

GENERAL REQUIREMENTS

BASIS OF DESIGN NARRATIVES

6C.3.1 - 02

6C.3.1 – 02a

CIVIL
BASIS OF DESIGN

MEMORANDUM

TO: Vladimir Lyubetsky, Drumney Rosane Anderson, Inc.
FROM: David Conway, P.E., Nitsch Engineering
DATE: May 16, 2023
RE: Northeast Metropolitan Regional Vocational School - Site Narrative

Stormwater

Storm drainage for the site will comply with Massachusetts Stormwater Management standards. Massachusetts Stormwater Management standards require that the rate of stormwater flows leaving the site not be increased in the developed conditions. The standards also require that the quality and quantity of stormwater be addressed by treating the stormwater to remove possible contaminants and to approximate existing flows to groundwater. Areas that experience vehicular traffic will have their stormwater quality addressed through mechanical means such as water quality structures or the implementation of other green infrastructure. Runoff from roofs and landscaped areas are considered clean and treatment prior to recharge or discharge is not required.

Stormwater flows from the parking, driveway, and roadway areas will be collected in deep sump catch basins routed to Stormceptor (or similar) water quality units to address stormwater quality. The catch basins and water quality structures are part of a new closed-drainage system that also consists of new drain manholes and stormwater detention or infiltration systems. Collected stormwater runoff from throughout the site will be directed to sub-surface systems located under a proposed parking lot, driveway, the proposed fields and the existing baseball field.

The stormwater management system located under the parking lot on the south side of the proposed school building, will consist of 265 SC-310 chambers in a bed of crushed stone. Additional storage is achieved in that system by installing a 138'x 27' bed of double washed stone next to the chambers, this combined system will be an infiltration system. The second system in the parking lot south of the building consists of 162 SC-310 chambers and is a detention system. Two systems located under the driveway in the vicinity of Farm Road will consist of 89 (total) SC-740 chambers with overflows directed to the wetlands to the north of the drive, one of these systems is an infiltration system. The detention system installed underneath the existing baseball field will include 210 MC-3500 chambers in a bed of crushed stone. A detention system, located under the proposed soccer field, will consist of 198 MC-3500 chambers in a bed of crushed stone with an overflow connecting to the existing outfall to the east. The last system will be located under the parking lot to the south of the football field. That system will be 189 MC-3500 chambers. The adjacent parking area will be porous pavement.

All the systems create subsurface storage volumes so that flows from the developed site can be detained and decreased to meet the pre-development conditions.

All stormwater pipes will be a minimum of 12" in diameter to meet the town guidelines for design.

Water

Water mains will need to be extended to the new school building. The extended water mains will be 8-inch ductile iron pipe and be connected to the existing system below the driveway entrance to the project site. Site fire hydrants will be connected to the extended main with 6-inch services and are scattered throughout

the site to provide access to all corners of the building and parking lots. The new building will be served via a 6-inch domestic and an 8-inch fire services. The new water main will continue down the new school drive to Farm Road where it will continue down Farm Road and connect into the town system at the Farm Road/Old Nahant Road. The second connection to the town system will provide improved flow characteristics and redundancy to the school.

Sanitary Sewer

A new sanitary sewer system consisting of PVC pipe will be constructed to collect sanitary flows from the new building. Two new exterior precast concrete grease traps will be required for flows from the cafeteria and the culinary arts area. Sewer service from the new maintenance building will be directed to the new sewer system via a pump station. The locker room building and concession building will both have gravity sewer services. The new sanitary sewer system will be connected to the town system through an existing manhole northeast of the existing school building. Existing portions of the sewer system that are to be reused will be video inspected and, if needed, spot repaired or slip-lined.

Permitting

Utilities - Permitting for the required utility improvements consists of review and approval for the utility improvements with the Town of Wakefield Department of Public Works. As part of the Conservation and Zoning Board of Appeals permitting, the project and its proposed utility connections have been reviewed by the Town of Wakefield Department of Public Works, Engineering Division. Comments received as part of the Engineering Department reviews have been addressed and incorporated into the plans.

Wetlands -The Massachusetts Wetlands Protection Act grants local Conservation Commission jurisdiction over work within 100' of most wetland resources (within 200' of a river or a perennial stream). The work in any jurisdictional areas require the filing of a Notice of Intent (NOI) with the Wakefield Conservation Commission.

An Abbreviated Notice of Resource Area Delineation (ANRAD) was filed with and approved by the Town of Wakefield Conservation Commission in July of 2021. The ANRAD sets the wetland resource area lines for three years.

The Notice of Intent for the proposed work was submitted to the Town of Wakefield Conservation Commission in September of 2022. Public hearings for the project began in October of 2022 and closed on May 16, 2023. A decision will be voted on within 21 days of the close of the public hearing. Peer reviews for the project have been completed by Town of Wakefield consultants and the Town of Wakefield Engineering Department, with the comment responses having been incorporated into revised plans.

6C.3.1 – 02b

SITE

BASIS OF DESIGN



WARNER LARSON
LANDSCAPE ARCHITECTS

Northeast Metro Technical High School
Wakefield, MA

MSBA 90% CD Construction Document Submittal

SITE NARRATIVE – May 12, 2023

The Northeast Metro Technical High School (NEMT) site is located between Farm Street and Water Street, off of Hemlock Road in the Town of Wakefield MA. The Site is behind, to the east of the Wakefield Memorial High School. South of the existing school building lies a forested area. To the east of the site, abutting the property is the Breakheart Reservation. Access to the Breakheart Reservation is provided through the school property.

The proposed site design and landscape character is inspired by the natural beauty found throughout the surrounding area and takes inspiration from the Breakheart Reservation Park aesthetics. The proposed site topography is influenced by the existing granite bedrock formation. Minimal disturbance to the surrounding areas is a focus of the overall site design. The new school and surrounding site improvements are designed to maximize the existing forest and topography of the site. This will anchor the school into the landscape and keep the character of the area.

The new high school building is positioned on the high point of the property to the south of the existing school location. A new, secondary, site access point will be created off Farm Street to the west, and the current site access drive off Hemlock Road will be maintained. The new access driveway weaves its way through the site and follows the existing topography. The school building was positioned to minimize the amount of rock cut required for construction. The elevation of the building will provide commanding views of the surrounding area. A student parking lot will be constructed to the south of the new school building with separate bus loops for student drop-off and pickup. A larger parking lot will be located north of the new school building on the existing school site. A series of low-impact elevated boardwalk ramps will provide an accessible path to the lower parking lot, along with a series of stairs interwoven in the boardwalk ramp system. The area where the current school building is located will become the athletic fields for the school. This new building location allows the existing school facility and athletic fields to remain in operation while the new high school building is being constructed and minimizes the need for temporary facilities and services in the process.

A 24-foot-wide service/emergency driveway loops around the new building, providing access to the culinary program, high-bay shops, and service area. Supporting facilities such as auto repair

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and body shop repair storage are located along the north side of the building. The lower parking lot is for students and will be controlled by electronic access gates. On weekends and after school hours, this parking lot will be open to the general community. A separate parking lot dedicated for school vehicle use only will be located on the existing basketball courts, south of the existing running track/football field. A 12-stall parking lot is dedicated for users of the Breakheart Reservation and will be open to the community at all times.

All driveways and parking areas will be constructed of vehicular rate bituminous asphalt and be curbed. Radii on turns are designed to allow cars, buses, emergency, and service vehicles to navigate the site. Parking stall dimensions and access drive lanes are designed to conform to the Town of Wakefield's by-laws. Parking stalls are 9' wide and 18' deep, drive lanes are 24' wide for 2-way traffic.

The athletic fields are located on the existing school building area. A new running track with a synthetic turf football field will be installed. A 500-person grandstand structure will be installed on the west side of the track. A concession/restroom building will be located to the south of the bleacher structure. The concession building will have a gathering plaza associated with the refreshment window and to provide the entry sequence to the bleacher structure. To the west of the track, an irrigated natural grass turf field will be installed. This field will host softball and soccer fields. Athletic sports lights will be installed for the track and football fields. The existing irrigated natural grass baseball field will be renovated and upgraded. The lower natural grass practice fields will be renovated, and a new JV softball field installed. Asphalt access drives will provide maintenance and emergency access to the sport fields. New maintenance/storage buildings will be located to the north of the softball/soccer field. A satellite athletic support building is located at the base of the main access drive and will house changing rooms, offices, and additional support for the athletic complex. This support building will also provide an elevator for ADA access to the boardwalk system, which connects the new school building with the lower student parking lot.

The building configuration creates a main entrance plaza on the southern side of the school building. This courtyard provides comfortable microclimates in the spring and fall. This area can be used for gathering spaces that maximize the days per year students can utilize the outdoors for their studies and lunch period. There is also a separate outdoor dining space for staff that is buffered by planting. Another outdoor plaza area will be provided on the eastern side of the

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building and will support the culinary program. This culinary program provides food service open to the public and the outdoor dining terrace is prominently visible at the approach to the main entrance to the school. Green roofs are proposed on various portions of the school building for sustainability and climate resiliency. There are 2 large roof decks that will provide students the ability to utilize the outdoor environment and learn about green roof technology. . There is a single non-accessible green roof that will be installed over the cafeteria area. The planting medium is an extensive green roof designed to support various sedum mixes. An outdoor playground to support the Early Childhood Education program will be located on a roof with complete safety and compliance. The need for locating this on the roof was to provide the Pre-K students a safe access away from the vehicular traffic and vocational shops.

Pedestrian movement through the site has been carefully designed to minimize driveway crossings while connecting to parking areas and athletic fields. Vertical granite curbs line all building adjacent sidewalks. Driveway approach angles are engineered to eliminate straight lines heading directly toward entry doors. There will be vertical obstructions at the main entry doors providing another level of security. These vertical obstructions will be bollards, stone block seat walls or changes in the topography. Accessible parking stalls have been distributed into all the parking areas and all are located within 200' of a building entry or to the facility they are intended to support. These accessible parking stalls have the associated curb ramps where necessary along with striped crosswalks. Each of the main entries of the school building have extended canopies to protect the entrances and adjacent walkways. Students arriving to the school by bus are dropped off along the sidewalks on the eastern and southern driveways. They will enter the school at the main south entrance (adjacent to the High School Office) or the eastern entrance (next to the Superintendent's Office). Parent drop-off will be in the southern parking lot where the students will walk to the main entry along a paved sidewalk. This walkway in the southern parking lot has raised crosswalks to help slow vehicles and increase pedestrian safety. Students that arrive by their own vehicles will park in the southern parking lot and walk to the main entry along the main access path. Students will also be able to park in the lower parking lot at the athletic fields. These students will then walk up the hill along the pathway consisting of stairs and landings, or along an accessible route of elevated ramping boardwalks. During dismissal, buses will queue along the eastern and southern driveways and along the back of the building. Students will be dismissed from their last period class/shop and leave via the most convenient exit to the front of the building. Parents in cars who arrive early will wait to pick up students in the south parking lot. Students will exit the building via the south entrance

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to meet them. Students leaving in their own vehicles will leave via the main entrance or lower-level entrance and walk back down the hill to the student parking lot. Accessible routes are provided to all site program areas. There is an accessible route from the lower parking lot to the main school building that utilizes an elevator within the athletic support building and a series of elevated boardwalk ramps. All the athletic fields, including the bleacher structure, will be fully accessible.

The planting scheme on the site intends to compliment the surrounding forested area. Native species are proposed and laid out in an organic pattern to mimic the forest. Low points are strategically located to help direct stormwater into bioretention basins. Buffer plantings consisting of native species will be planted along the entry drive where the driveway is adjacent to wetlands. Irrigation of the site's planting areas are limited to high impact areas at the school building and to the natural grass baseball field. The lower athletic practice fields will remain non-irrigated. Irrigation source is from the town water supply.

Site Lighting will be set on pole mounted fixtures. Roadway and drive lanes will be illuminated with 25' tall fixtures. Pedestrian light fixtures will be installed at a height of 14' to provide a more people-friendly lighting level. These site lighting fixtures will have LED lamps and are intended to meet the dark sky or similar guidelines. There will be lighting at the athletic fields for after-hour use. Illumination levels will conform to IES guidelines for site lighting levels. Security cameras will use light poles as needed to ensure site coverage as designed.

6C.3.1 – 02c

ARCHITECTURAL
BASIS OF DESIGN

Northeast Metropolitan Regional Vocational High School Project**– 90% Construction Document Architectural Narrative**

The purpose of the narrative is to establish the anticipated quality level of construction.

General Notes:**Building Code:**

Occupancy Classification – Non-Separated Uses

Use Group E (Classrooms, Lab Areas, Band and Chorus Spaces)

Use Group B (Administration and Guidance)

Use Group A-1 (Auditorium)

Use Group A-3 (Gymnasium) – for “non-school events”

Assume – Type IB Construction (non-combustible, 2hr rating)

Roofing:

Assume TPO membrane roof with combination of the tapered insulation and sloped steel with tapered insulation crickets as required achieving proper drainage. Roofing system rigid insulation shall be mechanically fastened and the membrane fully adhered. The minimum depth of the rigid insulation shall be 5-1/2”. Minimum slope for the roofing surface is 1/4" in 12". Minimum slope for the insulation crickets shall be 1/2" in 12". Roofing system shall meet the manufacturers' requirements for the 20-year warranty, cover board to remain as part of the roofing system.

Assume aluminum roof edge (8" tall minimum) perimeter of the roof at storefronts, curtain walls and metal panels.

Provide walkway pads as necessary for rooftop equipment maintenance.

Provide roof expansion joints.

Provide hatches at roof access interior ladders with safety railing.

Elevator vents (if required), see Mechanical.

Vegetated roofs for the portions of the lower roofs as indicated on the drawings. See Landscape Drawings and specifications for information.

Roof patio pavers are required at courtyard.

Assume that PV panels shall be installed after completion of construction by a third party.

Provide roofing slip sheet at the PV panels – to be provided by the PV panel system installer (NIC)

Exterior Wall Construction Types Fenestration:

Refer to Exterior Elevations and Building Sections, for additional information.

Exterior wall construction (shall be in compliance with NFPA 285) –

- LGMF back-up, 3" insulated metal panels. Paint GWB at the interior face of the exterior wall.
- Aluminum Composite Metal Panels (ACM) over LGMF framing with exterior sheathing, Air Vapor Barrier (AVB) and mineral wool insulation at exterior overhangs and other locations where insulated metal panels would not be an appropriate choice of material.
- Zink tile rain screen system over continuous insulation (mineral wool 3"), air water barrier, exterior sheathing or corrugated metal desk at the LGMF back-up walls.
- Large format exterior CMU veneer over mineral wool 3" continuous insulation, air and vapor barrier over CMU back-up walls.
- Split face exterior CMU veneer over mineral wool 3" continuous insulation, air and vapor barrier over LMF framing with exterior sheathing
- Brick (4" x 12" face dimension) veneer over mineral wool 3" continuous insulation, air and vapor barrier over LMF framing with exterior sheathing
- Stone (Granite) veneer over mineral wool 3" continuous insulation, air and vapor Barrier over exterior sheathing at the LGMF back-up walls.
- Cast Stone/Full Bed Stone (Arriscraft – Shadow Stone) veneer over mineral wool 3" continuous insulation, air and vapor Barrier over exterior sheathing at the LGMF back-up walls.
- Waterproofing is required at the exterior surface and/or "blind" side of all cast-in-place retaining walls at below grade occupied spaces.
- Waterproofing is required at the elevator pits

Fenestration:

- Thermally broken aluminum frames with insulated glazing panels shall be assumed for the exterior Curtain Walls, Storefront and Windows. U-Value to meet or exceed 0.25 (Winter) / 0.21 (Summer). Note that integrated aluminum projected sunshade is required at the locations as indicated on the exterior elevations.
- High Security glazing required at the main entrance, curtain wall and storefronts
- Insulated Translucent Wall Panels with operable insulated glass vision panels is planned for the openings located at the Vocational Shops as indicated on the Exterior Elevations. Exterior Louvers to be integrated into insulated translucent wall panel system.
- Exterior motorized overhead panel doors at the Vocational Shop exterior walls shall have insulated glass to match the rest of the exterior glass on the project. Provide telescoping security gates at interior side of all overhead doors.

Interior partitions:

Refer to the floor plans and partition types.

- Corridor walls – assume metal stud 6” (unless indicated as CMU on the drawings) with total of 3 layers of 5/8” GWB (to comply with acoustical performance requirements).
- Classroom demising walls - assume metal stud 6” (unless indicated as CMU on the drawings) with total of 3 layers of 5/8” GWB (to comply with acoustical performance requirements).
Administration Areas - assume GWB
- Toilet cores - assume metal studs with concrete backer board and ceramic tile. Toilets in the high bay shops assume CMU, painted (epoxy paint)
- Gymnasium – assume CMU, painted
- Locker Rooms - assume CMU walls, painted (epoxy paint)
- Auditorium / Multipurpose Space - assume GWB and CMU walls as indicated. Metal stud furring, millwork wall paneling and acoustical wall panels as indicated on Interior Elevations.
- Cafeteria - assume metal studs and CMU walls with backer board, acoustical wall panels and Large Format Porcelain Tile in high visibility areas. Also, glazed aluminum storefront with safety glazing.
- Kitchen Areas – assume CMU and 10’- FRP. Painted CMU walls, (epoxy paint)
- Library (Media Center) - assume GWB over metal studs and Paneling as indicated, see interior elevations. Also, glazed aluminum curtain wall and interior storefront with safety glazing.
- High Bay Shop Areas – assume painted CMU (epoxy paint 8’ AFF)
- Shop Areas – assume 6” metal studs with GWB, painted. Similar to classroom spaces, see above.

Ceilings:

Refer to RCP’s

- Corridors - assume ACT 2x2 with GWB soffits at classroom entrances and key intersections.
- Classrooms, Science Labs - assume ACT 2x2 High NRC in order to comply with acoustical performance requirements.
- Administration areas - assume ACT 2x2 High NRC.
- Toilet cores - assume Moisture resistant GWB
- Mechanical Areas - assume exposed structure painted;
- Gymnasium - assume painted exposed structure with structural metal cellular acoustical deck.
- Locker Rooms - assume exposed structure painted and limited moisture resistant GWB, painted
- Auditorium Multipurpose Space - assume combination of exposed structure painted and limited suspended acoustical specialty ceiling “cloud” to achieve acoustical performance goals. Also technical pipe grid as indicated on the drawings.

- Cafeteria - assume specialty metal ceiling system to achieve acoustical performance as well as be visually appropriate for this highly visibility space.
- Kitchen - assume ACT 2x2 washable as appropriate for the Foodservice Areas
- Library/Media Center – large format ACT with high NRC and GWB soffits, and specialty fiberglass “clouds”, Acoustical Preformed Ceiling Panels (ACPCP) at the rotunda space.
- Common Spaces – Lobby’s etc. – assume specialty ceilings as appropriate for high profile spaces
- Vocational Shops (High Bay) – Special acoustical separation ceiling shall be required to acoustically separate the Shop areas from the learning spaces above – assume system consisting of two layers of GWB on hat channels, on metal stud suspended from the floor structure above on the Spring Isolation hangers, Acoustical insulation (6”) above GWB. The MEP and FP systems shall not be supported or penetrate this system. All MEP and FP systems in the areas of the acoustical separation ceilings shall be supported by the supplemental steel, Unistrut etc., attached to the steel beams not deck. All exposed to view ceiling areas shall be painted.
- Vocational Shops – assume ACT 2x2 high NRC
- Vocational Shops spaces located below the mezzanines – assume ACT 2x2 high NRC
- Culinary Arts Restaurant – assume specialty ceiling as appropriate for the high profile spaces
- Cosmetology – assume specialty ceilings as appropriate for the high profile spaces

Floors:

Refer to the Finish Floor Diagram drawings

- Corridors - linoleum with resilient base. (unless noted otherwise)
- Lobby at Main, and Lobby at the Events entrance - assume porcelain tile pavers
- Classrooms - assume linoleum sheet flooring with resilient base.
- Science Labs - assume sheet vinyl with integral base
- Administration Areas - assume carpet with resilient base
- Toilet cores - assume Ceramic Mosaic Tile (CMT) and Ceramic Tile (CT) base
- Gymnasium - assume Athletic Performance Wood Floor and vented rubber base
- Locker Rooms - assume combination of poured epoxy floor and base and Ceramic Mosaic Tile (CMT)
- Auditorium - assume sealed concrete.
- Kitchen - assume poured epoxy floor and base
- Library/Media Center - assume carpet and resilient base
- Stairs - assume Rubber Treads and Risers
- Lockers and Toilet Areas located within the Shops – assume poured epoxy floor and base
- Shops High Bay – Assume sealed concrete
- Shops – assume linoleum tile and resilient base

- Culinary Arts Kitchen Space – assume poured epoxy floor and base
- Culinary Arts restaurant – assume sheet vinyl
- Cosmetology – assume sheet vinyl with integral base

Special treatment for high visibility spaces:

- Lobby / Cafeteria - assume phenolic paneling/large format porcelain tile at lower portion of walls. The Guardrail system at the second-floor openings as indicated on the drawings
- Gymnasium - assume 6' tall gym pads at the exposed wall areas and 4' tall acoustical fiber panels full perimeter of the gym space. Stainless steel netting system at the glass areas.
- Library/Media Center – Wood trim and paneling.
- Auditorium – fabric wrapped acoustical panels.

Specialty Wall Treatment:

- Kitchens - assume FRP (height as noted)
- Custodial Closets - assume FRP
- Toilets in Admin Areas - assume Ceramic Tile (4' high)

Lockers:

- Corridor lockers - assume two tier 15 x 15 (on wood base). Assume 200 units (to accommodate 400 freshmen students)
- Athletic Locker Room lockers - assume combination of multi-tier and single tier lockers on concrete base for PE; welded locker construction with antimicrobial treatment – see plans
- Team lockers - assume single tier appropriate size; welded locker construction with antimicrobial treatment (on concrete base) - see plans
- Shop lockers – assume 15" x 15" two tier locker on concrete base at the High Bay shops and on wood base elsewhere.

Doors and frames:

- Exterior doors – assume thermally broken aluminum glazed storefront in aluminum frame at highly visible entrances and hollow metal insulated doors and frames elsewhere. Note that all exterior hollow metal frames shall be galvanized.
- Athletic areas and Mechanical (back of the house areas) - assume hollow metal doors and frames
- High Bay Shops – assume hollow metal doors and frames
- Shops – assume wood doors in hollow metal frames

- Kitchen Areas – assume hollow metal doors and frames; doors between the kitchen and the server assume stainless steel doors in S.S. frames. Same for Culinary Arts Kitchen and Restaurant areas.
- Everywhere else - assume wood veneer doors (5 ply) s in hollow metal frames
- There also are several spaces that require borrowed lights with safety glass.
- Overhead exterior insulated door at the High Bay Vocational Shops shall be fully glazed with insulated safety glass
- Assume rolling grills at the foodservice server area
- Assume Stainless Steel rolling door at the dish returns

Manufactured Casework:

Refer to the Equipment Drawings and Outline Specifications:

- High Quality plastic laminate casework shall be assumed for the project.
- All Science Labs and Prep Rooms shall have standardized approach to the design, to make these spaces interchangeable. Assume chemical resistance countertops for the science spaces.
- The General Classroom spaces shall have a teacher's wardrobe and storage casework.
- Office Work Rooms and conference rooms shall have storage casework with base and wall cabinets and plastic laminate countertop assemblies

Gymnasium Equipment:

Refer to Equipment Drawings and Outline Specification

- Provide foldable basketball backstops for the main court and the practice courts.
- Provide motorized ceiling mounted Gymnasium Divider curtain
- Provide two scoreboards and shot clocks for the main court
- Provide volleyball standards inserts
- Provide ceiling mounted motorized batting cage
- Provide ceiling mounted matt lifter
- Provide electrically operated Gym Bleachers on both sides of the Gym.

Auditorium / Multipurpose Space:

- Provide Retractable Theatrical Seating as indicated on the drawings.

Window Treatments:

- Classrooms, Science Labs, Art rooms - assume manual operated roller shades
- Administration Areas - assume manual operated vertical blinds
- Library / Media Center – assume electrically operated roller shades (exterior). Manual operated vertical blinds at interior storefronts.
- Provide manual roller shades at all classroom sidelights for security

Displays:

- Each educational space shall contain at least 20' of Tack Board surface (4' tall) and 8' of Marker Board surface. (Refer to drawings)
- Each Educational space shall contain an Interactive wall mounted Display wall mounted
- Auditorium - assume 20' x 14' motorized Projection Screen
- Gymnasium - motorized Projection Screen
- Cafeteria Commons - assume large format digital information displays

Elevators:

- Elevator - assume traction elevator (two required for the main school building). One shall be oversized (not freight elevator) for large equipment delivery to the upper shops. Athletic Locker Room Building assume two stop elevator.

Fireproofing:

- All structural steel columns receive spray fireproofing 2 hour rated.
- At highly visible locations where structural steel components are exposed to view (i.e. in front of exterior or interior glass etc.) assume intumescent paint. Visual quality of the steel surface preparation shall be increased for all areas to receive intumescent paint.
- Beams and kickers supporting elevated/structured floor to receive spray fireproofing 2 hour rated
- Beams, kickers and metal deck supporting roof to receive spray fireproofing 1 hour rated
- Spray fireproofing is not required at the structural members located more than 25' above the floor surface below, measured to the bottom of the structural component

Food Service Equipment:

Refer to the Equipment Drawings and Outline Specifications:

- New Equipment for Kitchen and Culinary Arts Program
- Cooking equipment with convections ovens, combi ovens, 6 burner ranges.
- Storage will include dry storage for food and paper goods and cooler and freezers.
- Two dish rooms, one for the main kitchen and another one for the Culinary arts kitchen.
- Reuse existing dishwasher at the Main Cafeteria Kitchen
- The main kitchen will include a food court style server.
- Prep stations and tray slides shall conform to the ADA code.

Furniture and Equipment:

Refer to the Equipment Drawings and Outline Specifications:

- Movable Furniture shall include student desks, chairs, teacher desks, media center furniture, cafeteria furniture, café tables, stack seating, lounge seating. These items shall be procured by the District and are not part of the Construction CM-R's scope of work.

- Furniture shall conform to the ADA code.
- Specific Vocational Equipment for the shop spaces to be part of the FF&E scope of work (potentially may be included in the CM-R's scope to simplify coordination and construction logistics – Refer to Equipment Drawings, Schedules and Outline Specifications.
- Plumbing and HVAC training equipment specified as part of the MEP scope.
- CM-R shall coordinate ALL equipment (provided by the Owner and the CM-R) and provide all MEP & FP services and connections as part of the Construction scope of work.
- The school (students under instructors' supervision) is responsible for the installation and final connections for all services (MEP) to the training equipment in the HVAC and Plumbing shops.

6C.3.1 – 02d

STRUCTURAL
BASIS OF DESIGN



Project	Northeast Metropolitan Regional Vocational High School		Job Ref.	2019-091
Section	MSBA 90% Construction Document Submission		Sheet no./rev.	1
Date	01/09/2023		App'd by	MD
			Date	12/19/2022

Project Name:

Northeast Metropolitan Regional Vocational High School

MSBA Module 6 Requirements:

MSBA 90% Construction Document – Structural Basis of Design Narrative

Prepared For:

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Prepared By:

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Mehul Dhruv, P.E. – Engineers Design Group, Inc.



Project	Northeast Metropolitan Regional Vocational High School		Job Ref.	2019-091	
Section	MSBA 90% Construction Document Submission		Sheet no./rev.	2	
Date	01/09/2023		App'd by	MD	Date 12/19/2022

1. STRUCTURE

NEW CONSTRUCTION

Structural: Designed in accordance with the 9th Edition of The Massachusetts State Building Code and incorporating IBC 2015 with Massachusetts amendments.

The proposed scheme will consist of construction of the new school that would include a new, 4-story academic wing, auditorium, gymnasium, etc. located north of the existing high school; a standalone two story locker building, a single story concessions building, and a single story pre-engineered steel framed maintenance garage building.

SUBSTRUCTURE

Foundations

Based on the foundations of the existing school structure and preliminary recommendations from the Geotechnical Engineer of the soil conditions on the proposed site, the columns of the proposed structure would bear on reinforced concrete spread footings and the perimeter foundation walls would bear on continuous reinforced concrete strip footings extending at least 4 ft. – 0 in. below grade. The walls around the spaces below grade will be cantilevered retaining buttressed walls supported on reinforced concrete footings. Interior isolated column footings and continuous exterior strip footings shown on the Structural Contract Drawings are designed based on the recommended bearing capacity of the soil of 5 tons/sq.-ft. and 2 tons/sq.-ft. in different areas of the site. The retaining walls that separate Areas A and B from Areas C and D, shall be 20 to 25 feet below the first floor level, and shall be 2 ft. – 0 in. thick reinforced concrete walls supported on 16 ft. – 0 in. wide x 3 ft.-0 in. thick continuous reinforced concrete footings with 12 in. thick reinforced concrete full height buttress walls. The heel of the footing would be 10 ft. – 0 in. wide and located towards the existing buildings. The buttress walls will be a minimum 10 ft. – 0 in. long and spaced approximately 20 ft. – 0 in. on center, in coordination with the architectural layout of devising walls at the lower ground level. Foundation drains will be installed around foundations of all structures below grade. Foundations will be founded on 12 in. of compacted sand gravel fill or 6 in. of crushed stone placed above compacted structural granular fill in wet conditions. Reinforced masonry shear walls will be supported by 8 in. or 12 in. reinforced concrete foundation walls and 2 ft. – 6 in. wide by 12 in. thick continuous reinforced concrete footings.

Slabs-on-Grade

Based on the existing school construction and recommendations from the Geotechnical Engineer, the typical lowest level of the proposed structure would be a 4 in. thick concrete slab-on-grade, reinforced with welded wire reinforcing over a vapor barrier on 2 in. thick rigid insulation on 12 in. of compacted sand gravel structural fill. The slab on grade will be 6 in. thick, reinforced with welded wire reinforcing, in all the shop areas. Interior non-structural masonry walls will bear on continuous 14 in. thickened slabs.

SUPERSTRUCTURE

Floor Construction

Typical Floor Construction

Typical floor construction shall be 5 1/4 in. light-weight concrete composite metal deck slab, reinforced with welded wire reinforcing on wide-flange steel beams spanning between steel girders and columns, as shown on the Structural Contract Drawings. The weight of the structural steel is estimated to be 15 psf for the typical framing. The weight of structural steel at the second floor above the automotive and other shops is estimated to be 20 psf, (maximum span above this space is 45 feet). The weight of the



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steel for auditorium balcony framing is estimated to be 20 psf. The weight of structural steel is estimated to be 18 psf for framing supporting elevated courtyards or play areas. Note the floor above the second floor would be the typical floor construction.

Roof Construction

Typical Roof Construction

The roof construction shall be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck on wide-flange steel beams spanning between steel girders and columns, as shown on the Structural Contract Drawings. The weight of the structural steel is estimated to be 14 psf. At locations of roof-supported mechanical equipment, a concrete slab will be provided similar to that of the typical floor construction.

Low Roof Construction

The portion of the low roof around the media center that serves as a patio and the main interior courtyard shall be a continuation of the adjacent floor, and shall be similar to the typical floor construction of 5 1/4 in. light-weight concrete composite metal deck slab, reinforced with welded wire reinforcing on wide-flange steel beams spanning between steel girders and columns. The remainder of the low roof in front of the classrooms would be typical roof construction. The mechanical units located on this roof would be protected by a screen comprised of structural steel posts and beams. The weight of the structural steel for the patio, the vegetated green roof, and portions of roof supporting mechanical equipment is estimated to be 18 psf. The weight of the structural steel of the portion of the roof that is typical roof construction is estimated to be 14 psf.

Auditorium Roof Construction

The roof construction shall be galvanized, corrugated 3 in. deep, Type 'NA' acoustic metal roof deck, spanning between long-span steel joists. The weight of the steel joists and structural steel framing is estimated to be 13 psf.

Gymnasium Roof Construction

The roof construction shall be acoustic, galvanized, corrugated 3 in. deep, Type 'NA' acoustic metal roof deck, spanning between long-span steel joists. The weight of the steel joists and structural steel framing is estimated to be 13 psf.

Vertical Framing Elements

Columns

Structural columns shall be hollow structural sections, (HSS). Typical columns shall be square HSS12x12 and round HSS12 in the majority of the four-story spaces.

Lateral Load-Resisting System

The structure's lateral force resisting system shall mainly consist of ordinary concentric steel braced-frames, comprised of hollow-structural sections, (HSS). Reinforced concrete-masonry shear walls will be used throughout the building as well, mainly within the lower levels. The combined lateral force resisting system will be designed to resist the loads imparted on the structure from local wind and seismic forces, based on the applicable design codes noted on the Structural Contract Drawings.

Expansion Joints

The structure will have one expansion joint, between Area B and Areas C and D – separating the structure.



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Maintenance Garage

The pre-engineered superstructure shall be a steel-framed structure supported on reinforced concrete spread footings, and the perimeter foundation walls will bear on continuous reinforced concrete strip footings, extending at least 4 ft. – 0 in. below grade. The interior and exterior foundations supporting the columns of the single story, pre-engineered steel structure shall be 5 ft. – 0 in. x 5 ft. – 0 in. x 2 ft. – 0 in. deep. The structure would be comprised of steel bents with tapered columns and beams. The roof deck shall be a composite deck spanning between steel 'Z'-shaped purlins. The lateral loads shall be resisted by ordinary steel moment frames and ordinary concentric steel braced frames. The slab shall be the constructed as a 6 in. thick concrete slab-on-grade, reinforced with welded wire reinforcing over a vapor barrier on 2 in. thick rigid insulation on 12 in. of compacted sand gravel structural fill.

Locker Room Building

The building construction shall consist of steel beams bearing on reinforced masonry walls. Typical interior and exterior footings shall be 6 ft. – 0 in. x 6 ft. – 0 in. x 24 in. deep. Exterior masonry bearing walls shall be supported on continuous reinforced concrete foundation walls and 2 ft. wide strip footings, extending at least 4 ft. – 0 in. below grade. The retaining wall at the back-side of the building will retain soil up to the second floor, and would be a 2 ft.-0 in. thick reinforced concrete wall supported on a 9 ft. – 0 in. wide x 2 ft. – 0 in. thick continuous reinforced concrete footing. The first floor slab shall be constructed as a 6 in. thick concrete slab-on-grade reinforced with welded wire reinforcing over a vapor barrier on 2 in. thick rigid insulation on 12 in. of compacted sand gravel structural fill. The second floor shall be constructed as a 5 1/4 in. light-weight concrete composite metal deck slab, reinforced with welded wire reinforcing on wide flange steel beams spanning between reinforced load-bearing masonry walls. The roof construction would be galvanized, corrugated 3 in. deep, Type 'N' metal roof deck spanning between wide flange steel beams and girders. The weight of the structural steel is estimated to be 15 psf for the typical framing at the second floor and roof levels. The elevator shaft shall be constructed with full-height reinforced masonry, bearing on reinforced concrete foundation walls and a 3 ft. – 0 in. deep mat footing.

Concession Building

The building construction would consist of pre-fabricated wood trusses, bearing on reinforced load-bearing masonry walls. Exterior masonry walls would be supported on continuous reinforced concrete foundation walls and 2 ft. – 0 in. wide strip footings, extending at least 4 ft. – 0 in. below grade. The first floor slab shall be constructed as a 6 in. thick concrete slab-on-grade reinforced with welded wire reinforcing over a vapor barrier on 2 in. thick rigid insulation on 12 in. of compacted sand gravel structural fill. The roof deck shall be 3/4 in. plywood sheathing, spanning between wood trusses. The weight of the wood structure is estimated to be 12 psf for the typical framing at the roof level.

6C.3.1 – 02e

MEP-FP

BASIS OF DESIGN

NORTHEAST METROPOLITAN REGIONAL VOCATIONAL SCHOOL

90% CONSTRUCTION DOCUMENTS DESIGN NARRATIVE

I. FIRE PROTECTION

A. General:

1. All occupiable and accessible areas of the building will be protected with a complete combination standpipe and wet suppression sprinkler system.
2. Work shall be performed using the "Method "B" Shared Design" process, from a "Fully Engineered" "design" set of documents which outlines the system and requires the Fire Protection Contractor to provide the "installation" set of documents, in conformance with the design criteria as set forth in the bid documents. Works shall be performed in accordance with the Building Code, NFPA, and the Local Authority.

B. System Requirements and Criteria are as follows:

1. Complete combination standpipe and hydraulically calculated, automatic overhead, wet suppression sprinkler systems, providing proper coverage to all areas of the new high school building. Dry pendants shall be provided for interior spaces that would be subject to an operating temperature less than 40 F such as the cooler, freezer, loading dock or for any similar areas.
2. Eight inch dedicated/primary sprinkler water service which shall be extended from the site water main to all devices, equipment, and heads. (Note: All dedicated site water piping, fire hydrants, etc., are required by law to be installed by a licensed Sprinkler Contractor.).
3. Double check type backflow preventor with supervised valves, repair kit, certified test, and DEP permit for each of the building service entries.
4. Building fire department connection. Each fire department connection shall be located as to ensure access by the fire department and a fire hydrant located within 100 feet of each connection.
5. Based on new water flow tests information obtained on 6/25/2021, preliminary hydraulic calculations have been completed to verify that a 1000 gpm fire pump system will be required to support the proposed fire suppression system.
6. Alarm check valves, valves and all piping, hangers, sprinkler heads and accessories. Four (4) alarm check valves required per sprinkler zone requirements for the main high school building.
7. Based on the overall building area, each major building segment with an area not to exceed 52,000 SF per floor will be fed via a separate alarm check valve/system riser. Each of these risers are to supply a combination fire standpipe and sprinkler system.

8. The fire standpipe system within a building segment consists of a standpipe riser to be located in each required exit stairway and where otherwise required by code such as at the stage and at remote area of building segments that can't be reached with a 200 foot hose from a required hose valve connection. Each standpipe riser is to supply a hose valve per floor.
 9. 2-1/2" fire department valves are provided on the main landing of each level within the interior stairways. Intermediate standpipes are provided with a fire hose valve cabinet with a 2-1/2" connection on each level within the corridor. The sprinkler system within each building segment start from one of the required fire standpipe risers with a control valve assembly for each floor.
 10. Fire standpipe and sprinkler system zoning is to be consistent with the project phasing.
- C. Specific Program requirements shall be provided in accordance with NFPA 13 as follows:
1. In general, the building is designed as a light hazard occupancy and therefore sprinkler spacing not exceed approximately 225 SF for all academic, administration and common area type spaces.
 2. Shop type areas as the following spaces: Automotive, Automotive/Body, Metal Fabrication, Plumbing, Electrical, Carpentry, Electrical, HVAC, Robotics and Automation are designed as ordinary hazard group 2 and therefore sprinkler spacing not to exceed 130 SF. The following building spaces: kitchen, mechanical and utility rooms, storage rooms and similar spaces are designed as ordinary hazard group 1 and therefore the sprinkler spacing shall not exceed 130 SF.
 3. The paint spray booths are designed as an extra hazard group 2 occupancy and therefore the sprinkler spacing shall not exceed approximately 100 SF. A separate zone control valve is provided for each paint spray booth to serve these sprinklers.
 4. The metal fabrication room is designed as an extra hazard group 1 occupancy due to the presence of flammable gases within the space. Sprinkler spacing shall not exceed approximately 100 SF with this space.
 5. Window sprinklers shall be installed in locations coordinated with the architect to provide passive fire protection for glass partitions. These sprinklers shall be installed within 2 in. of the glass partitions and shall be spaced not greater than 10 ft from each other. A separate zone control valve is provided for these sprinklers.
- D. Specific requirements for this option:
1. Since the building is to consist of entirely new construction, it is anticipated that the project phasing should not affect the fire protection system. However, it will be important to confirm that the existing fire protection water supply can be maintained for the existing high school building until the building structure can be demolished.

II. PLUMBING

A. General:

1. All work shall be performed in strict accordance with the State Building Code, the State Plumbing and Fuel Gas Codes, the plumbing inspector and all Local Codes and Ordinances.
2. Sustainable Design Intent: Compliance with project requirements intended to achieve a certification and rating, measured and documented according to the LEED for Schools Green Building Rating System, of the US Green Building Council.

B. System Requirements and Criteria are as Follows:

1. Six inch primary domestic water service to 10 feet-0 inch outside building wall for the new high school building. Three inch domestic water service for the Concessions Building. Four inch domestic water service for the Locker Room Building. Two inch domestic water service for the Maintenance Building. Based on new water flow test data (6/24/2021) and based on the proposed site configuration, a domestic booster pump system will be required for the main high school building.
2. A new natural gas service is being coordinated to be brought to the site. For the new high school, a new natural gas system is to be provided for the kitchen and culinary arts equipment, as well as equipment in the HVAC and Plumbing shops, with work beginning at the gas company meter. Each of the major gas system components shall be supplied with a dedicated gas system to be fed via a gas sub-meter that shall also be monitored via the building automation system. The intent of this measure is to help achieved a certain LEED rating.
3. Internal storm water roof drainage systems from all flat roof areas, consisting of roof drains and all rainwater piping and accessories to points 10 feet outside of the building walls. Secondary roof drainage system is required for all courtyard areas in the building, but is not required on the main roof.
4. Complete sanitary, waste and vent system connecting to all fixtures and inlet connections and running to points 10 feet outside of the building walls.
5. Dedicated tempered water system including master mixing valve and dedicated tempered water circulation system is to supply all emergency shower and eyewash units within the Science Classrooms in the A wing. All other eyewash units and emergency showers shall receive tempered water via a local thermostatic mixing valve.
6. Dedicated special waste piping system serving Science Rooms and related areas susceptible to receive non-conventional waste and this system consists of:
 - a. Central pH neutralizing and monitoring system for Science Classrooms in the A wing of the school.
7. Reduced pressure backflow preventers on cold water supply to the Science Classrooms. The Science Classrooms have a dedicated non potable water heater and non potable circulation system.
8. Dedicated "grease waste" piping system from the Kitchen area and from the Culinary area and the restaurant to 10 feet outside building wall, for continuation by Site/Civil from the site grease tank/interceptor. One central grease trap for the kitchen and a separate one for the Culinary area since these spaces are located apart. Refer to the Kitchen and Culinary areas for the extent of the plumbing work

required to support the intended equipment. Four interior grease interceptors are required to support kitchen and Culinary arts.

9. Domestic hot water shall be generated by electric fired hot water systems for the high school. Each set up shall have a mixing valve, all accessories and devices and a building pumped recirculation loop. Each Major building area will be supplied by a separate hot water system: At this time, (3) such systems are planned for the high school main building.
 - a. Plumbing fixtures that are located too far away from the hot water systems described above will need to be supplied by separate point-of-use water heaters wherever feasible.
 - b. Each satellite building is to also include their own system.
10. Compressed-Air Systems
 - a. Furnish and install an industrial grade compressed air system for each of the shop areas: Five systems are included to support the following shops: Auto shops, Carpentry shop, Biotech Lab, Robotics Lab, and Dental Suite.
 - b. Furnish and install a medical grade compressed air system to handle the dentistry area.
 - c. Each system shall consist of a separate receiver, air dryer, and all required pre and after filters.
11. Vacuum Systems
 - a. Furnish and install a medical grade system to handle the dentistry area.
 - b. Furnish and install an industrial grade system to handle the lab area.
12. Piping distribution to be used with portable argon gas cylinders at welding booths in Metal Fabrication and Auto Shops.
13. Complete interior sanitary, waste, vent, gas, cold water, 120°F hot water, 140°F hot water and recirculation piping systems.
14. Main water meter with monitoring via building automation system. A sub-meter for each major system including the following: Kitchen, domestic hot water system. This measure is to be implemented to help achieved a certain LEED rating.
15. Plumbing fixtures and trim, all new, commercial grade and high efficiency types for an anticipated approximately 40 percent water saving to help achieved a certain LEED rating: 1.28/1.1 GPF dual flush water closets, 1/8 GPF urinals, 0.35 GPM lavatories, 1.5 GPM showers, 1.5 GPM Kitchen faucets, etc.
16. Freezeproof wall hydrants around the perimeter of all construction.
17. Drains, hose bibbs, valves, fittings, hangers, and all miscellaneous pipeline accessories, including seismic support requirements.
18. Cleaning and testing of all fixtures, equipment, and piping systems.

19. Disinfection of all domestic water piping systems.
20. Waste outlets to accept HVAC condensate and sprinkler waste discharges.
21. Insulation of all domestic water piping, roof drain bodies, storm water piping, water cooler drain piping and all exposed piping at handicapped fixtures.
22. Floor drains shall be provided with automatic trap primers as required per the plumbing code.
23. Include allowance for floor drainage and hose bibbs in all mechanical type spaces and large toilet rooms (with two or more fixtures).
24. Elevator pits shall include a drainage system. The system is to consist of a pit floor drain to discharge via sump pump and is to be extended to the building sanitary system.
25. The Auto Body and the Automotive Shops are provided with a dedicated floor drainage system that is extended to a gas/oil separator system to be located outside the building. This requirement also applies to all other shop areas that are to allow entry of vehicles within the interior shop area, including the satellite Maintenance Building.

III. HEATING, VENTILATING, AND AIR CONDITIONING

A. General:

1. Systems are based on all electric heating and cooling air-cooled variable refrigerant flow (VRF) systems.
2. Electric unit heaters will be provided at entrance vestibules, stairways, exit doors, loading dock, and utility spaces unless noted otherwise on the plans.
3. Air conditioning systems are all air-cooled.

B. Air-Source VRF Heat Pump Systems:

1. Units shall be variable refrigerant flow (VRF) air-source DX heat pump units serving all rooftop air handling units.
2. Multiple system modules shall be provided to meet capacity.
3. Units shall be capable of providing continuous heating down to -4 deg. F.
4. Units shall be capable of providing a changeover between heating and cooling as needed.

C. Piping:

1. The following piping distributions shall be provided:

- a. Refrigerant piping between outdoor units and associated indoor unit or DX coil.
 - b. Condensate drain piping from indoor air handling units to nearest condensate receptor and condensate drain piping from rooftop air handling units to nearest roof drain.
 - c. Condensate drain piping from indoor units to nearest condensate receptor.
 2. All main distribution piping 2-1/2" and larger shall be Schedule 40 carbon steel with welded joints or mechanical couplings equal to Victaulic. Piping 2" and less shall be Type L copper with mechanical coupling joints equal to Pro-Press. Refrigerant piping shall be Type L ACR hard drawn piping with brazed joints.
 3. Provide fiberglass pipe insulation with all service jacket on all piping to meet the MA energy code. Generally, 1-1/2" thickness required.
- D. Classrooms, Vocational Classrooms, and Athletics:
1. Classrooms and support spaces shall be served by rooftop dedicated outside air ventilation supply air systems. Units shall be 100% outside air with total energy recovery wheels, MERV 8 and MERV 14 filters, and recirculation dampers. Cooling and primary heating shall be provided with a DX coil and remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions. Supply and exhaust fans shall be variable speed with variable frequency drives.
 2. Outside ventilation air shall be delivered to each classroom by connection to a VAV terminal unit. Ventilation air shall be ducted to ceiling diffusers or the inlet of each VRF fan coil unit.
 3. Exhaust air shall be from a ceiling exhaust grille controlled by a VAV exhaust terminal.
 4. Ventilation supply air to each classroom shall be controlled by a space carbon dioxide sensor.
- E. Administration Area and Media Center:
1. Provide a new variable refrigerant flow (VRF) heating and cooling system with ceiling cassette or ducted fan coil units serving each zone as indicated on the floor plans. Locate heat recovery condensing unit on the roof and provide refrigerant piping distribution including branch selector boxes to serve each fan coil unit.
 2. Provide a roof mounted energy recovery ventilator with electric pre-heat coil for ventilation air to all administration spaces. Provide variable volume supply ductwork distribution connected to the fan coil unit return air duct. Exhaust air shall be connected to ceiling diffusers in each space.
- F. Cafeteria /Culinary Classroom and Cafe:
1. Cafeteria and Culinary shall be provided with a variable air volume rooftop air handling unit with DX cooling coil, remote VRF condensing units, electric preheat

coil, economizer damper section, MERV 8 and MERV 14 filters and supply and return fans with variable frequency drives. Cooling and primary heating shall be provided with a DX coil and remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions

G. Kitchen/Culinary Kitchen:

1. Main kitchen and culinary kitchen air handling units shall be 100% makeup air units interlocked with kitchen hood exhaust operation. Cooling and primary heating shall be provided with a DX coil and remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions. Supply fans shall be variable speed with variable frequency drives. Provide MERV 8 and MERV 14 filters.
2. Provide kitchen hood exhaust fans for main kitchen and culinary kitchen. Fans shall be variable speed and interlocked with kitchen hood variable exhaust flow control system.

H. Auditorium, Stage, and Gymnasium:

1. Provide separate single-zone variable air volume rooftop air handling units with DX cooling coil, remote VRF condensing units, electric heating coil, economizer damper section, MERV 8 and MERV 14 filters, energy recovery wheel, and supply and return fans with variable frequency drives. Cooling and primary heating shall be provided with a DX coil and remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions.

I. Cosmetology and Auditorium/Gym Lobby (Events Entry):

1. Provide separate multi-zone variable air volume air handling units with DX cooling coil, remote VRF condensing units, electric heating coil, economizer damper section, MERV 8 and MERV 14 filters, energy recovery wheel, and supply and return fans with variable frequency drives. Cooling and primary heating shall be provided with a DX coil and remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions.
2. Supply air shall be delivered to each zone by a VAV terminal unit ducted from the main supply duct to diffusers in each space for Cosmetology. Supply air shall be delivered to each zone by VAV dampers at the air handling unit for the Events Entry.
3. Return air shall be duct from the return main to return grilles in each space.

J. Shops:

1. Trade shops shall be provided separate single-zone variable air volume rooftop air handling units located in mezzanines. Each unit shall be provided with DX cooling coil, remote VRF condensing units, electric heating coil, economizer damper section, MERV 8 and MERV 14 filters, and supply and return fans with variable frequency drives. Cooling and primary heating shall be provided with a DX coil and

remote VRF (variable refrigerant flow) heat pump condensing units. An electric preheat coil shall be provided for preheating of outside air under low ambient temperature conditions. Air handling unit outside air damper shall be interlocked with exhaust system operation wherever possible.

2. Systems shall serve the following trade shops:

- a. Electrical Technology
- b. HVAC Technology
- c. Metal Fabrication
- d. Plumbing & Pipefitting
- e. Carpentry
- f. Auto Collision
- g. Auto Technology

K. Satellite Concessions Building and Maintenance Building (Add-Alternate):

- 1. Provide energy recovery ventilator for Women's and Men's Rooms and concession space exhaust air and ventilation air. Unit shall be ducted for exhaust and outside air with connections to exterior louvers. Provide electric heating coil in the supply air for tempering.
- 2. Provide electric space heating units in each space: Women's, Men's, Concession, and Janitor's Closet.

L. Satellite Athletics Building (Add-Alternate):

- 1. Provide ducted energy recovery ventilator for Women's and Men's Team Rooms, toilet rooms and coach offices for exhaust air and ventilation air to each space. Unit shall be ducted for exhaust and outside air with connections to exterior louvers. Provide electric heating coil in the supply air duct for tempering.
- 2. Provide electric space heating units in each space: team rooms, toilet rooms, coach offices, garage space, maintenance office and elevator vestibules.
- 3. Provide ductless split heat pump system for elevator machine room
- 4. Provide VRF condensing unit with indoor ceiling cassette fan coils for offices and locker rooms.

M. Ductwork:

1. Ductwork systems serving spaces for ventilation, air conditioning, or heating shall be provided for the following:
 - a. Classroom dedicated outside air systems with central supply and exhaust distribution to each zone.
 - b. Rooftop air handling units serving dedicated areas with supply and return ductwork.
 - c. Supply and exhaust systems for energy recovery ventilators.
 - d. Local zone supply and return air ductwork for VRF fan coil units.
 - e. Local supply and return air ductwork distribution for trade shops.
 2. All concealed supply ductwork shall be insulated with 2-inch duct wrap, R-6 minimum.
- N. Specialty Exhaust Systems:
1. Provide separate dedicated exhaust systems including ductwork and exhaust fans to serve the following listed uses:
 - a. Laser cutter
 - b. CNC machines
 - c. Woodshop with outside dust collector. Dust collector from existing school shall be relocated and reused at new school.
 - d. Vehicle exhaust
 - e. Paint spray, powder coating, and mixing booths with dedicated makeup air system
 - f. Welding booths
 - g. Welding benches
 - h. Cosmetology stations
- O. Ductless Split heat pump Systems:
1. Provide separate dedicated ductless split cooling and heating systems including indoor fan coil unit and roof-mounted heat pump condensing unit to serve the following listed uses:
 - a. MDF room
 - b. IDF rooms
 - c. Elevator machine rooms

d. Electric rooms with transformers

P. Automatic Temperature Controls:

1. Automatic temperature controls for building shall be direct digital DDC control building automation system (BAS) with web access interface. System shall be open protocol BACnet.
2. Manufacturer's controls for air-source heat pumps shall be integrated with the BAS via BACnet interface.
3. All VRF and ductless split system manufacturer's controls shall be integrated with the BAS through a BACnet interface.
4. All air handling units shall be provided with a DDC controller by the automatic temperature controls (ATC) sub-contractor. All field devices for unit operation shall be provided by the ATC sub-contractor.
5. Unitary controllers shall be provided for all terminal cooling and heating equipment including fan coil units, unit heaters, fin-tube radiation, fans, etc.

Q. Sustainability:

1. The HVAC systems will be designed to support the following LEED v4 prerequisites and credits:
 - a. WE Credit Cooling Tower Water Use, EA Prerequisite Minimum Energy Performance, EA Prerequisite Building-Level Energy Metering, EA Prerequisite Fundamental Refrigerant Management, EA Credit Optimize Energy Performance, EA Credit Advanced Energy Metering, IEQ Prerequisite Minimum Indoor Air Quality Performance, IEQ Credit Enhanced Indoor Air Quality Strategies, and IEQ Credit Thermal Comfort
2. Refer to the LEED scorecard for quantity of points being pursued for each credit.

IV. ELECTRICAL

A. Utility Service:

1. Scope of work
 - a. New underground electric service from Wakefield Municipal Gas and Light Department (WMGLD) primary services.
 - b. Current existing utility primary service, transformation and secondary service to main switchboard including main switchboard will be maintained per phasing schedule.

- c. New and existing panelboards feeders, mechanical equipment feeds, and branch circuits as required to maintain existing equipment per phasing schedule.
- d. Primary service infrastructure from WMGLD will begin at the site's property line, in a new underground junction box. Primary service shall be extended from this junction box to the main electric utility pad-mounted transformers via (2) 4-inch concrete-encased PVC conduits with rigid steel conduit sweeps. Additional junction boxes will be provided approximately every 250ft on center.
- e. A second concrete-encased duct bank with (2) 4-inch PVC conduits shall be provided from the site's energy park to the emergency main electric utility pad-mounted transformer, for emergency and standby loads within the building.
- f. Three precast concrete electric utility pads shall be provided with 4-inch inch PVC conduits with rigid steel conduit sweeps for (2) 2,000 kVA pad mount transformers and one (1) 300kVA pad-mounted transformer provided by WMGLD at School Building.
- g. New Athletic Building primary service shall extend underground from a local junction box via (2) 4-inch inch PVC conduits with rigid steel conduit sweeps to main electric utility pad.
- h. A precast concrete electric utility pad shall be provided with (2) 4-inch PVC conduits with rigid steel conduit sweeps for a 300 kVA pad mount transformer provided by WMGLD at Athletic Building
- i. Provide pre-formed concrete duct banks using PVC conduits with rigid steel conduit sweeps from electric utility pad to Main Electric Room for normal power supply. Run rigid conduit sweeps from electric utility pad to Generator Panel Room for emergency power supply.
- j. Secondary services at School Building will be run underground from new pad mounted transformers via PVC conduits with rigid steel conduit sweeps to double-ended switchboard with Kirk Key interlock, sized at 4000A, 480/277V, 3 phase, 4 wire, 200 kAIC
- k. Secondary services at new Athletic Building will be run underground from new pad mounted transformer via PVC conduits to main switchboard at 1200A, 480/277V, 3 phase, 4 wire, 65 kAIC.
- l. Secondary cold sequence utility metering will be provided at all electric service locations per WMGLD standards. A dedicated telephone line shall be provided for WMGLD metering.
- n. Provisions for measurement and verification of power will be provided via CT's and electronic sub-meters equal to submeter all circuits in the building. Meters shall be connected via BACnet communication to the building's BAS system for future load analysis.

B. Normal Distribution System:

1. Main double-ended switchboard will be provided with surge protection (SPD) and ground fault protection on main and feeder devices. Energy reduction maintenance switching shall be provided for all main and feeder circuit breakers that are rated or can be adjusted to 1200A or higher, as per NEC 240.87.
2. Distribution system will consist of conduit and wire feeders run from switchboard to panelboards and larger mechanical equipment. Panelboards and dry type transformers will be located in electric closets throughout the building.
3. Surge protection will be provided in all 120/208-volt receptacle panelboards.
4. Provisions for a distribution system for future photovoltaic systems of 325kW capacity consisting of conduit and wire feeders will be provided. Space for inverters and conduits will be provided for PV systems.
5. Provisions for a distribution system for future electrical vehicle service equipment (EVSE) consisting of 3-inch conduit via handholes to exterior service locations with precast concrete pads for exterior 75kVA transformers and panelboards mounted in NEMA 3R enclosures at each location, 2 inch conduits to serve future dual-charger charging stations each in a total of 5 EVSE chargers as indicated on site plan.

C. Emergency Distribution System:

1. A pad-mounted exterior transformer shall be provided by the utility and supplied by a UPS battery system and generator from the nearby future Energy Park. Upon power loss, the building's automatic transfer switches will switch from primary to continuously-energized secondary power, via the emergency transformer. The emergency transformer will supply power to the following loads upon primary loss:
 - a. Emergency/Life Safety: egress lighting and exit lighting in corridors, assembly areas, fire alarm system, and stairwells.
 - b. Standby: Miscellaneous systems will include telephone system, security system, IT head-end, and IT cooling systems, elevator power, and elevator machine room cooling.
 - c. Fire Pump
 - d. Domestic Water Booster.
2. Separate automatic transfer switches will be provided for emergency and standby loads. Automatic transfer switches shall be ASCO 7000 series, Russelectric RMTD series.
3. Emergency feeders will utilize type MI (mineral-insulated) cables. All emergency branch distribution equipment will be located inside 2hr-rated electric rooms and closets.
4. Upon a prolonged power outage, the utility company will have the capability to switch the entire building's electric loads to backup power via the Energy Park.

Automatic transfer switches will sense energization of primary power and switch back to the normal terminal.

D. Lighting:

1. Luminaires will be primarily light emitting diode (LED) with high efficiency drivers, with 0-10V control protocol. All luminaires will be suitable for respective utility rebate incentives.
2. Selected luminaires in corridors, interior rooms, stairs, and places of assembly will be wired to emergency power to provide minimum code required light levels.
3. Illuminated LED type exit signs will be wired to emergency power and located in all paths of egress and places of assembly.
4. Luminaires will be primarily high efficiency LED source. Gymnasium lighting and high ceiling spaces will use dimmable LED source with local controls for glare control.
5. Classroom luminaires will be pendant linear direct/indirect with high efficiency LED source.
6. Selected luminaires in classrooms, corridors, interior rooms, stairs, and places of assembly will be wired to emergency panelboards. Generally, every third luminaire in the corridors will be wired to the emergency system.
7. Outdoor egress lighting will be building mounted with LED source controlled by photocell and programmable lighting controls.
8. Roadways and parking lots will have LED pole mounted luminaires in type II, III, IV light distributions mounted on aluminum poles. Luminaires will be high cut-off/dark sky friendly fixtures with no light spill at property lines. Pole mounted fixtures shall have integral photocells for control of fixtures.
9. Luminaires will be enclosed and gasketed in Carpentry, Culinary Arts, Kitchen, and Gym Locker areas.
10. Provide theatrical lighting system with luminaires, blue dome system, distribution equipment and controls for Auditorium as per the theater consultant's requirements.
11. House lights shall be integrated with the building's main lighting control system. The theatrical lighting control system shall be fully separated and installed as per theater consultant's requirements.

E. Lighting Controls:

1. A networked low voltage lighting control system will be provided for common areas such as corridors, Cafeteria, Gymnasium, and other common areas. Local low voltage override switches will be provided to override the lighting control system. Manufacturers include Encellium, Lutron Vive, and Wattstopper.
2. Local lighting controls connected to the overall lighting control system will be provided in spaces such as classrooms, conference rooms, etc.

3. Local lighting controls that are not connected to the overall lighting control system will be employed in private offices, electrical and mechanical closets, storage rooms and closets, bathrooms, etc.
4. Classrooms will have 4 zones of lighting control for enhanced educational atmosphere. Scenes will include general, focused, presentation and programmable additional scene.
5. Daylight harvesting will be employed as per local energy code requirements.

III. Controlled Receptacles:

- A. The networked lighting control system shall include networked 120V relay control panels to switch plug load circuits on/off as per the owner's schedule requirements. 50% of all 120V, 20A receptacles in all private offices, conference rooms, rooms with copying/printing, break rooms, classrooms, and individual workstations will be controlled. Controlled receptacles will be permanently marked with the word CONTROLLED on them. Manufacturers include Encellium, Lutron Vive, and Wattstopper.

III. Auditorium:

- A. A professional theatrical lighting system will be provided as per the theater consultant's requirements. The theater lighting control system will be stand-alone and will not interface with the building's main lighting control system.

III. LEED v4:

- A. The Electrical systems will be designed to support the following LEED v4 pre-requisites and credits:
 1. Green Vehicles credit in the Location and Transportation category will be included.
 2. Light Pollution credit in the Sustainable Sites category will be included.
 3. Building Level Energy Metering credit in the Energy and Atmosphere category will be included.
 4. Advanced Energy Metering credit in the Energy and Atmosphere category will be included.
 5. Renewable Energy Production credit in the Energy and Atmosphere category will be included.
 6. Interior Lighting credit in the Indoor Environmental Quality category will be included.

III. Convenience Power:

- A. Duplex receptacles will be provided throughout the building in quantities to suit space programming.
- B. Receptacles will be provided in classrooms at teacher's desk, TV outlet, and for computers.

- C. Duplex receptacles for cleaning will be provided in corridors at 50 feet on center and in other large spaces.
- D. Single heavy-duty receptacles will be provided for special equipment.
- E. Duplex receptacles equipped with USB ports shall be located in all assembly and student gathering spaces.

IV. Fire Alarm

- A. A non-proprietary manufacturer automatic, fully supervised, analog addressable, voice evacuation system will be provided with following:
 - 1. Manual pull stations at exit doors (with tamperproof covers).
 - 2. Audible/visual units in corridors, classrooms, and places of assembly (ADA approved).
 - 3. Visual units in conference rooms, meeting rooms, and small toilets.
 - 4. Speaker only appliances will be provided within interior stairwells and in each elevator lobby.
 - 5. Notification appliances within the gymnasium will be provided with a guard.
 - 6. Weatherproof combination speaker/strobes will be provided throughout the courtyard area.
 - 7. Smoke detector coverage will be provided in corridors, stairwells, Electric Rooms and Closets, Telephone/IT Rooms and closets.
 - 8. Smoke detectors will be provided in elevator lobbies and machine rooms for elevator recall.
 - 9. Carbon monoxide detector coverage will be provided in all locations with fossil-fuel fired appliance locations in childcare areas and automotive shop. Local annunciation shall be by sounder base at carbon monoxide detector location.
 - 10. Carbon monoxide detector alarm strobes will be provided with green lens and located in central monitoring location, such as Admin areas for annunciation of alarms. Alarms shall provide a supervisory annunciation at fire alarm control panel and summon Fire Department.
 - 11. Smoke duct detectors in HVAC units over 2,000 CFM, and within 5 feet of smoke dampers.
 - 12. Connections to sprinkler water flow and valve supervisory switches.
 - 13. Connections to smoke and fire dampers, and fire suppression systems in kitchen and culinary areas.

14. The system will utilize networked transponder panels as required in lieu of booster panels.
15. 60-hour battery back-up.
16. 24 VDC magnetic hold open devices at smoke doors.
17. The Maintenance building and the Concessions building will be provided with the following, an exterior beacon, fire alarm transponder cabinet, pull stations and 155 F rated fixed temperature heat detectors. A digital Alarm communication transmitter will be provided to transmit signals off-site.
18. The locker room building will be provided with heat detectors, pull stations at exits and notification appliances. Weatherproof notification appliances will be provided in corrosive environments. A digital Alarm communication transmitter will be provided to transmit signals off-site.
19. Exterior beacons shall be located at front and rear entrance and at select exit doors per Wakefield Fire Department.
20. 25 percent spare capacity shall be provided in FACP for notification appliance circuits (NAC's).
21. Wiring will be run in minimum 3/4-inch EMT with red markings.
22. Connection to fire suppression systems.
23. Connections to the combustible gas systems located within Kitchen hoods.
24. Connections to the Ventilation Control system located in the Auto Collision and Auto Technology rooms.
25. Leased phone line connection to UL Central Station will be provided.
26. Knox boxes and exterior beacon will be provided at ground level exits.

J. Two-Way Fire Department Communication System

1. A Two-way fire department communication system master station will be provided in the main lobby.
2. Call station for the A two-way fire department communication system will be provided in each elevator lobby.

K. Antenna Systems

1. A bi-directional amplifier and antenna system will be provided to serve Wakefield Fire Department and Police Department radios.

L. Telephone/Cable TV Services:

1. An underground conduit system with 4foot X 6foot manholes spaced every 200 feet will be provided for each service.

M. Town Fiber Optic Service:

1. An underground conduit system with 4foot X 6foot manholes spaced every 200 feet will be provided for service.

N. Technology will be provided per Technology section.

1. Four, 4-inch underground service conduits will be provided for Verizon service cables and CATV into MDF.
2. Two, 4-inch conduits will be provided to each IDF from MDF with #6 ground wire in each conduit wired to ground bus in each IDF.
3. Telephones, handsets, cables, outlets, and telecommunications equipment will be provided under separate contract.
4. Empty conduits and outlet boxes will be provided for telephone and data system wiring and jacks.
5. Eight NEMA 5-20R twist lock quads will be provided in each IDF on 20A circuits (dedicated) wired to generator standby power.
6. Basket tray will be provided above corridor ceilings and ladder tray in all IDF and MDF spaces.
7. Two 2-inch sleeves shall be provided through all walls from corridor into rooms within the school for Telecom wiring.
8. A cable tray assembly shall be provided in all corridors, with perimeter ladder tray in all IDF and MDF spaces.

O. Integrated Intrusion, Access Control, CCTV, and Alarm System:

1. Addressable intrusion alarm system will include magnetic switches on perimeter doors, motion sensors in all perimeter rooms on first floor with susceptible access from grade and interior doors at high value locations. Motion sensors will be provided in first, second, third and fourth floor corridors. System will have secure-access zoning. Zoning will be provided to suit all proposed off hours usage including community programs. All required raceways, outlet boxes, and power shall be provided.
2. CCTV coverage will be provided at main and secondary entries as well as other entries to be used by students, staff or for off hours community programs, including but not limited to parking lots, athletic fields, gymnasium, auditorium, and educational programs.
3. CCTV coverage will be provided in cafeteria and all interior corridors.

4. Exterior CCTV coverage will be provided to cover the entire perimeter of the building.
5. Power for intrusion alarm system will include standby power to security system panels within the building.
6. Access control via card access system with all raceways and outlet boxes will be provided at all exterior doors and MDF and IDF rooms.
7. CCTV system will be IP based with minimum 30-day recording capacity. System will be web based to allow viewing by Wakefield Police Department and as manufactured by Honeywell NetAXS, Access Control; Exacqvision, Security Camera Software; Go2Blu, Emergency Alert System.

P. Photovoltaics System

1. Provisions for a roof mounted (fully ballasted) photovoltaic system, rated at 325 kW capacity.
2. Photovoltaic system provisions will include enclosures and raceways for energy production metering.

Q. Sustainable Features:

1. Provisions for roof mounted (fully ballasted) photovoltaic system.
2. Provisions for Electric Vehicle Service Equipment (EVSE) for charging of electric vehicles.
3. Full cutoff LED site luminaires with networked wireless control with dimming capability to reduce energy consumption and light pollution on site and surrounding areas.
4. Building Level Energy Metering to track building peak demand and to allow for trending of building operation to reduce energy demand charges.
5. Provisions for Advanced Energy Metering with meter management software to track local energy consumption and trending of building operation. System will identify high use areas and provide information to inform strategies to reduce energy consumption.
6. Networked lighting control system for interior and exterior lighting to monitor lighting power consumption and adjust consumption levels based on time-of-day usage.
7. Networked controlled receptacles to meet energy code requirements and reduce power consumption overnight.

R. Seismic Restraints:

1. Electrical components and systems will be designed to resist seismic forces as determined in accordance with provision of 780 CMR 1612.7, Massachusetts State Building Code, Ninth Edition.

S. Testing:

1. Owner-selected independent testing company will provide acceptance testing of work of this Section.

T. Demolition

1. Project consists of phased construction and phased demolition. Refer to Architectural and Civil documents for phasing and enabling requirements.

U. Work by Others:

1. Following items will be provided under other Sections:
 - a. Concrete work.
 - b. Painting.
 - c. Cutting of masonry.
 - d. Scaffolding above eight feet.
 - e. Telephone equipment and cable.
 - f. Temperature control wiring.
 - g. Motors.
 - h. Flashing.
 - i. Excavation.

V. Guarantee:

1. Work of this Section will be guaranteed for period of one year.

END OF SECTION 26 00 00

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**TECHNOLOGY &
SECURITY**
BASIS OF DESIGN

Northeast Metropolitan Regional Vocational High School Technology Systems Narrative

I. Overview

The technology and security scope of work for New Construction alternatives shall consist of the following systems.

- A. Tele/Data Infrastructure
- B. Wireless LAN
- C. Voice Infrastructure and Phone System
- D. PA/Intercom System
- E. Master Clock/Secondary Clock System
- F. Large Venue Live Sound Reinforcement Systems
- G. Large Venue Video Projection Systems
- H. Instructional Audiovisual Systems
- I. Digital Signage Monitors

Typical Room Design descriptions are presented in this document to provide details on Technology/Security systems and device quantities.



A. Tele/Data Infrastructure

The Tel/Data infrastructure shall consist of Communications Equipment Rooms and two physically separate structured premises cabling systems. For security and logistical reasons, IP security and building systems IP devices such as IP CCTV cameras, lighting control IP devices, and HVAC IP devices shall reside on a data network physically separate from the school Local Area Network

Communications Equipment Rooms will conform to BICSI standards.

Backbone and horizontal cabling shall be installed according to current EIA/TIA and BICSI industry standards.

Communications Equipment Rooms

Communications Equipment Rooms included in the building design are designated as Main Distribution Frame (MDF) and Intermediate Distribution Frame (IDF).

The MDF shall be the Demarc location for voice, CATV, and Wide Area Network services from the street.

The MDF and IDF rooms shall be the intermediate wire closets for the termination of data and voice horizontal UTP cabling within 290 cable feet of their locations.

They shall contain the following network cabling equipment:

- 2-post equipment racks and cabinet equipment enclosures
- Ladder rack/cable tray
- Vertical wire managers
- Horizontal wire managers
- Patch panels
- Backboards (one 4' x 8" minimum)
- Punch down blocks (110 style)

The MDF and IDF rooms shall be environmentally controlled adequately for the quantity of active electronic equipment to reside in them.

All electrical receptacles shall be on an emergency/standby generator.

Cabling and passive equipment shall be included in the base contract.

Active equipment shall be purchased as part of the Technology FF&E equipment procurement process.



Cable Pathways

Cable pathways and Work Area Outlets shall be as follows:

Interior Pathways

Ladder rack/cable tray in wire closets Multiple 2" sleeves from the corridors into rooms

J-Hooks installed from ladder rack/cable tray to within rooms for station cabling

4" sleeves between floors

Telecommunications Work Area Outlets (WAO)

Wall Outlets:

4" square or 2-gang back boxes with single-gang or dual-gang plaster rings as required

Back boxes shall have 1 1/4" EMT conduit stubbed above the nearest accessible ceiling

Floor Boxes and Poke-Thru Devices:

Typical floor boxes shall be a flush combination, low voltage/electrical, Wiremold RFB series, or equal-sized as required.

Typical Poke-Thru devices shall be Wiremold Evolution series or equal shall be installed

The IDF closets shall be connected to the MDF via new 12-strand 50-micron OM4 multi-mode and 6-strand OS-2 single-mode fiber cables.

The fiber cabling between the IDF closets and the MDF shall be capable of 10GbE.

The IDF closets shall have open 2-post equipment racks with data switches sized according to the number of data drops served by the individual closets.

Category 6E cabling shall be installed in all instructional and office spaces. The Category 6E cabling will be run to the MDF or IDF locations and terminated on Category 6 Patch Panels.

Bandwidth from the IDF closets to the desktop shall be 10/100/1000 Mb/s.

Tel/Data cabling and associated wire closet termination equipment shall be included in the base contract.



Data switches and other active data equipment shall be purchased as part of the Technology FF&E equipment procurement process.

B. Wireless LAN

The Tel/Data infrastructure will include Wireless LAN capabilities.

Access Point enclosures (wall and ceiling mounted) shall be installed in the Gymnasium, Multipurpose Room, Classrooms, and Vocational Shop areas as part of the base contract.

The school's existing newer 802.11ac Access points shall be re-used. Additional new Access Points shall be purchased to provide full wireless coverage in vocational shops, classrooms, and common spaces.

Required data cabling shall be included under the Tel/Data Infrastructure scope of work.

Access Points shall be procured as part of the Technology FF&E equipment procurement process.

C. Voice Infrastructure and Voice System

For life safety purposes, phone handsets will be located at all administrative desks, in all classrooms, and in all common spaces to provide internal and external communications for all spaces.

The existing Vertical VoIP phone system shall be relocated to the new building and upgraded to the most current version. Additional VoIP handsets shall be procured for the additional phone locations.

Required data cabling shall be included under the Tel/Data Infrastructure scope of work.

VoIP equipment shall be purchased as part of the technology FF&E equipment procurement process.

D. Public Address/Intercom System

An addressable Public Address system and cabling shall be installed. PA speakers shall be installed in all corridors, classrooms, offices, and common spaces for life safety and mass notification capabilities.

Speakers shall be lay-in speakers on the ceilings in corridors, classrooms, and offices. Recessed ceiling and wall speakers shall be installed in the common and remaining areas.

The PA system shall be zoned to allow announcements to be made to individual speakers and groups in specific areas.



The PA system shall be interfaced with the VoIP voice system to provide the capability for PA and emergency notification announcements from any phone handset.

The PA system shall be interfaced with the Fire Alarm system to interrupt PA announcements during a fire alarm.

The PA system shall be interfaced with all local sound systems so that local sound systems are interrupted during PA announcements and mass notifications.

The PA system equipment and wiring shall be included in the base contract.

E. Master Clock/Secondary Clock System

The clock system shall be a low-voltage wired clock system. The Master Clock/Transmitter shall be located in the MDF.

The Master Clock system shall be interfaced with the PA system to provide for scheduled bell tones to specific zones or throughout the building.

Secondary clocks in large areas (Student Commons, Gymnasium, and Learning Common) shall be 16" in diameter. Gymnasium clocks shall have protective wire grilles.

The Clock system equipment and wiring shall be included in the base contract.

F. Live Sound Reinforcement Systems

Live Sound Reinforcement systems shall be installed in the Multipurpose Room, Gymnasium, Student Commons, and the Learning Common.

Systems shall include:

- Equipment cabinet
- Mixers
- Processors
- Amplifiers
- Speakers
- CD / iPod player
- Wired and wireless microphones



- Audio level feedback sensing microphones
- Assistive listening transmitter and receivers
- Remote control touch panels
- Engraved wall plates
- Wiring

All active sound system equipment shall be Dante capable.

Each Live Sound Reinforcement system shall be interfaced to the Fire Alarm and PA systems for an interruption during a fire alarm or PA announcement.

The Live Sound Reinforcement system racks, equipment, and wiring shall be included in the base bid.

G. Large Venue Video Projection Systems

Large Venue Video Projection Systems shall be installed in the Multipurpose Room, Gymnasium, and Student Commons.

Systems shall include:

- Equipment cabinet
- Audio/video Mixers
- Processors
- Blu-ray player
- Remote control touch panels
- Engraved wall plates
- Wiring

The systems shall be interfaced to its associated large venue Live Sound Reinforcement system.

H. Instructional Audiovisual Systems

All Classrooms and Small Group rooms shall have Interactive Projectors systems, which will include touch capabilities, wall speakers, and a large format whiteboard to provide a 100" diagonal image.

Conference rooms and office conference spaces shall have 75-inch Interactive Flat Panel systems.

Each location shall have a "Low" (18" AFF.) A-V outlet and a "High" A-V Outlet.

The "High" A-V outlet shall be a 2-gang back box on the teaching wall.

Each "Low" A-V outlet shall have an HDMI, VGA, 3.5mm, and an RJ-45 connector cabled to the "High" A-V outlet.



The "High" A-V outlet shall have three Cat 6E data cables to provide networking capabilities for the Interactive Projector, the computer interface, and the touch control.

Each A-V outlet location shall have an adjacent associated quad electrical receptacle.

The back boxes for the "Low" and "High" A-V outlets shall have 1 ¼" conduits stubbed above the ceiling to provide pathways for the A-V cabling.

There shall be in-wall audiovisual cabling between the teacher presentation "Low" AV outlet and the "High" outlet.

The Low AV outlet shall include the following:

- HDMI cable
- 3.5 mm Audio cable
- Cat. 6E control cable

The High AV outlet shall include:

- HDMI cable
- 3.5 mm Audio cable
- Cat. 6E control cable
- Two Cat. 6E data drops

The in-wall AV cabling shall be included in the base contract.

The Interactive Projector Flat Panel and A-V cabling shall be procured as part of the technology FF&E package.

I. Digital Signage

Digital signage monitors shall be located in lobbies, common-use spaces, and student collaborative areas. A multiple-content system will provide different signage to groups of signage monitors.

The digital signage monitors shall be interfaced with a Panic Button/Duress alert system to provide visual notifications of duress situations.

The digital signage monitors shall be procured as part of the technology FF&E package.



Typical Technology Designs

Typical Academic Classrooms

Typical academic classrooms shall have the following design.

- Two data drops at the teacher location
- A Low A-V outlet at the teacher location
- A High A-V Outlet at the Interactive Projector location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above the ceiling for a Wireless Access Point
- An interactive projector system
- A VoIP desk phone handset
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8'-0" AFF.

Data and AV cabling shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

Interactive projector, VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Science Classroom

Typical science classrooms shall have the following design.

- Two data drops at the teacher's location
- A Low A-V outlet at the teacher's location
- A High Outlet at the Interactive Projector location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- Two data drops above the ceiling for a Wireless Access Point
- Six dual data drop outlets at the above counter height at student work counters
- An interactive Projector system
- PA lay-in speaker panel on the ceiling
- A twelve-inch wireless analog secondary clock at 8'-0" AFF.

Data and AV cabling shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.



Interactive projectors, VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Vocational Shops

Typical Vocational Shops shall have the following design.

- Two Wireless Access points with two data drops each
- Two data drops for VoIP wall phones with handsets
- Data drops for specialized equipment such as CNC and auto shop diagnostic equipment systems
- Four PA horn speakers
- Two 16" wireless analog secondary clocks
- A Proximity / Card Reader at the exterior door
- Door contacts on the exterior door
- An Intrusion Detection keypad

Data cabling shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

Proximity / Card Reader, door contacts, and intrusion alarm keypad shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Vocational Theory/Computer Labs

Theory Classrooms are laid out similarly to Academic Classrooms.

- Two data drops at the teacher's location
- A Low A-V outlet at the teacher's location
- A High Outlet at the Interactive Projector location above the teaching wall marker board
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- There shall be two data drops above the ceiling for a Wireless Access Point
- An Interactive Projector system
- A VoIP desk phone handset
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8'-0" AFF.

Data and AV cabling shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.



Interactive projectors, VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Typical Vocational Shop Computer Labs shall have the following design.

- Two data drops at the teacher's location
- A Low A-V outlet at the teacher's location
- A High Outlet at the Interactive Projector location on the teaching wall
- A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
- The High A-V outlet shall also have two data drops
- Data drops for (20) student computer stations
- There shall be two data drops above the ceiling for a Wireless Access Point
- An interactive projector system
- A VoIP desk phone handset
- PA lay-in speaker panel on the ceiling.
- A twelve-inch wireless analog secondary clock at 8'-0" AFF

Data and AV cabling shall be included in the base contract.

PA speaker and secondary clock shall be in the base contract.

Interactive projectors, VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Learning Common

The Learning Common shall have the following design.

- Four data drops at the circulation desk
- Eight data drops for lookup computer locations
- One data drop on a wall for a digital signage monitor
- There shall be four Wireless Access Point enclosures on walls with two data drops in each
- A VoIP desk phone handset at the circulation desk
- Seven to nine PA lay-in speaker panels on the ceiling.
- Two 16" inch wireless analog secondary clocks at 8'-0" AFF.
- Instructional Area
 - Twenty data drops for computer locations
 - A Low A-V outlet
 - A High Outlet at the Interactive Projector location above a marker board
 - A-V cabling between the Low and High A-V outlets shall consist of HDMI, 3.5mm audio, and Cat. 6E
 - The High A-V outlet shall also have two data drops
 - Data drops for (20) student computer stations
 -



Data and AV cabling digital signage monitor, PA speakers, and secondary clocks shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.

Common Areas – Multipurpose Room, Gymnasium, and /Student Commons Area

The Multipurpose Room shall have the following design.

- Four enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Ceiling PA horn speakers
- Local sound speakers and Local Live Sound Reinforcement system equipment rack with sound system equipment
- Motorized projection screen
- Large Venue Video Projector system
- Recessed wall-mounted Audiovisual Control Panel
- Equipment rack for A-V control equipment
- Multiple Video Source Digital Transmitter Outlets

Data cabling and sound system cabling, sound rack, and equipment shall be included in the base contract.

The projector system and A-V rack with control equipment shall be in the base contract.

PA speakers shall be in the base contract.

VoIP handsets and access points shall be in the Technology FF&E package.

The Gymnasium shall have the following design.

- Four enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Five recessed wall PA horn speakers
- Two 16" inch wireless analog secondary clocks with wire guards at 8'-0" AFF
- Local sound speakers and Local Live Sound Reinforcement system equipment rack

Data cabling and sound system cabling, sound rack, and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.



The Student Commons Area shall have the following design.

- Four enclosures for Wireless Access Points with two data drops each
- One data drop for a VoIP wall phone
- Four data drops in two floor boxes for Point of Sales computer equipment
- Recessed wall PA horn speakers
- Two 16" inch wireless analog secondary clocks at 8'-0" AFF
- Local sound speakers and Local Live Sound Reinforcement system equipment rack with sound system equipment
- Motorized projection screen
- Large Venue Video Projector system
- Recessed wall-mounted Audiovisual Control Panel
- Equipment rack for A-V control equipment
- Three Video Source Digital Transmitter Outlets

Data cabling and sound system cabling, sound rack, and equipment shall be included in the base contract.

PA speakers and secondary clocks shall be in the base contract.

VoIP handset, access points, projector system, and A-V rack with control equipment shall be in the Technology FF&E package.

Typical Administrative, Guidance, Nurse, and Teacher/Instructor Offices

Typical offices shall have the following design.

- Two data drops at each desk location for VoIP desk phones and wired networked computer
- Two data drops above the ceiling for a Wireless Access Point
- A lay-in PA speaker on the ceiling
- A PA speaker volume control at the entry door
- A 12" wireless analog secondary clock at 8'-0" AFF.

Data cabling shall be in the base contract.

The base contract shall include PA speakers, volume controls, and wiring. Clocks shall be in the base contract.

VoIP handsets, access points, and computer equipment shall be in the Technology FF&E package.