savings
Salaries & Benefits						
Teachers	16.2	$	651,839		$	-
Administrator - Principal	1	$	85,680		$	85,680
Administrator - Assistant Principal		$	-	1	$	(71,198)
Instr. Support (Guidance/TOA/Media)	3	$	124,816		$	124,816
Paraprofessionals		$	-		$	-
Office Specialist I	0.6	$	7,035	1.68	$	1,180
Office Specialist II	1	$	22,800	1.92	$	3,101
Office Specialist III	1	$	30,580	1	$	30,580
Nurse	0.75	$	12,074		$	12,074
Substitutes		$	10,235		$	-
Supplements		$	11,025		$	-
Benefits		$	282,130		$	178,875
Total Salaries & Benefits		$	1,238,215		$	365,109
Non-salary		$	7,296		$	-
Utilities*		$	53,957		$	53,957
Custodial**		$	71,249		$	15,976
Grounds		$	5,139		$	3,272
Total General Fund Savings		$	1,370,717		$	435,042

*Prior Year Utilities includes Energy Services, telephone, water & sewer

**Custodial cost at Osceola will increase