Renovations to Glen Cove Elementary School

SITE LAYOUT

The existing Glen Cove Elementary School will undergo interior renovations to bring the existing school in line with current standards. Site improvements will be made to meet regulatory requirements, improve site circulation patterns, and provide utility and other improvements as necessary. Existing improvements will be preserved where appropriate or demolished as necessary to meet the goals of the project. Construction will be coordinated and sequenced to allow the existing school to remain open and functional during the construction process.

The existing parking area will be reconstructed and reconfigured as shown on the Concept Plan. A new parent pickup/drop-off loop will be created at the front of the building to provide additional staging areas than what currently exists at the site. A new bus loop will be provided with bus pickup/drop-off located at the rear of the building. The existing service area located on the west side of the building will remain and will be accessed from the new bus loop. This new bus staging area will allow for separation of car riders from buses and service vehicles and will provide enhanced fire and emergency access around the building, all of which will improve safety at the school.

All parking areas will be asphalt surfaced with exterior curbing and will include necessary striping and signage. New sidewalks and other exterior improvements will be provided on-site to enhance outdoor spaces around the building and to provide appropriate pedestrian access through the site. The site will be further improved with new landscaping and lighting.

Review Agencies:
County of Roanoke
Virginia Department of Transportation (work within public right-of-way)
Western Virginia Water Authority (public water and sanitary sewer improvements)

SITE ACCESS

The existing entrance is to remain in a similar location on Cove Road (Route 780) but will be improved as necessary to meet the needs of the project.

WATER SERVICE

According to WVWA GIS, there is an existing 8” public water main crossing the site from Tully Drive to Cove Road. This existing line is expected to remain in place and be unaffected by the proposed construction project. The existing vault providing domestic water service for the building is located at the end of Tully Drive. It is anticipated that the existing service will either continue to be used for the renovated building or will be abandoned and a new vault and service installed to serve the building.

SANITARY SEWER

According to WVWA GIS, there is an existing 8” public sanitary sewer main crossing the site from Tully Drive and extending to sites located to the north and west. There also appears to be a separate 8” public sanitary sewer main extending toward the building from the east with service laterals extending from the public main to the elementary school and gymnasium. It is anticipated that the existing service will continue to be used for the renovated building.

STORM SEWER

The front of the site generally drains toward Cove Road and points south of the site. The rear of the site generally drains to an existing drainage low to the north. Existing storm sewer exists on-site to convey stormwater runoff to the existing ditch line adjacent to Cove Road. The existing storm sewer will be preserved to the extent practical and additional storm sewer improvements installed as necessary.

Stormwater management (SWM) requirements for quantity and quality will need to be addressed for the site to meet current regulations. It appears that there is an existing SWM facility to the north of the site that serves other Roanoke County facilities. It is anticipated that SWM quantity requirements will be addressed with the construction of a new SWM facility at the front of the site and either a new facility or modification of the existing County-owned facility at the rear of the site.

It is anticipated that stormwater quality requirements will be met through the purchase of off-site nutrient credits.

GRADING

The construction of the new bus loop will require the hillside to be re-graded and material removed from the site to accommodate the required elevations. A retaining wall is anticipated in this location.

GEOTECHNICAL CONSIDERATIONS

No geotechnical subsurface investigation has been performed to date; however, will be required to inform the design of site elements such as pavement and stormwater management.

PROPOSED BUILDING DESIGN

Glen Cove Elementary School (Glen Cove) has not seen significant renovations since its construction in the early 1970's. There have only been limited improvements to the 50-year-old school for items such as roof replacements, security upgrades, accessibility improvements, and select HVAC unit replacements. The original, awkward, and dysfunctional open-classroom floor plan remain, there is limited or no natural light for most classrooms, and the HVAC systems do not provide the proper ventilation for a healthy learning environment.

The County desires to move away from the open-classroom layout and provide modern enclosed classrooms, and unlike W.E. Cundiff, the existing building size can accommodate the projected student enrollment of approximately 400 students without an expansion. Glen Cove has not seen significant increases in student enrollment and is projected to remain close to the existing student population. The roadways, drop-off lanes, and parking areas do not provide adequate space for vehicles, nor for the safe separation of bus and automobile traffic that is customary and appropriate for an elementary school.

The primary goals of the proposed design are to completely update the interior by enclosing all classrooms spaces, improve the building circulation, access, and security. The existing administrative and kitchen space has been renovated in recent years; therefore, work in this area will be limited to assist in controlling the budget.

The enclosed site design concepts demonstrate how parking can be increased, drop off lanes extended, and bus traffic given its own loading and unloading area while also accommodating the space for modest additions.

The enclosed conceptual floor plans demonstrate how well the column grid of the existing main building can accommodate a much more functional floor plan that includes clear circulation patterns, properly sized, enclosed classrooms, and access to natural light for nearly every classroom.

Architectural Features *(to indicate general quality of the project…not an exhaustive list)*

1. The existing exterior building envelope is in good condition; however, the existing window will be replaced with heavy commercial aluminum units in a durable factory-applied finish and glazed with high performance insulating glass. Copings, flashings, and other metal trim are aluminum or galvanized sheet metal with high-performance factory applied finish. The existing roofs will be patched as required for the new installations associated with the renovation work. Interior finishes such as VCT flooring and ACT ceilings are in poor condition overall and have been determined to be replaced as part of this proposal.

2. Floor finishes typically include:
   a. Vinyl Composition Tile (VCT): most classrooms and corridors
   b. Carpet: generally limited to office / administrative areas
   c. Epoxy Floors: student or public toilets
   d. Sealed Concrete: mechanical rooms, custodial closets, and similar spaces
   e. Sheet vinyl: unisex toilets
   f. Rubber Flooring: stairways and ramps

3. Ceiling finishes typically include:
   a. Conventional acoustical ceiling tile: classrooms, corridors, office areas…most spaces in the school
   b. Exposed Structure (painted): Mechanical rooms, and other select spaces where functionally and aesthetically appropriate.

4. Wall finishes typically include:
   a. Painted drywall with sound attenuating insulation: classrooms, office areas and select new demising walls
   b. Painted CMU: corridors, demising walls, and exterior walls
   c. Epoxy Painted CMU: kitchen / serving area

5. New Cabinetry, Casework, and Trim typically include:
   a. Custom Grade Millwork with Plastic Laminate: for cabinetry throughout the school for office areas, workrooms, classroom storage, etc.
   b. Solid surfacing materials: exterior windowsills in new drywall construction, counter tops in high visibility areas such as the reception area and library

6. New Doors and Interior Windows typically include:
   a. Commercial Grade Wood Doors with Hollow Metal Frames: most interior doors
   b. Aluminum Storefront: Primary Entrances
   c. Interior Windows with Hollow Metal Frames: most interior windows
   d. Overhead Doors and Grilles: Loading Dock

7. Miscellaneous Specialties, Fixed Equipment, Accessories and Materials include but are not limited to:
   a. Toilet Partitions and Toilet Accessories
   b. Fire Extinguishers Cabinets at new additions
   c. Display Cases
   d. Key boxes
   e. Chalkboards and Tackboards
   f. Exterior window shades
   g. Signage (interior signage throughout)

8. Food Service Equipment will be designed by our Team's food service consultant and will comprise a fully equipped commercial kitchen appropriate for an elementary school setting and based upon RCPS preference for traditional food service delivery.

STRUCTURAL SYSTEMS

Given that the project is focused as an interior renovation of an existing open classroom concept, only minor structural changes, such as lintels and reinforcement of existing structural elements as necessary, are anticipated to accommodate the new layout. Most new interior partitions are anticipated to be non-load bearing, non-structural elements.

MECHANICAL SYSTEMS

Existing HVAC System:

The facility is currently served by a water source heat pump system. Individual heat pumps are located within small mechanical rooms and serve individual classrooms. Outside air is ducted from the roof to the mechanical room plenum where it mixes with return air. Supply air is ducted to the spaces. The heat pumps are scheduled for replacement in Spring/Summer of 2023. The Glen Cove cafeteria is served by multiple heat pumps while the Cundiff cafeteria is served by multiple ductless split system heat pumps. The gym is served by a packaged rooftop air conditioning unit with gas-fired heat exchanger. Condenser water is pumped to each heat pump by pumps located in the main mechanical room. Heat is rejected from the condenser water loop by an evaporative, closed-circuit cooler located on grade outside the mechanical room. Heat is added to the loop by natural gas-fired boilers (primary) and an electric boiler (secondary).

Proposed System:

The facility will undergo a complete HVAC renovation and be served by a water source heat pump system similar to the existing system.

Individual spaces will be served by high efficiency individual room water source heat pumps. Heat pumps shall be vertical where feasible and located within mechanical closets. Heat pumps will be accessible from public spaces, where feasible, to minimize impact on the learning environment. Typically, as allowed by mechanical closet locations, each classroom will be provided with a low return and ceiling supply diffusers. To the greatest extent possible, newly purchased water source heat pumps will be removed and reinstalled.

Decoupled, dedicated outside air systems (DOAS) will deliver the required amount of outside air to each classroom or space. DOAS systems will control overall high limit humidity and operate with a discharge air temperature range of 65° to 80°F to minimize individual room heat pump operation. Units will be capable of taking advantage of economizer conditions when available to maximize energy savings. DOAS units will be equipped with outside air flow measuring station, outside air and return air MERV-8 filters, outside air MERV-13 final filters, total energy wheel for energy recovery, heat pump air coil, heat pipe type heat exchanger, hot gas reheat coil, and water source heat pump section. Outside air will be ducted to diffusers within the space and discharge directly to the space.

Condenser water will be circulated to individual water source heat pumps located throughout the building.

Central heating and cooling fuel source will be provided by high efficiency gas-fired boilers, cooling tower, and water source heat pumps (WSHP).

Heat rejection from the condenser water loop will be provided by a cooling tower coupled with plate and frame heat exchanger. The cooling tower shall be factory assembled, induced draft, propeller fan type, vertical discharge, counter flow type, complete with casing, basin, frame, louvers, inlet louvers, electric basin heaters, fans, drain and overflow. All joints shall be watertight and arranged to shed water inward. Removable panels shall be provided to all parts for service and maintenance. All bolts, nuts and washers shall be galvanized steel. All steel shall be protected with minimum G-235 galvanizing. Cold Water Basin shall be constructed of 304 stainless steel including vertical supports and air inlet louver frames. The basin shall be self-cleaning and complete with depressed center section, cleanout and drain fitting, outlet sump with stainless steel suction screen and anti-cavitation device.

Heat will be added to the condenser water loop by multiple gas-fired water boilers. They will be condensing type gas-fired, fire tube, boilers with duplex stainless steel heat exchanger. Boilers will be up to 95% efficient. Boiler will be sealed combustion with vent stacks constructed of AL-29-4C appropriate for condensing boiler operation.

The cafeteria will be served by individual single zone, rooftop mounted, water source heat pumps with heat pump air coil, hot gas reheat coil and water source heat pump section. Units will provide temperature and high limit humidity control and will deliver the required amount of ventilation air to the respective spaces. Units will be capable of taking advantage of economizer conditions when available to maximize energy savings. CO2 sensors will be used to reduce ventilation air when operating at reduced occupancies.

The existing packaged rooftop unit serving the gymnasium will remain.

Exhaust fans will be power exhaust fans with aluminum, centrifugal blades connected to motors enclosed in an aluminum housing. Fans will be provided with motor operated dampers and, where roof-mounted, prefabricated roof curbs.

Ductwork will be galvanized steel (G90, ASTM A 525 and A 527) fabricated and sealed in accordance with SMACNA Standards, latest edition. Concealed low-pressure supply ductwork will be insulated with 1-½" thick fiberglass duct wraps and will be completely vapor sealed. Exposed supply ductwork inside the building will be prefabricated spiral round, 1" thick double wall construction. Where necessary, concealed return air and transfer air ductwork will be lined with 1" thick duct liner for acoustic purposes. Low loss fittings and galvanized steel opposed blade dampers will be provided at all supply, return, and exhaust branch connection. Fire dampers with access doors will be installed in each duct that penetrates a rated wall or floor.

Diffusers, registers, and grilles will be commercial type constructed of aluminum or steel. The diffusers will be square, louver faced, surface or lay-in mounted type. Supply registers and grilles will be double deflection surface mounted type with vanes spaced on 1/4" centers. Return, exhaust and transfer registers and grilles will be single deflection surface mounted type with vanes spaced on 2/3" centers. Supply registers in areas with exposed ductwork will be drum louver style or linear diffuser style, and low side wall registers in areas subject to abuse will be heavy duty steel.

Controls will provide safe, automatic operation of all systems through a stand-alone direct digital control/energy management system. This system will allow control of such items as space temperature, exhaust fan interlocks, time of day functions, and safety devices.

ELECTRICAL SYSTEMS

Existing Systems:

The school is currently served with a 480-volt, 2,000-amp electric service. The electric gear, wiring, and electrical devices throughout the building are original GE gear. The electric distribution system consists of multiple branch circuit panelboards with small step-down dry-type transformers and low-voltage branch circuit panelboards located in mechanical rooms throughout the building. Lighting in the facility consists of numerous types of lighting sources, including fluorescent, incandescent, LED, and high intensity discharge type. Lighting controls are primarily manual in type. Various types of low-voltage systems serve communications, safety, and security needs throughout the building and vary in their age.

Proposed Systems:

Design Criteria: The Electrical Systems for the elementary school will be designed based on the criteria set forth in the 2018 Virginia Uniform Statewide Building Code, International Energy Conservation Code (IECC), and the National Electric Code (NEC). The following are the descriptions of systems to be installed in the renovations and additions. In general, this project includes a complete electrical renovation. Existing systems and wiring will be removed and replaced with new, as noted herein below.

The school will receive a new electric service, which is anticipated to be terminated in a 2,000 amp, 480 volt, 3-phase switchboard with a main breaker section complete with ground fault protection module and phase loss protection module. The switchboard will be located in the new addition area of the building (Cundiff ES only) and will be complete with a current transformer section, main breaker section, and distribution section(s). At Glen Cove ES, the switchboard will be replaced in its current location in the main mechanical room. Lighting, large mechanical loads and step-down transformers will be served at 277/480 volts. The 480-120/208-volt step-down transformers will be located in the main electrical room and electrical rooms throughout the building for the purposes of serving 120 volt and 208 volts single and three phase loads. The step-down transformers will serve 120/208-volt distribution panelboards that will, in turn, serve branch circuit panelboards throughout.

Panelboards and electrical gear will be largely replaced in-kind in the existing school portion, but additional panelboards will be installed where required to serve loads being added or where more electrical capacity is needed. Panelboards will also be installed in the new addition to serve the addition area of the building as well (Cundiff ES only). Adequate spare capacity will be provided in distribution and branch circuit panelboards to allow for future modifications or additions to the building without significant electrical distribution infrastructure rework. Electric power wiring will be routed in conduit to distribution and branch panelboards located throughout the building as required. Feeders and branch circuit wiring will be replaced throughout the building.

Emergency Service:

An emergency generation system will be provided in compliance with NEC 700 and 702 as well as NFPA 110. Emergency gear, as defined by the NEC Article 700, will be located in a separate room from large, normal service equipment as required by NFPA 110. This includes the associated transfer switch, 480-volt panelboard, step-down transformer and 208-volt panelboard. A diesel 277/480-volt emergency generator with two (2) automatic transfer switches will be provided to supply emergency power. The generator will be complete with two (2) separate breakers, which will serve the automatic transfer switches. The generator panelboards will serve all MDF & IDF room loads (including telephone, intercom, and data), energy management systems, fire alarm and security systems, clinic refrigerator, kitchen refrigeration, emergency egress lighting, and other loads as directed by the Owner. The generator will be provided with enough fuel storage for a minimum of 48 hours of operation at full capacity (75%).

Motors:

All motors not provided with integral, factory mounted overcurrent protective devices and disconnect switch devices will be protected by means of a separate combination fusible disconnect switch motor controller. Motors larger than 1HP will be served at 480 or 208 volts, 3ø. Motors 1HP and under will be served at 277 or 120 volts. Motors will be served at industry standard voltage and phase configurations so that any future replacement of equipment would be readily available.

Lighting:

Lighting within the original facility will be replaced comprehensively throughout the facility. Replacement lighting and lighting in the new addition (Cundiff ES only) areas will be provided by full LED fixtures. These fixtures will consist of recessed lay-in type with volumetric housings, recessed downlights, industrial style fixtures (in mechanical and storage spaces), high bay LED fixtures in gymnasium spaces, and wall mounted fixtures on the building exterior. All controls will be in accordance with the IECC, including vacancy, occupancy sensing and daylight harvesting controls. Exterior building mounted, under-canopy, and pole mounted area lighting will be shielded and full cutoff type. Exterior pole lighting will also be replaced with new LED luminaires with full Nighttime Friendly characteristics. Pole mounted lighting will also be removed and added where required to accommodate proposed site improvements. Exit signs and selected fixtures with emergency drivers will be provided as required by code for egress lighting inside the facility and at exit doors. These fixtures will be powered by the emergency generation system during any loss of power to the facility.

Lighting levels will be in accordance with IES recommended levels of illumination:

Space:	**Footcandles:**
Classrooms	50
Offices	40
Workrooms	50
Gymnasium (Court)	75
Mechanical/Electrical	35
Corridors	25
Toilets	25
Exterior Entrance	5
Building Surroundings	1
Parking Area	1

Lighting controls will be provided in accordance with the IECC. All enclosed spaces will be provided with local lighting controller(s).

Classrooms and other teaching spaces will be complete with multi-scene low-voltage controllers with built-in dimming capabilities. Offices and similar spaces will contain low-voltage controllers with integral dimming capability. Additionally, vacancy sensors will be installed in all spaces as required by the IECC to override switches and turn off lights in unoccupied areas. Vacancy sensors will generally be of the dual technology infrared and ultrasonic type. Interior photocells will be installed in daylighting zones, as defined by the IECC, which will control and automatically dim lights in each associated daylighting zone in response to the available daylight in the space. Exterior pole mounted, building mounted, and canopy lighting will be controlled via single photocell and timeclock(s). Non-egress lighting can also be connected to the building management system for secondary control as well.

Wiring:

An emergency generation system will be provided in compliance with NEC 700 and 702 as well as NFPA 110. Emergency gear, as defined by the NEC Article 700, will be located in a separate room from large, normal service equipment as required by NFPA 110. This includes the associated transfer switch, 480-volt panelboard, step-down transformer and 208-volt panelboard. A diesel 277/480-volt emergency generator with two (2) automatic transfer switches will be provided to supply emergency power. The generator will be complete with two (2) separate breakers, which will serve the automatic transfer switches. The generator panelboards will serve all MDF & IDF room loads (including telephone, intercom, and data), energy management systems, fire alarm and security systems, clinic refrigerator, kitchen refrigeration, emergency egress lighting, and other loads as directed by the Owner. The generator will be provided with enough fuel storage for a minimum of 48 hours of operation at full capacity (75%).

Receptacles (General):

Duplex convenience receptacles shall be provided as required. All existing receptacles shall be replaced, and supplemental receptacles added where needed. Receptacles shall be 3-wire grounding type 20A at 125 volts, NEMA 5-20R. All receptacles within 6’ of a sink or water source will be ground-fault circuit interrupter type, as well as all 120V, 20A receptacles in the kitchen and on building exterior (as required by the NEC).

AV System:

Conduit, boxes, and power will be installed in all teaching spaces as coordinated with the current teaching standard for Roanoke County Public Schools. This may consist of power and empty raceways for power and low-voltage cabling and connections to touch screen teaching displays, or the like. The low-voltage cabling raceways will be extended to the teacher’s location in each teaching space or as otherwise designated by the Owner.

Communication Systems:

Communication systems not otherwise listed herein will consist of empty conduits and outlet boxes. All conduits will extend from the outlet box to the nearest accessible ceiling void. These pathways will be provided for systems including, but not limited to, CATV, data, telephone, and audio-visual systems.

Fire Alarm Systems:

A fully addressable fire alarm system that complies with NFPA 72 and ADA will be provided, which will replace the existing system in its entirety, including all required conduit, wiring, manual pull stations, detection devices, indicating appliances, sprinkler connections, auto-dialer, etc. Combination audio/visual indicating appliances will be installed in mechanical rooms, common areas such as corridors, areas of assembly, etc., and in classrooms, workrooms, and the like. Visual only indicating appliances will be installed in toilets and other limited space areas. In all cases, the required decibel level for alarm purposes will be achieved. Manual pull stations will be located adjacent to each exit way. The fire alarm system will not be a voice evacuation type system.

The following systems are not anticipated for use on this project and have not been included herein: Distributed Antenna System, Lightning Protection System, and a Nurse Call System (clinic).

Clock System:

A master clock system will be provided and integrated with the intercom system. Clock devices will be located in the corridors and common spaces, such as the gymnasium and cafeteria. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Public Address System:

A replacement Public Address system will be provided. The system will extend into the new addition area (Cundiff ES only) and will be extended to serve the existing building as needed. Wall-mounted call-in switches will be provided in classrooms. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Security and Access Control:

The Security and Access Control System will be replaced and will consist of card readers at entrances where required. The system will function and operate with the existing system being used by Roanoke County Public Schools. A new secure video entry system will be provided as part of the project as well. This system will be coordinated with the Owner in greater detail during the design phase. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Grounding System:

Equipment grounding of all conduits, motor frames, metal castings, receptacles, switches, etc., shall be provided as required by the latest publication of the NFPA-70. Grounding electrodes and conductors for the main electric service and all separately derived services shall be provided as required by the NFPA-70.

FIRE SUPPRESSION SYSTEMS

Existing System:

The building does not currently have sprinkler protection.

Proposed System:

The entire building will be protected with an automatic wet sprinkler system in accordance with NPFA 13. The water supply characteristics will be verified by a new site water flow test or modeled flow data provided by the locality water purveyor. The building fire sprinkler system will be divided into zones.

PLUMBING SYSTEMS

Existing Systems:

The facility is served by the water, sewer, and natural gas utility company. The domestic cold-water service has no backflow prevention. Domestic hot water is provided by an electric storage type water heater in the mechanical room. Plumbing fixtures throughout the facility consist predominantly of wall hung lavatories with manual faucets, floor mounted water closets with manual flush valves, wall mounted urinals with manual flush valves, and wall hung electric water coolers.

Proposed System:

Plumbing systems will include complete renovation of hot and cold domestic water distribution, sanitary drain waste and vent (DWV), grease waste drainage system and storm drainage system. The building will be provided with separate domestic water and fire water entrances. The main domestic water service entrance to the building will be protected against backflow with a reduced pressure zone type backflow preventer.

Plumbing fixtures will be of commercial quality. Plumbing fixture installation, materials and functional performance will be in compliance with the Virginia Plumbing Code (VPC). Accessible plumbing fixtures will be provided in accordance with the VPC and the referenced ICC A117.1 Accessible and Usable Buildings and Facilities standards.

The sanitary drain, waste, and vent system and storm drainage systems will be replaced.

W.E. Cundiff Elementary School Renovation & Addition

SITE LAYOUT

The existing W.E. Cundiff Elementary School is proposed to undergo extensive interior renovations and an exterior renovation to bring the existing school in line with current standards. A building addition is also proposed to provide additional area for needed services to support the renovated school. Site improvements will be made to meet regulatory requirements, develop the proposed building addition, improve site circulation patterns, and provide utility and other improvements as necessary. Existing improvements will be preserved where appropriate or demolished as necessary to meet the goals of the project. Construction will be coordinated and sequenced to allow the existing school to remain open and functional during the construction process.

The existing parking area will be reconstructed and reconfigured as shown on the Concept Plan. A new parent pickup/drop-off loop will be created at the front of the building to provide additional staging areas than what currently exists at the site. A new bus loop will be provided with bus pickup/drop-off located at the rear of the building. A new service area will be developed on the east side of the building and will be accessed from the new bus loop. The new bus staging area will allow for separation of car riders from buses and service vehicles and will provide enhanced fire and emergency access around the building.

All parking areas will be asphalt surfaced with exterior curbing and will include necessary striping and signage. New sidewalks and other exterior improvements will be provided on-site to enhance outdoor spaces around the building and to provide appropriate pedestrian access through the site. The site will be further improved with new landscaping and lighting.

Review Agencies:
County of Roanoke
Virginia Department of Transportation (work within public right-of-way)
Western Virginia Water Authority (public water and sanitary sewer improvements)

SITE ACCESS

The existing entrances are to remain in similar locations on Hardy Road. Improved staging areas for pickup and drop-off, as well as separation of car riders and buses will ease stacking issues that currently exist at the site.

WATER SERVICE

According to WVWA GIS, there is an existing 8” public water main located in Hardy Road. The existing vault providing service for the building is located along the frontage of Hardy Road. It is anticipated that a new sprinkler system will be installed for the building and that the existing service will be upgraded to accommodate this. Fire hydrants will also be provided around the building as necessary.

SANITARY SEWER

According to WVWA GIS, there is an existing 8” public sewer main located in Hardy Road, with private service lateral extending to the building. This lateral is shown as an 8” lateral on WVWA GIS and it is anticipated that the existing service will continue to be used for the renovated building. Additional sewer connections to be coordinated as necessary.

STORM SEWER

The majority of the site drains to the south toward Hardy Road, with a small area at the rear of the site draining to the north. According to GIS information, existing storm sewer on-site conveys stormwater runoff to the existing storm sewer system along Hardy Road. The existing storm sewer will be preserved to the extent practical and additional storm sewer improvements installed as necessary.

Stormwater management (SWM) requirements for quantity and quality will need to be addressed for the site to meet current regulations. It is anticipated that SWM quantity requirements will be addressed with the construction of a new SWM facility at the south side of the site adjacent to Hardy Road.

It is anticipated that stormwater quality requirements will be met through the purchase of off-site nutrient credits.

GRADING

The construction of the new bus loop will require the hillside to be re-graded and material removed from this area to accommodate the required elevations.

PROPOSED BUILDING DESIGN

W.E. Cundiff Elementary School (Cundiff) has not seen significant renovations since its construction in the early 1970's. There have only been limited improvements to the 50-year-old school for items such as roof replacements, security upgrades, accessibility improvements, and select HVAC unit replacements. The original, awkward, and dysfunctional open-classroom floor plan remain, there is limited or no natural light for most classrooms, and the HVAC systems do not provide the proper ventilation for a healthy learning environment.

While the County desires to move away from the open-classroom layout and provide modern enclosed classrooms, the existing building cannot accommodate the projected student enrollment of 500 students without an expansion. Cundiff has also seen an increase in student enrollment and is projected to see these numbers to continue to grow. Additionally, the kitchen, the administrative, clinic, and special education areas are undersized and outdated. The roadways, drop-off lanes, and parking areas do not provide adequate space for vehicles, nor for the safe separation of bus and automobile traffic that is customary and appropriate for an elementary school.

The primary goals of the proposed design are to improve the building access and security, build a new cafeteria, kitchen, and administrate space, which will in turn provide a much more functional food service and free up much needed area for additional instructional spaces. The new cafeteria, kitchen and administrative spaces are repositioned to provide the type of space that is appropriate for these functions and facilitate after-hours and community use, as well as accommodate the increased student enrollment. The existing gymnasium is to be fully renovated. This overall approach considers how to expand and renovate while the school must remain in operation. An added benefit to the additional, is that it creates a new "front door" and a new architectural language for school, making it feel like a new facility.

The enclosed site design concepts demonstrate how parking can be increased, drop off lanes extended, and bus traffic given its own loading and unloading area while also accommodating the space for modest additions.

The enclosed conceptual floor plans demonstrate how well the column grid of the existing main building can accommodate a much more functional floor plan that includes clear circulation patterns, properly sized, enclosed classrooms, and access to natural light for nearly every classroom.

Architectural Features *(to indicate general quality of the project…not an exhaustive list)*

1. The exterior building envelope for new addition is envisioned as a brick masonry veneer in colors that are compatible with the existing brick. Windows would be heavy commercial aluminum units in a durable factory-applied finish and glazed with high performance insulating glass. Copings, flashings, and other metal trim are aluminum or galvanized sheet metal with high-performance factory applied finish.

   The exterior architectural character shown in our proposed design concept reflects a building design that we believe that is complimentary to the existing school and community. Low-slope membrane roofing (with 20-year warranty) is proposed for new areas. The existing roofs will be patched as required for the new installations associated with the renovation work.
   The architectural general assessment of the existing facility included several areas that would be considered for heavy

renovations. The existing building envelope includes poor exterior windows (rusted hollow metal frames and non-insulated glazing) that are in need of full replacement. Interior finishes such as VCT flooring and ACT ceilings are in poor condition overall and have been determined to be replaced as part of this proposal.

2. Floor finishes typically include:
   a. Vinyl Composition Tile (VCT): most classrooms and corridors
   b. Carpet: generally limited to office / administrative areas
   c. Epoxy Floors: student or public toilets
   d. Sealed Concrete: mechanical rooms, custodial closets, and similar spaces
   e. Sheet vinyl: unisex toilets
   f. Rubber Flooring: stairways and ramps

3. Ceiling finishes typically include:
   a. Conventional acoustical ceiling tile: classrooms, corridors, office areas…most spaces in the school
   b. Exposed Structure (painted): Mechanical rooms, and other select spaces where functionally and aesthetically appropriate

4. Wall finishes typically include:
   a. Painted drywall with sound attenuating insulation: classrooms, office areas and select new demising walls
   b. Painted CMU: corridors, demising walls, and exterior walls
   c. Epoxy Painted CMU: kitchen / serving area

5. New Cabinetry, Casework, and Trim typically include:
   a. Custom Grade Millwork with Plastic Laminate: for cabinetry throughout the school for office areas, workrooms, classroom storage, etc.
   b. Solid surfacing materials: exterior windowsills in new drywall construction, counter tops in high visibility areas such as the reception area and library

6. New Doors and Interior Windows typically include:
   a. Commercial Grade Wood Doors with Hollow Metal Frames: most interior doors
   b. Aluminum Storefront: Primary Entrances
   c. Interior Windows with Hollow Metal Frames: most interior windows
   d. Overhead Doors and Grilles: Loading Dock

7. Miscellaneous Specialties, Fixed Equipment, Accessories and Materials include but are not limited to:
   a. Toilet Partitions and Toilet Accessories
   b. Fire Extinguishers Cabinets at new additions
   c. Display Cases
   d. Key boxes
   e. Chalkboards and Tackboards
   f. Exterior window shades
   g. Signage (interior signage throughout)

8. Food Service Equipment will be designed by our Team's food service consultant and will comprise a fully equipped commercial kitchen appropriate for an elementary school setting and based upon RCPS preference for traditional food service delivery.

STRUCTURAL SYSTEMS

The primary structure of the school is a steel post and beam system (non-load bearing wall partitions). In the existing building being area renovated, only minor structural changes, such as lintels and reinforcement of existing structural elements as necessary, are anticipated to accommodate the new layout. Most new interior partitions are anticipated to be non-load bearing, non-structural elements.

The addition will likely be framed with steel beams and columns supporting a structural metal roof deck. The roof deck will be supported by steel bar joists or steels beams as required by the architectural interior finishes. Without having a geotechnical report in hand, it is assumed that the steel structure will be supported on shallow reinforced concrete strip and spread foundations. The interior floor space will be a concrete slab on grade.

MECHANICAL SYSTEMS

Existing HVAC System:

The facility is currently served by a water source heat pump system. Individual heat pumps are located within small mechanical rooms and serve individual classrooms. Outside air is ducted from the roof to the mechanical room plenum where it mixes with return air. Supply air is ducted to the spaces. The heat pumps are scheduled for replacement in Spring/Summer of 2023. The Glen Cove cafeteria is served by multiple heat pumps while the Cundiff cafeteria is served by multiple ductless split system heat pumps. The gym is served by a packaged rooftop air conditioning unit with gas-fired heat exchanger. Condenser water is pumped to each heat pump by pumps located in the main mechanical room. Heat is rejected from the condenser water loop by an evaporative, closed-circuit cooler located on grade outside the mechanical room. Heat is added to the loop by natural gas-fired boilers (primary) and an electric boiler (secondary).

Proposed System:

The facility will undergo a complete HVAC renovation and be served by a water source heat pump system similar to the existing system. Individual spaces will be served by high efficiency individual room water source heat pumps. Heat pumps shall be vertical where feasible and located within mechanical closets. Heat pumps will be accessible from public spaces, where feasible, to minimize impact on the learning environment. Typically, as allowed by mechanical closet locations, each classroom will be provided with a low return and ceiling supply diffusers. To the greatest extent possible, newly purchased water source heat pumps will be removed and reinstalled.

Decoupled, dedicated outside air systems (DOAS) will deliver the required amount of outside air to each classroom or space. DOAS systems will control overall high limit humidity and operate with a discharge air temperature range of 65° to 80°F to minimize individual room heat pump operation. Units will be capable of taking advantage of economizer conditions when available to maximize energy savings. DOAS units will be equipped with outside air flow measuring station, outside air and return air MERV-8 filters, outside air MERV-13 final filters, total energy wheel for energy recovery, heat pump air coil, heat pipe type heat exchanger, hot gas reheat coil, and water source heat pump section. Outside air will be ducted to diffusers within the space and discharge directly to the space.

Condenser water will be circulated to individual water source heat pumps located throughout the building.

Central heating and cooling fuel source will be provided by high efficiency gas-fired boilers, cooling tower, and water source heat pumps (WSHP).

Heat rejection from the condenser water loop will be provided by a cooling tower coupled with plate and frame heat exchanger. The cooling tower shall be factory assembled, induced draft, propeller fan type, vertical discharge, counter flow type, complete with casing, basin, frame, louvers, inlet louvers, electric basin heaters, fans, drain and overflow. All joints shall be watertight and arranged to shed water inward. Removable panels shall be provided to all parts for service and maintenance. All bolts, nuts and washers shall be galvanized steel. All steel shall be protected with minimum G-235 galvanizing. Cold Water Basin shall be constructed of 304 stainless steel including vertical supports and air inlet louver frames. The basin shall be self-cleaning and complete with depressed center section, cleanout and drain fitting, outlet sump with stainless steel suction screen and anti-cavitation device.

Heat will be added to the condenser water loop by multiple gas-fired water boilers. They will be condensing type gas-fired, fire tube, boilers with duplex stainless steel heat exchanger. Boilers will be up to 95% efficient. Boiler will be sealed combustion with vent stacks constructed of AL-29-4C appropriate for condensing boiler operation.

The cafeteria will be served by individual single zone, rooftop mounted, water source heat pumps with heat pump air coil, hot gas reheat coil and water source heat pump section. Units will provide temperature and high limit humidity control and will deliver the required amount of ventilation air to the respective spaces. Units will be capable of taking advantage of economizer conditions when available to maximize energy savings. CO2 sensors will be used to reduce ventilation air when operating at reduced occupancies.

The existing packaged rooftop unit serving the gymnasium will remain.

Exhaust fans will be power exhaust fans with aluminum, centrifugal blades connected to motors enclosed in an aluminum housing. Fans will be provided with motor operated dampers and, where roof-mounted, prefabricated roof curbs.

Ductwork will be galvanized steel (G90, ASTM A 525 and A 527) fabricated and sealed in accordance with SMACNA Standards, latest edition. Concealed low-pressure supply ductwork will be insulated with 1-½" thick fiberglass duct wraps and will be completely vapor sealed. Exposed supply ductwork inside the building will be prefabricated spiral round, 1" thick double wall construction. Where necessary, concealed return air and transfer air ductwork will be lined with 1" thick duct liner for acoustic purposes. Low loss fittings and galvanized steel opposed blade dampers will be provided at all supply, return, and exhaust branch connection. Fire dampers with access doors will be installed in each duct that penetrates a rated wall or floor.

Diffusers, registers, and grilles will be commercial type constructed of aluminum or steel. The diffusers will be square, louver faced, surface or lay-in mounted type. Supply registers and grilles will be double deflection surface mounted type with vanes spaced on 1/4" centers. Return, exhaust and transfer registers and grilles will be single deflection surface mounted type with vanes spaced on 2/3" centers. Supply registers in areas with exposed ductwork will be drum louver style or linear diffuser style, and low side wall registers in areas subject to abuse will be heavy duty steel.

Controls will provide safe, automatic operation of all systems through a stand-alone direct digital control/energy management system. This system will allow control of such items as space temperature, exhaust fan interlocks, time of day functions, and safety devices.

ELECTRICAL SYSTEMS

Existing Systems:

The school is currently served with a 480-volt, 2,000-amp electric service. The electric gear, wiring, and electrical devices throughout the building are original GE gear. The electric distribution system consists of multiple branch circuit panelboards with small step-down dry-type transformers and low-voltage branch circuit panelboards located in mechanical rooms throughout the building. Lighting in the facility consists of numerous types of lighting sources, including fluorescent, incandescent, LED, and high intensity discharge type. Lighting controls are primarily manual in type. Various types of low-voltage systems serve communications, safety, and security needs throughout the building and vary in their age.

Proposed Systems:

Design Criteria: The Electrical Systems for the elementary school will be designed based on the criteria set forth in the 2018 Virginia Uniform Statewide Building Code, International Energy Conservation Code (IECC), and the National Electric Code (NEC). The following are the descriptions of systems to be installed in the renovations and additions. In general, this project includes a complete electrical renovation. Existing systems and wiring will be removed and replaced with new, as noted herein below.

The school will receive a new electric service, which is anticipated to be terminated in a 2,000 amp, 480 volt, 3-phase switchboard

with a main breaker section complete with ground fault protection module and phase loss protection module. The switchboard will be located in the new addition area of the building (Cundiff ES only) and will be complete with a current transformer section, main breaker section, and distribution section(s). At Glen Cove ES, the switchboard will be replaced in its current location in the main mechanical room. Lighting, large mechanical loads and step-down transformers will be served at 277/480 volts. The 480-120/208-volt step-down transformers will be located in the main electrical room and electrical rooms throughout the building for the purposes of serving 120 volt and 208 volts single and three phase loads. The step-down transformers will serve 120/208-volt distribution panelboards that will, in turn, serve branch circuit panelboards throughout. Panelboards and electrical gear will be largely replaced in-kind in the existing school portion, but additional panelboards will be installed where required to serve loads being added or where more electrical capacity is needed. Panelboards will also be installed in the new addition to serve the addition area of the building as well (Cundiff ES only). Adequate spare capacity will be provided in distribution and branch circuit panelboards to allow for future modifications or additions to the building without significant electrical distribution infrastructure rework. Electric power wiring will be routed in conduit to distribution and branch panelboards located throughout the building as required. Feeders and branch circuit wiring will be replaced throughout the building.

Emergency Service:

An emergency generation system will be provided in compliance with NEC 700 and 702 as well as NFPA 110. Emergency gear, as defined by the NEC Article 700, will be located in a separate room from large, normal service equipment as required by NFPA 110. This includes the associated transfer switch, 480-volt panelboard, step-down transformer and 208-volt panelboard. A diesel 277/480-volt emergency generator with two (2) automatic transfer switches will be provided to supply emergency power. The generator will be complete with two (2) separate breakers, which will serve the automatic transfer switches. The generator panelboards will serve all MDF & IDF room loads (including telephone, intercom, and data), energy management systems, fire alarm and security systems, clinic refrigerator, kitchen refrigeration, emergency egress lighting, and other loads as directed by the Owner. The generator will be provided with enough fuel storage for a minimum of 48 hours of operation at full capacity (75%).

Motors:

All motors not provided with integral, factory mounted overcurrent protective devices and disconnect switch devices will be protected by means of a separate combination fusible disconnect switch motor controller. Motors larger than 1HP will be served at 480 or 208 volts, 3ø. Motors 1HP and under will be served at 277 or 120 volts. Motors will be served at industry standard voltage and phase configurations so that any future replacement of equipment would be readily available.

Lighting:

Lighting within the original facility will be replaced comprehensively throughout the facility. Replacement lighting and lighting in the new addition (Cundiff ES only) areas will be provided by full LED fixtures. These fixtures will consist of recessed lay-in type with volumetric housings, recessed downlights, industrial style fixtures (in mechanical and storage spaces), high bay LED fixtures in gymnasium spaces, and wall mounted fixtures on the building exterior. All controls will be in accordance with the IECC, including vacancy, occupancy sensing and daylight harvesting controls. Exterior building mounted, under-canopy, and pole mounted area lighting will be shielded and full cutoff type. Exterior pole lighting will also be replaced with new LED luminaires with full Nighttime Friendly characteristics. Pole mounted lighting will also be removed and added where required to accommodate proposed site improvements. Exit signs and selected fixtures with emergency drivers will be provided as required by code for egress lighting inside the facility and at exit doors. These fixtures will be powered by the emergency generation system during any loss of power to the facility.

Lighting levels will be in accordance with IES recommended levels of illumination:

Space:	Footcandles:
Classrooms	50
Offices	40
Workrooms	50
Gymnasium (Court)	75
Mechanical/Electrical	35
Corridors	25
Toilets	25
Exterior Entrance	5
Building Surroundings	1
Parking Area	1

Lighting controls will be provided in accordance with the IECC. All enclosed spaces will be provided with local lighting controller(s). Classrooms and other teaching spaces will be complete with multi-scene low-voltage controllers with built-in dimming capabilities. Offices and similar spaces will contain low-voltage controllers with integral dimming capability. Additionally, vacancy sensors will be installed in all spaces as required by the IECC to override switches and turn off lights in unoccupied areas. Vacancy sensors will generally be of the dual technology infrared and ultrasonic type. Interior photocells will be installed in daylighting zones, as defined by the IECC, which will control and automatically dim lights in each associated daylighting zone in response to the available daylight in the space. Exterior pole mounted, building mounted, and canopy lighting will be controlled via single photocell and timeclock(s). Non-egress lighting can also be connected to the building management system for secondary control as well.

Wiring:

Branch circuit wiring for power and lighting will generally be NEC type "THWN", with type "THHN" being used in wiring space inside LED fixtures and for connections to recessed fixtures. All branch circuit and feeder conductors #1 AWG and smaller will be copper. All panelboard feeders #1/0 AWG and larger will be either copper or aluminum. Wiring will be installed in heavy wall rigid conduit utilizing threaded fittings or electric metallic tubing utilizing set screw type fittings. Minimum size conduits will be 3/4" with larger sizes as required by the National Electric Code. Schedule 40 PVC conduit will be utilized only under the floor slab for underground service entrance conduits (Cundiff ES only) and exterior branch circuits.

Receptacles (General):

Duplex convenience receptacles shall be provided as required. All existing receptacles shall be replaced, and supplemental receptacles added where needed. Receptacles shall be 3-wire grounding type 20A at 125 volts, NEMA 5-20R. All receptacles within 6' of a sink or water source will be ground-fault circuit interrupter type, as well as all 120V, 20A receptacles in the kitchen and on building exterior (as required by the NEC).

AV System:

Conduit, boxes, and power will be installed in all teaching spaces as coordinated with the current teaching standard for Roanoke County Public Schools. This may consist of power and empty raceways for power and low-voltage cabling and connections to touch screen teaching displays, or the like. The low-voltage cabling raceways will be extended to the teacher's location in each teaching space or as otherwise designated by the Owner.

Communication System:

Communication systems not otherwise listed herein will consist of empty conduits and outlet boxes. All conduits will extend from the outlet box to the nearest accessible ceiling void. These pathways will be provided for systems including, but not limited to, CATV, data, telephone, and audio-visual systems.

Fire Alarm System:

A fully addressable fire alarm system that complies with NFPA 72 and ADA will be provided, which will replace the existing system in its entirety, including all required conduit, wiring, manual pull stations, detection devices, indicating appliances, sprinkler connections, auto-dialer, etc. Combination audio/visual indicating appliances will be installed in mechanical rooms, common areas such as corridors, areas of assembly, etc., and in classrooms, workrooms, and the like. Visual only indicating appliances will be installed in toilets and other limited space areas. In all cases, the required decibel level for alarm purposes will be achieved. Manual pull stations will be located adjacent to each exit way. The fire alarm system will not be a voice evacuation type system.

The following systems are not anticipated for use on this project and have not been included herein: Distributed Antenna System, Lightning Protection System, and a Nurse Call System (clinic).

Clock System:

A master clock system will be provided and integrated with the intercom system. Clock devices will be located in the corridors and common spaces, such as the gymnasium and cafeteria. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Public Address System:

A replacement Public Address system will be provided. The system will extend into the new addition area (Cundiff ES only) and will be extended to serve the existing building as needed. Wall-mounted call-in switches will be provided in classrooms. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Security and Access Control System:

The Security and Access Control System will be replaced and will consist of card readers at entrances where required. The system will function and operate with the existing system being used by Roanoke County Public Schools. A new secure video entry system will be provided as part of the project as well. This system will be coordinated with the Owner in greater detail during the design phase. We have included accommodations for this system in the form of raceways, cable trays, backboxes, and adequately sized areas. All system components are represented in our Technology budget.

Grounding System:

Equipment grounding of all conduits, motor frames, metal castings, receptacles, switches, etc., shall be provided as required by the latest publication of the NFPA-70. Grounding electrodes and conductors for the main electric service and all separately derived services shall be provided as required by the NFPA-70.

FIRE SUPPRESSION SYSTEMS

Existing System:

The building does not currently have sprinkler protection.

Proposed System:

The entire building will be protected with an automatic wet sprinkler system in accordance with NPFA 13. The water supply characteristics will be verified by a new site water flow test or modeled flow data provided by the locality water purveyor. The building fire sprinkler system will be divided into zones.

PLUMBING SYSTEMS

Existing System:

The facility is served by the water, sewer, and natural gas utility company. The domestic cold-water service has no backflow prevention. Domestic hot water is provided by an electric storage type water heater in the mechanical room. Plumbing fixtures throughout the facility consist predominantly of wall hung lavatories with manual faucets, floor mounted water closets with manual flush valves, wall mounted urinals with manual flush valves, and wall hung electric water coolers.

Proposed System:

Plumbing systems will include complete renovation of hot and cold domestic water distribution, sanitary drain waste and vent (DWV), grease waste drainage system and storm drainage system. The building will be provided with separate domestic water and fire water entrances. The main domestic water service entrance to the building will be protected against backflow with a reduced pressure zone type backflow preventer.

Plumbing fixtures will be of commercial quality. Plumbing fixture installation, materials and functional performance will be in compliance with the Virginia Plumbing Code (VPC). Accessible plumbing fixtures will be provided in accordance with the VPC and the referenced ICC A117.1 Accessible and Usable Buildings and Facilities standards.

The sanitary drain, waste, and vent system and storm drainage systems will be replaced.