Valdez Middle School Project
Project No.: 11-310-9507

City of Valdez

Schematic Design Narrative

June 27, 2012

BETTISWORTH NORTH

ARCHITECTS, PLANNERS, INTERIOR DESIGNERS
AND LANDSCAPE ARCHITECTS

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OVERVIEW

The Valdez City School District and the City of Valdez have identified a need for a new more efficient and flexible middle school to replace the aging junior high school, which was constructed in 1965.

The new Valdez Middle School will be built at the same location of the existing George H. Gilson Junior High School, which will be demolished. An existing Wood Shops building will be demolished and wood working classes will be relocated within the new Middle School's Career & Technical Education space. Also, the existing Bus Barn Maintenance Shop will be demolished. The site will be regraded so that the floor elevation of the new School is as close to the existing High School floor level as possible, while still providing proper water drainage. The existing football field and track will be renovated and improved at its approximate current elevation and location.

The new 56,125 square foot, one-story tall Middle School has an occupancy of Group E, Educational, and is Construction Type II-B with automatic sprinklers throughout.

The key components of the design were formulated during the creation of the Educational Specifications which evolved through a series of planning labs lead by our consultant, DeJong-Ritcher. The planning labs were held with broad-based representation from the Valdez schools, as well as community members, parents, teachers, school administrators and students.

The project was designed within the following parameters:

1. The school will accommodate approximately 160 students.
2. The gross square footage of the new school is defined by Alaska Statute 4 AAC 31.020 and is based on an agreement with the State of Alaska D.E.E.D. for the replacement of the existing Valdez Junior High School.
3. The new school will be constructed on the existing combined Valdez Junior High and High School site, with the existing High School to remain in operation during the construction of the new Middle School.

Project Goals guiding the design process:

1. Clear Identity
2. Safe and Inviting
3. Adaptable
4. Flexible
5. Durable, Maintainable Materials and Systems
6. Energy Efficient
7. Provide Community Use/Accommodate Public Needs

The Valdez Middle School project consists of four key areas: Welcome Center; Core Academic Neighborhood; Physical Education; and Food Service facilities.

A Welcome Center/Administration Space contains a Principal's Office; Reception/Secretarial Area; In School Suspension room; Conference Room; Cot Room; Mail/Work/Copy Room/Kitchenette; Restrooms; and Administrative Storage.

The Core Academic Neighborhood includes a Learning Commons space (*Information Center/Library, Project Area/Business Center, Presentation/Event area, and Kitchenette adjacent to cafeteria and event space*); Learning Labs/Classrooms (*labs and classrooms; Wet Flex, Science and Math Labs*); Career and Tech Ed; Teacher/Paraprofessional Planning Area; Small Group/Conference/Tutor room; Counselor's Office; Special Ed Classroom; Cool Down Room; Kiln; and storage spaces.

Physical Education provides a Gym; Mat Room; Fitness Room/Multipurpose Room; PE Office; Coaches/Officials Locker Rooms; Student Shower/Locker Rooms; Laundry; Concession Stand/Student Store; and Storage.

Food Service incorporates a Serving Area; Warming Kitchen; Dry Food Storage; Cooler/Freezer; Ware Washing space; Kitchen Manager's Office; and staff Lockers.

The remaining area of the school includes Custodial Spaces (*Receiving/Storage; Maintenance/Repair Area*) as well as Building Services and Circulation areas.

2006 IBC CODE SUMMARY (Prepared by Bettisworth North)

Code Summary:

Occupancy	Group E, Educational
Existing Construction	Type IV-A (Heavy Timber, One-Hour)
Automatic Sprinkler System	Required throughout
Fire Separation Distance	30 feet on all sides
Existing Floor Area	103,252 sf
Story 1	72,798 sf
Story 2	30,754 sf
New Construction	Type II-B (Noncombustible, Nonrated)
Automatic Sprinkler System	Required throughout
Fire Separation Distance	30 feet on all sides
Allowable Floor Area	63,875 sf
Actual Floor Area	56,125 sf

Automatic Sprinkler System:

The new addition requires automatic sprinkler protection in accordance with the State of Alaska, Fire and Life Safety Code.

Fire Wall:

A 2-hour fire wall is required to separate the existing building from the new addition. This allows the different types of construction and it allows the new 56,125 square feet floor area to abut the existing building.

Fire Wall Horizontal Continuity:

Where fire walls intersect exterior combustible walls, the exterior wall shall have a fire-resistance of 1-hour for at least 4 feet on both sides of the fire wall. Openings within such exterior walls shall have a fire protection rating of not less than 45 minutes. Or, the fire wall may terminate at the noncombustible exterior sheathing in a building protected throughout by automatic sprinklers.

Fire walls need to extend to the outer edge of a horizontal projection, such as the canopy on the south side of the building. However since the canopy does not have concealed spaces, the wall behind the projecting element can be of 1-hour fire-resistive construction for a distance not less than the depth of the canopy on both sides of the fire wall.

Openings in such walls shall be protected with opening protectives having a fire-resistance rating of not less than 45 minutes.

Fire Wall Vertical Continuity:

Fire walls shall extend from the foundation to at least 30 inches above both adjacent roofs, but may terminate at the roof sheathing based on three design options in the International Building Code. The option providing the optimum cost effective constructability will be utilized.

Fire Barriers:

Vocational shops do not require 1-hour separation when the building is protected throughout by an automatic sprinkler system. Assembly rooms (cafeteria, gymnasium) do not require 1-hour separation when the building is protected throughout by an automatic sprinkler system. However, the furnace (boiler) room requires 1-hour fire barrier enclosures in accordance with the State of Alaska, Fire and Life Safety Code.

Fire Partitions:

Corridors do not require 1-hour fire partitions when the building is protected throughout by an automatic sprinkler system.

Smoke Partitions:

The following Incidental Use Areas require smoke partitions in addition to automatic sprinkler protection.

- Laboratories
- Vocational Shops
- Laundry Rooms exceeding 100 sf
- Storage Rooms exceeding 100 sf
- Waste and Linen Collection Rooms exceeding 100 sf

Plumbing Fixture Count:

The following table lists the number of water closets and lavatories required in the new addition.

Gender	Item	Assembly	Student	Staff – North	Staff – South	Total
Male	Water Closets	5	2	1	1	9
Male	Lavatories	5	2	1	1	9
Female	Water Closets	5	3	1	1	10
Female	Lavatories	5	2	1	1	9

ENVIRONMENTAL DESIGN NARRATIVE (Prepared by NORTECH)

As part of the 35% Design effort a pre-demolition hazardous materials and environmental site assessment has been completed. The assessment was undertaken to identify the hazardous materials, demolition and environmental site concerns associated with the Valdez Middle School project. During the field work demolition quantities were also determined as provided in the project estimate. Based on the completed assessment efforts the following key environmental findings were determined:

Hazardous Materials:

The following hazardous materials have been identified in the project structures to be demolished.

- Asbestos: Friable and non-friable asbestos containing materials were identified in the George H. Gilson Junior High School, Bus Barn and Wood Shop
- Lead: Lead concerns are present only in the George H. Gilson Junior High School
    - No lead concerns were identified in the Bus Barn or Wood Shop
- Other Hazardous Materials and universal wastes were identified in all three buildings including fluorescent tube light bulbs and High Intensity discharge light bulbs containing mercury, lead-acid batteries, PCB light ballasts, fire extinguishers and radioactive emergency exit signs.

All hazardous materials previously identified, identified during this survey, or discovered during demolition, require careful handling, appropriate work practices and proper disposal in accordance with applicable federal and state regulatory guidelines. Hazardous materials information associated with the building is made available on the project drawings as necessary to inform employees, demolition contractors and/or the abatement workers associated with the demolition of the building. Project demolition specifications include these findings and, where appropriate, require the contractor to submit a work-plan for approval.

Environmental:

There are 3 underground (UST) and 1 aboveground (AST) heating oil fuel storage tanks located on the site. The site surface at all four fuel tank locations are visually contaminated. One tank was observed leaking at the time of the site assessment. Groundwater in the area is shallow and may be impacted.

Currently the project cost estimate only includes quantities of contaminated soil necessary to remove the existing storage tanks and complete a standard closure report. The project cost estimate does not have any costs included to remove additional quantities of contaminated soil or provide for any groundwater contamination, which remains an unknown.

During follow on subsequent project design phases additional subsurface site assessment is recommended at all the fuel storage tank locations on the site. The additional investigation efforts should include soil borings and groundwater monitoring wells sufficient to determine the areal extent of the soil and ground contamination present at each site. Information developed should be utilized to determine applicable regulatory requirements, actual quantities of contaminated soils and any necessary groundwater remediation.

GEOTECHNICAL DESIGN NARRATIVE (Prepared by Shannon & Wilson)

Geotechnical Findings and Considerations:

The proposed Valdez Middle School (VMS) will be built in a previously developed area, which overlies the existing middle school and adjacent landscaped areas. The proposed VMS will be connected to the Valdez High School, immediately east of the proposed building site. We reviewed two previous geotechnical studies of the area: an October 1975 Shannon & Wilson, Inc. report titled, Subsurface Investigation, Proposed Valdez High School Addition and a January 2004 Dowl Engineers report titled, Final Geotechnical Investigation, Valdez Middle School. Subsurface investigations for these studies reported natural subsurface conditions consisting of loose to dense sandy gravel with cobbles and gravelly sand with zones or layers of sandy silt. The borings reviewed were explored to depths of 11.5 feet to 31.5 feet below the ground surface (bgs). Slate bedrock was noted in a couple of borings at a depth near 16 feet bgs; these borings were north of the existing structures. The surficial soils near the existing structure consist of silty sand and gravel fills. Peat and organic soils were noted in several borings; generally to depths of less than 5 feet bgs.

Groundwater was noted in a couple borings at approximate depths of 15 feet to 20 feet bgs at the time of drilling. We anticipate groundwater levels in the area fluctuate seasonally.

These soils (both reworked fill and natural) are potentially compressible and frost-susceptible and may contain organic deposits. We recommend replacing these soils with nonfrost-susceptible (NFS) structural fill, within the bearing zone of the proposed foundations, to improve bearing conditions, reduce the potential for detrimental settlement, and mitigate potential frost-jacking concerns.

Portions of the proposed new footprint overly existing structure areas, which may have been previously excavated and replaced with clean structural fills. These areas should be worked to provide uniform bearing conditions below the proposed new facility.

The project is in a seismic area where major earthquakes can and have occurred. Although localized, relatively loose granular soils may be present below the groundwater table, we believe the potential for widespread liquefaction in the soil mass below the groundwater table during the design earthquake is low. An associated effect of earthquake shaking is densification and reduction in shear strength of loose soils and potential settlement of the ground surface.

Our approach to foundation development at the site includes conventional spread and continuous footings bearing in and on a compacted structural fill. Site preparation will replace potential surficial organic, frost-susceptible, and compressible soils, and provide a prepared and compacted subgrade to improve allowable bearing capacity.

Site Preparations:

Site preparation for the proposed facility will consist of an area-wide excavation to establish grade and extents for the new structure, and additional excavation as necessary to replace surficial silty or organic soils below excavation limits. The excavation will extend to a minimum depth of 1 foot below exterior foundations. Excavation should include the entire building footprint and extend laterally a minimum of 4 feet beyond the outside edge of all foundations. Existing subsurface information suggests groundwater will not be encountered in the excavations; however, snow melt or rainfall events could flood excavations.

Site preparation for the new foundations in areas of existing construction should consist of demolishing and removing existing foundations, extending the excavation out under the new building footprint, and verifying all organic soils have been removed below the new foundations. Subgrade preparation will consist of the removal and replacement of all existing foundation material and re-working of suitable materials derived from the excavation to establish uniform subgrade conditions beneath the entirely of the proposed new structure footprint, on which structural fills can be placed.

Relatively clean natural sands and gravels may be encountered in the excavation above the recommended excavation depths. These soils can be re-used to replace deeper unsuitable soils. The Designer of Record (DOR) or his representative will observe the base of all excavations to determine if unsuitable soils have been removed prior to smoothing the base of the excavation. Excavated clean to slightly silty sand and gravel may also be used as fill below the interior of the structure. Seasonal frost should be allowed to thaw or removed prior to compacting the base of excavations.

Prior to backfilling, soils in the base of the excavation will be compacted with at least eight passes of a large vibratory compactor weighing at least 15 tons. The excavation will then be backfilled with NFS structural fill in 8-inch lifts; each lift should be compacted to at least 95 percent of its Modified Proctor maximum dry density. Excavated sand and gravel meeting the requirements for structural fill may be reused as structural fill.

Foundations:

Foundations of continuously heated structures will be designed as conventional spread and continuous footings, bearing a minimum of 48 inches below grade for exterior foundations, and 2 feet below grade for interior foundations. Footings bearing on a minimum of 1 foot of compacted structural fill over proof-rolled granular *in situ* soils will be designed for a maximum allowable bearing pressure of 3,000 pounds per square foot (psf) for square or rectangular footings, up to a maximum of 8 feet wide. Bearing capacities and footing-design parameters will be assessed as design proceeds. Foundations will be designed for a total settlement of 1 inch under static loads. Settlement under the design earthquake may approach 2 inches with differential near the total.

Asphalt Concrete-Surfaced Pavement Section:

Our preliminary analyses suggest total minimum thickness required for the subbase, base, and pavement surface is 24 inches for asphalt concrete-surfaced driveway and parking areas. The pavement section consists of 2 inches of asphalt concrete, 4 inches of aggregate base course meeting all the requirements for Alaska Department of Transportation & Public Facilities (ADOT&PF) grading D-1 and 18 inches of compacted NFS structural fill. In heavy truck-traffic and loading areas, the thickness of the NFS structural fill subbase will likely require an increase to 24 inches, and aggregate base thickness to 6 inches.

If a geotextile separator fabric is necessary to facilitate construction, it will conform to the requirements of the American Association for Highway and Transportation Officials (AASHTO) M288-00 for a Class 2 geotextile with an elongation of greater than or equal to 50 percent.

Drainage and Grading:

During the construction of the project, the ground surface near open excavations should be sloped away to reduce water flowing into the excavation. The addition of water to soils in the excavation may reduce the stability of slopes, as well as raise the moisture content of soil to a point where it is difficult to compact to the required density.

It is very important to provide good drainage to remove standing surface water near or under the access road, parking area, and near retaining walls or concrete walkways. Although the groundwater table is too deep to provide water for frost-jacking, precipitation may occur in the fall before the ground freezes, resulting in saturation of surficial silty soils. It is particularly important to provide good drainage near of roof-drain outlets.

Subsurface conditions noted in some of the boring logs we reviewed suggest *in situ* soils may be silty and may not drain freely. To minimize the potential for buildup of hydrostatic forces behind retaining walls or structure walls acting as retaining walls, retaining walls will be backfilled with structural fill. This granular material will act as a permeable column to drain infiltrating surface and groundwater. This may be required on the uphill sides of the proposed structure.

Placing drain pipes in the base of the granular backfill will assist in preventing the accumulation of water around and beneath wall footings. The drainage pipes should be designed to resist crushing or excessive deformation under the loads imposed by surrounding soil or footing pressures, or should be placed outside the footing-pressure influence zone (as defined by a 1H:1V line extending out and down from the edge of the footing).

During the winter freezing season, drainage pipes for unheated retaining structures could freeze and become blocked with ice. We expect drain pipes next to heated building walls will remain thawed;

however, if the drain pipe outlets are exposed and "daylight" to an exterior drain, they may freeze and become blocked with ice, thereby inhibiting drainage around the foundation. The outlets for drainage pipes behind walls should be designed so they are maintained in an ice-free condition.

Materials:

Structural fill should consist of unfrozen NFS gravelly sand or sandy gravel meeting the following gradation limits after compaction:

GRADATION CRITERIA FOR STRUCTURAL FILL

Size	Percent Passing
4-inch	100
No. 4 sieve	30-60
No. 200 sieve	0-5

LANDSCAPE DESIGN NARRATIVE (Prepared by Bettisworth North)

Overall Site Plan:

The proposed orientation and location of the middle school is directly west of the existing high school. The middle school will be connected to the high school by the Career Technical Education (CTE) building addition.

The orientation of the middle school is such that it will have excellent morning and afternoon sunlight to most of its interior spaces.

Vehicular Circulation:

Private Vehicles- Parking provided for the project is as follows:

Existing parking at the high school and junior high includes 93 spaces east of the high school and approximately 65 spaces associated with the junior high for a total of 158 existing spaces. (9) parking spaces with an accessible van space will be provided directly adjacent to the pool entry. (46) parking spaces including an accessible van space are provided on the north side of the new middle school for staff. (31) parking spaces including an accessible van space are provided on the south side of the school for visitors. South of the track, (16) paved spaces with an accessible van space and (18) spaces on gravel surface are provided. This location is primarily event parking and provides an accessible walk to the track and field, concession and bleacher areas. In total, there are (213) parking spaces provided on the middle school and high school site. This is an increase of (55) total spaces.

A parent/student drop off lane will be provided south of the main entry to the proposed middle school. This drop off lane will also serve the high school.

The site plan identifies the parking and vehicular patterns graphically. New parking will be of asphalt with striping necessary for delineation.

Large vehicle and fire truck access

Vehicle access around the entire site will have turning radii large enough to accommodate large truck and emergency vehicle access for the entire loop around the middle and high schools. Due to the avalanche hazard zone potentially closing the loop at times during the winter, a fire 'T' turnaround will be provided at the pool main door and CTE expansion area, allowing an emergency vehicle to safely reverse its direction.

A bus parking and drop off lane is provided south of the high school's library on Robe River Drive. The drop off lane will directly abut Robe River Drive providing more distance from the south face of the library to buses and providing easier snow clearing operations.

Refuse service/ Dumpsters

Two refuse dumpsters will be provided at the middle school. Screens will not be placed around the dumpsters as they impede snow clearing. The dumpsters will set on a 6" thick reinforced concrete pad. Bollards will be placed along the wall of the school on the dumpster pad in order to prevent the dumpsters from hitting the building.

Pedestrian Circulation:

Pedestrians can access the proposed middle school via a main front south entrance or from the entrances on the north side from the north staff parking areas. Pedestrian walks will be of concrete. Most walks will be 6" thick reinforced concrete in order to bear the weight of snow clearing machinery. A 16' wide paved walk will access the football field and track from the middle school main entry area. This walk will also give snow clearing machinery the ability to push snow from the visitor parking area straight west instead of forcing them out onto Robe River Drive.

Landscaping:

Tree plantings are intended to be incorporated into the site in a few select locations. Tree plantings will only be provided in areas that will not impede snow clearing and where they will not provide areas for people to hide from view. Shrub plantings will also be fairly limited, but will be included in the raised planters along the south side of the middle school. All open spaces not paved will be seeded with grasses. 4" of topsoil will be provided at all seeded areas.

Landscape Equipment, Amenities and Site Furnishings:

Outdoor Play Area

Two regulation basketball goals will be provided as a part of an outdoor play area. One swing set will also be provided and will include (4) swings total. The swings will require playground safety surfacing to be installed underneath them to ASTM 1292 standards. The recommended type of safety surfacing to use is rubber tiles. The outdoor play area will be located off the southwest face of the proposed middle school.

A 6' high chain link fence will be located on the west and south side of the basketball court and swings in order to prevent balls and children from getting onto the streets and drives.

Track and Football Field

A new track is intended to be provided as a part of the project. The new track will consist of (6) 400 meter lanes and (6) sprint lanes. The track will be offered with two cost options: one for an asphalt surface and one that will add a rubberized surface. The location of the track will be slightly west of the existing track location. Track events provided for are:

- Long Jump
- Discus
- Shot Put

A regulation high school football field will be located at the center of the track. The existing goal posts will be reused for the new field. The football field will be turf with a sub-grade that is engineered to provide the healthiest natural playing surface as possible.

Bleachers will be provided at the track and football field. Two (4) row bleachers seating a total of 72 people per section are provided as a part of the project. The bleachers will be located on the east side of the new track and football field. Paving for placing an additional (5) bleachers is provided. Space for an approximately 10' x 10' concessions stand is provided in the bleachers area.

Power to a scoreboard location will be provided as a part of the project. An existing scoreboard on a towable trailer will be provided by the owner.

A 6' high chain link fence will be provided on the north, east and south side of the track. Existing fence is found on the west side of the track. There will be two gates on the east side of the fence allowing vehicle and pedestrian access into the area the fence surrounds.

Archery

It is intended that the area northeast of the track that currently houses conex containers will be used for archery.

Site Furnishings & Amenities

Benches and trash receptacles will be provided at the parent/student drop off area on the south side of the proposed middle school. Benches and trash receptacles will be located under the covered canopy in order to provide seating during inclement weather. There is also a bench and trash receptacle located adjacent to the basketball court.

Moveable bicycle racks for (30) bikes will be provided as well and will be located just west of the main entry. The bicycle racks will be stored during the winter and will not impede snow clearing operations.

As an option to benches, several 18” high concrete seat walls will be provided along the south side of the middle school. These walls will provide seating opportunities and create planting beds. Skateboard deterrents will be provided in the seat walls.

Bollards will be provided at building corners where vehicles are in movement. They will also be located around the fuel tank filling apparatus and at the dumpster pad. The bollards will be 6” diameter steel filled with concrete. High visibility plastic sleeves will be placed over the bollards.

Exterior Monument Signage

An exterior monument sign is located adjacent to the play ground area, directly in line with Hazelet Avenue. The sign will be part of a concrete seat wall that is integrated into the site design. The sign itself will be an inset into the concrete wall and will have a brushed metal background with standoff cast metal letters. The sign will be lit with internal LED lighting and will require power to it.

Flag poles

(2) Flag poles will be provided at the parent drop off area. Flagpoles will be embed-mounted and made of aluminum. The flagpoles will have internal halyards.

CIVIL DESIGN NARRATIVE (Prepared by CRW Engineering)

Site Grading:

The finished floor elevation of the existing Valdez Junior High School (VJHS) is 104.33 feet, and the finished floor of the Valdez High School (VHS) is 96.56 feet. It is desired that the new Valdez Middle School (VMS) have approximately the same finished floor elevation as the VHS. Based on the 35% design effort to date, it is feasible for the VMS to be set at a finished floor elevation of 97.7 feet; any lower elevation makes it impracticable to achieve adequate site drainage. The transition in elevation between the VMS and VHS will occur in the area of the CTE space. The athletic field will remain at its existing elevation.

The new VMS finished floor elevation will require a significant amount of site excavation and grading. The north parking lot will sit approximately 4-feet below existing grade, requiring a short section of 8% grade to access the snow storage area next to the mountain.

Water Utility:

The existing VJHS is served by the City of Valdez municipal water system. The current water service connects to a buried 8-inch cast iron water main that runs north from Robe River Drive and passes between the VJHS and the VHS. This water main also serves the VHS, connecting to the mechanical room on the north side of the building near the Shop. A second 10-inch cast iron water main is installed parallel to the 8-inch water main and is a transmission main from City of Valdez Well House No. 1 on Hanagita Street to the water storage tank on a hill near Mineral Creek Canyon. These water mains are currently buried below grade beneath the breezeway that connects the VJHS and VHS. The CTE space for the new VMS is programmed to be constructed above these water lines, necessitating the need to relocate them.

From its connection point to the existing water main in Robe River Drive, the new VMS building water service will be constructed to the west around the VMS, then turn eastward to connect into the mechanical room on the north side of the building. The water service piping will then continue eastward and connect into the existing VHS water service, thereby serving both facilities.

The well transmission line will be relocated to the south of the athletic field, and connect to the existing 10-inch or 12-inch water main where it turns north near City of Valdez Well House No. 3 and continues on to the water storage tank. This main was constructed in 1975 and is ductile iron pipe. There are no known issues with this main, and Larry Weaver, Valdez Public Works Director, is comfortable using it to serve both Well House No. 1 and Well House No. 3. The existing transmission main that transitions across the VMS site (including the athletic field) will be abandoned in place.

The new water mains will be constructed with HDPE piping to meet City of Valdez design standards. The water mains will be installed with 8 feet of cover over top of pipe. Water main gate valves will be installed where the new main connects to existing in Robe River Drive. Gate valves will also be installed on the individual water services to each building. New single pumper fire hydrants will be located to the

north and southeast of the VMS. Construction of the new water facilities will be in accordance with the City of Valdez Standard Construction Specifications for Water Systems.

A separate 2-inch connection will be made to the VMS water service to serve the irrigation system for the athletic field.

Sewer Utility:

The existing VJHS connects to the City of Valdez municipal sewer system in Robe River Drive near the intersection with Hazelet Avenue. The new VMS will connect to this same sewer, and be served by gravity. The alignment of the service will run south from the building across the parking lot to connect in Robe River Drive. The sewer service will be constructed with 8-inch ductile iron piping. A new control manhole will be installed where the service connects to the existing sewer main, and a cleanout structure will be installed every 100 feet along the service. Construction of the new sewer service will be in accordance with the City of Valdez Standard Construction Specifications for Sanitary Sewers.

Storm Drainage:

Runoff at the site will be generated by rainfall, snowmelt, and runoff of the mountain side north of the VMS. Existing site drainage for the VJHS site is surface flow, generally from the northwest to the southeast. There are no storm drain facilities immediately adjacent to the VJHS. Runoff on the south side of VJHS drains to curb and gutter in the Robe River Drive roadway. Runoff on the north side drains eastward towards an existing catch basin located west of the VHS pool. This catch basin connects to a storm drain line that runs eastward along Service Road north of VHS, then turns to the south where it connects to the storm drain system in Robe River Drive. A storm drain inlet box is located along the south edge of VHS, mid-building; this inlet box connects to a 15-inch storm drain line that runs eastward and connects to the line in Robe River Drive. Runoff from the mountainside is partially collected by a ditch that runs west to east at the foot of the mountain, and drains offsite to the east.

The site drainage for the new VMS will be a combination of surface flow and below grade storm drain facilities. The below-grade storm drain system will include catch basin inlets, manholes, and piping, and will serve the south parking lot and extend to the west side of the VMS. It will connect to the existing storm drain manhole in Robe River Drive at the southeast corner of VHS, which is the lowest storm drainage structure in the project area. It is not anticipated that storm water flows to the existing facilities will increase significantly, and it is further assumed that the existing storm drain system has adequate capacity for this increase. The new storm drain facilities will also connect to the subdrain system at the athletic field. The subdrain at the athletic field will be installed to replace the existing drywells that reportedly have not functioned well in the past.

The construction of the new storm drain facilities will be in accordance with the City of Valdez Standard Construction Specifications for Storm Drain Systems.

Parking Areas & Access Lanes:

Automobile, bus, and pedestrian access to the VMS will be from Robe River Drive. Access driveways will connect to the existing roadway. Secondary access will be from the Service Road north of VHS; the Service Road is located within the Avalanche Hazard Zone and access is restricted during winter months.

Signs and striping will be installed to direct and control the flow of traffic onto and off of the VMS site, as well as the traffic flow on the site.

The parking areas for the new VMS will be surfaced with asphalt concrete pavement. Curb and gutter and sidewalks will be constructed with concrete. Parking islands and medians will be striped rather than constructed of concrete in order to accommodate snow removal operations. Curbs will be either Type 1 Standard 6-inch Curb & Gutter or Type 2 Rolled Curb & Gutter. Sidewalks will be vary in size from 5 to 10 feet wide.

Construction of the new parking areas and access lanes will be in accordance with the City of Valdez Standard Construction Specifications.

Demolition:

The existing VJHS structure will be demolished to accommodate construction of the new VMS. The entire structure, including foundations, retaining structures, and connecting utilities will be removed. In addition, the existing Wood Shop and Bus Barn will be removed from the site.

Existing water and sewer services will be capped and abandoned in place where they connect to the existing structures. In addition, they will be abandoned where they connect to the existing water and sewer mains.

All existing paved surfaces at the VJHS will be demolished, including asphalt access and parking areas, sidewalks, and curb and gutter. Asphalt pavement removal and replacement may be required for Robe River Drive and Hazelet Avenue for utility work and grade transitions to the improved school site. Site lighting and signing will be demolished.

ARCHITECTURAL DESIGN NARRATIVE (Prepared by Bettisworth North)

Building Envelope:

Exterior Walls: Six-inch and 8 inch light gauge metal stud wall framing with R-21 high density and R-29 fiberglass batt insulation, respectively. The lower wall will be faced with 2 inches of rigid insulation and a 4 inch thick cast concrete panel. Above the concrete panel, 2-inch metal panels on 1 inch rigid insulation at 8 inch studs and 3 inches of rigid insulation at 6 inch studs will be installed as typical siding. A reinforced vapor retarder, gypsum wall board, and applied paint finish with rubber base will be installed on the interior face of the stud. Minimum R-value of 30 will be achieved for wall assembly.

Exterior Wall: 2-hour fire rated wall assembly and smoke partition with 8" concrete masonry units, 6" light gauge metal stud wall framing with R-21 high density fiberglass batt insulation, reinforced vapor retarder, gypsum wall board, and applied paint finish immediately adjacent to existing high school in CTE Shop. Wall assembly is capable of resisting the passage of smoke from floor to underside of roof decking or sheathing.

Windows: High efficiency, thermally broken fiberglass frames with operable sashes at lab/classrooms, library, Fitness, and offices at exterior walls. Fixed sashes will be provided in other locations. Minimum U-factor rating of 0.32.

Glazed Curtain Wall: Low-E glass in high efficiency aluminum curtain wall system at the south entrance lobby.

Doors: Thermally broken aluminum at building entrances. Insulated hollow metal at service entrances.

Roof: Ethylene propylene diene monomer (EPDM) membrane, 60 mils, with rigid insulation having an average R-value of 40, sloped with structure or tapered insulation to roof drains.

Canopy: Galvanized, or powder-coated, steel frame to protect entry locations, and internally drained. Sprinkler system with dry heads.

Canopy Walkway Screens: Galvanized steel frame and supports connected to the canopy columns, and with colored, laminated glass panels.

Building Interior:

Interior Walls: Typical light gauge cold rolled metal stud frame construction with gypsum wall board and finish. Toilet, shower, and locker rooms will receive ceramic mosaic wall tile. High traffic areas in common areas will receive a ceramic mosaic wall tile wainscot, with acoustic wood panels above the tile on the stage wall. Sound walls will be constructed between classrooms and labs, conference rooms, at corridors, toilet rooms and mechanical areas to achieve improved sound transmission ratings.

Interior Wall: 1-Hour fire rated wall assembly at boiler room composed of typical light gauge cold rolled metal stud frame construction with 5/8" Type X gypsum wall board and paint finish on both sides.

Interior Wall: Smoke partition wall assembly at incidental use areas such as laundry and storage rooms greater than 100 square feet, is typical light gauge cold rolled metal stud frame construction with 5/8" gypsum wall board and paint finish on both sides. Assembly constructed to be capable of resisting the passage of smoke and includes doors which are self- or automatic closing upon detection of smoke, do not have air transfer openings and are not undercut in excess of the clearance permitted in accordance with NFPA 80.

Interior Glazed Walls: Where shared light from exterior windows is desirable, interior borrowed lites will be installed to bring sunlight into interior spaces.

Doors: Labs/Classrooms, library, teacher lounge, business center, and offices will receive solid hardwood veneer doors in hollow metal frames. Hollow metal doors and frames will be provided in service areas.

Floors: The commons, cafeteria, stage, and main halls will have linoleum. Toilets, showers and locker rooms will have ceramic tile. Classrooms, library, conference rooms, offices, and administrative areas will have carpet. The kitchen will have quarry tile. The gym will have wood; gym fitness will have resilient rubber. Vestibules will have walk-off carpet or grid system. Special Ed, labs with sinks, kiln, small group, laundry, janitor closets, and maintenance/repair will have VCT. Storage rooms will have vinyl composition tile (VTC) or sealed concrete. Mat room, mat storage, CTE, shipping/receiving, mechanical and electrical rooms, and stairs will have sealed concrete.

Ceilings: The typical ceiling is acoustical ceiling panels within a 2' x 4' suspended grid. The cafeteria and stage space, the library and in selected areas of grades 6, 7 and 8 common areas will have an acoustical panel with wood finish. Mat room and storage, kiln, kitchen, toilets, locker rooms, showers, vestibules, and some storage rooms have gypsum wall board ceilings.

Special Construction: Electric operable, acoustical partitions will divide selected classrooms.

STRUCTURAL DESIGN NARRATIVE (Prepared by BBFM Engineers)

Snow Loads	300 psf ground snow load. 208 psf warm flat roof snow load (Per ASCE 7-05) Snow Drift Loads will be determined per ASCE 7-05
Mechanical Floor Floors	125 psf
Wind Loads	120 mph 3-second gust Exposure C, Occupancy Category III, Main Force Resisting Pressure = 39 psf
Seismic Loads	Special Concentric Braced Frame Ss = 1.85, S1 = 0.69, Cs = 0.256

Estimated Design Soil Bearing Capacity of 3,500 psf

Structural roof framing is proposed to be steel joists and steel wide flange girders with a minimum of 1½" deep steel decking. Long span open web joists are proposed to span the width of the gym. The gym roof truss design will include capacity to support backstops and climbing ropes. Snow drift loads will be accommodated on the lower roofs surrounding the gym.

The mechanical mezzanine is proposed to be concrete fill over composite steel decking and steel wide flange beams and girders.

The roof and floor framing are proposed to be supported on tube steel columns and typical concrete spread footings with concrete stem wall and strip footings around the perimeter. The depth of the perimeter footings are proposed to be placed approximately 4 feet below grade. The interior column footings will be placed about 1 foot below finished slab. The main floor is proposed to be a 4" concrete slab on grade.

Lateral loads are proposed to be resisted by special concentric steel bracing using tube sections. Bracing should be anticipated on each of the four walls of the gym. Additional bracing will be required in the classroom area.

Where the new building abuts the existing high school, the footing depth will be adjusted to match the existing footings to avoid applying additional loads to the existing footings. In addition, the height of the new roof adjacent to the high school will be reviewed to ensure additional snow load is not applied to the existing roof or alternately, the existing roof will be reinforced.

MECHANICAL DESIGN NARRATIVE (Prepared by RSA Engineering)

Design Parameters:

The latest adopted version of the following codes and standards as amended by the City of Valdez are currently applicable for this project:

International Mechanical Code
International Fuel Gas Code
Uniform Plumbing Code
International Building Code
International Fire Code
NFPA 13
SMACNA – Sheet metal design standards
National Electrical Code
Americans with Disabilities Act (ADA)
ASHRAE/IES Standard 90.1

The design parameters listed in this document may be considered a working document as well. As the design progresses the parameters in this document may be revised as a result of changing technology, payback analysis and/or feedback from School District Personnel.

Fire Protection:

A standard wet-pipe sprinkler system, complying with NFPA 13, will be provided throughout the facility. Based on the overall area of the facility being more than 52,000 sq. ft., two sprinkler risers will be required. The sprinkler system riser assemblies will be located in the boiler room. The 4-inch diameter fire department connection line will be routed from the sprinkler riser to near the building's main entry. Sprinkler piping will be specified to be CPVC in appropriate areas or black steel piping. All piping will meet the requirements of NFPA 13. The sprinkler system will be performance-specified by the Engineer and designed/installed by the contractor.

Plumbing:

The water service for the school will be supplied from the city utility. It is anticipated that an 8-inch diameter water service will supply the building. The service will be routed into the boiler room to supply the sprinkler system and the domestic water system separately. The domestic water system will be separated from the sprinkler system by a double check back flow prevention device in accordance with requirements of the UPC.

Domestic water piping will be specified as CPVC piping. Copper piping will not be allowed for domestic water piping. Ductile iron will be utilized at the water service entrance for connection to the sprinkler system. Sanitary piping will be cast iron no-hub or copper, drain waste and vent (DWV).

Hot water generators consisting of a tank and heating coil will be used to provide domestic hot water to the school. Hot water generators are an economical solution since they utilize boiler water to heat domestic water and do not require fuel oil piping, combustion air or a flue through the roof. We

anticipate locating the hot water generators in the boiler room or fan room. Hot water recirculation systems will be required to provide hot water to remote plumbing fixtures. Water will be stored in the tanks at 140 degrees and will be routed through a tempering valve prior to distribution to the rest of the building. The distribution temperature will be adjustable but we recommend a 115-degree temperature.

New plumbing fixtures will be installed throughout the facility in accordance with the architectural drawings. Fixtures will be specified to include water and energy saving devices as appropriate and will incorporate vandal resistant features to prevent tampering. New domestic hot, hot water recirculation and cold-water piping will be routed throughout the school. Water closets will utilize automatic flush controls. Lavatories will utilize automatic faucets. Sensor faucets and flush valves will be permanently powered; battery operated sensors will not be utilized. All shop and maintenance sinks will include a sediment interceptor.

Hose bibs will be installed around the exterior of the building at approximately 150' intervals. Hot and cold hose bibs will be installed in common area bathrooms.

Rain leaders will drain to the city storm water system. Overflow drains will be routed to overflow scupper to provide secondary drainage in accordance with the UPC. Rain leader piping will be cast iron no-hub.

Fuel Systems:

Fuel for the boiler and generator systems will be stored in a 12,000 gallon underground double wall fiberglass fuel oil storage tank. The underground tank will include a tank monitoring leak detection system. Piping from the tank to the boiler room and generator module will be double wall piping, sloped to drain back to the underground tank. The generator module will include a packaged sub-base day tank with integral pump package. A packaged double wall 50 gallon day tank with duplex pumps and integral controls will be installed in the boiler room. Single fuel oil lines will be routed from the boiler day tank to the boilers with Tigerloop de-aerators installed at each burner. Above grade fuel piping will be schedule 40 threaded steel piping or brazed copper piping.

The existing fuel tank serving the High school generator building, boiler room and pool boiler room will be displaced during this project. Due to site constraints, the above grade fuel tank for the High School will be replaced with a 16,000 gallon underground double wall fiberglass fuel oil storage tank. The underground tank will include a tank monitoring leak detection system. The tank will have two compartments, one compartment for high school fuel storage and one compartment for pool boiler room fuel storage. The high school compartment will have 10,000 gallon capacity; the pool boiler room compartment will have 6,000 gallon capacity. Piping from the tank will be routed to the boiler rooms and generator module will be double wall piping, sloped to drain back to the underground tank. The piping will re-connect at the existing locations within the high school and pool building.

Heating:

The heating plant will be located in the boiler room contained in the utility building located to the south of the school. The new heating plant design will consist of three oil-fired cast iron boilers. Each boiler will be sized at 50% of the total heating load. The boilers will be commercial grade oil-fired high

efficiency three pass cast iron boilers. The boilers will have oil fired only burners, but could be retrofit with dual fuel or natural gas burners in the future.

The hydronic heating system will be piped in a primary/secondary arrangement. Primary circulators with built-in variable frequency drives and controllers will circulate the primary loop to supply terminal heating equipment and air handling unit heating coils. The boilers will consist of the secondary loop and will inject heat into the primary loop. Each boiler will include a circulation pump to inject the heat.

The heating system will utilize water with inhibitors for corrosion protection and stabilization a chemical feed and test station will be incorporated into the design. A 50% propylene glycol solution will be used in the air-handling unit heating coils and snowmelt system. A heat exchanger will be located in the fan room to transfer heat from the primary water system to a glycol system to protect air handling unit heating coils from freezing. A heat exchanger will be located in the boiler room for the snowmelt system. Each heat exchanger location will include secondary pumps, an air separator, expansion tank and a glycol fill station.

Heating water piping design will be direct return with a preset flow control valve and 2-way temperature control valve at each terminal heat transfer unit. The direct return system allows the maximum possible savings for the variable speed pumps. Piping installation costs are reduced when compared with a reverse return system since there is less piping. Pump electrical energy costs are reduced since the VFD pumps modulate to match the required heating water flow rate as sensed by a DDC pressure sensor. The intent is to operate the pumps at the minimum capacity needed to provide the required flow at any time.

Building heat will be provided using hydronic radiant heating panels and duct coils in the VAV boxes. Overhead hydronic radiant panels will be installed along the exterior wall. Duct heating coils will be installed in the VAV boxes to provide tempering of supply air and supplemental heating. The radiant panels will provide heat to the building during unoccupied hours when the air-handling units are off. Entry areas will be heated using cabinet unit heaters. Storage rooms and unoccupied spaces will be heated with hydronic unit heaters, fin tube or radiant panels. Heating system piping will be Type “L” insulated copper piping installed above the ceiling.

The front walkway will include a snowmelt system. A heat exchanger located in the boiler room will utilize a 3-way control valve to temper the water to the snowmelt system. Snowmelt piping will be routed in pre-insulated PEX piping below grade from the boiler room to in-grade manifolds in the front of the building. Snowmelt tubing will be routed in the slab from the manifolds. Two pumps will operate lead/lag to circulate the snowmelt water to in-grade manifolds for the snowmelt system.

Ventilation:

The new ventilation system will consist of three variable air volume air handling units for the school and one make-up air handing unit serving the shop. The air distribution system will be designed to conform to ASHRAE Standard 62.1-2007 to ensure good indoor air quality. CO2 sensors and outside air intake volumetric measurement sensors will be employed to ensure adequate ventilation rates and limit ventilation during periods of low occupancy.

The ventilation equipment will be specified as packaged air handling units. Each air-handling unit will include an internally isolated plenum fan section, heating coil section and filter mixing section. Air filters will be specified to MERV 13 rating. Larger AHU's will include a fan array system using multiple smaller fan assemblies. Intake air, exhaust air and relief air will be located to prevent exhaust from idling vehicles from entering the openings. Extruded aluminum, drainable louvers will be specified for air intake and exhaust service.

The gymnasium fan will be a single zone system that will operate between minimum and maximum flow to provide adequate cooling and ventilation for the gymnasium. The remainder of the school will include be served by variable air systems complete with hydronic tempering (booster) coils at each classroom to allow individual room temperature control. The supply air temperature will be reset based upon the air temperature required to cool the hottest room served by the respective unit. The VAV system will be sized to cool the building using 60 degree F supply air in the ductwork distribution system. The VAV system supply air temperature will be reset based upon the air temperature required to cool the hottest room served by the respective unit. The air handling unit fan will modulate up or down as needed to meet the required demand load.

The variable air volume systems will include relief fans to ensure air turnover during economizer operation. The relief fans will include a variable frequency drive to allow capacity modulation to maintain a +0.05" (adjustable) pressure differential between the indoor and outdoor. The fan rooms will serve as a return air plenum, drawing air from the space above the T-bar ceiling and returning the air to the air-handling units or exhaust air through roof mounted relief air fans.

The main restrooms in the facility will be served by inline style exhaust fans. These exhaust fans will be scheduled to operate during the owner's occupied/unoccupied schedule. The new toilet rooms located through the school will be served by inline mounted exhaust fans with the exhaust ductwork terminating on the sidewall of the building. These exhaust fans will be interlocked with lights to operate when restroom is occupied.

It is our understanding that no food preparation other than basic food warming will take place in the food service area. A Class II hood will be designed to remove heat and vapor only. An inline exhaust fan will serve the hood. The fan will be interlocked with the kitchen hood and the VAV box that serves the space. Domestic style kitchen hoods will be installed in locations noted on the plans. The domestic style range hood exhaust ductwork will terminate on the sidewall of the building.

Communication closets that are not air conditioned will be provided with a dedicated cooling exhaust air fan with transfer air duct to maintain space temperature. The dedicated exhaust fan will be capable of 24/7 operation allowing cooling of the electrical rooms when main building air handling units are shut off during unoccupied modes.

The art room kiln will be designed with a UL listed exhaust system specifically designed for venting electric pottery kilns. A new boiler room combustion air system will be installed. The system consists of a gravity combustion air inlet and boiler room ventilation fan. Exhaust ventilation will also be provided for trash rooms, janitor rooms, electrical rooms with transformers and other room as required to get rid of excess heat and odors.

The wood shop will be ventilated by a single air handling unit that provides 100% outside air ventilation. In-line exhaust fans will provide code required general exhaust for the wood shop and paint rooms. The air handling unit will provide make-up air for each space with variable air volume terminal units. A dust collection unit located outside will be ducted to the wood working equipment in the shop. The dust collector will be manually operated by a key switch located in the wood shop. Each piece of wood working equipment will have a blast gate and flexible duct connection.

The science room ventilation system will include a general exhaust fan to provide code required exhaust air ventilation. Make-up air will be provided by a variable air volume box connected to the main air handling unit. The fume hood will have a manually operated exhaust fan, ducted to an exhaust stack located on the roof. The variable air volume box will operate to provide supplemental make-up air if the fume hood is on.

Air Conditioning Systems:

The main server room will include a ducted air conditioning unit that will reject excess heat to the gymnasium ceiling. No other mechanical refrigeration systems are planned for this facility. Economizer cooling utilizing outside air will be utilized to cool the remaining areas of the building.

Humidifying and Dehumidification Systems:

No humidifying or dehumidification systems are planned for this facility.

Controls:

A microprocessor based direct digital control (DDC) system will be specified for the facility. The control system will be performance specified by the engineer to meet the sequence of operations listed in the contract documents. The control system will be specified to be an open protocol BACnet DDC control systems

Sequences of operation will be configured to provide energy efficient operation of the mechanical systems, and will be described in the contract documents. The system will be Internet accessible which will allow authorized School District personnel remote access the DDC system to monitor performance and troubleshoot the system.

The control system will include a full graphics package to allow point and click access for control of mechanical system. Sequences of operation and building alarms will be configured to match the existing standardized control algorithms preferred by the District.

The boiler system will be specified to include a package boiler controller. The boiler controller will communicate with the building DDC system to provide alarm and boiler system reporting to the School District monitoring system.

Energy Analysis:

A schematic level energy analysis has been performed on the proposed school utilizing AKWarm© Commercial Energy Use Software. The analysis includes building shell, interior and exterior lighting systems, HVAC systems and plug loads. The purpose of the analysis is to provide an estimated baseline energy use of the new school in comparison to existing facilities for the school district.

Utilizing historic energy use information provided by the Valdez School District, we have calculated the annual Energy Usage Index (EUI) for the existing school facilities for comparison to the new middle school design energy analysis. The EUI is a measure of a building's annual energy utilization per square foot of building. The calculation is completed by converting all utility usage consumed by the building for one year to British Thermal Units (Btu) and dividing the number by the building square footage. The EUI is a good measure of a building's energy use as it compares actual energy utilized and is not effected by local utility rates. The following table lists the approximate annual energy use for each building:

Valdez Area - EUI Summary

Facility	Square footage	% Electricity	Annual EUI (btu/sq. ft)	Annual Cost $/sq/ft.
Administration Office	7,056	24%	108,118	$5.32
Bus Barn	8,100	41%	91,309	$5.73
Hermon Hutcheons	96,000	35%	73,430	$4.27
George Gilson*	23,200	32%	119,546	$4.11
Valdez High School*	91,000	25%	155,579	$7.83
New Valdez Middle School**	**53,547**	**23%**	**80,571**	**$3.92**

*Historical electrical use data combined for both schools, estimated use per building by square feet.
**Estimated values based on energy model.

This table shows that the new Middle Schools estimated energy use will be lower per square foot than the existing middle school. The reason the new middle school is estimated to have lower energy use per square foot is that the new school will have a more efficient building envelope, mechanical and lighting systems than the existing building. The energy use of the new middle school also includes energy use associated with a significant increase in fresh air ventilation to comply with current building codes. The additional ventilation increases energy use as cold outside air used for ventilation has to be heated. Based on our current the analysis, the energy use for the increased ventilation is offset by the more efficient building envelope, mechanical and electrical systems. It also should be noted that the energy use for the existing school does not include the CTE area; the new school energy use includes the CTE area.

The other item to note in the analysis is the EUI per square foot does not directly correlate to cost per square foot. The cost per square foot is based on electrical rates of $0.3661/kWh and fuel cost of $4.28 per gallon for Valdez. At these rates, the cost per BTU is higher for electricity than fuel oil. The new middle school cost per square foot is lower than other facilities as the electrical use is a lower percentage of the overall energy use. The low electrical use percentage is mostly due to the planned use of LED lighting.

While the energy use per square foot for the new school will be lower, the overall energy use and cost of energy for the new building will be more than the existing due to the increase in square footage. The following is a summary of total energy use between the new middle and existing junior high schools:

Valdez Middle School - Energy Use Comparison

Facility	Square footage	Annual EUI (btu/sq. ft)	Total Annual Energy Use (MMBtu)	Annual Cost $/sq/ft.	Annual Estimated Cost
***George Gilson**	23,200	119,546	2,773	$ 4.11	$95,352
New Valdez Middle School	53,547	80,571	4,314	$ 3.92	$209,904

*Does not include energy use for existing wood shop. Electric history was not available for wood shop.

This energy analysis will be revised as the school design progresses.

ELECTRICAL SERVICE, DISTRIBUTION, POWER AND LIGHTING (Prepared by RSA Engineering)

Design Parameters:

The latest adopted version of the following codes and standards are currently applicable for this project:

International Building Code
International Fire Code
International Energy Conservation Code
National Electrical Code
NFPA 72 National Fire Alarm Code
Americans with Disabilities Act (ADA)
National Electrical Safety Code
TIA/EIA Telecommunications Building Wiring Systems
IES Lighting Handbook, Tenth Edition
ASHRAE/IES Standard 90.1

The design parameters listed in this narrative may be considered a working document. As the design progresses, the parameters in this document may be revised as a result of changing technology, payback analysis and/or feedback from the City of Valdez and School District personnel.

Site Utilities:

Existing Conditions:
The High School and Junior High School currently share the same electrical service from the utility. The buried medium voltage service conductors enter the site at the southwest corner of the middle school near the corner of Robe River Drive and Hazelet Avenue. The service runs north between the middle school and the track, then along the north end of the property over to a pad mounted sectionalizing switch located between the middle school and high school. From there, an underground medium voltage line terminates in a pad mounted transformer located in the covered generator shelter near the high school.

The High School has two service disconnects. The first is an 800A, 480V, 3P disconnect that feeds a Main Distribution Panel (MDP) located in the 2nd floor electrical room and a 400A, 480V, 3P disconnect that feeds a Standby Distribution Panel (SDP) via an Automatic Transfer Switch in the generator module.

Normal power to the Junior High School is fed from a 150A/3P breaker in the High School MDP via an exterior, pad mounted, dry type, 112.5kVA, 480:208V, 3-phase step down transformer and 400A/3P fused disconnect into a Main Distribution Panel in the Junior High School electrical room.

In addition to the normal power service from the High School, the Middle School is fed with standby power from the High School Generator with a 50A/3P feed from panel 'SDP'. The feeders were routed via utilidor between the High School and Junior High School.

New Design:

The entire middle school, including all utility connections will be demolished in their entirety. The middle school electrical system will no longer be fed from the high school and will have its own electrical service and generator.

Due to the site grading and new building footprint, the existing utility feeders from the High School transformer all the way back to the corner of Robe River Drive and Hazelet Avenue will need to be demolished and re-routed. The utility lines will be relocated along the access road that runs north/south, and then along the access road that runs east/west on the north side of the building. The existing padmounted sectionalizing switch will be relocated to the northeast side of the access road. This switch will re-feed the existing high school transformer and will also feed a new padmounted transformer for the Middle School, which will be installed at the northeast corner of the middle school. All medium voltage work will be performed by Copper Valley Electrical Association (CVEA).

Power Distribution:

Preliminary load calculations indicate an NEC demand load of 1,300A (which includes 25% spare capacity for future expansion). To accommodate this, a 1,600A, 208V, 3-phase, 4-wire electrical service will be provided. Underground secondary service laterals will be routed from the utility transformer to a new service switchboard in the generator module. The switchboard will contain a metering section and a main 1400A, 208V, 3P disconnect. From the switchboard, (4ea) 3.5”C, 4#500kcmil, 1#4/0 copper conductors will be routed via a 1,600A,208V,3P Automatic Transfer Switch, (which is also located in the generator module), up to a Main Switchboard (MSWB) in the 2nd floor main electrical room of the new middle school.

The MSWB will feed (9 ea) 200A branch panelboards. Three will be located in the main electrical room, three in the west electrical room on the first floor, one in the boiler room, one in the kitchen and another in the CTE room.

Standby Power:

A diesel-fired, 300kW, 208V, 3-phase engine generator set in an arctic walk-in module will be located near the utility transformer and will provide stand-by power for the entire facility via the ATS. A remote generator annunciator panel will be provided in the front office for monitoring of the generator. As noted above, the generator module will also house the ATS and service switchboard. A water mist fire suppression system will also be installed in the generator module. The electrical meter will be placed on the exterior of the module.

The electrical service, all panelboards and feeders will be sized with a minimum of 25% spare capacity to allow for future growth.

Loads on general use and lighting branch circuits will be kept to approximately 80% of their rated capacity to allow for future load growth. A minimum of 10 percent spare circuit breakers will be provided in all branch circuit panelboards. All distribution and panelboard busses will be copper. Power will be distributed from the various branch panelboards to appropriately located convenience outlets as well as power for computers and other special equipment. The panelboard(s) serving computer and

telecommunications equipment will be provided with internal transient voltage surge suppression (TVSS) units and 200% neutral.

Motors ¾ horsepower and over and large equipment loads will be operated at 208 Volt three-phase. In general, lighting will be operated at 120 Volts.

Utilization Devices:

General-purpose outlets will be provided for cleaning and general maintenance in corridor and common areas. Unless otherwise specified, duplex receptacle outlets will be placed at an average of 6 feet on center in all instructional areas or office and no less than two on 12-foot wall. In the classrooms, the general receptacle circuits will have no more than 4-duplex receptacles per circuit, in order to provide plenty of spare capacity for future equipment. Office areas will have at least one receptacle on each wall, plus additional dedicated circuits where large equipment such as copiers or printers are located. Duplex receptacle outlets are to be provided at approximately 20 ft interval in corridors and hallways. Outlet locations will be adjusted according to the configuration and usage of the room and the specific equipment use expected in a room. Additional receptacles will be provided in classrooms as needed for anticipated equipment and at computer locations. GFCI duplex receptacle outlets will be provided in restroom, kitchen and janitor areas. Cover plates will be satin finish stainless steel.

GFCI duplex receptacle outlet with while-in-use weatherproof cover will be provided on the exterior areas.

Power will be provided for all equipment supplied by others such as the kitchen, shop equipment, mechanical equipment, etc. Coordination will be performed with all disciplines to provide power as needed for all equipment.

Grounding System:

The facility grounding system will consist of earth electrode ground rods and grounding electrode conductor. The earth electrode ground rod will be ¾ inch by 10 feet, copper or copper-clad steel. The top of the vertically driven ground rod will be a minimum of 12 inches below grade. The grounding electrode conductor will be bonded to the earth electrode ground rod with an exothermic welded joint or clamp. The electrical service system neutral will be grounded at service entrance equipment to building metal water piping, structural steel, and telecommunications system.

Service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway system, cable tray, equipment-grounding conductor in all feeders and branch circuits and receptacle grounding connectors will be bonded.

Equipment grounding conductor will always be a GREEN insulated copper conductor unless otherwise indicated. There will be no interconnection between equipment grounding conductors and neutral conductors except at the main service grounding point. All connections to equipment to be grounded will be made with a grounding connector specifically intended for that purpose.

Bare wire, wrapped around mounting bolts and screws, is not acceptable as a grounding connection. All ground lugs will be of a non-corrosive material suitable for use as a grounding connection, and must be

compatible with the type of metal being grounded. All mating surfaces and connections will be between cleaned bare metal to bare metal surfaces.

Lighting / Emergency Lighting System:

All new lighting will meet current Illuminating Engineering Society (IES) lighting standards per the IES Lighting Handbook. Although not required by this project, the lighting design will attempt to comply with the Lighting Unit Power Densities in accordance with ASHRAE/IES Standard 90.1 and LEED.

High performance recessed, 2x4, LED fixtures, with fully dimmable 0-10V drivers will be provided in the classrooms. In addition to being energy efficient, the LED fixtures have built-in dimming capability at no additional cost. This can allow the teacher to set the light level to whatever task is being performed. Multi-zone lighting controls will be provided so that the lighting near the teacher board can be independently controlled from the remainder of the room.

Lighting in Generator Building, Mechanical/Electrical Room, Custodian, and Storage Rooms and similar spaces will consist of either surface or pendant mounted fluorescent strip fixtures with wire guards. The lighting will be controlled by a standard light switch at room entrance (mech/elec areas) or wall or ceiling mounted occupancy sensors (storage/janitor rooms).

Lighting in Office, Workroom, Counsel, Principal, and Reception/Waiting area will consist of 2x4 recessed, LED fixtures, with fully dimmable 0-10V drivers. Fixtures will provide low glare and greater visual comfort. The dimmable driver will allow the user full comfort control of their lighting.

Lighting in Library/Media Center will consist of pendant-mounted direct/indirect LED fixtures. All LED fixtures will have 0-10V fully dimmable drivers.

Lighting in Gymnasium will consist of high bay, fluorescent fixtures with wire guards. Gymnasium lighting will be controlled by wall switches with inboard/outboard lighting control in each fixture for multiple lighting levels on each half of the court with occupancy sensors to provide on-off control.

Lighting in Locker/Shower area will consist of surface mounted lensed LED fixtures. Locker/Shower lighting will be controlled by occupancy sensor and keyed override switch at room entrance. Showers will be outfitted with LED type recessed downlights.

Lighting in Kitchen area will consist of recess mounted lensed LED fixtures. Kitchen lighting will be controlled by standard light switches at room entrance.

Lighting in Corridor and Lobby/Common area will consist of a combination of decorative pendant LED's, LED downlights and recessed 2x2 LED fixtures. The presentation wall will be lit via ceiling mounted LED adjustable track lighting. Corridor and Lobby/Common area lighting will be controlled by occupancy sensors with keyed override switches at entrances. Multiple zones will be provided for the corridor lighting.

Lighting in Restrooms will consist of wall mounted LED fixtures located above each mirror and recess mounted LED lighting fixtures. Restroom lighting will be controlled by occupancy sensor.

Special use areas will receive lighting design appropriate for the activities associated with the space. Task lighting can be provided under cabinets or over specific furnishing as desired.

Exit signs will consist of vandal resistant energy efficient, LED type, self-contained emergency power pack with green letters on white background. Exit signs will be mounted above doors and along egress pathways. *Basis of Design: Lithonia #LQC series*

Emergency egress lighting will be provided in all exit corridors, utility module, Mechanical/Electrical Room, Kitchen and other locations as required by NFPA 101 and the IBC. Emergency lighting will consist of selected LED fixtures with emergency battery inverters or emergency drivers, which will provide an average of 1 foot-candle along egress paths in the event of a power outage. Emergency egress lighting will be extended on the building exterior to a gathering area. *Basis of Design: Bodine #BSL series and Iota #IIS-125*

Exterior Lighting:

New site lighting will consist of pole-mounted and building mounted LED area lights for the parking areas with 30'-0" square, straight steel poles. High wattage LED lights will be building mounted to illuminate the parking, driveway and playground areas. Lower wattage building-mounted LED fixtures will be used at all entrances to provide normal area lighting and also emergency egress lighting. These LED fixtures are very energy-efficient and have a long lamp life (over 50,000 hours), which will help reduce both energy consumption and maintenance costs over the life of the building.

All exterior lighting will be controlled by photocell and time clock connected to the building controls, so lights will be on only when required, reducing energy costs for the facility. In addition, the area lights will be bi-level with occupancy sensors to reduce lighting levels further after normal hours when the parking and driveway areas are unoccupied.

Energy Conservation:

Interior lighting control will be accomplished in accordance with ASHRAE 90.1 requirements, using occupancy sensors, photocells, ambient sensors near re-light and windows and manual switching. Occupancy sensors with manual override will be provided to control lighting in all Restrooms. Corridor and public areas will be controlled by keyed switches and will be connected to the building controls to reduce energy costs. Classrooms and Office areas will be provided with ambient sensors and dimming-ballast to allow for lower lighting levels when desired and for energy savings. *Basis of Design: Wattstopper #DLM series*

Interactive Whiteboard System:

Classroom, labs and the library will be outfitted with an Owner provided interactive whiteboard system. The system will consist of the interactive touch-screen whiteboards and above whiteboard mounted projector system. Wall and conduit connection boxes will be roughed-in to allow for tie-in of the instructor computer to the interactive whiteboard system. The system will be outfitted with Owner provided speakers to allow for audio distribution (4 speaker locations per classroom). Conduit and boxes will be provided for cable routing and termination of Owner provided equipment.

Fire Alarm System:

A new Class B, supervised, addressable panel will be installed in the front office area and a new remote LCD text annunciator will be installed in the entry vestibule. The current IBC/IFC requirements for a manual and automatic fire alarm system in a Type E occupancy is limited to duct detectors in ducts over 2000 CFM, pull stations at all exits, and smoke detection at the location of the fire alarm control panel. We will coordinate with the School District to determine how much coverage above the minimum code requirements will be provided, but likely areas may be storage rooms, janitor closets, mechanical rooms, kiln areas, etc. New horn/strobes will be installed throughout the school to provide audible alarms at 15dB above the ambient noise level. Strobes will be provided in all classrooms, toilet rooms, and other public spaces as required by ADA.

The fire alarm panel will have an integral digital alarm communicator/transmitter (DACT) to transmit an alarm or trouble signal to the central monitoring station.

Addressable Pull Station will be single action and will be provided at each exit door. Polycarbonate protective covers will be provided on all pull stations in Gymnasium and Stage.

Fire sprinkler pressure, flow, and tamper switches will be monitored using addressable modules.

Telecommunications:

The existing telephone utility service follows the same path as the power service. It will also need to be relocated to accommodate the new building footprint and grade changes. Proposed location for new utility pedestal is adjacent the CVEA padmount sectionalizing switch in the northeast corner of the school. See discussion above. The existing service to the high school would need to be re-fed and a new service brought to the middle school. (2 ea) 4" PVC conduits will be installed from the telephone pedestal to the Main Comm room on the 2nd floor of the middle school.

A complete telecommunication system will be provided for the facility. The enhanced cable plant will consist of unshielded twisted pair (UTP) copper cabling for video, data and voice transmissions. Backbone cabling will consist of plenum-rated Category 6 UTP cable to connect the Ethernet switches and plenum-rated multi-pair telephone cables for voice lines. All backbone cabling will be run from the main equipment room located in the Mechanical/Electrical Room in the new building to all telecom rooms (TRs) located throughout the building. The horizontal cabling will be plenum-rated Category 6 UTP cable that runs from each telecom outlet to the designated patch panel in the ER or TR.

All horizontal and backbone cabling will be distributed throughout the building via the cable tray and J-hook pathways located above accessible ceilings. Conduit will be used from the telecom outlet to the space above the accessible ceiling, as well as in all inaccessible areas. All horizontal and backbone cabling will be terminated on modular patch panels that are installed in 19" racks located in each Electrical Room (ER) or Telecommunications Room (TR). Sufficient space will be provided in each rack for the installation of new network switching equipment. The entire cabling infrastructure will be designed and engineered to be in compliance with NFPA 70, ANSI/TIA/EIA 568-B, 569, and all applicable local, state and federal codes, rules, regulations and ordinances. All telecommunication system cables and components will be clearly marked and labeled and will conform to ANSI/TIA/EIA-606 Standards. Telecommunications systems grounding and bonding will be provided in accordance with TIA/EIA-607.

Telecommunication outlets will be provided for the administrative area and offices, library-media, conference, shops, and all classrooms. The horizontal cabling system will allow any jack to be connected as voice, data, or video by cross-connecting to the associated patch panel in the telecom room. Connectivity for fax machines will be provided via dedicated analog phone lines that are cross-connected through the telecom cabling system. Dedicated phone lines will be provided for the fire alarm system, as well as the building automation system if required. All telecommunications jacks will be type RJ-45, Category 6, T568A/B, 8P8C, single white finish, telecommunications jack with 45 degree exit for wall outlets and flush exit for outlets in horizontal dual-channel surface raceway.

Evenly spaced throughout the school will be single jack telecommunication outlets for a school wireless infrastructure. Depending on discussion with the Owner's IT department, this system might be self-administrated and powered-over-Ethernet type or conventional which would require power next to the data outlet. The conventional system would need to be located below the accessible ceiling, while the power-over-Ethernet type can be located above an accessible ceiling with only the antenna being visible below.

1" minimum conduit with telecommunication cables should be routed to each telecommunication outlet location.

Clock/Intercom/Sound:

The intercom system will consist of speakers and call-in switches in all classrooms and other offices and instructional areas, and new paging speakers in the hallways and on the building exterior. In most locations, the speaker will be mounted together with a wireless clock system. The clocks will be battery operated and wireless. They will utilize the Ethernet network signals to keep time.

A new dedicated sound system with CD and MP3 players will be provided for use in the Gymnasium and Commons, with speakers located throughout these areas and microphone outlets located on the perimeter walls. Although this will be a stand-alone system, it will also be connected to the building intercom system for paging override. A microwave hearing impaired system will also be provided for the sound system.

MATV:

If requested, a MATV system could be provided but many School Districts are moving away from this type of coax-based system, in favor of more modern technology such as interactive white boards and IP-based distribution. An MATV system will not be provided for this project.

Security/Video:

The existing school does not have a security system but we recommend that it be considered for the new facility. We recommend a simple system that consists of motion sensors at entry vestibules, door contacts at all exterior doors, and glassbreak sensors in all rooms with windows.

We also recommend providing a new IP video (CCTV) system in the building. We estimate approximately 10-15 color, high-resolution, day/night fixed IP cameras, including one camera aimed at the main office entrance, one at the bus lane, one at the loading dock, two in the gym, two in the

commons, and the rest at locations yet to be determined. All cameras will be connected to the head-end via Cat 6 cable. The head-end will consist of a video storage appliance (a server) in the main telecom closet, along with video management system software on selected client computers in the school to provide review and playback capability.