# ARLINGTON PUBLIC SCHOOLS:
# ARLINGTON CAREER CENTER CAMPUS
# SCHEMATIC DESIGN NARRATIVE

Schematic Design Report Submission

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Arlington Public Schools

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Project Number:
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# Executive Summary

The redevelopment of the Arlington Career Center (ACC) campus includes the demolition of the Fenwick Building, existing Montessori Public School of Arlington (MPSA) playgrounds, new primary and secondary playfields / playgrounds for the MPSA, construction of the new ACC High School, the partial demolition of the existing ACC, and the construction of a new parking garage.

The Public Facilities Review Committee's "Principles of Civic Design" guided the design of the redevelopment of the ACC Campus, influencing the design of the pedestrian plaza, the new ACC's mass and building, and the fenestration of the new Parking Garage.

The ACC is sited along S. Walter Reed Drive, preserving open shared space in the center of Campus. This shared space consists of a curb less pedestrian plaza, a synthetic turf field, additional trees which have been strategically placed to create gathering areas and integrated SWM detention areas which will incorporate native plantings.

The new ACC's form and angled setbacks along S. Walter Reed Drive serve to break down the scale of the building, while creating additional outdoor space for use by both ACC occupants and pedestrians. The building also incorporates terraces along S. Walter Reed Drive and S. 7th Street. These terraces step the building back from the streetscape vertically, to help the building respond to the scale and context of the surrounding residential community.

The proposed exterior materials for the new ACC serve to break down the mass of the building while also emphasizing the interior spaces (public vs, instructional) that occur within the building. The proposed exterior materials of the Parking Garage serve to provide varied levels of transparency to screen the garage while providing some degree of openness for security.

The interior planning of the new ACC promotes an interdisciplinary approach to learning by co-locating standard classrooms, science labs, and CTE labs on the same floor. The inclusion of collaboration spaces promote interactivity between students while providing opportunities to expand the classroom into the public space for student group projects and activities which promote critical thinking and hands on learning.

The design will also comply with the APS Design Standards dated January 2021 (Version #01).

# Space Program / Educational Specifications

The space program / outline educational specifications (Ed. Specs.) were developed with guidance from APS staff and representatives of the Arlington Career Center. This preliminary program establishes learning space requirements for the programs and proposed enrollments planned for the expanded ACC.

The proposed ACC Base Ed. Specs. provides for an estimated 254,562 GSF (gross square feet) and 87 teaching stations that accommodate 1,619 students in grades 9~12. The calculated maximum capacity of 1,619 students was determined using APS standards for student teacher ratios for each of the programs offered at the ACC and provides space for future growth beyond the planned enrollment for 1,550 students.

The proposed ACC Alternative Ed. Specs. provides for an estimated 239,022 GSF and 77 teaching stations that accommodate 1,412 students in grades 9~12. The calculated capacity of 1,412 students was determined using APS standards for student teacher ratios for each of the programs offered at the ACC and provides space for future growth beyond the planned enrollment for 1,100 students. The reduction in square footage associated with the alternate Ed. Spec has been identified as an deduct alternate by the cost estimators.

Both proposed base and alternate educational specifications represent the minimum square footage required to accommodate the ACC program.

The square footage of the new ACC (based on the alternate ed spec) is 248,462 GSF. Below is a summary of the area by floor, including additional space added to accommodate mechanical equipment that will serve the building.

| | |
|---|---|
| First Floor: | 71,939 |
| Second Floor: | 64,772 |
| Third Floor: | 60,424 |
| Fourth Floor: | 26,960 |
| Fifth Floor: | 24,367 |
| Total: | 248,462 GSF |

See Appendix A for the detailed Base and Alternative Ed. Specs revised September 15,2022.

# 1 Code Compliance and Accessibility

The building and site will be designed to comply with the following Arlington County commercial building codes and accessibility requirements:

Applicable Building Codes:

- 2018 Virginia Construction Code
- 2018 Virginia Statewide Fire Prevention Code
- 2018 Virginia Fuel Gas Code (IFGC)
- 2018 Virginia Energy Conservation Code (IECC)
- 2018 Virginia Existing Building Code
- 2018 Virginia Mechanical Code (IMC)
- 2018 Virginia Plumbing Code (IPC)
- 2018 International Fire Prevention Code (IFC)
- 2017 NFPA 70 – National Electric Code (NEC)

Cited References:

- ICC A117.1: Accessible and Usable Buildings and Facilities 200 Edition
- ASHRAE 90.1

Fire Suppression:

- Automatic Sprinkler System per NFPA 13 (Applies to new ACC Only)

# 2 Sustainability

The new ACC will be designed and constructed to meet the requirements of LEED v. 4.1 for BD + C: Schools. APS has requested the design meet the requirements to achieve a minimum LEED Silver rating.

The following sustainable features are being evaluated for the project.

## 2.1 Location and Transportation

- Siting the building near other development, near public transportation.

## 2.2 Sustainable Sites

- Integrating new trees and landscaping with native plants to protect the surrounding ecosystem
- Using highly-reflective roof surfaces to reduce heat-island effect and heat gain to the building
- Managing stormwater to reduce runoff quantity
- Minimizing exterior light pollution

## 2.3 Water Efficiency

- Installing water-conserving, low-flow plumbing fixtures
- Specifying commercial food service equipment that is water-efficient
- Selecting drought-tolerant and native plants for landscaping to eliminate need for irrigation

## 2.4 Energy and Atmosphere

- Analyzing system options for building envelopes, lighting, heating, ventilation, and air-conditioning with energy modeling to optimizing the energy performance of the building.
- Lighting efficiently with automatic shut-off controls.
- HVAC systems and controls including demand-controlled ventilation, air economizers, and total energy recovery wheels.
- Maximizing suitable un-shaded areas for installation of on-site photovoltaic energy systems and including systems in the design, or including infrastructure for easy future installation.
- Encouraging alternative transportation to the school by providing conveniently located bike racks.

## 2.5 Materials and Resources

- Selecting materials with transparent, documented environmental impacts
- Diverting construction “waste” from landfills to be salvaged for reuse or recycled
- Providing recycling facilities for use throughout the life of the building
- Maximizing the longevity and durability of building envelope systems by meeting high industry standards confirmed by enclosure commissioning.

## 2.6 Indoor Environmental Quality

- Providing excellent ventilation air quality and outside air exchange rates, supported by proper filtration, $CO^2$ sensor controls, and air handling equipment
- Controlling humidity with systems for humidification and dehumidification
- Providing light levels to match standards for the tasks anticipated in different spaces
- Meeting industry standards for thermal comfort
- Providing a high level of occupant control over individual lighting and thermal comfort to promote enhanced indoor environment
- Using low-emitting interior building materials to safeguard occupant health
- Minimizing background noise level from HVAC systems in classrooms and other core learning spaces

See Appendix B for the new ACC LEED score card. It shows the team the points the team has identified as highly feasible in the “Y” column, as well as those that the team cannot yet confirm in the”?” column.

The LEED criteria will be further analyzed during design development. Overall, we expect that enough points to achieve the LEED goal of Silver.

# 3 ACC Campus Site: Existing + Demo Scope:

The Arlington Career Center site is located on S. Walter Reed Drive and shares a campus with the Montessori Public School of Arlington MPSA) and Arlington Community High School housed in the Fenwick Building. The site is bounded by 9th Street S. to the south, S. Walter Reed Drive to the east, 7th Street S. to the north, and S. Highland Street to the west.

The Career Center is in the center of a diverse, multicultural, and multi-use neighborhood. It is strategically located less than a five-minute walk from the intersection of Columbia Pike and S. Walter Reed Drive (the heart of Columbia Pike's town center).

The site is classified as S-3A Special Districts. Its immediate surroundings are mostly residential. To the north and west there are single family homes, to the east multi-family apartment buildings and to the south commercial office buildings and parking.

The overall site includes one primary parcel, RPC 25-014-004, owned by the County School Board of Arlington. The Arlington Career Center site consists of an existing surface parking lot along with a community high school. In addition, a secondary parcel in the north part of the site, RPC 25-014-010, is owned by the County School Board as well. This parcel includes the Montessori Public School of Arlington and park that will be affected by this project. The areas of the two parcels are 372,002 SF (8.5 acres) and 182,952 SF (4.2 acres), respectively.

## 3.1 Fenwick Building + Demo Scope

The Fenwick Building is a 24,000 GSF, two-story building between the Arlington Career Center and the Montessori Public School of Arlington (MPSA). Built in 1975, The Fenwick Building is a poured-in-place concrete structure with panelized exterior concrete walls. The primary structural members are concrete beams, columns and floor slabs.

### 3.1.1 Demo Scope

The Fenwick building shall be demolished, including all associated subsurface structures and utility services.

#### 3.1.1.1 Civil

The full civil site demolition scope shall be refined and confirmed with the future demolition plans and permits approved by Arlington County. Anticipated Fenwick building demolition scope includes:

- Full demolition of Fenwick building, slab on grade and foundations (portions may be phased).
- Cut and cap of water service lateral at the watermain in S. Walter Reed Drive. Abandon water laterals in place in accordance with Arlington County regulations.

- Cut and cap of sanitary sewer lateral at existing manhole adjacent to the Columbia Pike Branch Library.
- Disconnection of existing electric, telecommunications and gas services in accordance with the provisions of those service providers.

#### 3.1.1.2 Mechanical, Electrical, And Plumbing

The Fenwick building shall be demolished, including all associated mechanical, electrical, plumbing, and fire protection systems. Major incoming services will be demolished inside the building. Refer to the civil narrative for the scope of demolition for the site utilities.

## 3.2 Existing MPSA Playgrounds + Demo Scope

The MPSA's primary and secondary playgrounds, including the basketball courts are located along S. Walter Reed Drive. These playgrounds consist of:

- 55'x180' asphalt court with two basketball hoops surrounded by an 8' fence chain-link fence.
- 100'x126' natural grass playground with play equipment and park benches.

### 3.2.1 Demo Scope

Completely demolish all playgrounds, asphalt paving, fences, and benches.

## 3.3 Existing Arlington Career Center + Demo Scope

The Arlington Career Center is a two-story reinforced concrete structure exhibiting elements of Brutalist architecture and was constructed in the 1970s. The building mass is defined by long rectangular forms. The second floor is cantilevered over the lower level on the north, east and west elevations. This projection is interrupted on the south elevation where high-bay workshop spaces are located and at the location of the library on the southeast corner. The exterior walls feature exposed concrete with texture created by the concrete forms used during construction. The concrete walls also feature a vertical ribbed texture with horizontal reveals at the head and sill of windows on the first and second floors.

Second floor windows are surrounded by pre-cast concrete elements with exposed aggregate. The primary entries to the school and the library are aluminum curtainwall systems with spandrel panels at the second-floor structure.

Generally, the building's exterior features are in good to fair condition. The concrete walls are in good condition overall with isolated areas of concrete in fair condition including cracking and exposed reinforcing on the east elevation, cracking at window openings and areas of staining. Small circular voids located within the ribbed concrete remain from the form ties used during construction. Honeycombing in the concrete is present in specific areas on all of the building elevations. Honeycombing consists of rough, pitted areas of concrete that occur during construction when concrete does not completely fill the formwork when poured.

The areas of honeycombing on the building are shallow, sound and do not appear to be contributing to concrete damage at this time. The precast concrete window surrounds are in good condition with specific areas of hairline cracking and staining.

Entrances are in good condition with some minor deterioration requiring minimal maintenance. Windows are in good to fair condition with minor deterioration at select windows.

Control joints are located approximately 9'-0" on center and extend from the top of the second-floor cantilever, and down to grade. The control joints are interrupted where the second-floor concrete wall transitions to the plaster soffit, and cracks have formed in this location.

Expansion joints are located at changes in plane on the building facades. The sealant in the expansion joints is in good condition.

The existing building is a two-story concrete flat-slab structure. The roof structure is a 9" thick concrete slab with 4 ½" drop panels. The second-floor structure is the same with concrete beams in isolated locations. Concrete columns support the second floor and roof and are supported by shallow foundations. The lateral system consists of concrete shear walls. There are expansion joints located along grid lines 5 and 12.

## 3.3.1 Demo Scope

### 3.3.1.1 Civil

Anticipated scope for the partial demolition of the Arlington Career Center includes:

- For portion to be demolished: full demolition of building, slab on grade and foundations (portions may be phased).
- Demolish and remove all sub-slab utilities.
- Intercept two existing sub-slab storm drainage lines and route to storm network.

### 3.3.1.2 Architectural

Demolish 25,686 GSF of the existing ACC which houses the High-Bay CTE spaces, including the exterior precast wall panels adjacent to the demolition scope. The existing mezzanine (including the 3,799 SF space below the mezzanine) and TV Studio wing shall remain. In addition, minor selective demolition of existing interior partitions, doors, windows will be done to eliminate openings where no longer required and./or to provide openings for access to rooms below the mezzanine.

### 3.3.1.3 Structural

The south end of the building, consisting of the large automotive shops and the carpentry shop, will be selectively demolished. The structure is 10" exterior cast-in-place bearing walls, roof bar joists, and tectum roof deck. The removal of the wings does not weaken the remaining structure.

### 3.3.1.4 Mechanical, Electrical, And Plumbing

The single-story tech classroom areas will be demolished in the existing career center to accommodate the construction of the new parking garage. The scope of mechanical, electrical, and plumbing demolition is as follows:

a. The existing air-cooled chillers, which are located at grade behind the gym, will be relocated. The existing chilled water piping extending from the chillers through the single-story tech classrooms will be removed back to their entrance point in the existing main mechanical room.

b. The existing electrical feeders serving the existing air-cooled chillers will be disconnected and removed back to existing-to-remain 480-volt switchboard located in the main electrical room. The existing overcurrent protection devices serving the chillers in the existing-to-remain 480-volt switchboard will remain for reuse.

c. The existing gym is conditioned by a packaged rooftop unit, located directly on the roof of the gym structure. Supply and return ductwork extend from the rooftop unit into the space. The rooftop unit and all associated ductwork and gas piping connections will be removed in their entirety.

d. The existing lighting fixtures, lighting controls, wiring devices (receptacles, switches, motor starter, etc.), connections to equipment (fans, motors, etc.) and associated branch circuit conduit and wiring in the gym will be removed back to their sources.

e. Each tech classroom has an independent HVAC system consisting of an indoor air handling unit. The indoor air handling units for the wood shop, and both auto shops provide only heat and ventilation. The heating source associated with these air handling units includes duct mounted electric coils. The air handling units and associated ductwork and heating coils will be removed completely. All specialty exhaust systems including the fans and ductwork will be removed.

f. A packaged rooftop unit conditions the two auto tech classrooms. The rooftop unit is located directly above the classrooms and ductwork extends into the space. The unit and associated ductwork and gas piping connections will be removed in their entirety.

g. The existing lighting fixtures, lighting controls, wiring devices (receptacles, switches, motor starter, etc.), connections to equipment (spray booth, fans, motors, etc.) and associated branch circuit conduit and wiring in the tech classrooms will be removed back to their sources. The existing dedicated 120/208-volt branch circuit panelboards serving each tech classroom will be demolished with the existing conduit and feeder serving the branch circuit panelboards removed back to the existing-to-remain 208-volt switchboard located in the main electrical room.

h. The animal science classroom is conditioned by a split system air handling unit. The system consists of an indoor air handling unit and an outdoor condensing unit, located on the roof. The equipment and all associated ductwork and refrigerant piping will be completely removed.

i. The existing lighting fixtures, lighting controls, wiring devices (receptacles, switches, motor starter, etc.), connections to equipment (fans, motors, etc.) and associated branch circuit conduit and wiring in the animal science classroom will be removed back to their sources.

j. The existing gas service for the entire facility enters behind the auto-tech lab from the utility company. The gas regulators and meters are located at grade. Exterior gas piping routes along the exterior of the building to the roof. Gas piping mains route on the roof to the gym rooftop unit, the auto tech classroom unit, and then into the main mechanical room. The gas main routes in the building to the main boiler room. The gas service and associated piping mains will be demolished to accommodate the new parking garage. The gas utility company will perform the demolition of their meter and regulators.

k. Branch domestic cold, hot, and hot water return piping enter the tech classroom area from the mains located within the portion of the building that will remain. All branch piping and associated plumbing fixtures located within the area of demolition will be removed.

l. Roof drains and associated storm water piping located within the area of demolition will be removed. Two storm water mains that connect to roof drains located in the portion of the career center that will remain drop below slab within the area of demolition. The piping will be re-routed and drop below slab in the portion of the career center that will remain. The new piping outfalls will be connected to site utility. Refer to civil for more information.

m. All sanitary piping serving fixtures within the area of demolition will be removed. The piping mains route, below slab, into the area of the career center that will remain. The piping mains will be capped below grade.

# 4 ACC Campus Site: Civil and Landscape Scope

## 4.1 Civil Scope

### 4.1.1 Site Improvements

To be confirmed during the processing of the forthcoming Use Permit, it is anticipated that site civil improvements to the sidewalks will be required by the County for the perimeter of the site; except for that frontage of the existing MPSA building on South Highland Street and 7th Street South adjacent to the MPSA is expected to remain in the existing conditions with this project.

#### 4.1.1.1 Streetscape

For the project's frontage lengths along S. Walter Reed Drive and 9th Street South, typical streetscapes are anticipated. Typical streetscapes are expected to be approximately 14' wide, including 5 feet for planters, 6 inches for curb and 8 to 8.5 feet of pedestrian sidewalk. Typical streetscapes to also include:

- Street trees spaced at approximately 30 feet on center placed within 5 feet wide by 12 feet long planters.
- Arlington County standard continuous soil panels connecting the tree planters.
- Street lights spaced at approximate 80' intervals.
- Additional bicycle racks, benches, refuse containers, etc. as specified on landscape architecture plans.

For the project's frontage along S. Highland Street, a modified streetscape design is anticipated which includes: demolition of the existing sidewalk and installation of a new 6' wide concrete sidewalk with street trees on the east side of the sidewalk.

For the project's frontage along 7th Street South, a modified streetscape design is anticipated which includes: demolition of the existing sidewalk and installation of an 8' wide concrete sidewalk with street trees on the south side of the sidewalk.

A Schematic Streetscape Improvements Exhibit has been added to the civil site drawings to better depict and quantify these expectations.

#### 4.1.1.2 Sidewalks, curb and gutter

See Section 3.1.1.1.

#### 4.1.1.3 Lighting

See Section 3.1.1.1.

#### 4.1.1.4 Transportation Upgrades

An on-going Arlington County Complete Streets project will implement primary transportation upgrades to S. Walter Reed Drive adjacent to this project. Additional transportation upgrades for this project will include additional and upgraded site entrances to the project along S. Walter Reed Drive, S. Highland Street and 9th Street South.

A Schematic Mill and Overlay Exhibit has been added to the civil site drawings to better depict and quantify the expected mill and overlay extents for the streets around the site.

### 4.1.2 Stormwater Management (SWM)

For the purposes of determining stormwater management requirements for this site, the Arlington-specific version of the Virginia Runoff Reduction Method (VRRM) for Redevelopment shall be used. Stormwater Management (SWM) and Best Management Practice (BMP) facilities have been identified for potential use in meeting stormwater quantity and quality mitigation requirements onsite. It should be noted that these analyses are preliminary where the post-redevelopment pervious and impervious areas are assumed per the layouts provided. The sizing and locations for the SWM and BMP measures may change with final design.

### 4.1.3 Site Utilities

#### 4.1.3.1 Storm Drainage

County Stormwater Maps and field run survey of the site identify significant storm drainage infrastructure crossing the site. The existing storm drainage flows primarily to the southeast corner of the site across 9th Street South. A 48” diameter storm sewer crosses through the south side of the site. This storm sewer conveys storm runoff from the neighborhood on the west side of the site along South Highland Street as well as from the existing surface parking lot onsite. The pipe sizes in South Highland Street progress from 15” to 18” to 42” and finally to 48” pipes that crosses the site at the southeast corner. The site design proposes a new alignment of 48” storm sewer to reroute the storm drainage to the perimeter of the site along S. Highland Street and 9th Street South to accommodate on-site development. The 48” storm sewer will be realigned prior to the new garage construction. In addition, new storm laterals for the new and existing buildings will be implemented along South Walter Reed Drive and 9th Street S. There is also existing storm in the existing surface parking lot area that will need to be removed and replaced in phases to ensure positive drainage during construction. The SWM and BMP designs will include underdrains for the fields, underdrains for the urban bioretention planters, and their connections to the storm sewer system.

### 4.1.3.2 Domestic Water and Fire Protection

The existing Career Center building is served by a 3” waterline connected to the 12” main waterline in South Walter Reed Drive. A 6” waterline exists in 7th Street South and extends into South Highland Street. South Highland Street also has a 30” water transmission main. A 12” waterline exists in 9th Street S that serves two fire hydrants on the project site. A new 3” water meter and domestic lateral paired with an 8” fire service line are anticipated for the new high school. The water service for the new high school should connect to the existing 12” water line in South Walter Reed Drive.

It is anticipated that the water service laterals for the existing Career Center Building may need to be replaced with a new 3” meter (and domestic lateral) and a new 8” fire lateral to be connected to the 12” water line in South Walter Reed Drive. This scope has been identified as an add alternate in the cost estimate.

Additionally, a new 2” water meter (and domestic lateral) and 6” fire lateral connected from the existing 12” water line in 9th Street South are expected for the garage structure when it is constructed.

### 4.1.3.3 Sanitary Sewer

Per the Arlington County Sanitary Sewer System Map, the existing building is serviced by a sanitary sewer lateral connection to the 8” main on South Walter Reed Drive. There are also public sewer mains that exist in the surrounding streets.

It is anticipated that the existing Career Center building sewer lateral may need to be replaced in-kind with a new 8” lateral along the same alignment. In addition, it is anticipated that the new garage structure will require a new 6” sanitary lateral and connect to the existing 8” sewer main in 9th Street South when the garage is constructed. This scope has been identified as an add alternate in the cost estimate.

Two new sanitary sewer laterals, each estimated at 8” diameter, are anticipated to serve the new high school building. One of these is expected to tie to the existing sewer main in South Walter Reed Drive and the other to the existing sewer main in 7th Street South.

### 4.1.3.4 Gas

It is anticipated a new 4” gas service will be required for the new building additions and will connect to the existing gas main along the east side of S Walter Red Drive.

### 4.1.3.5 Power + Communications

The existing Career Center building is serviced by both overhead and underground electric communications

#### 4.1.3.5.1 Power

The project anticipates the following electric power provisions:

a. Install two (2) new pad mounted utility transformers to be installed on-site (location to be determined) with primary utility service provided from existing utility power poles along the project side of South Highland Street to serve the new ACC.

b. Maintain the existing utility transformers, primary service ductbanks, and electrical services from the existing utility power poles along the east side of S Walter Reed Drive to the existing Career Center building.

c. Install a pad mounted utility transformer to be positioned along S Highland Street with primary utility service provided from an existing utility power pole along the project side of the street to serve the new garage facility.

d. Install a pad mounted transformer to be positioned along S Highland Street or 7th Street South with primary provided from an existing power pole along the project side of the street to serve the athletic field lighting.

#### 4.1.3.5.2 Communications

The project anticipates the following site communications provisions:

a. Install four (4) 6” conduits extended from an existing utility pole along the east side of South Walter Reed Drive to the new ACC building.

b. Maintain the existing communication conduits from the utility poles along the east side of South Walter Reed Drive to the existing Career Center Building

c. Install two (2) 6” conduits extending an existing utility pole along from S Highland Street from the project side of the street to the new garage facility.

d. Install two (2) 6” conduits provided from either S Highland Street or 7th Street S from an existing utility pole along the project side of the street to the athletic field.

We recommend including the additional conduits identified above under items a, c and d for potential emergency services communications.

## 4.2 Landscape Architecture

Landscapes consist of pavements, tree plantings, ornamental shrub, groundcover and biofiltration plantings, synthetic turf playfields, synthetic turf dog relief areas and early childhood playgrounds.

### 4.2.1 Pavements

1. Vehicular pavement with special finish: Basis of design to be 6” thick 4000 psi concrete with #4 rebar at 16“ o.c.e.w. Basis of design finish to include integral color and/or decorative aggregate exposed by retardant and/or saw cut pattern
2. Pedestrian pavement with special finish: Basis of design to be 4” thick 3000 psi concrete with 6x6x#6 w.w.f. Basis of design finish to include integral color and/or decorative aggregate exposed by retardant and/or saw cut pattern
3. Vehicular pavement without special finish: Per Arlington County standard
4. Pedestrian pavement without special finish:Per Arlington County standard
5. Asphalt pavement: Per Arlington County stadard
6. Stabilized Gravel Pavements: Basis of Design to be Gravel Rings by Invisible Structures. Fill with ASTM #8 stone stabilized with acrylic stabilizer.

### 4.2.2 Planting

1. Canopy Trees: Basis of Design to be Acer rubrum ‘October Glory’ 3”-3.5” caliper.
2. Flowering/understory trees: Basis of design to be Prunus yedoensis (Yoshino Cherry) 2”-2.5” caliper
3. Ornamental and Biofiltration Plantings: Basis of Design to be 33%/33%/33% mix of deciduous shrubs, evergreen shrubs and perennial plants. Deciduous and evergreen shrubs to be 3 gal. min. @ 36” o.c. Perennial plants to be 1 gal. min. @ 15” o.c. average

### 4.2.3 Synthetic Turf Playfield

1. Basis of Design to be FieldTurf Classic HD by Tarkett.

### 4.2.4 Early Childhood Play Area

1. Play Equipment: Basis of Design to be Kompan # PCM101531
2. Play Surfacing: Basis of Design to be PlayBound Poured-in-Place Rubber by Surface America
3. Fencing: Basis of Design to be 48” height steel picket fence with one 36” wide swing gate

### 4.2.5 Animal Relief Area

1. Surfacing: Basis of Design to be synthetic turf with underdrainage system

2. Fencing: Basis of Design to be 48” height steel picket fence with one 36” wide swing gate

# 5 New Arlington Career Center

## 5.1 Code Compliance

The new Arlington Career Center (ACC) will be a concrete and steel framed 5 story, 260,000 GSF building. A summary of the building code requirements are below:

- Construction Classification: IB
- Mixed Use / Occupancy: Non-Separated Mixed Use. Groups E, A-2, A-3, B. Accessory Use S-1
- Building Area: 248,462
- Height: 84'-8".
    - The tallest occupied floor is 60'-0" (making building a non high-rise structure)

The applicable fire resistance requirements for the building are as follows:

- Interior Exit Stairways: 2 Hour
- Structural Frame: 2 Hour
- Floor Construction: 2 Hour
- Roof Construction: 1 Hour
- Shaft Enclosures: 2 Hour
- Fire Pump Room: 2 Hour

## 5.2 Architecture

The new ACC will house Classrooms, Career and Technical Education (CTE) laboratories, Media Center (Library), Gymnasium, Black Box Theatre, Dining / Kitchen, Teen Parenting Program, Fitness/PE, Administrative and Counseling offices, and support spaces distributed on 5 floors. Courtyards and terraces have been incorporated into the design to ensure access to day light for all instructional spaces and to provide students and building occupants with a connection to the outdoors.

### 5.2.1 Exterior Enclosure Systems

The exterior façade of the new ACC consists of brick, concealed fastener metal panels, phenolic panels, curtainwall, and storefront window assemblies.

#### 5.2.1.1 Brick Masonry Veneer

This assembly consists of:

- Nominal 4” brick
- Adjustable ties engineered for cavity
- 2” wall cavity with drainage matt
- 5” mineral wool cavity insulation,
- Air/ vapor barrier
- 5/8” exterior glass-mat sheathing
- 6” cold formed metal studs
- Interior gypsum wall board with painted finish.

Through wall flashing will be used at the base of the wall, brick relief angles, and at window openings. The design incorporates three brick types.

#### 5.2.1.2 Concealed Fastener (Single Skin) Formed Metal Panel

This assembly consists of:

- 1 ½” Concealed Fastener Formed Metal Panel – Installed vertically
- Adjustable Thermally Brocken Green Girt Delta – L Base Assembly
- 5” mineral wool cavity insulation
- Air/ vapor barrier
- 5/8” exterior glass-mat sheathing
- 6” cold formed metal studs
- Interior gypsum wall board with painted finish.

Through wall flashing will be used at the base of the wall and at window openings. The design incorporates three different types of formed metal panel profiles (MP-1, MP-2, MP-3).

#### 5.2.1.3 Phenolic Panel (High Pressure Laminate “HPL” Panels)

This assembly consists of:

- Phenolic Panel (Concealed fastener)
- Adjustable Thermally Broken Green Girt Delta – L Base Assembly
- 5” mineral wool cavity insulation
- Air/ vapor barrier
- 5/8” exterior glass-mat sheathing

- 6” cold formed metal studs
- Interior gypsum wall board with painted finish.

Through wall flashing will be used at the base of the wall and at window openings. Flashing will be prefinished aluminum to match the phenolic panels.

Phenolic panel accents will be utilized above and below the storefront windows in the brick veneer.

### 5.2.1.4 Waterproofing Assembly at Foundation walls

- Reinforced Concrete Wall / CMU Walls
- Waterproofing.
- 2” Rigid Insulation

### 5.2.1.5 Acoustical Mechanical Screen Wall Assemblies

Acoustic mechanical screen walls will be utilized to screen roof top mounted mechanical equipment. The panels will be mounted on a galvanized steel frame assembly of vertical and horizontal posts secured to the structure.

### 5.2.1.6 Perforated Screen (Auto Tech Labs)

The decorative screen at the automatic labs is a perforated aluminum metal panel. The basis of design is by Pac-Clad in a standard color TBD.

### 5.2.1.7 Curtain Wall Assemblies

The Curtain wall system basis of design is Kawneer 1600 wall and will be thermally broken and with a anodized finish. Systems depth will be a 7-1/2” typical. The curtainwall will have a anodized finish, color tbd..

Integrated GLASSvent casement windows will be provided at all occupied spaces.

### 5.2.1.8 Storefront Assemblies

The storefront system basis of design is Kawneer Trifab VersaGlaze 601 framing system with integrated GLASSvent casement windows where indicated. The storefront will have a an anodized finish.

The storefront windows located in the brick veneer have a aluminum frame surround that will have an anodized finish to match the storefront frame.

#### 5.2.1.9 Glazing Assemblies

Clear glazing basis of design is PPG Solarban 70 Solar Control low E coated insulated units meeting the thermal and shading and energy performance required to achieve LEED.

Spandrel glazing basis of design is PPG Solarban Solar Control 70 low E insulating units with color applied to surface number 4. There are two color types:

- Color (TBD) will be used in the curtainwall.
- Color accents will be utilized adjacent to the metal panels.

All glazing shall be safety glazing. All exterior glazing at ground level shall be laminated safety glazing.

#### 5.2.1.10 Exterior Entrances

- All public entrances will be anodized aluminum wide stile full glass doors with exit devices. One set of doors will have automatic operators for enhanced accessibility.
- Stair exit doors and secondary exits will be painted hollow metal doors and frames. Exit devices will be provided at all stair doors and secondary doors where the egress capacity exceeds 49 occupants.
- All hardware will comply with APS' design standards.

#### 5.2.1.11 Roofing Assemblies

- Low slope roofs will be white fully adhered polyvinyl-chloride (PVC) roofing in 80 mill thickness.
- The roof terraces will have a hot fluid applied rubberized asphalt waterproofing assembly with roof pavers.
- The sloped roof at the music rooms will be a standing seam metal roofing assembly with factory applied Kynar finish.
- The canopy at the main entrance and 7th Street S. entrance will have PVC roofing assembly, metal soffit panels and an aluminum composite panel fascia.
- The canopy at the exterior stairs and Teen Parenting will be a prefabricated aluminum walkway cover.

### 5.2.2 Interior Assemblies

#### 5.2.2.1 Flooring

The following flooring assemblies are proposed. Basis of design manufacturers, styles, and colors TBD.

- Polished Concrete (First Floor Only)
- Luxury Vinyl Tile (LVT)

- Sheet Carpeting
- VCT (Science Labs)
- Seamless Epoxy Flooring – Auto Tech Labs, Engineering / Fab Labs
- Slip Resistant resilient sheet flooring. Basis of Design Altro Stronghold 30 – Kitchen & Culinary Arts Lab.

#### 5.2.2.2 Ceilings

The following flooring assemblies are proposed. Basis of design manufacturers, styles, and colors TBD.

- Exposed Concrete Deck
- Acoustical Panel Ceilings
- Specialty Ceilings (TBD)
- Painted GWB Bulkheads / Accent Ceilings
- Pipe Grid – Black Box
- Fabric Wrapped Ceiling Panels – Black Box

#### 5.2.2.3 Walls

The following flooring assemblies are proposed. Basis of design manufacturers, styles, and colors TBD.

- Exposed Concrete Columns
- Painted GWB
- Specialty Accent Finishes
- Acoustical Panels – Gym
- Fabric Wrapped Panels – Black Box / TV Studio
- Hygienic PVC Wall Cladding – Kitchen and Culinary Arts Lab
- Painted Graphics – Elevator Lobbies – Floor Graphics
- Vinyl Graphics – Dining / Lobby / Educational themes

#### 5.2.2.4 Doors / Openings

- All interior doors will be wood, stain TBD with hollow metal frames.

- Interior Hollow Metal Frames will be used to provide large openings into conference rooms, Gym, and CTE Labs for increased visibility. All interior glazing shall be laminated safety glazing.
- All office doors and doors to instructional space will have a 2'-0" wide sidelite. All sidelites will have drapes for security.
- All hardware will comply with APS' hardware standards.

#### 5.2.2.5 Stairs

- All stairs will have rubber flooring and treads.

#### 5.2.2.6 Elevators

- The basis of design elevator is Otis Gen 3. There will be two service elevators and one passenger elevator.

#### 5.2.2.7 Restrooms

- Restrooms will have porcelain / ceramic tile floor and wall finishes.

#### 5.2.2.8 Window Coverings / Drapes

- All exterior windows into instructional spaces and offices will have roller shades.
- All glazing into offices and instructional spaces (from the corridor) will have drapes with curtain track.
- The black box and TV studio will have Acoustical Curtains surrounding the space. The Music Lab and General Music rooms will have acoustical curtains along the exterior wall at the glazing.

See the room schedule for a list of proposed finishes by space type.

## 5.3 Structure

### 5.3.1 Design Loads And Criteria Based On The VUSBC (VCC) 2018:

#### 5.3.1.1 Building Classification

- Risk Category III
- Not an Emergency Shelter
- The building is fully sprinklered.
- 1B Construction – HS and Existing ACC
- 2A Construction – Parking Garage

### 5.3.1.2 Gravity Live Loads

- Stairs, Lobbies, Assembly Floors, 100 psf
- Gym, & 1st Floor Corridors
- Mechanical & Kitchen 150 psf
- Classrooms 40 psf
- Tech Labs 125 psf
- Offices 50 psf
- Second Floor Corridors 80 psf
- Light Storage & Work Rooms 125 psf
- Sloped Roof 16 psf
- Flat Roof 20 psf
- Assembly Roof 100 psf
- Parking Garage (Non-reducible) 40 psf
- Parking Garage Wheel Load 3000 lb/wheel
- Parking Garage Vehicle Barrier
- Load – Horizontal Load 6000 lb

### 5.3.1.3 Snow Loads

- Pg = 25 psf
- Surface Roughness B
- Exposure B
- Ct = 1.0 (1.2 @ canopy)
- Ce = 1.0
- Pf = 22 psf (Flat Roofs)
- Ps = 22 psf (Sloped Roofs)
- Drift loads occur at parapets, projections, roof terraces, and high-low roofs.
- Is = 1.1

### 5.3.1.4 Rain Loads

- Rain Intensity - i = 6.06 in/hour
- Rain loads will be determined by roof slope and drainage pattern.

### 5.3.1.5 Wind Loads

- 120 mph
- Surface Roughness - B
- Exposure Category - B
- Enclosed Building - GCpi= +/- 0.18
- (No special wind loading criteria like FM is assumed)

### 5.3.1.6 Seismic Criteria

- Ie = 1.25 (1.0 for parking garage)
- Ss = 0.134
- S1 = 0.043
- Site Class D (Assumed)
- Sds = 0.143
- Sd1 = 0.069
- Seismic Design Category B
- TL= 8 sec
- Equivalent Frame Method

#### 5.3.1.6.1 High School:

- Force Resisting System – B6 - Ordinary Reinforced Concrete Shear Walls
- R = 5
- Cd = 4.5
- Cs = 0.032
- Base Shear (Not calculated at this phase)

#### 5.3.1.6.2 Parking Garage – Risk Category 2

- Force Resisting System – A4 - Intermediate Precast Shear Walls
- R = 4
- Cd = 4
- Cs = 0.036
- Base Shear (Not calculated at this phase)

### 5.3.1.7 Deflection Limits

- L/600 for concrete masonry supports
- L/360 for floor live load, Max. LL deflection < 1.0
- L/240 for roof live load, Max. LL deflection < 1.0
- H/67 Max. for seismic lateral displacement

### 5.3.1.8 Material Strengths

- Cast-in-Place Concrete: NW Concrete
- Suspended Floor System: 4000 psi
- Slab–on–Grade Concrete: 3500 psi
- General Concrete: 3000 psi (4000 psi at PG)
- Structural Steel: ASTM A992 (Wide flanges)
- Non-load Bearing Masonry: f'm = 1500 psi
- Soil Bearing - Not available until report is released

### 5.3.2 Foundations: High School

A geotechnical report has not yet been performed so no site-specific information is currently unavailable. An anticipated allowable bearing pressure up to 6000 psf is possible since the existing career center had this value. Conventional strip and spread footings are anticipated for this site. The exterior footings will bear a minimum of 24" below grade.

A 4" slab-on-grade is proposed for the interior slabs-on-grades that have conventional school loading. Mechanical rooms, tech labs, storage rooms, and special loading areas require a 6" slab. Car lifts and other special slab loading could require 8” minimum in limited areas. A 4” thick gravel barrier with a 15 mil vapor barrier is below all slabs.

### 5.3.3 Structural Frame Systems: High School

A concrete frame is the predominate framing system for the school which consists of concrete columns supporting flat plate floor slabs, non-post tensioned. Concrete columns will support the structural steel framing for the roofs, the roof terraces, the gym roof, the saw-tooth roof over the music area, and the west exterior wall of the gym. See attached Key Plans in Appendix D for designated areas.

The concrete floor system consists of an 11" flat plate slab with 4’x4’x8” shear heads at most columns. The anticipated column sizes are 24”x24” for locations supporting less than three levels and 30”x30” for columns supporting four levels or more. Concrete columns will extend up above the floors and support the structural steel roof framing. The exterior spandrel beams are 24” wide x 24” to 30” deep and will depend on the exterior cladding loads and the spans. The exterior spandrel beams will have shelf angles at each floor to support the masonry or finish system.

For most of the building, structural steel beams, bar joists and 1.5” Type B roof deck frames the roofs. Joists will be spaced typically at 6’ max. oc except under areas with high snow drift. There are four areas/locations that are the exceptions. The first exception is the roof area above the third floor which has the RTU’s, chillers, or generators. Here the roof will be framed with the typical cast-in-place floor slab construction. The second roof area exception is above the fifth floor at the (4) RTU’s where beams will replace the bar joists. The third atypical roof area is above the music rooms which have a saw-tooth patterned roof. Here, only structural steel framing will frame this area without bar joists. The last atypical area is the gym roof and west wall of the gym. The proposed gym framing is long span joists spanning the long direction of the gym and spaced around 6’ oc supporting 1.5” cellular acoustic deck. The long span joists have RTU loads above them with anticipated acoustic concrete slabs below the units. The west wall of the gym, since it is not supported from below, will be a two-story deep steel truss spanning the length of the gym and supported on each end by cantilevering steel trusses framed off the concrete frame.

Most roof terraces are framed with composite structural steel with a 5.25” light-weight concrete slab supported by 2”, 20 gage, composite deck. See Key Plans for locations.

Most of the exterior walls are framed with full height, floor to floor, 6” or 8" CFMF studs. All studs will have vertical slip clips or deep deflection tracks with a minimum required gap of 1.0".

### 5.3.4 Lateral Force Resisting System: High School

The proposed lateral bracing system is concrete shear walls. The current stair towers and elevator shaft walls supplemented by additional walls will form the basis of the lateral system. The proposed walls are 12” typically but could become 16” at the high load areas and 8” at the lightly loaded areas.

## 5.4 Mechanical

The proposed mechanical system for the new Arlington Career Center includes central station air handling units that will provide space heating, cooling, and ventilation to all areas of the building. The air handling units will include internal refrigeration systems and will connect to the building water source heat pump (WSHP) condenser water piping system. The water source heat pump infrastructure will consist of a cooling tower, for heat rejection, and a gas fired boilers, used as the heating source.

### 5.4.1 Infrastructure

The infrastructure for the proposed water source heat pump mechanical systems will include a cooling tower for heat rejection and gas fired boilers, used as the heating source. A set of building heat pump loop pumps will motivate water to all water source heat pump equipment.

#### 5.4.1.1 Cooling Tower

Induced draft style cooling towers are proposed. The basis of design will be the Evapco model AT. Preliminary load calculations indicate that 800 tons of cooling will be required for the facility. The tower will be sized based on outdoor temperatures of 95°F dry bulb and 78°F wet bulb with a 7-degree approach and 10-degree range. These design conditions will allow for the condenser water loop to operate with supply water temperatures of 85°F and return water temperatures of 95°F.

The cooling tower cells will be located on the roof of the new building. Structural dunnage beams will extend above the roof for mounting the towers. The towers will be screened by architectural louvered screen walls. The free area opening of the screen wall louvers will be determined based on the basis of design manufacturer’s recommendations for airflow and service.

Dedicated condenser water pumps will motivate water between the towers and a plate-frame heat exchanger. The heat exchanger will decouple the tower water from the building WSHP loop. The heat exchanger will be sized to maintain the WSHP loop supply temperature at 86°F during design conditions. Two, fully redundant base mounted horizontal split case pumps are proposed for the condenser water system. Each pump has an anticipated capacity of 2400 gallons per minute (GPM).

### 5.4.1.2 Boilers

Gas-fired, condensing style boilers are proposed. The basis of design will be the Fulton Endura +. Preliminary load calculations indicate that 10,800 MBH of heating will be required for the facility. Three 5,000 MBH (nominal capacity) boilers are proposed. The size and quantity of boilers proposed provides redundancy such that if one boiler is taken offline, the remaining capacity is 80% of the design load, per APS design standards.

The heating water system will operate with a maximum supply temperature of 140°F with a 30-degree temperature differential. These design parameters will allow for the boilers to operate within the range that is required for flue gas condensing to occur. The condensing boiler technology will recovery the heat of the flue gas condensing process, which will improve the overall efficiency of the heating water system.

The boilers will interface with the building's WSHP loop directly. Three pumps (one per boiler), with 240 gpm capacity will be positioned as a primary pump for the boiler system. The heating water piping will connect to the WSHP loop and will be hydraulically decoupled with a bypass bridge. The boilers will be controlled to maintain the WSHP loop temperature at 68°F in the heating season.

### 5.4.1.3 WSHP Pumping and Distribution

The water source heat pump loop will include two, fully redundant, base mounted pumps. 2400 gallon per minute (gpm) pumps are anticipated. Horizontal split case style pumps are anticipated to handle this flow rate. The basis of design will be Taco TA series.

The heat pump loop pumps will motivate water between the boiler, cooling tower heat exchanger, and building HVAC equipment.

### 5.4.1.4 Heating Water System

Heating water that will be used for space heating purposes in the air side HVAC equipment will be generated by water-to-water heat pumps. The water-to-water heat pumps will use the WSHP loop as the heating source. The internal refrigeration system will create the heating water for use in the space conditioning equipment.

Two, fully redundant heating water pumps will motivate water from the water-to-water heat pumps to the space conditioning equipment. The system will be designed to operate with a 140°F supply temperature and a 20-degree temperature differential.

The water-to-water heat pump approach for generating heating water is proposed in lieu of using the gas fired boilers for the following reasons:

1. The county is interested in a future geothermal solution for the building. When geothermal is installed and the boilers and cooling towers are decommissioned, the water-to-water heat pump system will be necessary to create the heating water that is required for the space conditioning systems.

2. The water-to-water heat pumps system will operate very efficiently, especially during the cooling season where it will be needed to create low-temperature heating water for dehumidification re-heat purposes. The summer time use will give the building the ability to generate heating water without turning on the gas-fired boilers.

3. Having a separate system generate the heating water and keeping the boilers dedicated to only providing heat to the WSHP loop simplifies the controls.

### 5.4.2 HVAC Systems And Equipment

The systems that provide heating, cooling, and ventilation to all spaces are all selected to meet the unique demands of the program in the Arlington Career Center. A memorandum was produced and sent to APS that analyzed potential system options for the Career Center. Refer to the memo dated 5/24/2022 for more information. Since a large portion of the program for the Career Center Expansion includes spaces that require high volumes of ventilation and unique temperature control, central station air handling units located in larger mechanical rooms are required regardless of what HVAC system is used for the general academic classrooms. When focusing on these non-specialized program spaces (general classrooms, art classrooms, and science labs), central station variable air volume (VAV) systems appear to have an advantage over other system options that were analyzed. Based on the assessment that was performed and summarized in the memorandum, central station VAV systems are recommended as the space conditioning solution for the general academic areas at the Career Center.

All central station VAV air handling unit (AHU) systems will include self-contained internal refrigeration systems and will be connected to the WSHP loop. The refrigeration systems will be heat-pump type, with reversing valves. As an energy saving feature, the refrigeration system will also include a hot gas (refrigerant gas) reheat coil. The hot gas reheat will give each unit the ability to reheat the supply air, as necessary, during dehumidification mode. The hot gas refrigerant is a by-product of the cooling process needed during dehumidification. Therefore, using the refrigerant hot gas for this purpose provides a source of reheat that does not require expending energy.

APS also has a new ventilation and filtration standard that is to be incorporated into each design. The pandemic mode of operation will increase the amount of fresh air supplied by each central station AHU by 30%. The units will all be designed to accommodate the addition load from this additional 30% of fresh air. The control systems will also be designed with a pandemic mode of operation, which will adjust airflow measuring station setpoints accordingly.

In addition to the increase in fresh air, during pandemic mode, APS will install higher grade filters at each AHU. The AHUs will be designed to include 12” MERV 13 filters that will be used during normal modes of operation. During pandemic mode, MERV 14 filters will be installed. The supply fans will be sized to accommodate the additional air pressure drop caused by the improved filtration.

The basis of design for the AHUs will be Annexair custom air handling units. Additional details about each type of AHU system is provided in the following sections.

### 5.4.2.1 Single Zone VAV Systems

Spaces in the Career Center that will have a unique heating and cooling load profile or that have unique occupancy types and schedules require a dedicated HVAC system. These spaces include:

1. Gymnasium
2. Black Box Theater
3. Cafeteria

These spaces are required to be ventilated per the requirements of the International Mechanical Code (IMC) and do not have any exhaust airflow rate requirements. Therefore, these units can be designed with supply and return fan configurations. Each unit will include the following components:

1. Supply fan(s)
2. Return fans(s)
3. Self-contained, heat pump refrigeration system
4. DX coil
5. Hot gas reheat coil
6. Filters
7. Minimum OA energy recovery wheel.

One AHU will be provided for each of these spaces and operate as a single zone VAV system. All heating and cooling processes will occur within the AHU, and no external, duct mounted airflow control devices or reheat elements are required for these systems.

Supply and return air will duct from the AHUs to the respective spaces. Where possible, low return grille intakes will be used to help with stratification and ventilation efficiency. In the Gym, if low return grilles are not possible, destratification fans will be used.

Controls for the AHUs will include variable speed supply and return fans, which will reduce speed based on the load in the space. Dehumidification controls will activate the cooling process and the associated hot gas reheat coil. Air side economizer controls will also give the unit the ability to provide “free” cooling when outdoor conditions are acceptable.

Since each of these spaces have the potential to include large, but variable occupancies, demand-controlled ventilation will also be included. The demand-controlled ventilation strategy will be room carbon dioxide based, and adjust the quantity of fresh air provided to reflect the number of occupants that are actually in the space.

The cafeteria unit is planned to be located in a mechanical room on the 1st floor. The AHU for the gym and black box theater is currently planned to be located on the roof. To keep all piping connections and maintenance activities under cover and protected from the outdoor elements, the custom roof mounted AHUs will include a 6-foot-wide service vestibule. The service vestibule will be semi-heated with a unit heater and include the unit’s controls, variable speed drives, and access doors to the internal components of the AHUs.

### 5.4.2.2 100% OA Single Zone Systems

Spaces in the career center that have unique heating and cooling load profiles and also unique exhaust and ventilation requirements will be provided with a dedicated AHU. These spaces require high exhaust airflow rates, per the mechanical code. The code also prohibits air from these spaces be recirculated and supply to other spaces. These spaces include:

1. Auto Tech Labs
2. Cosmetology
3. Kitchen
4. Culinary Arts
5. Animal Science
6. Fabrication Lab

The high exhaust airflow rates or special process exhaust systems required in these labs require that the dedicated AHUs be designed to deliver 100% outside air. Therefore, these units are designed with supply and exhaust fan configurations. Each unit will include the following components:

1. Supply fan(s)
2. Exhaust fans(s)
3. Self-contained, heat pump refrigeration system
4. DX coil
5. Hot gas reheat coil
6. Filters
7. OA energy recovery wheel.

One AHU will be provided for each of these spaces and operate as a single zone VAV system. All heating and cooling processes will occur within the AHU, and no external, duct mounted airflow control devices or reheat elements are required for these systems. Supply and exhaust air will duct from the AHUs to the respective spaces.

Controls for the AHUs will include variable speed supply and exhaust fans, which will reduce speed based on the load in the space, subject to minimum exhaust airflow rate requirements. Dehumidification controls will activate the cooling process and the associated hot gas reheat coil.

It is anticipated that each of the spaces will include process exhaust fan systems. These exhaust fan systems are described in a later section of this narrative. The controls for the AHUs will be interfaced with these process exhaust fans. Upon activation of these fans, the amount of supply and exhaust air provided by the AHUs will be adjusted to accommodate the exhaust airflow rate of the process fans. Standard exhaust airflow from the AHUs will be reduced and supply air will be increased (as needed) such that ample make-up air is provided to the spaces.

Four of these AHUs for these tech lab spaces are all planned to be located in mechanical rooms inside the building. The remainder will be located on the roof.

### 5.4.2.3 Multi-zone VAV Systems

Spaces in the Career Center that have similar occupancy types and schedules will be heated, cooled, and ventilated by a common AHU system. These AHU systems will be designed as multi-zone VAV systems. The multi-zone VAV systems will deliver supply air to each space at a constant temperature, usually sufficient for space cooling and dehumidification. The systems will include duct mounted supply air terminal units (VAV boxes) at each space. The VAV boxes will include a modulating damper and reheat coil and will provide each space with individual temperature control capabilities.

These spaces are required to be ventilated per the requirements of the International Mechanical Code (IMC) and do not have any exhaust airflow rate requirements. Therefore, these units will be designed with supply and return fan configurations. Each unit will include the following components:

1. Supply fan(s)
2. Return fans(s)
3. Self-contained, heat pump refrigeration system
4. DX coil
5. Hot gas reheat coil
6. Filters
7. Minimum OA energy recovery wheel.

One AHU will be provided for a cluster of spaces with similar occupancy types and operational schedules and that are also located in close proximity. It is anticipated the following group of spaces be provided with a dedicated AHU:

1. Administration Suite
2. Teen Parenting / Early Childhood Suite
3. Auto Tech general classrooms
4. Library and adjacent classroom spaces
5. General, non-science or art classrooms on floors 3-5.
6. TV studio and editing suite
7. General, non-science or art classrooms on floors 2 and 3.

Supply and return air will duct from the AHUs to the respective spaces. Medium pressure supply duct systems will be used to limit the size of the duct distribution required. One VAV box per space will be provided. Low pressure return ductwork systems will be used. Where possible, corridor ceiling return plenums are recommended to reduce the amount of ductwork and save project costs.

Controls for the AHUs will include variable speed supply and return fans, which will reduce speed based on duct static pressure. Dehumidification controls will activate the cooling process and the associated hot gas reheat coil. Air side economizer controls will also give the unit the ability to provide “free” cooling when outdoor conditions are acceptable.

The AHUs conditioning Administration and Auto Tech classrooms are planned to be located in mechanical rooms. The remainder of the AHUs are currently planned to be located on the roof. To keep all piping

connections and maintenance activities under cover and protected from the outdoor elements, the custom roof mounted AHUs will include a 6-foot-wide service vestibule. The service vestibule will be semi-heated with a unit heater and include the unit's controls, variable speed drives, and access doors to the internal components of the AHUs.

#### 5.4.2.4 Multi-zone 100% OA Systems

Spaces in the Career Center that have similar occupancy types and schedules as well as special ventilation and exhaust needs will be heated, cooled, and ventilated by a common AHU system. These AHU systems will be designed as multi-zone VAV systems. The multi-zone VAV systems will deliver supply air to each space at a constant temperature, usually sufficient for space cooling and dehumidification. The systems will include duct mounted supply air terminal units (VAV boxes) at each space. The VAV boxes will include a modulating damper and reheat coil and will provide each space with individual temperature control capabilities.

These spaces are required to be ventilated per the requirements of the International Mechanical Code (IMC) and also are required to be exhausted a prescribed airflow rates. Air from these spaces are also prohibited from being recirculated and returned to other spaces. Therefore, these units will be designed with supply and exhaust fan configurations and will deliver 100% outside air. Each unit will include the following components:

1. Supply fan(s)
2. Exhaust fans(s)
3. Self-contained, heat pump refrigeration system
4. DX coil
5. Hot gas reheat coil
6. Filters
7. OA energy recovery wheel.

One AHU will be provided for a cluster of spaces with similar occupancy types and operational schedules and that are also located in close proximity. It is anticipated the following group of spaces be provided with a dedicated AHU:

1. Athletic locker rooms and team rooms
2. Science labs and prep rooms on floors 2 and 3
3. Science labs and art classrooms on floors 3-5.

Supply and exhaust air will duct from the AHUs to the respective spaces. Medium pressure supply duct systems will be used to limit the size of the duct distribution required. One VAV box per space will be provided. Medium pressure exhaust ductwork systems will also be used. One round retrofit style exhaust terminal unit will be provided for each space. The exhaust terminal unit will provide the ability to maintain the code required exhaust airflow rates in each space. The exhaust terminal units also provide the ability for the system to be controlled in conjunction with any specialty exhaust fan systems. When specialty exhaust systems are utilized, such as science lab fume hoods, the exhaust terminal unit will automatically adjust the amount of exhaust air provided to maintain pressurization.

Controls for the AHUs will include variable speed supply and exhaust fans, which will reduce speed based on duct static pressure. Dehumidification controls will activate the cooling process and the associated hot gas reheat coil.

The AHUs for these spaces are currently planned to be located on the roof. To keep all piping connections and maintenance activities under cover and protected from the outdoor elements, the custom roof mounted AHUs will include a 6-foot-wide service vestibule. The service vestibule will be semi-heated with a unit heater and include the unit's controls, variable speed drives, and access doors to the internal components of the AHUs.

#### 5.4.2.5 Process Exhaust Systems

Many of the technical lab spaces have programs with processes that require specialty local exhaust for fume or dust extraction. These process exhaust systems are described in the following sections.

##### 5.4.2.5.1 Auto Tech Lab Exhaust

Each of the Auto Tech labs will require an engine exhaust system. The engine exhaust systems will consist of an exhaust fan and ductwork that connect to car exhaust hoses and adaptors. The basis of design for the exhaust system is the Carmon CO-X exhaust package. The discharge of the engine exhaust will be ducted to wall mounted louvers, integrated in the exterior wall of the Auto Tech labs. Two complete systems per Auto Tech labs will be required.

Both Auto Tech labs will also include welding processes. A welding exhaust system is proposed that includes an exhaust fan, ductwork, and welding extraction arms. The welding extraction arms will be hung from structure and will be movable. The basis of design for the extraction arms is Carmon WXS.

The Auto Tech Collision lab includes a finishing program with paint spray. It is anticipated that the paint spray booth requirements will be similar to that in the existing Auto Tech Labs. This will require a down draft style paint spray booth with adjoining paint mixing and storage room. The paint spray booths are anticipated to be provided with exhaust fans and gas-fired heaters from the booth manufacturer. The exhaust discharge will be ducted to wall mounted louvers, integrated in the exterior walls.

##### 5.4.2.5.2 Fabrication Lab / Wood Shop

The fabrication lab and wood shop will require a central dust collection system. The dust collector will be located outdoor, at grade, next to the wood shop area. Exhaust ductwork will extend to the shop with connections to various tools and floor sweeps. The collector will include a hopper and return filtered air back to the shop.

To comply with NFPA requirements for dust collectors, the machines will be equipped with spark detection and deflagration systems.

#### 5.4.2.5.3 Kitchen

The kitchen for the facility will be equipped with a cooking hood that requires a grease duct system and kitchen exhaust fan. Grease exhaust ductwork will route from the cooking hoods to a wall mounted kitchen exhaust fan. The wall mounted fan will be mounted to the exterior wall outside of the loading dock area.

The dishwashing area of the kitchen will include a commercial dish machine with a type 2 hood. A dedicated exhaust fan will be provided for the dish machine hood. The fan will be mounted to the exterior wall outside of the loading dock area.

#### 5.4.2.5.4 Culinary Arts

The culinary arts facility will include multiple cooking stations with hoods that will require grease duct systems and kitchen exhaust fans. Grease exhaust ductwork will route from the cooking hoods to a wall mounted kitchen exhaust fan. The wall mounted fan will be mounted to the exterior wall outside of the loading dock area.

#### 5.4.2.5.5 Cosmetology

The cosmetology program will include pedicure and manicure stations. These stations require local fume extraction and typically have exhaust grilles integrated into the station's equipment. Exhaust ductwork will connect to the work stations and route to an exhaust fan. The discharge of the exhaust fan will route to louvers integrated in the exterior wall.

#### 5.4.2.5.6 Science Lab

The science labs will include fume hoods. It is understood that the APS prefers that each hood be connected to dedicated exhaust fans that are operated by local switch controls. Therefore, each fume hood will be connected to stainless steel exhaust duct systems that will route to roof mounted utility set fans.

### 5.4.2.6 Miscellaneous HVAC systems

The sections below describe HVAC systems that heat and cool back-of-house spaces or that provide cooling needs for building processes, such as kitchen walk-in coolers and data rooms.

#### 5.4.2.6.1 Stairwells, entries, and mechanical rooms

Stairwells, building entries, and mechanical rooms will be conditioned by water source heat pumps. Console style or vertical hi-rise style water source heat pumps (WSHPs) will be located in each of miscellaneous spaces. These spaces do not require ventilation. Therefore, these unitary, recirculation only WSHPs will provide heating and cooling needs only. The WSHPs will connect to the building WSHP piping loop.

#### 5.4.2.6.2 Walk-in Cooler and Freezer

The walk-in coolers and freezers in the kitchen and culinary arts area will be equipped with a split system refrigeration system. The associated condensing units are recommended to be air-cooled and located on the roof.

#### 5.4.2.6.3 Data and IT rooms

Data, IT, and Electrical rooms that have year-round cooling demands will each be cooled by ductless split system units. Wall mounted indoor conditioning units will be located in each space and connected to associated roof mounted condensing units with refrigerant piping.

### 5.4.2.7 Automatic Temperature Controls

A new direct digital control (DDC) system will be provided to monitor and control the HVAC equipment and systems serving the school. This system will be installed in accordance with the APS standards and be networked to the existing central server at the APS main facility office. Actuation will be electric / electronic for all systems. All heat pump AHUs will be provided with the equipment manufacturer's packaged controls, complete with BACnet protocol for interface with building automation system. The DDC system will allow for general trending to assist with detecting problems and potentially resolving them without requiring access to the school facility. All controls will be provided by Automated Logic and will be installed by ALC's Glen Allen, VA office.

## 5.5 Plumbing

A completely new plumbing system is required for the facility. The following section describe the scope of work for plumbing systems.

### 5.5.1 STORM WATER PIPING SYSTEMS

Storm water drainage, including roof drains, overflow drains, condensate drainage, and storm water piping systems will be provided for the new Career Center. Above- and below-grade piping systems will be constructed from cast-iron material. All storm water piping systems will exit the building at various locations and coordinate with the available site piping connections provided for the school and the planned stormwater management systems.

### 5.5.2 SANITARY WASTE AND VENT PIPING SYSTEMS

Sanitary waste and vent piping systems will be provided for supporting plumbing fixtures throughout the Arlington Career Center. Similar to the storm water piping, above- and below-grade sanitary and vent piping systems will be constructed from cast-iron material. Vent piping will terminate at the roof level, with a minimum 25-foot separation provided between vent piping terminations and any outdoor air intake locations. Sanitary piping systems will exit the building at various locations and coordinate with the available site piping connections provided for the school.

Equipment and sinks that may discharge grease into the sanitary system from the kitchen and Culinary Arts lab will be piped to an underground concrete grease interceptor. The discharge from this interceptor will be connected to site sanitary piping system.

Floor drains from the Auto Tech Labs will be piped to sand interceptors and oil separators, which will be buried below slab with manhole access doors. The discharge of oil separators will be piped to the site sanitary system.

A used oil receptor will also be provided in the auto tech labs with a waste-oil monitory panel. The used oil receptor will be piped to a below graded mounted waste oil tank. The tank will be located below grade, just outside of the Auto tech labs. The waste oil tank will include a monitoring system and suction pipe for oil removal.

## 5.5.3 DOMESTIC WATER PIPING SYSTEMS

A new water service will enter the building within the new mechanical room. A separate fire water service will be provided for the fire suppression system (see fire protection narrative). A new domestic water service, complete with basket strainer and RPZ-style backflow preventer will separate the domestic water service prior to distributing water throughout the school. Type “L” copper domestic water piping will be distributed from the mechanical room area to plumbing fixtures and equipment located throughout the school.

### 5.5.3.1 Domestic Water Booster Pump

The flow test results of municipal water system will be evaluated during the design development phase to assess the adequacy of the available domestic utility. It is anticipated, however, that a domestic water booster pump will be required to support fixtures with flush valves on the upper floors.

A duplex style domestic water booster pump is proposed that includes two, fully redundant pumps. The pumps will be a skid mounted, packaged system that is complete with the pumps, stainless steel headers, variable speed drives, and controls. It is proposed that the booster pump be connected to a dedicated boosted cold-water main that only supports fixtures with flush valves on the upper floors that require the elevated pressure. The remainder of the fixtures in the building will be connected to non-boosted domestic water piping systems.

### 5.5.3.2 Domestic Hot Water Systems

Water-to-water heat pump style domestic water heaters will be used to generate domestic hot water for the facility. The water heaters will be connected to the WSHP loop and use the utility as the heating source. The heaters will include internal circulator pumps that connect the heaters to separate storage tanks. The system will be controlled to maintain 140°F water in the storage tank.

Two independent domestic hot water distribution loops will be required for the facility. A 120°F water supply system with associated return system and pump will be piped directly to food service equipment, in accordance with health department regulations. The second hot water system will send 110°F water to all

non-food service equipment. The 110°F domestic hot water temperature will be created through a master thermostatic mixing valve. Per the international pluming code, domestic hot water delivery to a plumbing fixture must be delivered through an ASSE 1070 mixing valve. Master mixing valves are manufactured in accordance with ASSE standard 1017. Therefore, both ASSE 1017 master mixing valves and ASSE 1070 fixture mixing valves are required to satisfy code requirements.

### 5.5.4 FUEL GAS PIPING SYSTEMS

A new natural gas service will be required for the facility. Natural gas fired appliances are included in the commercial cooking kitchen and the culinary arts lab. Science labs will also include gas turrets. Gas fired HVAC equipment is limited to the boilers. The existing gas service at the existing ACC building has a delivery pressure of 2-psi. It is anticipated that a 2-psi deliver pressure from the utility will be provided to the new ACC building.

Gas regulators will be located in the distribution piping outside of the kitchen and culinary arts lab as well as the science classrooms. Pressure will be reduced from 2 psi to 7” wc before being connected to any appliance. Emergency gas shut-off switches will be provided in each space, accessible by the teaching staff or kitchen employees. The gas shut-off switches will connect to a solenoid valve that will close off gas deliver upon activation.

### 5.5.5 COMPRESSED AIR SYSTEMS

Compressed air systems will be required for the activities in multiple tech labs. The Auto Tech shops and the fabrication / wood shop programs will have activities that use pneumatic tools. A new central air compressor is proposed for the facility that will locate the equipment in a mechanical room. The air compressor will be complete with an air dryer to deliver clean, dry air to the spaces.

Compressed air piping will route to each tech lab space requiring the utility. Piping drops will terminate with manual shut-off valves, pressure gauges, and quick-connect fittings.

### 5.5.6 PLUMBING FIXTURES

Institutional grade plumbing fixtures will be provided throughout the replacement school.

Restroom fixtures will include wall-mounted water closets utilizing 1.28 gallon per flush valves, pint flush (0.125 gallon per flush) wall-hung urinals, and wall-hung lavatories with self-closing hot and cold-water faucets that supply 0.35 gallons per minute. All plumbing fixtures will comply with the Americans with Disabilities Act (ADA). All fixtures will include hard-wired sensor activated flush valves or faucets.

Classroom sinks will be coordinated with the casework designer for the individual classrooms. Science classroom sinks will be provided with faucets that include hot and cold-water connections and serrated nozzles. Designated sinks used for chemical disposal will be provided with an acid neutralization trap. This approach will avoid the need for an acid resistant piping network and large central acid neutralization tank.

Art classroom sinks will include 1.5 gpm aerators and the sink waste trap will be provided with a solids separator.

Clean-up sinks in the auto tech labs are anticipated to be free-standing, stainless-steel utility sinks with wall mounted faucets.

Plumbing fixtures in the kitchen and culinary arts lab are selected by the food service consultant. Refer to the food service portion of the narrative for more information.

## 5.6 Electrical

The new Arlington Career Center (ACC) will include a complete installation of power, lighting, and fire alarm systems as well as raceways (outlet boxes and conduit) and power provisions for solar photovoltaic, electric vehicle charging, voice/data, audio/video, security, and other specialty systems.

### 5.6.1 POWER DISTRIBUTION

Based on the existing Arlington Career Center, two electrical services (one service at 480Y/277-volts, 3Ø, 4-wire and the other service at 208Y/120-volts, 3Ø, 4-wire) are recommended for the ACC. The recommendation for two services is based on the large density of 120/208-volt loads anticipated for the kitchen, culinary arts labs, auto tech labs, fabrication labs, and Construction Lab. The expected benefits of the second service are reduced space requirements for electrical equipment throughout the facility, reduced cooling loads for mechanical systems, and increased efficiencies in the electrical distribution system.

#### 5.6.1.1 Utility Service

The electrical services will be provided by Dominion Energy (Virginia) via pad mounted utility transformers. A concrete encased, primary utility ductbank will be provided from existing utility service poles to each pad mounted utility transformer. Concrete encased, secondary utility ductbanks will be provided from the utility transformers to the service entrance equipment located in the main electrical room.

#### 5.6.1.2 Service Entrance Equipment

The service entrance equipment for the 277/480-volt, 3Ø, 4-wire service will be a 4,000-amp rated switchboard designated as Switchboard SWBDH with a 2,500-amp main circuit breaker. The service entrance equipment for the 120/208-volt, 3Ø, 4-wire service will be a 4,000-amp rated switchboard designated as Switchboard SWBDL with a 4,000-amp main circuit breaker. The main circuit breaker in each switchboard will be 80-percent rated, UL 891 listed, electronic trip, fixed insulated case-type (for system coordination) with ground fault protection and arc energy reduction maintenance setting in accordance with the requirements of the National Electrical Code (NEC).

Branch circuit breakers will be adjustable electronic trip type or standard molded-case type, 100% or 80% current rated, with advanced digital rms trip unit. Branch circuit breakers rated 1,200-amps and larger will also be provided with arc energy reducing maintenance switches. Service-entrance rated surge suppression devices will be provided to protect the bus of each main switchboard.

Copper bussing structure will be specified in electrical distribution equipment (switchboards, panelboards, etc.).

The basis-of-design switchboard manufacturer is Square D (Schneider Electric). Equipment from the following alternative manufacturers will also be considered: Siemens, Eaton Corporation, and General Electric.

### 5.6.1.3 Emergency Power

A stand-by generator power distribution system consisting of a 250-kW generator, generator docking station, automatic transfer switches, and distribution equipment is required for the ACC. The generator will be specified with three (3) output circuit breakers to serve the fire pump, emergency (egress lighting, fire alarm, etc.), and optional stand-by (elevator, voice/data communications systems, security systems, refrigerators, etc.) loads.

The natural gas fueled generator will be specified with a weather-proof, sound-attenuated enclosure and installed on the third-floor roof.

The basis-of-design generator manufacturer is MTU. Equipment from the following manufacturers will also be considered: Caterpillar Power Generation and Cummins Power Generation/Onan.

Article 700 Emergency Systems, Section 700.3(F) of the 2017 NEC requires a generator docking station be provided for use when the stand-by generator is being maintained. The generator docking station, located adjacent to the generator, will have key interlock circuit breakers and temporary generator connections.

The basis-of-design generator docking station is model SBDS by Trystar. Equipment from the following manufacturers will also be considered: Asco, Hipower, Powertron, Semcor, and Thomson.

The basis-of-design automatic transfer switch manufacturer is Zenith (ABB/General Electric). Equipment from the following manufacturers will also be considered: ASCO Power Technologies (Schneider Electric).

### 5.6.1.4 Panelboards and Transformers

Distribution panelboards will be provided to serve dedicated mechanical, lighting, and receptacle branch panelboards. The distribution panelboards will incorporate main circuit breakers, where located remote from upstream overcurrent protection, or will be main lug only where upstream overcurrent protection is provided locally (within the same space). Distribution panelboards will accommodate large frame size breakers as necessary. Main circuit breakers, where provided, will be adjustable electronic trip type or standard molded case-type. Branch circuit breakers will be standard molded-case type.

Branch circuit panelboards will have copper bussing structures. Circuit breaker type branch panelboards will typically include main circuit breakers with bolt-on-type branch breakers. Fuse-type coordination branch panelboards will be provided to serve emergency lighting loads throughout the building to meet the NEC requirement for selective coordination of emergency distribution systems. Branch panelboards will typically be recessed within occupied spaces. Panelboards will be sized with approximately 20% spare capacity and 10% spare breakers or fuses.

Transformers serving 120/208-volt panelboards will be general-purpose, energy-efficient type, complying with DOE 2016.

The basis-of-design manufacturer of circuit breaker-type distribution and branch panelboards is Square D (Schneider Electric). Distribution panelboards will be I-Line series and branch panelboards will be either NF or NQ series. Equipment from the following alternative manufacturers will also be considered: Siemens, Eaton Corporation, and General Electric.

The basis-of-design manufacturer of fuse-type distribution and branch panelboards is Mersen. Distribution panelboards and branch panelboards will be MFCP series. Equipment from the following alternative manufacturers will also be considered: Eaton-Cooper-Bussmann and LittleFuse.

The basis-of-design manufacturer of transformers is Square D (Schneider Electric). Equipment from the following alternative manufacturers will also be considered: Siemens, Eaton Corporation, and General Electric.

### 5.6.1.5 Energy Metering and Monitoring

An energy metering, monitoring, and reporting system will be provided to record the building's mechanical (HVAC), lighting, plug load (receptacle), kitchen, and building operation loads (exterior lighting, elevators) total energy usage (kWh) and peak demand.

The metering system will utilize a combination of advanced power quality meters and current sensors with revenue-grade accuracy. Current sensors will be split- or solid-core. The system will be capable of communicating with a central building management software package.

The basis-of-design energy metering, monitoring, and reporting system is Leviton Manufacturing Co, Inc. Equipment from the following alternative manufacturers will also be considered: Eaton Corporation, General Electric, E-Mon Meters (Honeywell), and Square D (Schneider Electric).

### 5.6.1.6 Solar Photovoltaic System Ready

It is anticipated that a portion of the available roof area will be utilized for a solar photovoltaic (PV) system to be installed under a Power Purchase Agreement (PPA) in the future. The PV System will consist of PV panels will be connected to exterior distributed inverters which will combine at a dedicated panelboard located in the main electrical room. The panelboard will connect to Switchboard SWBDH in accordance with NEC 690 requirements. The solar PV system will be utility grid-connected ("on-grid") and not use on-site battery storage. The system will also include rapid shutdown and an enclosed safety/disconnecting switch located in the main electrical room. The distributed solar PV inverters are recommended to be located outside the building, in lieu of an interior inverter room, due to the amount heat produced by inverters.

Electrical provisions required for the ACC to be solar PV ready for a future PV system provided under a PPA. Electrical provisions to include the following:

Provide a dedicated circuit breaker in Switchboard SWBDH and appropriate labeling.

Provide dedicated wall space within the main electrical room for PV system panelboard, rapid shutdown, and enclosed safety/disconnecting switch.

Provide two (2) 4-inch conduits from the Main Electrical Room to each roof level (4 total conduits).

### 5.6.1.7 Wiring Methods

Building power will be distributed at 277/480-volts and 120/208-volts via conduit and copper conductors for all vertical and horizontal distribution for feeders and for direct feeds to equipment. Copper grounding conductors will be specified for all feeders and branch circuits. In general, horizontal distribution throughout the building will occur overhead in open or accessible ceiling space.

Branch circuit wiring will consist of either 1) conduit (Type EMT) and copper wiring (Type THHN/THWN), or 2) branch circuit metal-clad cabling (Type MC). Conduit and wiring will be utilized typically for inaccessible branch circuits, back-of-house support spaces (mechanical, electrical), and for homeruns back to panels. Type MC cabling will be utilized for branch circuit feeds serving wiring devices (receptacles and line-voltage switches). Type MC luminary cabling will be utilized for branch circuit feeds serving lighting fixtures. Conductors and cables shall be copper.

In general, conduit and wire will be used in the ceilings from space to space, while type MC and type MC luminary cabling will be used in accessible ceilings and concealed in walls to serve electrical items within a space. Flexible metal-conduit and flexible liquid-tight conduit will be used to serve motor and equipment connections.

### 5.6.1.8 Grounding

The building grounding system will follow the conventional grounding techniques and requirements for an institutional facility. The building framing utilizes steel structural members. A continuous vertical ground riser system will be employed for power and telecommunications. There are no specialty system or specialty equipment grounding characteristics known at this time. The building grounding system will consist of the following:

*Building Electrical System*:

The building electrical power equipment will be grounded in compliance with the NEC. A building ground ring, consisting of ground rods, will be provided to achieve a maximum system resistance of 5-ohms. The service-entrance switchboard ground bus will be connected to a copper ground busbar in the main electrical room which is bonded to the ground ring via exothermic joints.

*Telecommunications System*:

The building will include a telecommunications ground riser system for connection of telecommunications-based systems. Each telecommunications closet will include a ground busbar assembly for connection of telecommunications-related equipment.

### 5.6.1.9 Wiring Devices

Wiring devices will consist of receptacles, combination receptacle/USB charging stations, cord reels, and line-voltage switches. Wiring devices will be located as needed to support programming of spaces and to comply with general code-requirements. Device locations will be carefully coordinated with Architectural interior elevations to maximize clear wall space throughout the building.

Receptacles for plug-and-cord connectivity will be specification-grade. Outdoor receptacles will be weather-resistant type with while in-use covers and will be provided with integral ground fault protection in accordance with the NEC. Receptacles will typically be recessed mounted in public and private (back of house) spaces.

Cord reels will be provided through out the auto tech labs. Receptacles in the tech lab spaces will be mounted 30-inches to the top of box

If required by the Energy Code governing the project, a portion of the 125-volt, 15- and 20-ampere receptacles in private offices, open offices, and circuits serving modular furniture will be automatically controlled. Automatically controlled receptacles will be connected to the lighting control system for automatic control via occupancy.

Switches utilized for lighting controls will primarily be of the low-voltage variety, and part of the lighting control systems. Switches utilized for operation of other power-related devices will be specification-grade toggle switches, and in some cases, manual motor starter switches with pilot lights.

### 5.6.1.10 Motor Controls

Equipment containing 3-phase motors will operate at 480-volts or 208-volts and equipment containing 1-phase motors will operate at 120-volt, 208-volts, or 277-volts. Some equipment will utilize electronically commutating (EC) motors which may require a 4-wire circuit (neutral requirement).

Motor control will be achieved using a combination of variable frequency drives, combination motor starter-enclosed switches, and manual motor starter switches (with or without thermal overload protection). Equipment with integral motor starting control will have a single-point connection and utilize a fuse-type enclosed switch. Interior electrical equipment will be specified with NEMA Type 1 enclosures and exterior electrical equipment will be specified with weather-proof NEMA Type 3R enclosures.

Motor control will be achieved using a combination of variable frequency drives, combination motor starter-disconnects, and manual motor starter switches. Equipment with integral motor starting control will have a single-point connection and utilize an enclosed circuit breaker-style disconnect switch. Interior electrical equipment will be specified with NEMA Type 1 enclosures and exterior electrical equipment will be specified with weather-proof NEMA Type 3R enclosures.

Variable frequency drives will be commonly applied to infrastructure-related 3-phase motors such as pumps and fans. Variable frequency drives will incorporate IGBT technology and be 6-pulse with harmonic filtration (where determined necessary). Only equipment considered essential to continuous building operation will incorporate the maintenance bypass feature integral to the drive assembly.

Combination motor starter-enclosed switches will typically be applied to small multi-phase motors and equipment not requiring speed regulation. Units will include a motor starter sized to accommodate the full-load starting current (locked rotor amps) for each motor horsepower, and an integral disconnect means (circuit breaker type).

Manual motor starter switches, with or without thermal overload protection, will typically be applied to small, single-phase motor or equipment loads. The switches will consist of 120V, 1-pole or 208V, 2-pole variety toggle switches.

Fused enclosed switches will serve as the disconnecting means in ‘line of sight’ of motors. The enclosed switches will be rated for the equipment current requirements and nominally rated at 240-volts or 600-volts.

Each enclosed switch will be heavy-duty type for 3-phase equipment/motors loads and general-duty type for 1-phase equipment/motor loads.

The Basis-of-Design unit for VFD assemblies is the ABB ACH550 series. Supplemental (non-integral) harmonic mitigation would be TCI. VFD assemblies by the following alternative manufacturers will also be considered: Danfoss, Emerson, and Yaskawa.

The basis-of-design manufacturer of enclosed motor controllers is Square D (Schneider Electric). Equipment from the following alternative manufacturers will also be considered: Eaton Corporation and General Electric.

#### 5.6.1.11 Studies and Calculations

The following studies and calculations will be performed as part of the design and installation of the building's power distribution system. The resulting requirements of these studies and calculations will be incorporated into the design and specifications of equipment ratings and settings.

- System Fault Current Analysis complying with the requirements of IEEE 141 and IEEE 242.
- System Coordination Study complying with the requirements of IEEE 399 (Emergency System).
- System Arc Flash Hazard Analysis according to the IEEE 1584 equations as presented in NFPA 70E, Annex D. Equipment shall be labelled as required by the results of the study/calculations.

### 5.6.2 LIGHTING

Energy efficient lighting and a low-voltage lighting control system will be specified to provide high quality illumination for the community and staff in the ACC.

#### 5.6.2.1 Lighting Fixtures

Lighting fixtures will utilize LED sources with a minimum color rendering index of 80 CRI. LED color temperatures will be 4000K for interior lighting fixtures and 3000K for exterior. Lighting fixture styles will be coordinated with the Architectural design.

Illumination levels will be designed in accordance with the recommendations of the Illuminating Engineering Society of North America (IESNA). Maintained illuminance values will be calculated using a total light depreciation factor of 90%.

As part of the life-safety code requirements, emergency egress lighting is required throughout the building. The emergency egress lighting system will consist of specific luminaires, selected among the normal lighting system, placed on emergency power branch circuits. Egress lighting will be designed per International Building Code, National Fire Protection Association 101, and the National Electric Code to maintain a minimum average of 10 lux (1 foot-candle) in paths of egress for a period of 90 minutes following a normal source power outage. The building will have an emergency egress luminaire at exits and LED exit signs with red or green letters, according to the requirements of the AHJ.

Exterior lighting will be placed around the perimeter of the building to provide illumination for security. Area-based LED fixtures will be utilized at these locations. Additional LED façade lighting will be used to visually enhance the building entrance. Exterior lighting will be controlled via an astronomic time switch with override switch.

#### 5.6.2.2 Lighting Controls

Lighting fixtures will be specified with 0-10-volt dimming drivers and connected to a local lighting control network (one room controller per space). The drivers will be capable of dimming from 100- to 10-percent of full light output. The basis of design lighting control system is the NX Room Controller Series manufactured by Hubbell. Lighting control systems by the following alternative manufacturers will also be considered: Eaton Controls (Greengate series), WattStopper (DLM Series), and Acuity Brands (nLight).

General lighting will be controlled by ceiling mounted occupancy sensors with 360-degree detection and low voltage wall stations. The wall stations will typically be specified with on, off. and raise/lower functionality. Occupancy sensors, operating in either vacancy or occupancy modes, will be programmed to automatically turn off the lights when the space has been unoccupied for 20-minutes. Ceiling mounted daylight monitoring sensors will be used to automatically dim lighting fixtures near windows where required by the IECC. Wired occupancy sensors, daylight sensors, and wall stations will be specified.

### 5.6.3 Fire Alarm

A Johnson Controls model 4100ECS, intelligent, addressable fire alarm system with one-way voice communication capability will be provided for the ACC. The fire alarm system will meet the requirements of the Americans with Disabilities Act (ADA) and comply with the State of Maryland Fire Code, the International Building Code, National Fire Protection Association (NFPA) 72: National Fire Alarm and Signaling Code, and the local authority having jurisdiction (AHJ).

The fire alarm control panel (FACP) will be located in the main electrical room. The FACP will have a network interface to communicate with the local fire authorities. The FACP will also interface with the automatic temperature control (ATC)/energy management control system (EMCS).

Manual pull stations will be located on each floor at exits and exit stair entries used for egress. Smoke detectors will be provided in the elevator lobbies and, when activated, shall initiate elevator recall. Smoke and heat detection will also be provided in the elevator shaft and in elevator equipment rooms as required by the American Society of Mechanical Engineers (ASME) A17.1: Safety Code for Elevators and Escalators. Sprinkler flow and tamper (valve monitor) switches will be provided for each sprinkler zone. Each initiation device will have a unique address.

Smoke detection will be provided above the FACP, in ductwork of air-handling systems over 2,000 cubic feet per minute (cfm), and at other locations required by the Fire Marshal. The fire alarm system will interface with the HVAC equipment for shutdowns.

Fire alarm combination speaker/strobe units will be installed in required locations. Fire alarm strobes will be installed in toilet rooms. Notification appliance circuit (NAC) power extender panels will be provided where needed for speaker/strobe and strobe units. Strobe spacing and locations will be per NFPA and ADA requirements for rooms and corridors. Candela minimum required light output intensity will be indicated on the drawings.

A graphic display and LCD-style annunciator with a handset or microphone for one-way voice communication will be located in the main lobby for use by the Fire Department. Zoning shall be by building floor, with separate zones for smoke detectors, heat detectors, manual pull stations, and water flow devices.

Fire alarm system wiring will typically be in conduit. Type MC fire alarm cable will be allowed in concealed spaces above ceilings and within walls.

### 5.6.4 Low-Voltage Systems

Raceways, outlet boxes, and power supplies for voice/data, audio/video, security, and other specialty systems will be provided in accordance with the requirements provided by the Owner.

### 5.6.4.1 Public Address

The intercom (public address) system will include the head-end console/rack in the main telecom room, microphone, administrative telephones in the main office area, call switches and ceiling speakers in classrooms and instructional spaces, and ceiling speakers in corridors and group toilet rooms. The basis of design public address system will be the Rauland Telecenter U. The system will include capacity for future expansion and have ethernet connectivity.

The Sapling SAT system will be the basis of design master clock system.

Individual sound systems for the gymnasium and cafeteria, each with a listening assistance system (for the hearing impaired), will be provided. Each system will be complete with speakers, microphone jacks, auxiliary jack(s), and wall mounted equipment cabinet with mixer/amplifier, CD/MP3 player, wireless microphone receiver, and hearing assistance transmitter.

Requirements for sound systems in music rooms will be determined with input from the Owner.

The AiPhone IX Series intercom entry phone system will be provided between the main building entrance and main office.

### 5.6.4.2 Voice and Data Cabling Infrastructure

Data and voice cabling infrastructure includes, but is not limited to, data racks, patch panels, cable management, cable trays in telecom rooms, fiber-optic cabling, copper (Category 6, 6A, 7) cabling, wall outlets with RJ-45 jacks, and ceiling outlets for wireless access points. Requirements will be determined with input from the Owner.

### 5.6.4.3 Audio/Visual for Instructional Technology

Audio/visual provisions for instructional technology includes, but is not limited to, cabling between outlet at teacher workstation, and outlet at interactive panel, smartboard, and/or projector, and may also include audio reinforcement requirements (ceiling speakers and amplifiers) in classrooms and instructional spaces. Requirements will be determined with input from the Owner.

### 5.6.4.4 Distributed Antenna System for Public Safety / First Responders Radio

In compliance with the 2015 International Fire Code (IFC) 510.1, and 2013 NFPA 72 Section 24.5.2, a two-way radio communications enhancement system for emergency responder radio coverage will be provided in the form of a distributed antenna system (DAS).

The distributed antenna system for public safety / first responders' radio will include a head-end repeater, booster, combiner, taps, splitters, couplers, and/or filters as required, ceiling mounted interior antennas, roof mounted exterior donor antenna with lightning/surge protection, and associated coaxial or fiber optic cabling.

### 5.6.4.5 Intercommunications Equipment for Rescue Assistance

In compliance with the 2015 International Building Code (IBC) Section 1009.8 Two-way communication, the local authority having jurisdiction (AHJ) may require an area-of-refuge rescue assistance system (for two-way communication) at the landing serving each elevator on each accessible floor that is one or more stories above the level of exit discharge. Therefore, intercommunications equipment for rescue assistance will be provided to include a head-end rescue assistance main console at main entrance vestibule (adjacent to fire alarm annunciator panel), rescue assistance emergency call station adjacent to elevator on upper floors, and associated cabling in conduit.

#### 5.6.4.6 Access Control System

The door access control system will include head-end control panel card readers, cabling, outlet boxes, conduits and raceways, and connections to door hardware. Locations of access control system devices will be determined with input from the Owner. Vanderbuilt will be specified as the building headend access control equipment.

#### 5.6.4.7 Intrusion Detection System

The intrusion detection system will include head-end control panel, motion detectors/sensors, door contacts, keypads, cabling, outlet boxes, and conduits and raceways within walls. Locations of intrusion detection system devices will be determined with input from the Owner. Bosch will be the manufacturer of the security system headend equipment.

#### 5.6.4.8 Video Surveillance System

The video surveillance system will include a network video recorder, IP-based video surveillance cameras, power over Ethernet (PoE) Category 6 cabling, and outlets and conduits/raceways within walls. Category 6 cabling will be provided from a dedicated rack-mounted patch panel in the main telecom room to interior and exterior video surveillance cameras. Security cameras will be supplied and installed by APS venders. Contract Documents will include conduit and system wiring. Acceptable manufacturers and locations of video surveillance cameras will be determined as directed by the Owner.

## 5.7 FIRE PROTECTION

A new metered fire water service will be provided to the building from the municipal water system. The entire building will be fully sprinklered with standpipes with hose valves located in the enclosed egress stair towers. The building will be separated into several zones that will match the fire alarm pull zones for the building. The municipal water system will be evaluated during the design development phase. However, it is anticipated that adequate water pressure will not be available to support the system without the need for a fire pump since the highest portion of the proposed building is 5 stories tall. A packaged fire pump system complete with an inline pump, a pressure management jockey pump, and system controller is proposed. All work will be specified to conform to the National Fire Protection Association (NFPA) standards and will include requirements for hydraulically calculating the system's performance.

Specialty equipment that requires fire suppression is anticipated to be provided as an accessory to the equipment. Kitchen cooking hoods are typically provided with packaged fire suppression systems. Large paint spray booths are also typically provided with chemical-based fire suppression systems. The fire alarm system will monitor these systems.

Dry type sprinkler heads will be provided to protect the walk-in freezers and coolers. Dry type side wall sprinkler heads will also be required where there are any covered canopies or building overhangs.

# 5.8 Food Service

## 5.8.1 Cafeteria Kitchen

### 5.8.1.1 General Description

- The facility will be equipped with all-new commercial-grade appliances meeting current N.S.F. requirements and installed according to local governing health codes. All countertops and work surfaces will be of durable stainless steel finishes, and mounted on legs to promote sanitation and ease of cleaning. Likewise, shelving inside the walk-in cooler/freezer will be installed on casters to aid in re-stocking of food supplies.

- The kitchen will be designed to operate as an on-site prep/production facility equipped to prepare, cook and serve lunch meals to the student population of approximately 1,500 during three (3) meal periods of grades 9 thru 12. Bulk refrigerated items will be stored in a walk-in cooler/freezer with remote refrigeration. Onsite cooking will take place in convection ovens, tilting kettle and steamers requiring a non-grease exhaust canopy. A fire protection system for this style of ventilation is not required. Cooking and serving utensils will be washed and sanitized in a 3-compartment sink with integral left & right drainboards. Clean ware will be stored on mobile pot & pan shelving.

- Serving of students will take place on three (3) lines of cafeteria counters equipped with: 5-well hot food counter, mechanically refrigerated frost top and cold pan for cold food and a refrigerated open merchandiser for milk and beverages. Meals will be served on disposable trays, flatware and cups eliminating the need for a full dishwashing operation.

### 5.8.1.2 Spatial Description

The kitchen will receive all new equipment arranged to include the following functional workspaces:

- Receiving Area
- Kitchen
    - Walk-In Cooler/Freezer equipped with audible/visual high-temperature alarms. Rooms will be fitted with shelving on casters for mobility and cleanliness
    - Cold food preparation with 2-compartment prep sink
    - 30-Gallon Tilting Kettle
    - Convection Steamer
    - Convection Ovens
    - One-Section Pass-Thru Heated Cabinets
    - Two-Section Pass-Thru Refrigerators
    - Utility Raceway
    - Type II Wall-Mounted Ventilator

  - (6) Worktables With Undershelf
  - 3-compartment pot/pan washing sink with large drainboards
  - Pot & pan shelving
  - (5) hand washing sinks with soap & towel dispensers
- Hot Food Serving Station (3 Lines)
  - (5) hot food wells with drains and fill faucet.
  - Mechanically refrigerated frost top and cold pan for cold food
  - Refrigerated Open Merchandiser for milk and beverages
    - Cash Register/P.O.S.
- Dry Storage Room
  - Floor mounted shelving system
- Office
  - Office desk & chair, filing cabinet and computer & printer
- Janitor's Closet/Soap Storage Room
  - Floor-type mop basin with shelving for storage of soap & chemicals
  - Stacked commercial-grade washer and dryer

## 5.8.2 Culinary Arts Lab

### 5.8.2.1 General Description

The facility will be designed to operate as a teaching kitchen to provide basic training for the Culinary Program. The overall new kitchen and storage spaces will accommodate up to 20 students per period and equipped with all-new commercial-grade appliances meeting current N.S.F. requirements and installed according to local Health Department codes.

### 5.8.2.2 Spatial Description

- The overall foodservice operation will encompass the following functional work areas:
- Kitchen
  - Walk-In Cooler/Freezer equipped with audible/visual high-temperature alarms. Rooms will be fitted with shelving on casters for mobility and cleanliness
  - Cold food preparation with 2-compartment prep sink
  - Convection Oven
  - Deck Oven
  - 4-Burner Range

  - Wall-Mounted Type I Ventilator with Fire Protection System
  - Two-Section Reach-In Refrigerator
  - Two-Section Reach-In Freezer
  - Proofer/Heated Cabinet
  - Cooking Suite (Includes 6-Burner Range, Charbroiler, Salamander, Fryer, Workcounter With Sink, Island Type I Ventilator with Fire Protection System)
  - Baker's Table with 3-tier Drawers
  - Ingredient Bins
  - 30-Quart Mixer
  - (6) Worktables With Undershelf
  - Ice Machine/Bin
  - High-temperature Door-Type Dishmachine
  - Condensate Canopy
  - Soiled & Clean Dishtable
  - 3-compartment pot/pan washing sink with large drainboards
  - Pot & pan shelving
  - (3) hand washing sinks with soap & towel dispensers
  - Eye Wash Station
- Lab Room
  - Demonstration Table With Mirror
- Café/Dining Room
  - 20 to 25 seat café
- Beverage Station
  - Serving Counter
  - Beverage Counter with Sink
  - Microwave/Convection Oven
  - Coffee brewer with water filtration system
  - Blender
  - Refrigerated/Ambient Display Case
  - Espresso Machine
  - Ice Machine/Bin
  - 2-door Undercounter Refrigerator

    - Soup Warmer
        - Cash Register/P.O.S.
- Dry Storage Room
    - Floor mounted shelving system
- Office
- Office desk & chair, filing cabinet and computer & printer
- Janitor's Closet/Soap Storage Room
    - Floor-type mop basin with shelving for storage of soap & chemicals
- Laundry Room
    - Commercial-grade washer and dryer

## 5.9 Career and Technical Education (CTE) Equipment

See Appendix I for a preliminary budget for both fixed and loose equipment for each CTE lab.

# 6 Existing Arlington Career Center

## 6.1 Code Compliance and Accessibility

The existing Arlington Career Center (ACC) is a concrete framed 2 story, 221,000 GSF building. A summary of the building code requirements are below:

- Construction Classification: IB
- Mixed Use / Occupancy: Non-Separated Mixed Use. Groups E, A-2, A-3, B. Accessory Use S-1
- Building Area Demo: 26,686 GSF
- Building Area Light Renovation: 6,005 GSF
- Height: 26’-0”

The applicable fire resistance requirements for the building are as follows:

- Interior Exit Stairways: 2 Hour
- Structural Frame: 2 Hour
- Floor Construction: 2 Hour
- Roof Construction: 1 Hour
- Shaft Enclosures: 2 Hour

## 6.2 Architecture

The new work for the existing ACC will be limited to a new exterior façade where the existing building was demolished, new doors to provide access to the first-floor mechanical space.

### 6.2.1 Exterior Enclosure Systems

The exterior façade of the existing ACC consists of calcium silicate masonry units, concealed fastener metal panels, aluminum composite metal panels, curtainwall, and storefront window assemblies.

#### 6.2.1.1 Concealed Fastener (Single Skin) Formed Metal Panel

This assembly consists of:

- 1 ½" Concealed Fastener Formed Metal Panel – Installed vertically
- Adjustable Thermally Brocken Green Girt Delta – L Base Assembly
- 5" mineral wool cavity insulation
- Air/ vapor barrier
- 8" nom. CMU back up wall.

Through wall flashing will be used at the base of the wall. The design incorporates three different types of formed metal panel profiles (MP-4, MP-5, MP-6, MP-7).

#### 6.2.1.2 Calcium Silicate Concrete Masonry Units (CSMU-1)

This assembly consists of:

- 8" nom. CSMU-1 (Basis of Design is Arriscraft's White Cambridge Renaissance)
- Adjustable Thermally Brocken Green Girt Delta – L Base Assembly
- 5" mineral wool cavity insulation
- Air/ vapor barrier
- 8" nom. CMU back up wall.

Waterproofing will be applied at the foundation and extend up to the through wall flashing at the base of the wall.

## 6.3 Structural

The demolition of the southern wings of the buildings requires the remaining interior wall to become a new exterior wall. The conversion requires CMU infill in the current openings in the concrete wall.

The new mechanical unit locations currently do not require any roof strengthening.

## 6.4 Mechanical

The existing mechanical systems at the existing Arlington Career Center are mostly located in a central mechanical room. The mechanical room is within the footprint of the existing building that will remain when the tech labs are demolished to make room for the parking garage. Therefore, all air handling unit equipment and associated ductwork will remain.

The existing air-cooled chillers will be relocated to make room for the parking garage. The scope of demolition for the ACC requires that existing single story tech labs be demolished back to the mezzanine area of each lab. Above that mezzanine area is a roof well that adjoins to the 2-story existing structure

that will remain. This roof well was originally designed to support mechanical equipment that has since been replaced by the chillers. It is proposed that the existing chillers be relocated to this roof well. Chilled water piping will connect on the roof and enter directly into the mechanical room and re-connect to the existing piping mains.

## 6.5 Plumbing

The scope of demolition for the existing career center involves removing the existing single story tech labs. Domestic water plumbing systems do not originate in these labs, and therefore all piping in the area can be removed and capped at the entrance points within the portion of the building that will remain. Sanitary piping systems supporting the tech labs also route back into the existing building. Therefore, existing below grade sanitary piping can be capped and demolished without disruption to the existing system.

Storm water piping for the existing Career Center routes and exits the building, below slab, in the area of demolition and where the proposed parking garage is to be located. Any storm drainage piping that drops below grade within the existing single story tech labs will be relocated to the mezzanine area which will remain. The modified below slab storm water outfalls will exit the building and be reconnected by re-designed site stormwater systems (see civil narrative for more details).

The existing gas service for the career center originates on the exterior wall of the existing Auto Tech lab. The scope of demolition requires a new service for the facility, located in an area that coordinates with demolition and the construction of the new parking garage. A new gas service, installed by the utility company, will bring a new piping main to a site mounted regulator and meter assembly. Downstream gas piping will route up the building's exterior wall to the existing roof well, where it will re-connect to the existing roof mounted gas main.

## 6.6 Electrical

The existing electrical services and switchboards at the existing Career Center are located in the main electrical room. The main electrical room is located within the footprint of the existing building that will remain when the tech labs are demolished to make room for the parking garage. Therefore, the existing electrical services, switchboards, and associated conduit and wiring will remain.

As mentioned in the demolition portion of this narrative, the existing branch circuit panels and associated lighting fixtures, lighting controls, receptacles, etc. located in the tech labs, gym, and animal science classroom will be demolished to make room for the parking garage. The branch circuits serving the existing chillers will be disconnected and removed.

New electrical connections and circuits will be provided to serve the two (2) relocated air-cooled chillers. New branch circuit wiring will connect to existing circuit breakers made spare through demolition.

## 6.7 Fire Protection

The scope of demolition is such that the branch sprinkler piping serving the single-story tech labs extend from mains in the portion of the existing building that will remain. Therefore, piping will be demolished in the tech labs and capped within the existing building.

# 7 Parking Garage

## 7.1 Code Compliance and Accessibility

The Parking Garage will be a precast concrete framed 4 story building. A summary of the building code requirements are below:

- Construction Classification: IIB
- Mixed Use / Occupancy: S-2 / “Open Parking Garage”
- Building Area: 132,696 GSF
- Height: 43’-6”
- Parking Spaces: 354
- ADA Parking Spaces: 11 (including two Van Spaces)

The applicable fire resistance requirements for the building are as follows:

- Interior Exit Stairways: 0 Hour
- Structural Frame: 0 Hour
- Floor Construction: 0 Hour
- Roof Construction: 0 Hour
- Shaft Enclosures: 2 Hour

## 7.2 Architecture

The parking garage is a 4-level open parking deck constructed using a precast concrete structural system. The anticipated floor-to-floor height for the garage will be 10’-0”, with the first-floor level of the parking structure 4’ lower than the finished grade elevation of S. Highland St., requiring excavation.

The garage will have two egress stairs and two elevators for circulation as well as a bike storage room, mechanical and electrical rooms and sump pump for floor drains.

The garage slab (including the slab within the Storage and mechanical spaces) shall be finished with a vehicular traffic coating.

Pavement marking paint shall be used for all stripping and arrow directional graphics on the garage slab. Accessible car and van parking access aisle will be marked with diagonal stripping and signage. Each parking stall will have one precast wheel stop.

## 7.2.1 Exterior Enclosure Systems

The garage facades will have a combination of exposed pre-cast spandrel panels, perforated architectural metal cladding screens, metal fins.

### 7.2.1.1 Architectural Metal Cladding Screens

The basis of design cladding system mfr. for the garage is KOVACH. The structural frame will be a delegated design system by the screen mfr. secured to the garage's precast concrete spandrels. The cladding panels will perforated powder coated aluminum panels with Biophilic patterns.

### 7.2.1.2 Architectural Metal Fin Screens

The basis of design fin screen system for the garage is KOVACH. The fins will be secured to the precast concrete spandrel with steel framing and clips. The fins will perforated powder coated aluminum panels.

### 7.2.1.3 Architectural Precast Concrete

The parking garage, including the stair towers and elevator will be constructed of precast concrete panels.

## 7.2.2 Finish Systems

### 7.2.2.1 Epoxy Paint

The walls of the stair towers and elevator core will be painted with a high-performance epoxy coating. Basis of Design is Series 66 Hi-Build Epoxoline by Tnemec.

### 7.2.2.2 Vehicular Traffic Coating

Provide a penetrating silane sealer on all parking structure horizontal surfaces, all levels. Provide a Elastomeric traffic deck coating over electrical, utility rooms, etc. only.

As an add alternate, provide a price to provide an elastomeric traffic deck coating on all horizontal surfaces.

## 7.2.3 Misc. Assemblies

### 7.2.3.1 Wheel Guards

7' precast concrete wheel stops will be provided at each parking space.

#### 7.2.3.2 Misc. Metals: Guardrails, Bollards, and Pipe Guards

- Galvanized guardrails and handrails will be utilized in the stairs.
- Concrete filled traffic bollards will be provided.
- Painted metal pipe guards will be provided at all vertical piping.

## 7.3 Structural

The proposed parking garage is precast concrete. The floor system is 30" pre-topped double tees x 12' wide. The interior lite-walls support the double tees on each side of the interior ramp and act as lateral shear walls. Exterior spandrels support the exterior end of the double tees. The proposed architectural decorative metal panels are attached laterally to the panels. Supporting the double tees over the (4) drive aisle spans are 42" deep inverted tee beams. The exterior columns are 24"x28" and the interior columns are 24"x24". On each short side of the garage, a shear wall panel is centered between the two middle columns. The foundations consist of large spread footing and strip footings between them. Since the PG is about 3' below outside grade on all sides, a 12" retaining wall as part of the foundation is required. The northeast corner's foundation is very close to the existing ACC, so a short amount of concrete underpinning may be required. The slab-on-grade at the entry level is a 6" thick over 4" drain gravel/vapor barrier and reinforced with fiber mesh. The slab will slope to area drains.

## 7.4 Mechanical

The parking garage is proposed to be an above grade, open structure that does not require ventilation or heating. Mechanical systems are limited to providing HVAC for the garage elevator and elevator machine room. A dedicated split system AHU is proposed. The AHU portion will be located in the elevator machine room and duct into the elevator shaft. The associated condensing unit will be located outside of the machine room, either in a designated location in the garage or outside of the garage on grade.

## 7.5 Plumbing

Plumbing systems for the parking garage are limited to interior deck drains that will be piped to the below grade storm water piping system. The storm water piping will connect to the site civil utility and stormwater management system. Since the garage will not be used for vehicle washing, an oil separator is not required.

## 7.6 Electrical

A dedicated 277/480-volt, 3Ø, 4-wire electrical service will be provided to serve the parking garage. The electrical distribution equipment will include a main distribution panelboard, a low-voltage transformer, and branch circuit panels to serve lighting, receptacle, mechanical (HVAC), plumbing (sump pumps) and elevator loads. A lighting control system will be specified to control the lighting fixtures in the parking garage

based on a combination of occupancy and time of day scheduling. Emergency egress lighting will be provided via emergency battery packs or by providing emergency branch circuits from the adjacent existing Career Center.

## 7.7 Fire Protection

The above grade, open parking garage does not require a fire sprinkler system. It is anticipated that a manual dry stand-pipe system with hose valves and a fire department connection will still be required for the parking facility. The fire main will route on the lowest level and connect to various risers such that all areas of the garage are within 150 feet of a fire hose valve.

# DIVIDER NAME

# Appendix A: Educational Specifications

A.1 Base Educational Specifications

A.2 Alternate Educational Specifications

# Appendix B: LEED Score Card

# Appendix C: Interior Room Finish Schedule (New ACC)

# Appendix D: Structural Key Plans

# Appendix E: Specifications Table of Contents

# Appendix F: Program Color Floor Plans

# Appendix G: Program Comparison Spreadsheet

# Appendix H: Comparison between Initial and revised ACC Schematic Design

# Appendix I: CTE Equipment Budget

# Appendix J: Schematic Design Drawings